

Proposed standard guideline for managing information systems (ISs) in libraries in Africa

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Received 13 April 2023
Revised 7 June 2023
Accepted 1 August 2023

Abstract

Purpose – Libraries in Africa are adopting technology at a fast pace. However, literature has provided enough evidence of the many challenges libraries on the continent are facing in the use of the adopted information technology of which information systems (ISs) are major components. Literature also does not provide evidence of IS standard, policy or guideline at both national and international levels as a benchmark for the use of these systems. Therefore, this paper aims to propose an IS standard guideline as a guide for libraries in Africa to develop IS policies, standards or guidelines to help in effective use of IS in libraries.

Design/methodology/approach – The researchers based their proposed standard guideline on the findings from their earlier research works and evidence from other existing literature as has been reviewed in this paper.

Findings – Findings from the literature revealed that libraries in Africa face a number of challenges in the use of IS which can be categorised into four main areas, namely, financial challenges, technological and infrastructural challenges, human resource challenges and organizational challenges.

Originality/value – This paper proposed an IS standard guideline to serve as a guide for libraries in Africa to develop IS policies, standards or guidelines to help in effective use of IS in libraries.

Keywords Libraries, Africa, Systems management, Information systems, Digital libraries, Library management

Paper type Viewpoint

Introduction

Libraries all over the world and even in Africa have invested in numerous information systems (ISs) from the limited financial resources available at their disposal. IS adoption is a major cost factor to most libraries. Despite this heavy investment, IS only becomes beneficial if it is used. This makes the use of IS an important component of every organization, even in libraries (Shaikh and Karjaluto, 2015). For all ISs to become usable, it is highly recommended for them to be managed properly. The availability of standards in organizations ensures compliance to the stated standards.

Funding source: The financial assistance of the National Institute for the Humanities and Social Sciences under grant number APS16/1070, in collaboration with the Council for the Development of Social Science Research in Africa towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at are those of the author and are not necessarily to be attributed to the NIHSS and CODESRIA.



Unfortunately, though libraries are major users of different ISs, standards on IS use are mostly absent in libraries (Ahenkorah-Marfo and Akussah, 2016; Makori, 2013; Mapulanga, 2013; Mutula, 2004). It has been noted that international federation of library associations and institutions (IFLA) has only a standard for online public access catalogues (OPACs) and not yet one for a general IS. The state of Texas in the USA has Library Automation Standards and Guidelines as far back as 1995 (Texas State Library, 1995) but concentrates only on the use of Library Management Systems (LMS). No standard from the American Library Association was found. In South Africa, an attempt has been made to develop a standard for purchasing of IS in libraries (Kirsch, 2014).

The research findings from two previously published articles (Ocloo and King, 2022a; Ocloo and King, 2022b) have shown very clearly that all the academic libraries studied in Ghana have implemented more than one IS to automate library activities. Despite the implementation of IS, most of the libraries are not being guided by any standard on using and managing them. Some libraries are not using their ISs and perform tasks manually or with general office management systems. Most of the information technology (IT) heads perform maintenance as and when they feel it is necessary or when the system breaks down. Lack of adequate skills on the part of library staff to fully use the IS coupled with inadequate management and system support was clearly indicated. Similar findings were recorded by older studies by Ibegbulam and Eze (2016), Makori (2013), Mapulanga (2013), Adeleke and Olorunsola (2010), Adeyoyin (2005), Asogwa (2014) as well as Mutula (2004).

The availability of an IS standard guideline for libraries will be in the best interest of the three major in-house stakeholders, namely, the head librarians, library staff and IT staff, and that the standard guideline will assist libraries to develop an IS policy to guide each staff in the performance of specific tasks.

Literature review

Libraries have been portrayed in the literature as one of the earliest institutions to adopt the application of technology specifically ISs to the organization of information and service delivery (Morris *et al.*, 2001; Tedd, 2006). Technology experts have tried to provide tailor made solutions through the development of software to help manage library resources and services. Initial efforts in this direction were meant to manage only print collections; these systems were called integrated library systems or LMS.

Advancement in technology and the changing nature in library collection format and service delivery made these earlier systems incapable of meeting current needs of libraries. System experts brought in solutions by developing other systems such as electronic resource management and digital asset management to aid in new library workflows to be used in collaboration with LMS to help libraries function.

At some point, these other systems were merged with LMS and this brought about second-generation library automation systems, next-generation library systems or the new library system. In this 21st century, these systems have again been upgraded to what is being termed library service platforms where cloud computing devices and services are IS application in libraries.

Social media and other collaborative tools have also been at the heart of library services. Social media is used for communication, marketing, collaboration and sharing of ideas in libraries. Other advanced collaborative tools such as library 3D, Internet of Things and natural language interaction are also being used by libraries. The list of IS use in the library also include geographic IS and content management systems (Madhusudhan and Singh, 2016; Tyagi and Senthil, 2015; Fu and Fitzgerald, 2013; Yang, 2013; Breeding, 2012; Giri, 2012; Cho, 2011).

The use of computer technology or systems in libraries have advanced in the current era of the Fourth Industrial Revolution which is data-driven and is anchored on the internet. This has revolutionized library work flow (Sibiya and Ngulube, 2023). As posited by Hussain (2020), availability of smart technology has enabled libraries to enhance their services and collect huge data which is enabled by artificial intelligence, mobile computing and machine learning. It was noted by Ocholla and Ocholla (2020) that most of the technology use in the Fourth Industrial Revolution is not new but have been carried over from the digital revolution. This enables libraries to adopt IS that help to provide undisrupted services.

The researchers are of the view that, the list of IS used in libraries can never be exhaustive. As early adopters of ICT/IS, libraries and for the matter academic libraries will continue to embrace new IS as long as they are being developed. This gives the chance to libraries never to be regarded as outmoded so long as they can offer the traditional services using the most current IS available, they will be regarded as relevant from the user's perspective provided the systems use are managed properly to always deliver timely services.

Literature on IS management revealed that despite the importance of managing and maintaining IS, most organizations struggle to keep up to the task leading to loss of huge capital investments in the IS (Pilemalm *et al.*, 2016; Anisimov and Reshetnikov, 2011). Different studies have also proved the benefits of managing IS indicating that well-functioning IS lead to use of them (Marnewick, 2017; Mouakket and Bettayeb, 2005; Boddy *et al.*, 2005; Bharati and Berg, 2003). A number of studies also gave recommendations as to how IS should be managed to ensure its effectiveness. Notable among these recommendations are: management of IS should not be seen as the responsibility of only IT staff but also the responsibility of managers, regular evaluation of ISs should be carried out and quality infrastructure should be put in place and maintain regularly (Campos, 2016; Fattahi and Afshar, 2006; Skretas, 2005).

Available literature has extensively documented the challenges encountered in IS adoption in libraries in Africa. Ani *et al.* (2005) explored the sources of funds available for ICT and factors that impede effective adoption of ICT in academic libraries in Nigeria. The study showed that the main causes inhibiting the use of ICT in Nigerian university libraries are lack of funds, frequent power outage, lack of trained personnel and the negative attitude of university management towards the adoption of IT/IS in libraries, lack of understanding of the impact of the IS by users and the staff behaviour towards change.

Adeleke and Olorunsola (2010) conducted a study on the use of online tools for cataloguing and classification in Nigerian university libraries and found that lack of skills on the part of library staff in using the tools is a major challenge. Their findings on ICT skills were also echoed by Adeyoyin (2005) as well as Ibegbulam and Eze (2016) by stating that the rate of ICT literacy among Nigerian library staff is very low. Libraries also encounter subscription challenges dealing with licencing agreement coupled with lack of experience of completing online forms, difficulty with the use of credit cards coupled with the risk of internet fraud.

Asogwa (2014) measured the IT infrastructural availability in academic libraries and skills and competencies of academic librarians in Nigeria. The study revealed that most of the libraries had unstable power supply, inadequate computers, poor internet, poor ICT policy and regulatory framework and low bandwidth. Library staff had inadequate knowledge of Web development and therefore under-used digitized institutional repositories. Similar problems were stated by Anie and Achugbue (2009) and Baro and Asaba (2010).

At the broader institutional level, a study by [Eze et al. \(2013\)](#) to determine the inhibiting factors to ICT adoption by Nigerian universities also buttressed the finding of similar studies in Nigerian academic libraries by stating that electricity, internet connectivity, technology support, obsolete technology pose challenges to adoption of ICT in Nigerian Universities. Lack of institutional support and embezzlement of funds were also cited as challenges by [Eze et al. \(2013\)](#). In Kenya, [Makori \(2013\)](#) identified the lack of an ICT policy as a major drawback to the adoption of an IS in libraries. [Husain and Nazim \(2015\)](#) and [Ayoku and Okafor \(2015\)](#) indicate the specific areas of ICT training need in academic libraries as computer programming, website, portal or subject gateways development, hardware maintenance, metadata or e-resource management and content management. The issue of lack of ICT skills among library staff is not limited to specific countries in Africa, as a study by [Adeyoyin \(2006\)](#) of 370 professional librarians in West African countries revealed that only 179 of them had adequate ICT skills.

[Mapulanga \(2013\)](#) studied the digital library initiative of the University of Malawi Libraries. Findings showed that three out of the five college libraries adopted Greenstone and the other two adopted DSpace. Thus, in the same university library system, three different software programs were being used for the digital library project. The University of Malawi did not have a policy to regulate the activities of the digital library. Other challenges identified by the study included low level of ICT among library staff, viral attacks, funding and inadequate bandwidth.

In a study by [Kari and Baro \(2014\)](#) on the use of LMS in Nigerian university libraries, it was reported that there was a high software turnover rate in most Nigerian university libraries for reasons such as lack of proper feasibility studies, huge maintenance cost and lack of technical support. [Thompson and Pwadura \(2014\)](#) also identified frequent power outages/surges, poor maintenance culture, lack of appropriate system security and inadequate finance as major problems affecting the use of LMS at the University of Development Studies in Ghana. In another study in Ghana by [Ahenkorah-Marfo and Akussah \(2016\)](#), it was revealed that the adoption of social media in top universities in Ghana was not streamlined, as the libraries did not have policies to guide them in the use of social media and they lacked the required skills to make the use of such tools effective.

[Mutula \(2004\)](#) investigated IT diffusion in sub-Saharan Africa and noted that there is limited utilization of the IS available in libraries across Africa. For instance, internet use is restricted to accessing specific sites and services. A number of university libraries change their IS over short periods with reasons of poor performance, lack of technical support from suppliers, inadequate information on the functions of the IS prior to their purchase. There is also lack of ICT policy in most of the universities and their libraries. High cost of ISs coupled with maintenance cost make the systems unsustainable. In addition to this, IS project managers in libraries in Africa also provide wrong cost to IS projects which affects the budget for projects. These challenges make the adoption of ISs a huge burden for small academic libraries, especially in Africa ([Cho, 2011](#)).

From the literature, a number of challenges encountered by academic libraries in their quest to use IS in the delivery of services was discovered. The researchers noticed four major broad areas of challenges based on the trends of reported challenges in the literature reviewed for this study. These trends are as follows:

- financial challenges;
- technological and infrastructural challenges;
- human resource challenges; and
- organizational challenges.

It should however be noted that these challenges are not mutually exclusive of one another but move hand in hand. For instance, financial challenges will lead to technological and infrastructural challenges and will also not enable a library to maintain highly qualified IT/library staff. Organizational challenges will lead to financial challenges due to lack of commitment from leadership and will also cause staff not to be committed to IS projects. In the midst of these existing challenges, it is very dangerous for libraries to continue to operate IS without policies.

Methodology

Based on the findings from a larger research study (Ocloo and King, 2022a, 2022b) and evidence as shown in the literature above, an IS standard guideline for libraries in Africa to serve as a benchmark for ensuring implemented IS in libraries is used for the purpose for which it was acquired and managed properly to ensure future use and benefits to the library is proposed.

Proposed information system standard guideline for academic libraries in Africa

It is therefore recommended for every library to have a standard/policy for IS with the following basic elements.

Purpose and function

The purpose of acquiring an IS should be defined and outlined for each IS acquired and every staff member made aware of this.

The functionalities and requirements of each IS adopted should be specifically stated. This will serve as a yardstick for measuring the performance of the IS.

Legal and ethical issues

The use of the IS should be situated within the code of conduct of the information professional and all data collected and use on patrons should be done within the personal data protection act of the country.

Financial provision

To ensure adequate financial provision of IS projects, every library should assign a specific percentage of the library's budget towards an IS project. This initiative will help the institutions to make funds available for IS projects. The percentage assigned should be reviewed regularly and take into consideration local currency to foreign exchange rates, as most of the IS tools are imported.

Libraries should endeavour to seek other sources of funding through aid and internally generated funds to finance library IS projects.

Level of integration

Libraries, especially academic library ISs, should be integrated with the main institution system. Academic libraries systems should be integrated with learning management system adopted by the university.

Hosting of information system and security

Libraries should determine and indicate the means of hosting ISs; whether cloud-based or locally hosted. If locally hosted, it should be indicated if it will be hosted by the main

institution or IT unit or in the library. Whichever option the library decides on, adequate facilities should be provided.

The library IS team should endeavour to provide current and robust internal and external security of the IS. This will ensure that physical IS infrastructure and data in the IS are secured. Appropriate levels of authorization should also be granted to each staff member to safe guard the integrity of data and the system at large.

Information provision on information system

Adequate information should be provided to each staff member on the use of the IS and how it can affect the staff's job and the total outcome of the library. This will help staff appreciate the benefits they are likely to gain from the use of the IS for their specific job roles and the total benefit of the use of the IS to the library.

Each job position should be associated with a specific IS function and staff should be adequately informed. This will enable staff to know exactly what functions to use the IS for in their line of duty.

Information should be given to all staff members anytime there is an upgrade or change in the IS associated with specific job performance to enable library staff be abreast with current changes to the IS to aid ease of use.

Design issues

The user interface of all ISs should be designed to be user friendly and format of output from ISs should be well structured to ensure clarity and use.

Maintenance and upgrades

Estimated schedules for maintenance work should be specifically outlined and measures put in place to guarantee the stated maintenance is carried out.

The life span of every major equipment including servers, workstations and scanners among others should be clearly stated. This will help replace equipment before they become obsolete.

Evaluation of information systems

Estimated schedules for evaluation of jobs performed with ISs should be provided. This type of evaluation can easily be done through report generation on each function for every user account created in the IS. This will guarantee that staff will use the IS to perform their expected roles.

The performance of the IS itself should be evaluated by using the purpose and functions outlined as yardstick. It is highly recommended that this should be done every three months to determine if the IS is performing as expected.

Training

Training should be made a core component of an IS. Training should be provided on general computer use skills and library IS use on three different levels:

- (1) Pre-implementation training: This should be provided by the vendor/developer/consultant in charge of the IS before implementation and during the implementation process of the IS. This type of training should aim at giving the general knowledge and skills of using the IS to all staff members and also equip each staff with adequate skills to use the IS to perform specific job-related functions. It is advisable for this type of training to equip core IT/IS staff with adequate knowledge and skills on installation and all functions of ISs, so that they will serve as in-house trainers to other staff members in the future.

- (2) Refresher training: Due to the fact that IS functionalities keep advancing, it is prudent for libraries to organize refresher training to all staff members using training methods that best meet the needs of the library. Libraries can organize in-house training using IT/IS staff who have been trained by vendors as proposed in Point (1) above. No matter the method of training chosen by a library, it is highly recommended for each staff member to be retrained at least once in every three months to ensure library staff do not become obsolete in the use of the IS and other IT tools.
- (3) It is highly recommended that personal training sessions should be organized for individual staff who may have peculiar challenges with IS use. This is very necessary in the African context, as the majority of library staff as evident in the literature do not have advanced IT skills leading to the possibility of them to not use the training initiatives optimally or struggle to apply skills and activities after the training. This type of training will help them feel more comfortable to express their weakness and be assisted to overcome them.

Due to the peculiar nature of the African situation where IT professionals with expert knowledge on library ISs are generally not available, IS installation and training should be made a compulsory part of the purchasing agreement so that vendors will ensure the full enrolment of the IS before handing it over to the library. In the case of open-source software acquisition, consultation should be done with an expert team with knowledge of library IS installation. This will help prevent the situation where IS projects are left in the hands of an individual IT staff member.

Level of authentication

The system use should ensure a two level authentication. Thus, data entered should be approved by a senior level staff to ensure the integrity of the data in the IS.

Level of automation with ILMS and functions

Total automation of all library functions and services is highly recommended but due to the challenging demands of the African environment, it is also recommended that at least all basic/core library functions namely acquisition, cataloguing, electronic resource management, circulation and OPAC should be the minimum level of automation in every library with the ILMS adopted having the function of report generation.

Acquisition. The acquisition module should enable pre-order searching, ordering process, receiving, fund processing and payment.

Cataloguing. The cataloguing module should support an international machine readable cataloguing record standard. This will ensure that the bibliographic record of libraries can be shared and the database can be migrated to another ILMS.

Serial control. The serial control module should provide functions to support the processes of ordering, receiving, paying of current issues, cataloguing, indexing and creating of union list of serial publications. It must also contain a search functionality allowing for different access points.

Electronic resource management. The electronic resource management module should help libraries develop a subscription management facility supported by a knowledge base, an A–Z searchable list, discovery services, provide information on electronic resources held by the library and their subscription status, vendor access to provide support through trial, acquisition and licencing stages. The system should aid the library to generate usage statistics for each electronic resource.

Circulation. The circulation model should be used for the following minimum functions:

- creation of user accounts;
- charge items;
- discharge items;
- calculate fines;
- payment of fines;
- assignment and modification of due dates of items; and
- sending of automatic e-mails or SMS to patrons on overdue and other relevant messages

The circulation module of an ILMS acquired by a library should also enable offline circulation in case of system failure or internet downtime. This is very essential in the African environment where internet downtime and power cuts are common challenges. The offline and online circulation modules should be programmed to synchronize automatically to avoid inaccuracies in the two data sets.

OPAC. The OPAC should be online and work well with major browsers to facilitate federated searching. All library materials including e-resources and IR records should be searchable via different search options or access points via the OPAC.

Report generation. The report module should provide statistical information on each record in the LMS as well as staff activity which can be used to determine productivity of staff and the performance of the IS.

Personalization feature. The ILMS adopted should provide a feature for end users to create personal accounts to keep track of library resource they use or are interested in. This feature should enable a user to keep record of all transaction performed with the ILMS. A user should be able to self-charge and discharge resources and also renew via the web portal of the library with this feature.

Use of digital asset management tools

- Every academic library should use the most current version of the Digital Asset Management chosen. It is recommended that countries choose one type of software as is the situation now in Ghana (Ocloo and King, 2022b), for instance, to enable them to continue sharing their experiences.
- A minimum of two staff members should be trained and assigned to IR projects even in small libraries.
- Self-archiving should be encouraged among the academic community as it will reduce the work load of the library staff.
- Bibliographic details and metadata of materials uploaded should be linked with the OPAC and discovery services to enhance the use of the materials.
- The content of the materials should be uploaded in searchable format.
- African academic libraries should endeavour to merge their IR to form a national academic repository for the continent.

Social media accounts

Libraries should officially declare the social media handles they have created for official functions. To ensure active use of library social media handles, a staff member should be

assigned to be in charge thereof and post information regularly. All other staff members and patrons should be encouraged to patronize the links.

Library websites

All library websites should be available free of charge and link to the library site not more than three clicks from the home page of institutions. It is highly recommended for the library link to be on the home page. The link should be appropriately titled “library”.

Adequate navigational and search features should be provided.

The date of posting and authorizing institution (library) should be clearly stated on each page of the site.

Information available on the site should be updated at least every three months.

All libraries should provide the following functions and information on their website:

- website index;
- site map;
- library website feedback form or e-mail link;
- web site search;
- frequently asked questions;
- mobile version (mobile catalogue);
- Webmaster link;
- library “news alerts”;
- RSS feed;
- Web 2.0;
- user guidelines;
- virtual help desk or ask a librarian;
- new-arrival section;
- LibGuides;
- Myaccount;
- discovery services;
- library events calendar;
- image gallery of library providing pictures of every section of the library and other library activities;
- online tutorials;
- information and virtual request for off-campus access;
- information on different library sections;
- library services and technical services;
- link to e-resources including a research portal;
- information on library resources/collection; and
- library general information.

The library website should be provided in the two major international languages, namely, English and French to enable international access to the information on the websites.

Staffing for information system projects

The library committee should setup a sub-committee to oversee IS issues in the library. This committee should be headed by the librarian and the head of IT unit should be made a member.

For academic institution, they should assign one IT/IS staff to the library who will be directly in charge of all library IS issues. Large universities can set up IT units within the library to provide IT support to the library team.

Conclusion

IS have become a major component of libraries. Their functionality determines the success of library service provision. These systems come at huge cost to libraries and must therefore be properly managed for adequate benefits to be derived from them. The users of libraries also expect prompt and efficient service delivery which can only be made possible through appropriate current technology.

To achieve these and overcome the challenges outlined in existing literature in Africa, the study developed an IS standard guideline for libraries in Africa. This will serve as a guideline to help libraries make maximum use of ISs in libraries in Africa.

It is recommended that every library should adopt an IS policy based on the standard that has been proposed in this paper to ensure that ISs are properly managed and used for the specific purposes for which they have been acquired.

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