Use of KOHA Integrated Library System by higher education institutions in Malawi

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Introduction

KOHA is a web-based open source integrated library system (ILS) that is widely used by different kinds of libraries world-wide (Ponelis and Adoma, 2018; Todd, 2018; Makori and Osebe, 2016). The software was first developed by Chris Cormack whilst working for Katipo Communications in 1999, and first deployed in the Horowhenua Library Trust in New Zealand (Macan, Fernández and Stojanovski, 2013). Ever since, KOHA has developed into a vibrant enterprise-based open source software, maintained by a team of software providers and library information technology personnel around the globe (Shafi-Ullah and Qutab, 2012). Other open source software (OSS) that include NewGenLib, ABCD, Evergreen, Emilda and OpenBiblio are also known to exist (Ponelis and Adoma, 2018; Makori and Osebe, 2016). Koha, just like other open source softwares, is preferred by many libraries over proprietary softwares because it is cheaper to install and operate, is customisable and adaptable to local needs, and also embraces more functionalities (Kampa, 2018; Khor et al., 2015).

Koha has progressively grown in popularity from the time it was first installed and used in a New Zealand special library towards the end of the last century. Initially, Koha was viewed as an ideal software for small to medium-sized libraries, and those in a financially precarious position (Makori and Osebe, 2016; Keast, 2011). Although finances are often and rightly cited as one of the main drivers for the adoption and use of Koha in libraries (Todd, 2018; Singh, 2017), libraries of all kinds and sizes are currently migrating to Koha (Dennison and Lewis, 2011; Carlock 2008). Keast (2011) reports that only five Australian health-related special libraries were using Koha in 2008 but the number had increased to over 45 by 2010. Similar cases chronicling rapid diffusion of Koha in libraries have been reported in countries like the USA, Uganda, Kenya, South Africa, Nigeria and even Malawi (Ponelis and Adoma, 2018; House, 2016; Makori and Osebe, 2016; Ogbenege and Adetimirin, 2013; Stilwell and Ruth Hoskins, 2012; Bonamici, Huterand Smith, 2010). A study conducted by Ponelis and Adoma (2018) in Uganda revealed that 61.5% of the libraries that participated in the study were using Koha, with majority (71%) of the private universities reporting to have adopted Koha as opposed to only 50% for public universities. The scenario in Kenya was slightly different to that obtaining in neighbouring Uganda as it was noted

that both public and private universities were adopting the use of Koha at a similar pace (Makori and Osebe, 2016). Use of Koha is also gaining momentum in the USA. Singh (2017) reported that some libraries had been fully migrated to open source ILSs, including Koha as individual institutions, but were in the process of bringing as many as 120 regional member libraries into a consortium in waves. Correspondingly, Breeding (2013) indicated that of the 794 library technology contracts reported in the public and academic arena in the USA, 113 (14%) were for support services for OSSILS products that included Evergreen and Koha. The increased demand for support services for Koha implied that there was a significant number of libraries that were using Koha ILS.

Enis (2016) further stated that twenty library and information science programs that included the University of Illinois at Urbana-Champaign, the University of Washington, Rutgers University, Indiana University, Purdue University Indianapolis (IUPUI), and the University of Pittsburgh had started using free hosted instances of the Koha open-source ILS as an instructional resource to prepare graduates to freely work in a free and open source environment. This is further evidence of the popularity of Koha as an ILS. In spite of all these success stories, Enis (2016) notes that other small libraries migrated to proprietary software during the same period. Biblionix, for instance, reported to have migrated several libraries running Koha to its hosted Apollo ILS.

Installation and use of Koha in Malawi started towards the end of the last decade. The initiative was championed by the Technology Research Group of the Malawi Library Consortium (Bonamici, Huter and Smith, 2010; Mapulanga, 2009). Some of the early adopting libraries of Koha in Malawi were the Central Library Services and College of Medicine, both under the University of Malawi, Domasi College of Education, Mzuzu University and ten nursing colleges. The number of libraries currently using Koha is not known. However, based on the interest shown by librarians in several professional discussion forums and mailing lists, there are indications that the number is increasing. Besides the advocacy role that the Malawi Library Consortium (MALICO) has played in the proliferation of Koha in higher education institutions in Malawi (Bonamici, Huter and Smith, 2010), anecdotal evidence shows that some of the early adopting institutions of Koha such as Mzuzu University, the National Library Service and individuals working in these institutions have facilitated further adoption by providing technical expertise

during installation and usage, including training of staff. Mzuzu University which hosts the country's only library and information science (LIS) school has played an even greater role in the adoption and usage of Koha by exposing LIS students to the software during practical sessions. Some of the students have gone on to implement Koha in the institutions they have been employed. Mzuzu University Library has also organised a number of workshops where participants drawn from institutions that are using Koha and those not using Koha have been trained. These interventions might have facilitated further adoption and usage of Koha among higher education institutions in the country.

Koha, just like other open source software, is preferred by many libraries over proprietary software because it is cheaper to install and operate, is customisable and adaptable to local needs, and also embraces more functionalities (Kampa, 2018; Khor et al., 2015). Although Koha is free of user fees, Singh (2017) cautions that the system is not entirely free as libraries using it, especially those in the global south where paid for technical support is not readily available, might have to invest more in time and effort to ensure that the system works. Similarly, libraries operating in environments where paid for technical support is available might have to foot the bills to ensure that the system performs satisfactorily. Even in situations where technical support and other ancillary costs have to be met, Koha has still proven to be a cheaper alternative to proprietary software (Todd, 2018; Rapp, 2011) although in other instances these costs have proven to be much higher than initially anticipated (Singh, 2013). Modern releases of Koha incorporate a number of functionalities that include the administration, circulation, serials control, cataloguing and even barcode generation that compare favourably with proprietary software. Much as this is the case, other equally important modules such as interlibrary loans are missing (Pruett and Choi, 2013). Whilst other ILSs such as ABCD support a wider range of metadata standards that include MARC21, Dublin Core, and METS, Koha only supports MARC21 and UNIMARC (Macan, Fernández and Stojanovski, 2013). The only respite is that the metadata standards that Koha supports are widely used, implying that the impact of this limitation is not widely felt. In spite of these shortfalls, Koha is still rated highly. Indeed, the software is not just viewed as a fall-back option to those reeling in financial difficulties but as a leading innovation capable of delivering higher quality services, and also achieving higher satisfaction levels of the users (Ponelis and Adoma, 2018).

Statement of the problem

Library automation is critical as it does not only enhance efficiency of operations but also enables a library to meet the ever-evolving demands of its users (Ponelis and Adoma, 2018; Omeluzor and Oyovwe-Tinuoye, 2016). Library automation further facilitates remote access to user services including electronic journals and databases around the clock (Malik and Mahmood, 2013) which is ideal in the Malawian higher education sector where majority of students reside off-campus (Gunya, 2015). Koha is fast emerging as an ILS of choice for libraries seeking to automate their services in various parts of the world (Ponelis and Adoma, 2018; Todd, 2018; Makori and Osebe, 2016) including Malawi (Bonamici, Huter and Smith, 2010).

Library automation in Malawi commenced in 1992 at the University of Malawi with funding from the Rockefeller Foundation (Mapulanga, 2014). Proprietary software was initially used to undertake such projects. However, Koha has since 2006 been installed in a number of libraries of higher education institutions (Bonamici, Huter and Smith, 2010; Mapulanga, 2009). Nevertheless, the actual number of libraries that are using Koha ILS, and the factors that have influenced its adoption including the challenges such institutions are facing are not yet known. This study was therefore undertaken to shed more light on these issues.

Libraries in Malawian higher education institutions face funding challenges that affect the development of collections and infrastructure (Chaputula, 2014). The University of Malawi libraries, for instance, were in 2012 owing over US$47,000 subscription fees to an ILS provider whilst access to e-journals was also blocked due to late payment of subscription fees (Mapulanga, 2013). Koha has proven to be relatively cheaper to install and manage (Todd, 2018; Singh, 2017) which makes it a viable alternative for libraries operating in Malawi. The study is therefore significant as it would pave the way for practical and policy interventions that could facilitate rapid adoption of Koha which could in turn lead to better library service delivery.

Research objectives

This study seeks to address the following objectives:

1. Establish levels of adoption and use of KOHA ILS among libraries of higher education institutions in Malawi.

2. Determine factors that have influenced the selection and use of KOHA ILS by libraries of higher education institutions.
3. Examine challenges experienced by libraries using KOHA ILS.

Literature review

There is a significant body of literature on the topic in a form of case studies (House, 2016; Makori and Osebe, 2016; Tajoli et al., 2011), surveys (Ponelis and Adoma, 2018; Omeluzor and Oyovwe-Tinuoye, 2016; Keast, 2011), and reports (Enis, 2016; Breeding, 2013) covering the themes under discussion. Whilst the majority of these sources have focused on Koha ILS, some discuss open source software (OSS) that include Koha. The pervasiveness of literature on the topic point to the growing interest of researchers and LIS practitioners on Koha and other OSSs.

Studies conducted in various parts of the world have shown that libraries in various categories are increasingly adopting KOHA. Ponelis and Adoma (2018) used a survey research design to investigate the diffusion of open source integrated library systems in academic libraries in Uganda. Findings indicated that Koha is the most adopted OSS ILS, and is also being considered by all libraries without any ILS or a proprietary ILS. Some of the notable factors influencing the selection of Koha, according to this study, were flexibility (85%), costs of adoption and use (77%), ease of use (60%), timely support (40%), and affordable maintenance (40%). Findings further revealed that information and communication technology (ICT) infrastructure, organisational procurement policies and national procurement legislation, human resource capacity and limited finances are some of the barriers to diffusion of OSS. Amollo (2013) carried out a survey to gauge the feasibility of using open source ILS for all categories of libraries in Kenya. The survey attracted only a 15% response rate, a development which might have a bearing on the reliability of the findings. Stillmore, findings revealed that there was a 50-50 distribution of libraries that had OSS and proprietary software. This was a departure from what was obtained in a study that was conducted by Ponelis and Adoma (2018) in neighbouring Uganda where 63% of private universities were discovered to have adopted the use of Koha as opposed to only 20% of public universities. Additionally, private universities in Uganda adopted Koha much earlier than public universities. Other findings based on the Kenyan study indicated that of the more than ten OSS systems installed, Koha had significantly more users (28.5%) than the rest. This serves as further evidence

to the popularity of Koha and its wider adoption and usage. Amollo (2013) further discovered that cost and functionalities were the main factors affecting selection and usage of Koha.

In yet another survey dwelling on the usage of Koha in Australian special libraries, Keast (2011) report an upward increase in the number of Koha users to above 45, majority of whom (85.7%) were migrating from another system. Besides economic considerations, which also came out in the previous studies reviewed, respondents in this study reported growing dissatisfaction with previous proprietary systems, particularly the lack of flexibility in achieving customisations as the reason for migrating to Koha. Other compelling reasons respondents gave for migrating to Koha were its wide range of functionalities and flexibility which some of its competitors, both OSS and proprietary, could not provide. Ogbenege and Adetimirin (2013) investigated the selection and use of KOHA software in two private Nigerian universities of Redeemer and Bowen. Findings revealed that KOHA was implemented in Bowen University in 2007 whilst Redeemer University migrated to KOHA much later in 2011 from LIBRARY PORTAL (proprietary software) because it had some limitations. The study further discovered that faculty, systems librarians and heads of library units from two private universities were all satisfied with Koha. However, respondents to this study indicated that orientation on the use of Koha was not adequately done. House (2016) did a case study on the implementation of Koha at the German language immersion school of Deutsche SchuleCharlotte (DSC – German School of Charlotte), in Charlotte, North Carolina in the USA. Findings indicated that Koha was selected for installation and use at this school because it has the most online support, is easiest to install and manage, has an intuitive and web-based interface, and could be easily explained to volunteers.

In his article titled "Wireless Power, Geolocation-based Ebook Lending Top Tech Trends" in the Library Journal, Enis (2017) gives a varied picture of the adoption trends of Koha ILS across the USA library sector. He estimates that while 12% of the U.S. public libraries were using open source systems including Koha, only 4% academic libraries were using an open source ILS then. These statistics imply that much as there is a growing enthusiasm for Koha and other OSS amongst US libraries, actual adoption is still low and it may take some time before Koha makes a big presence, particularly in the academic sector. Enis (2016) also notes that while other libraries were joining the Koha fold, other small libraries migrated to proprietary software during the same

period. Biblionix, for instance, reported to have migrated several libraries running Koha to its hosted Apollo ILS. Reasons for migration were not reported but previous studies have shown that smaller libraries tend to struggle with technical support, a development that compels some of them to turn to proprietary software. Keast (2011), however, found that proprietary software providers were also falling short with regard to technical support. This prompted Breeding (2013) to advise that the effectiveness of the software and the quality of support are both paramount for sustained use of any software, open source or proprietary. Fortunately, the technical support gap seems to be closing fast. A mixed methods study conducted by Singh (2014) to compare the technical support-related experiences with the expectations of librarians using open source Integrated Library Systems (ILS) in the USA indicated that both paid and unpaid options for technical support for OSS ILS including Koha existed. This assisted OSS to achieve satisfaction levels of over 75% amongst librarians that were using the systems.

Theoretical framework

The study used the Diffusion of Innovation (DOI) theory as an anchoring model. DOI theory describes the process through which new ideas, practices, or technologies are spread into a social system (Rogers, 2003). Rogers (2003, p. 12) defines innovation as 'an idea, practice, or object that is perceived as new by an individual or other unit of adoption'. Diffusion, on the other hand, is defined as "the process in which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003, p. 5).

DOI posits that there are four key elements that explain the diffusion of innovations within a particular context. These elements are: (1) innovation (2) communication channels (3) time (4) social system. Although Everett Rogers is credited for popularising the DOI theory through his book which was first published in 1962, the ideas around which Rogers built his theory were first championed by the French sociologist, Gabriel Tarde, as early as 1903, and later expanded through the works of Ryan and Gross in 1943 and Coleman et al. in 1957 (Cua, 2012; Hornor, 1998). Tarde's research introduced two key concepts of DOI: the innovator and adopter, and also concluded that human interactions (communication) are fundamental aspects of the diffusion process. On the contrary, Ryan and Gross (1943 cited in Cua, 2012) introduced the idea of the early majority, late majority, and laggards whilst Coleman et al., focusing on opinion leaders,

examined diffusion as a social process originating with the media in1957 (Cua, 2012). DOI has become such a popular theory such that the book that introduced the theory is now in its 5th edition.

The DOI theory was chosen to be used in this study because it is well established and widely used in information technology (IT) diffusion-related research (Prescott and Conger, 1995). The popularity of the model is reflected in that it has been used and revised several times (Cheng et al., 2004). Moreover, it is the basis of most of the models that attempt to explain the factors affecting whether an innovation will be shared and adopted by other individuals and organisations (Aizstrauta et al., 2015).

Furthermore, DOI offers a broader and more comprehensive explanation of technology adoption. According to Barrette (2015), whilst the technology adoption model (TAM) offers empirical evidence of the factors influencing a user's intention to adopt a new technology, DOI considers how individuals reach the decision point, how they implement the technology after adopting it, and whether and how they decide to continue using it. Such an approach gives technology advocates a clearer understanding of the complexities and scope of the technology adoption process.

The DOI theory also has its weaknesses. One key aspect is that it assumes that a new idea, product, or service is favourable and would be adopted at different times by the different categories of the adopters of the innovation (innovators, early adopters, early majority, late majority and laggards). Cua (2012) contends that this is not always the case in real life arguing that although DOI postulates that 16% of the population has a favourable attitude toward innovation: the innovators (2.5%), and the early adopters or opinion leaders (13.5%); and the remaining 84% are negatively biased: 34% (misleadingly called the "early majorities") can still be convinced to reduce their innovation resistance while the remaining 50% (so-called late majorities and laggards) remain non-adopters to the end. Rogers (2003) further notes that there is nothing "early" about the 34% majority, and the late majorities and laggards may actually never become adopters. This implies that DOI fails to fully explain the rate at which different categories of people adopt innovations as implied in the model. Bose and Luo (2011) have argued further that although the DOI theory is a

powerful descriptive tool, it is less strong in its explanatory power, and less useful still in predicting outcomes and providing guidance as to how to accelerate the rate of adoption.

In spite of these weaknesses, the DOI was still chosen as an anchoring model for this study because its strengths outweigh its weaknesses. The theory was also viewed as ideal for the study as it offers better explanation of technology adoption in libraries than other competing models. More importantly, the DOI theory has been used in related studies. Ponelis and Adoma (2018), for instance, used the DOI theory in the study of diffusion of open source integrated library systems that include Koha, in academic libraries in Uganda. Similarly, Mutula (2012) used the DOI theory in conjunction with TAM in the study of library automation at the University of Botswana.

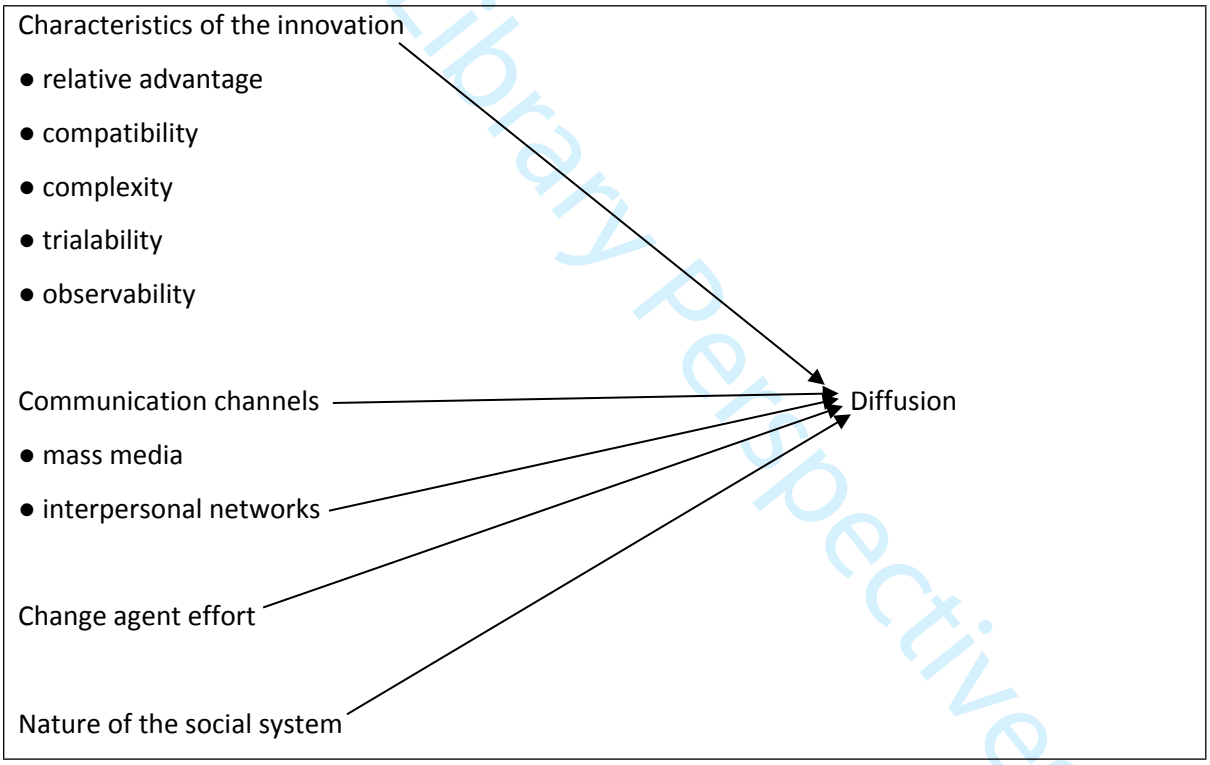

Figure 1: Diffusion Elements in the Rogers Framework (Source: Chaudhuri, 1994)

Methodology

Design and methods

The study adopted a social survey research design which implied use of quantitative methods. According to Creswell (2014), survey research provides a quantitative or numeric description of

trends, attitudes or opinions of a population by studying a sample of that population with the aim of generalising from sample to a population. The survey research design was viewed as appropriate for this kind of study because it best served the researcher's intent of figuring out usage trends of Koha ILS among libraries of higher education institutions at national level. To accomplish this, a survey questionnaire was sent to 43 library mangers of higher education institutions registered by the National Council for Higher Education (NCHE) in Malawi (NCHE, 2019) through email. Sampling of the participating institutions was done using Israel (2013) sampling table that necessitated carrying out total enumeration as the study population was small. Israel (2013) sampling table recommends that all respondents should be sampled if the population does not exceed 200.

The NCHE Act No. 15 of 2011 recognises a 'higher education institution' as any institution that provides higher education which is:

(a) established as a public higher education institution in Malawi;

(b) registered as a private higher education institution under this Act; or

(c) an affiliate of a higher education institution

The 43 higher education institutions that formed part of this study included public and private universities, colleges and institutes and tuition providers, and they represented the entire population of registered higher education institutions in Malawi (NCHE, 2019).

Instruments

Questionnaires are a favoured data collection instrument for researchers carrying out social surveys. This study was no exception. The study adapted questions from a questionnaire used by Keast (2011) who conducted a survey on the use of Koha in Australian special libraries and an interview guide used by Singh (2014) who conducted a comparative study on expectations and experiences of librarians using open source integrated library systems. The modified questionnaire was pilot-tested on a team of 5 library staff at Mzuzu University who commented on its suitability and effectiveness. Feedback received from this exercise was used to amend the questionnaire to enhance its effectiveness. Thereafter, the researchers sent the questionnaires to library managers of participating institutions through email. Respondents were given three weeks to respond. Two

reminders were made to institutions that took time to respond through email and phone calls. The data collection exercise was conducted in May and June, 2019.

Analysis

Of the 43 questionnaires that were sent out to participants, 38 were returned. After checking for completeness, all the 38 questionnaires were used. This represented an 88.37% response rate. Scholars differ on what constitutes an adequate response rate. Whilst Dillman (2000) has advocated for 50% as the minimal acceptable level, Fowler (1984) recommends 60%, and De Vaus (1986) insists 80% should be the acceptable response rate. However, the 88.37% response rate achieved in the current study is way above what each of the three scholars recommended which makes the researcher confident about the validity of the findings. The data collected was analysed using the Statistical Package for the Social Sciences (SPSS) to generate descriptive statistics.

Data analysis and interpretation

Participating institutions

The majority of the institutions that participated in this study 14 (36.8%) were private university libraries. College libraries (public and private tuition providers) 9 (24%), health science college libraries (mainly Christian Hospital Association of Malawi [CHAM] affiliated nursing colleges) 7 (18%), and public university libraries 6 (16%) were also well represented in the study. On the contrary, other public academic institutional libraries 2 (5%) had the least representation. These details are presented in Figure 2.

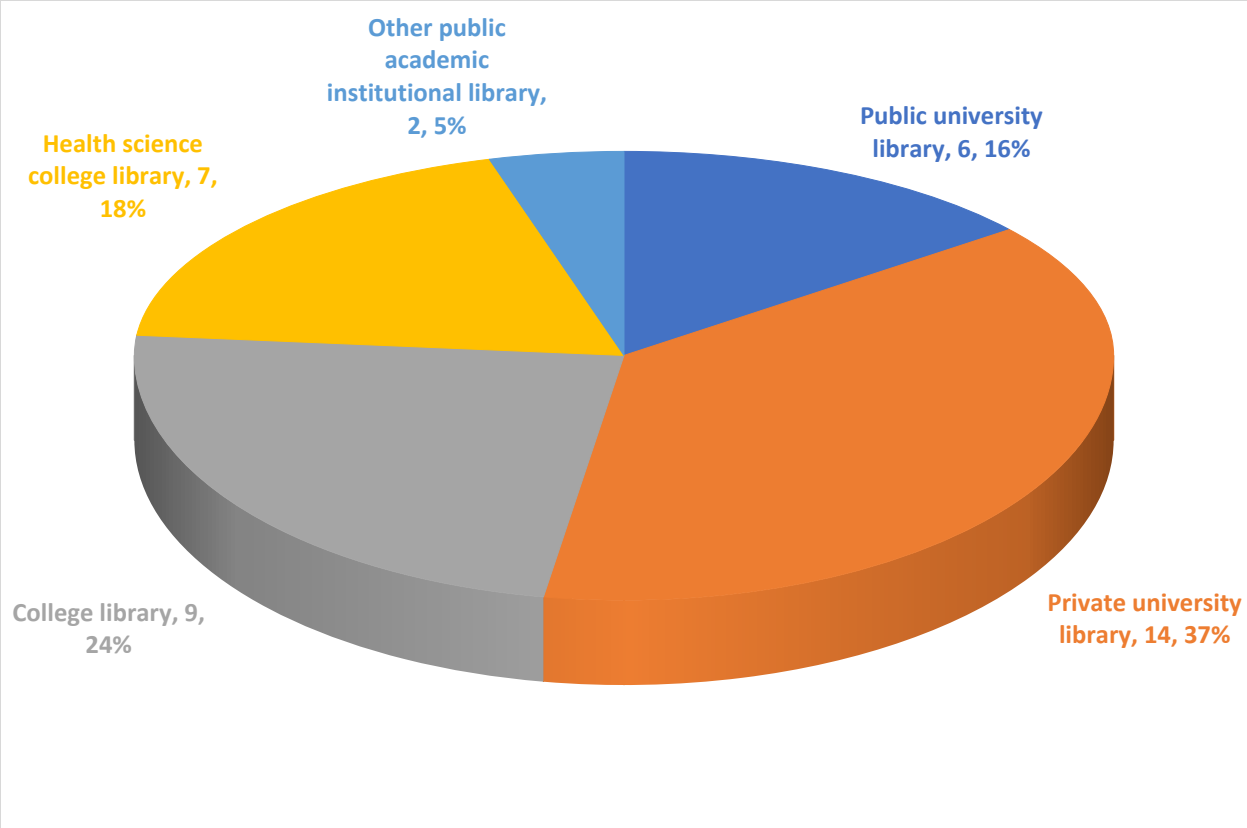

Figure 2: Participating institutions (N=38)

Levels of adoption and use of KOHA ILS among libraries of higher education institutions in Malawi

The researcher probed a number of issues that gave a glimpse of the level of adoption and use of Koha amongst higher education institutions in Malawi.

Library Automation and Use of Koha ILS

Participating libraries were asked to indicate whether they are automated or not. Furthermore, libraries that are automated were asked to specify the year in which they achieved their automation status, and state the type of system in use. Findings indicated that 32 (84.2%) libraries are automated whilst only 6 (15.8%) libraries are not automated. Further analysis of the findings revealed that majority of the libraries 28 (87.5%) implemented their automation projects over the past ten years with an even greater number 21 (75%) having achieved that over the past four years.

Findings presented above show that libraries in institutions of higher learning in Malawi have made big strides in adopting technology in service delivery although a smaller proportion of the libraries were still lagging behind. The scenario is in line with global trends whereby even in the developed countries where use of technology is widespread there are still instances where some institutions are left behind. Enis (2017), for instance, observed that hundreds of public libraries in the U.S. operate without an ILS whilst others had very old and outdated websites.

More findings revealed that 26 (81.3%) institutions were using Koha ILS and 2 (6.3%) were using Library Solution. Other ILSs deployed by libraries of higher education institutions in Malawi are SirsiDynix Symphony, NewGenLib System, Mandarin M3, and System embedded with Enterprise Resource Planning (ERP), each one with 1 (3.1%) representation. These findings signify that Koha ILS is the most dominant ILS used by libraries in higher education institutions in Malawi. Further analysis of the findings reveal that use of Koha ILS was highest among health science college libraries (4) and other public academic institutional libraries (2) with a 100% representation in each case. Diffusion of Koha ILS was equally high among private university libraries 12 (85.7%) and college libraries 4 (80%) but lower 3 (50%) among public university libraries. These findings are presented in Table 1, and show that public university libraries and college libraries were the early adopters of Koha in Malawi having done so before 2005 and between 2006-2010 respectively. Similarly, the DOI theory contends that adoption of innovation or technology is a phased process spearheaded by a small group of people called ‘innovators’ while the rest follow later on in stages (Rogers, 2003).

The findings presented above are in some ways similar to those obtained in a study by Ponelis and Adoma (2018) in Uganda but also differed in other ways. Similar to what was found in the current study, Ponelis and Adoma (2018) discovered that a larger number of private universities (63%) were using Koha as opposed to only 20% of public universities. In spite of the similarities, adoption rates of Koha were higher amongst both types of libraries in Malawi. The other notable difference between the two studies is that public university libraries in Malawi took a pioneering role in using Koha and private university libraries followed later. This situation could be attributed to the fact that most of the private universities are relatively new, many of them having been established over the past ten years. On the contrary, private universities in Uganda adopted Koha much earlier than

public universities. Findings of another study conducted by Makori and Osebe (2016) in Kenya discovered that public and private universities were adopting Koha ILS at a similar pace which is in variance to what was obtained in the present study and the study conducted in Uganda. These findings imply that Koha ILS adoption rates differ much depending on the context. Findings made in the current study also differed much to those made in a study conducted by Jabeen et al. (2018) in China where it was found that Chinese research and academic libraries mainly use commercial software and locally produced OSSs. The study further revealed that although a significant number of Chinese librarians had shown interest in OSS, they were not very keen to implement it in their libraries.

All the 6 libraries that are not currently automated indicated that they are planning to automate soon, and 5 (83.3%) of them stated that they were planning to use Koha ILS whilst only 1 (16.7%) indicated that it was planning to use an in-house web-based system. This finding further buttresses the popularity of Koha ILS among libraries of higher education institutions in Malawi.

Table 1: Crosstabulation of type of library, system in use and year of automation (N=32)

Indicate year in which the library was automated			What type of system are you using?						Total
			Koha	Library Solution	Sirsi Dynix Symphony	New GenLib System	Mandarin M3	System embedded with Enterprise Resource Planning (ERP)	
Before 2005	Indicate the type of your library	Public university library	1	1					2
	Total		1	1					2

2006-2010	Indicate the type of your library	Public university library	0	1					1
		College library	1	0					1
	Total		1	1					2
2011-2015	Indicate the type of your library	Public university library	0		1	0	0		1
		Private university library	2		0	0	1		3
		College library	1		0	1	0		2
		Health science college library	1		0	0	0		1
	Total		4		1	1	1		7
2016-2019	Indicate the type of your library	Public university library	2					0	2
		Private university library	10					1	11
		College library	3					0	3

		Health science college library	3					0	3
		Other public academic institutional library	2					0	2
	Total		20					1	21
Total	Indicate the type of your library	Public university library	3	2	1	0	0	0	6
		Private university library	12	0	0	0	1	1	14
		College library	5	0	0	1	0	0	6
		Health science college library	4	0	0	0	0	0	4
		Other public academic institutional library	2	0	0	0	0	0	2
	Total		26	2	1	1	1	1	32

Use of Koha ILS is a relatively new phenomenon among libraries of higher education institutions in Malawi as majority of them 24 (92.3%) only adopted it after 2010 (See Table 1). Another important finding of the study is that most of the higher education institutions using Koha ILS 18 (75%) are using the latest versions of the software (see Figure 3). Version 16.05 and above were released in May 2016 or later (Koha, 2019). This means that libraries using Koha ILS are benefiting from the new capabilities accorded by the latest software releases.

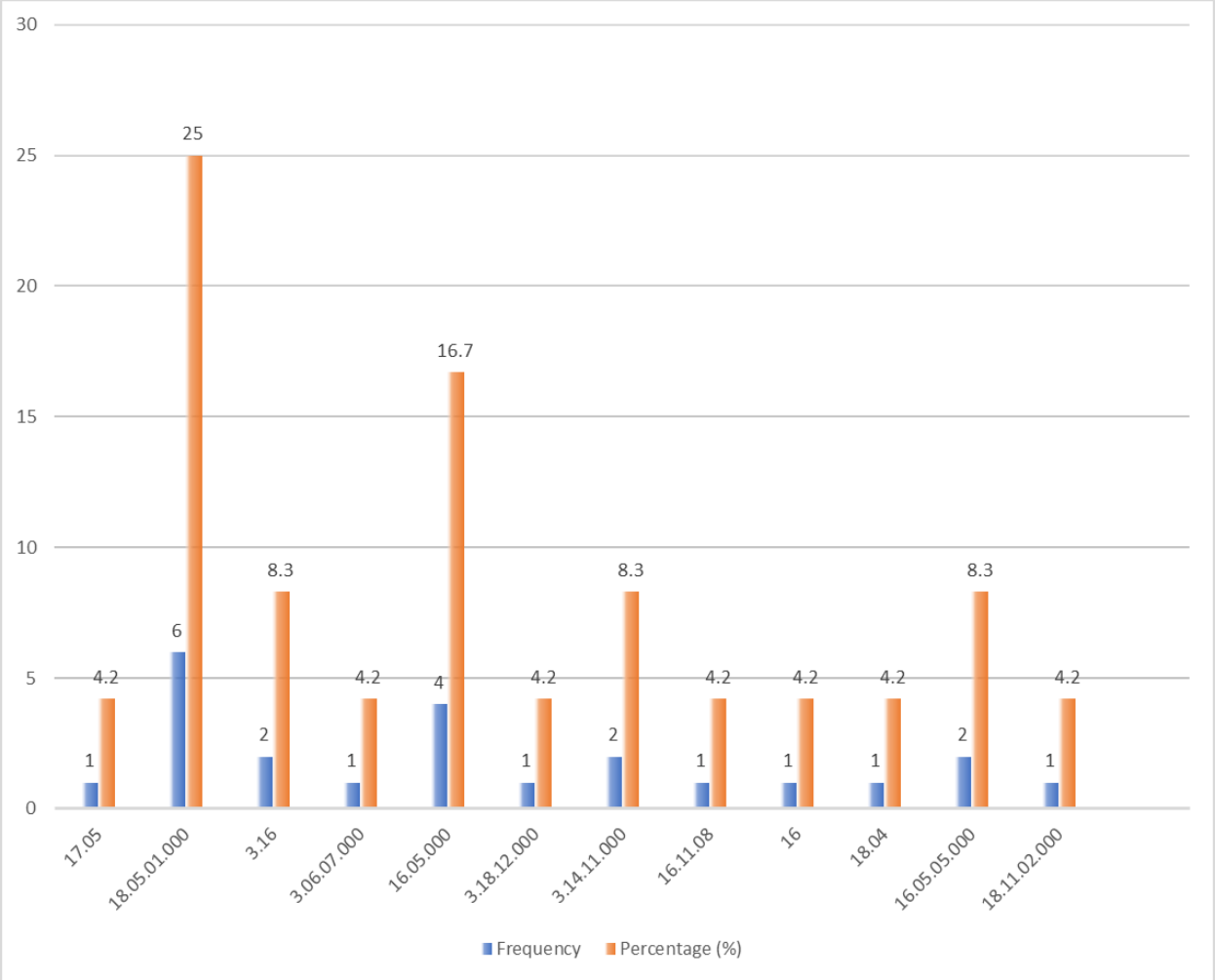

Figure 3: Koha Versions used by libraries of higher education institutions in Malawi (N=24)

It is also worth noting that 18 (72%) libraries currently using Koha indicated that they did not have a preexisting ILS before adoption of Koha whilst only 7 (28%) indicated that they had one. These findings imply that many libraries in the Malawi higher education sector have recently automated their services, and this process has been made possible with the aid of Koha.

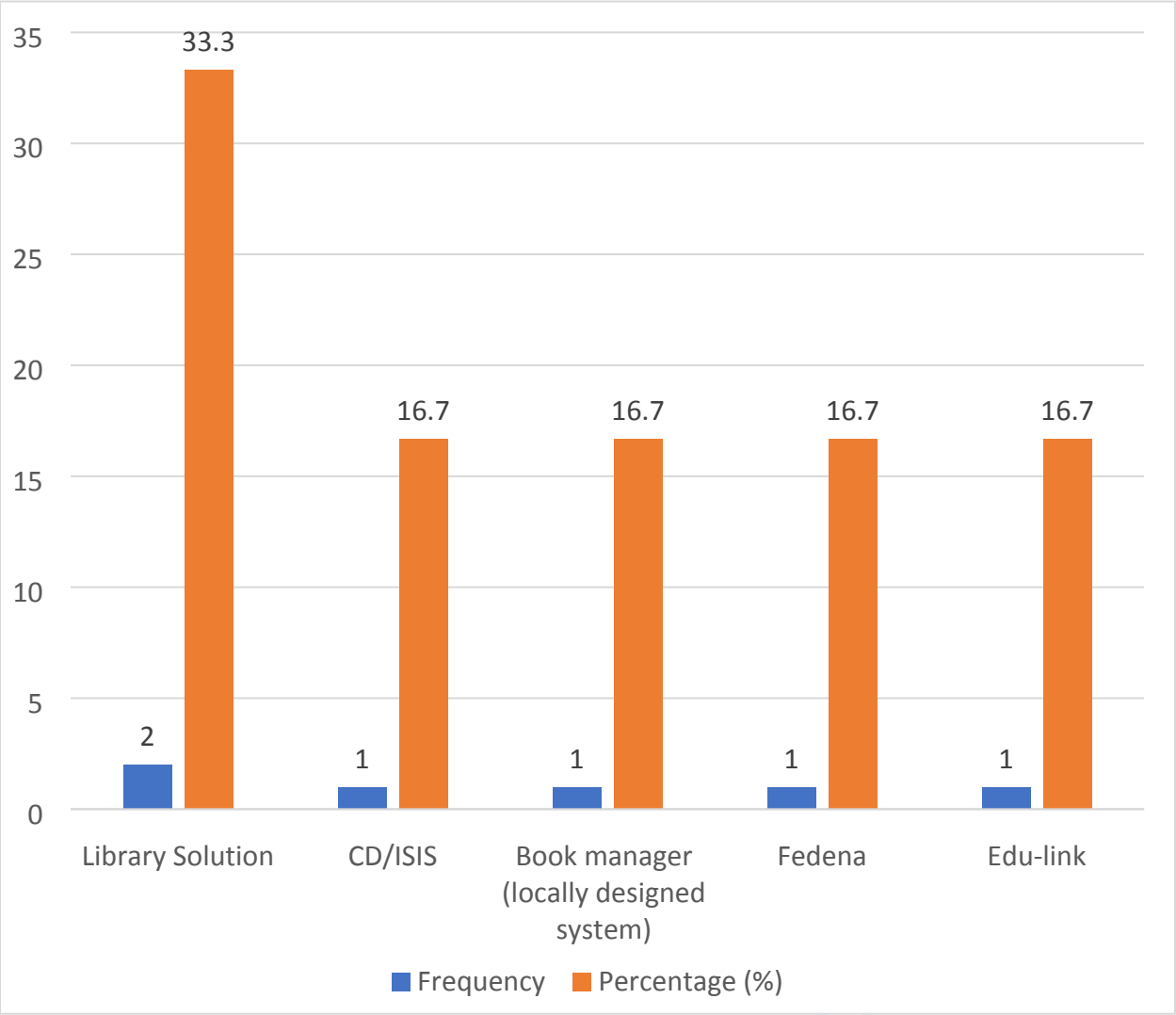

Figure 4: Previous system used by some libraries before switching to Koha (N=6)

Six (6) out of the seven (7) libraries that indicated that they had a preexisting ILS specified the ILS they were using before switching to Koha. The results presented in Figure 4 show that 2 (33.3%) institutions were using Library Solution whilst the other 4 institutions with a score of 1 (16.7%) each were using CD/ISIS, Book Manager (locally designed system), Fedena and Edu-link.

Modules of Koha libraries have implemented

Findings presented in Table 2 show that libraries in higher education institutions in Malawi have implemented a large number of modules found in the Koha ILS. However, cataloguing is the most popular module having been implemented by all the 26 libraries that are using Koha. Administration is the second most popular module implemented by 25 out of the 26 libraries. However, most of the library functions in Koha ILS are controlled by the Administration module, and therefore hard for a library to function without implementing this module. It is hence possible that the library that skipped this module might have implemented it but forgot to indicate it as one of the modules implemented. If indeed the module was not implemented, then the library might not be aware of its importance. Other modules that have been implemented by a large number of libraries are Z39.50 Searching 24 (12.7%), circulation 22 (11.6%), Statistics (reporting functions) 22 (11.6%), Cataloguing 22 (11.6%), and Authority 17 (9.0%). These modules facilitate the processing of the book stock and lending which are the core functions of many libraries. This could partly explain as why majority of the libraries implemented these modules. Additional modules such as Acquisitions 10 (5.3%), Barcode generation 7 (3.7%), Spine labels generation 5 (2.6%), Course reserves 5 (2.6%), and Serials control 4 (2.1%) were only implemented by few libraries.

A comparative study of Koha and other open and proprietary systems such as Symphony, Voyager and Evergreen conducted by Pruett and Choi (2013) revealed that Koha compare favourably with the other ILSs. Apart from the interlibrary loan module which was missing, Koha was discovered to have well developed modules that included circulation, cataloging, OPAC, authority, administration, reports, and acquisitions. The fact that libraries in this study were able to implement these modules signify that new releases of Koha, that have largely been implemented by libraries in higher education institutions in Malawi (see Fig. 3), continue to offer a wider range of modules. In fact, newer modules are being added to new versions of Koha. This will only make Koha better and more attractive to potential users. The DOI theory states that an innovation has higher chances of getting adopted if it is viewed as being better than the idea that it supersedes (Rogers 2003). Therefore, availability of more functional modules in Koha when compared to similar ILSs looks to be aiding its rapid diffusion.

Table 2: Modules of Koha implemented in libraries of higher education institutions

Koha module	Frequency	Percentage (%)

Cataloguing	26	13.8
Administration	25	13.2
Authority	17	9.0
Z39.50 Searching	24	12.7
Circulation	22	11.6
Acquisitions	10	5.3
Statistics (reporting functions)	22	11.6
Catalogue (OPAC)	22	11.6
Barcode generation	7	3.7
Spine labels generation	5	2.6
Serial control module	4	2.1
Course reserves	5	2.6
Total	**189**	**100.0**

Factors that have influenced the selection and use of KOHA ILS by libraries of higher education institutions in Malawi

The Diffusion of Innovations (DOI) theory, which is the anchoring theory in this study, postulates that there are some elements that explain the diffusion of innovations within a particular context. Some of the elements that have been identified as key to diffusion of an innovation or technology are the innovation itself, communication channels used to reach out to potential users of the innovation, amount of time required for diffusion to take effect and the social system or context in which the innovation is implemented (Rogers, 2003). Having studied adoption rates of Koha among libraries of higher education institutions in Malawi, the researcher endeavored to explore factors that have played a role in the selection and adoption of the software.

Reasons for using Koha over other integrated library systems

Libraries that had a preexisting system and opted to switch to Koha ILS were asked to indicate reasons that prompted them to do so. An analysis of their responses is presented in Table 3, and it shows that most of them 4 (40%) made the switch because technical support was not readily available. Likewise, a survey of Koha in Australian special libraries conducted by Keast (2011) discovered that some libraries switched from proprietary systems to Koha because of poor

technical support. On the other hand, Koha was preferred because of the presence of strong local support. Other reasons libraries in higher education institutions in Malawi gave for switching from previous ILSs to Koha were high cost of the previous system 2 (20%), lack of flexibility in terms of customization 2 (20%), previous system was not integrated 1 (10%) and previous system had limited features 1 (10%). Apparently, Koha has proven to be strong in all these areas. Related studies by Kampa (2018) in India and Todd (2018) in the USA revealed that Koha is cheaper to install and operate, is customisable and adaptable to local needs, and also embraces more functionalities. Another survey conducted by Ponelis and Adoma (2018) in Uganda further showed that flexibility (85%), costs of adoption and use (77%), ease of use (60%), timely support (40%), and affordable maintenance (40%) as some of the factors influencing the selection of Koha.

Table 3: Reasons some libraries gave for switching to Koha

Reasons for switching to Koha	Frequency	Percentage (%)
The previous system was very costly	2	20.0
Technical support was not readily available	4	40.0
Previous ILS System did not offer flexibility of customisation	2	20.0
Previous system was not integrated	1	10.0
System had limited features	1	10.0
Total	10	100.0

Libraries that were using Koha were further asked to indicate if they had considered installation of another open source ILS or not. Findings showed that only 6 (23.1%) of the respondents answered in the affirmative whilst the majority 20 (76.9%) answered in the negative. Considering that a wide number of open source ILSs are available on the market, and others such as NewGenLib and Fedena are already in use in some of the institutions studied (see Table 1 and Figure 4) implies that Koha is a much favoured ILS in libraries of higher education institutions in Malawi. A number of previous studies conducted in Uganda (Ponelis and Adoma, 2018) Kenya (Amollo, 2013) Australia (Keast, 2011) USA (Enis, 2017) and even Malawi (Bonamici, Huter and Smith, 2010) have equally shown that libraries in all categories are adopting the use of Koha ILS. This signifies that the number of libraries that are adopting the use of Koha ILS is increasing.

Technical considerations in the use of Koha

Technical considerations have proven to be one of the main issues that have positively and negatively impacted the use of Koha ILS (Singh, 2014; Keast, 2011). To this effect, the researcher investigated a number of aspects relating to installation and functionality of Koha ILS.

Firstly, the respondents were asked to indicate the one who handled installation of Koha at their institution. Findings displayed in Figure 5 show that outside IT staff 12 (41.4%) slightly edged out library staff 11 (37.9%) in facilitating Koha installations in libraries covered by this study. Inhouse IT staff 6 (20.7%) also played a significant role in facilitating the installations. However, when the figures of library staff and inhouse IT staff are combined, it becomes apparent that the vast majority of the Koha installations 17 (58.6%) were handled by personnel inside the higher education institutions studied. However, it should be pointed out that a total of 29 responses were received for this question against the 26 libraries that earlier indicated that they had installed Koha. It is therefore possible other libraries that were using other systems, most likely proprietary systems that are heavily reliant on technical support (a cross-reference to Table 1 shows that 5 libraries were using proprietary systems) might have attempted this question too. It is therefore likely that the role played by outside IT staff in Koha installation might have been slightly exaggerated.

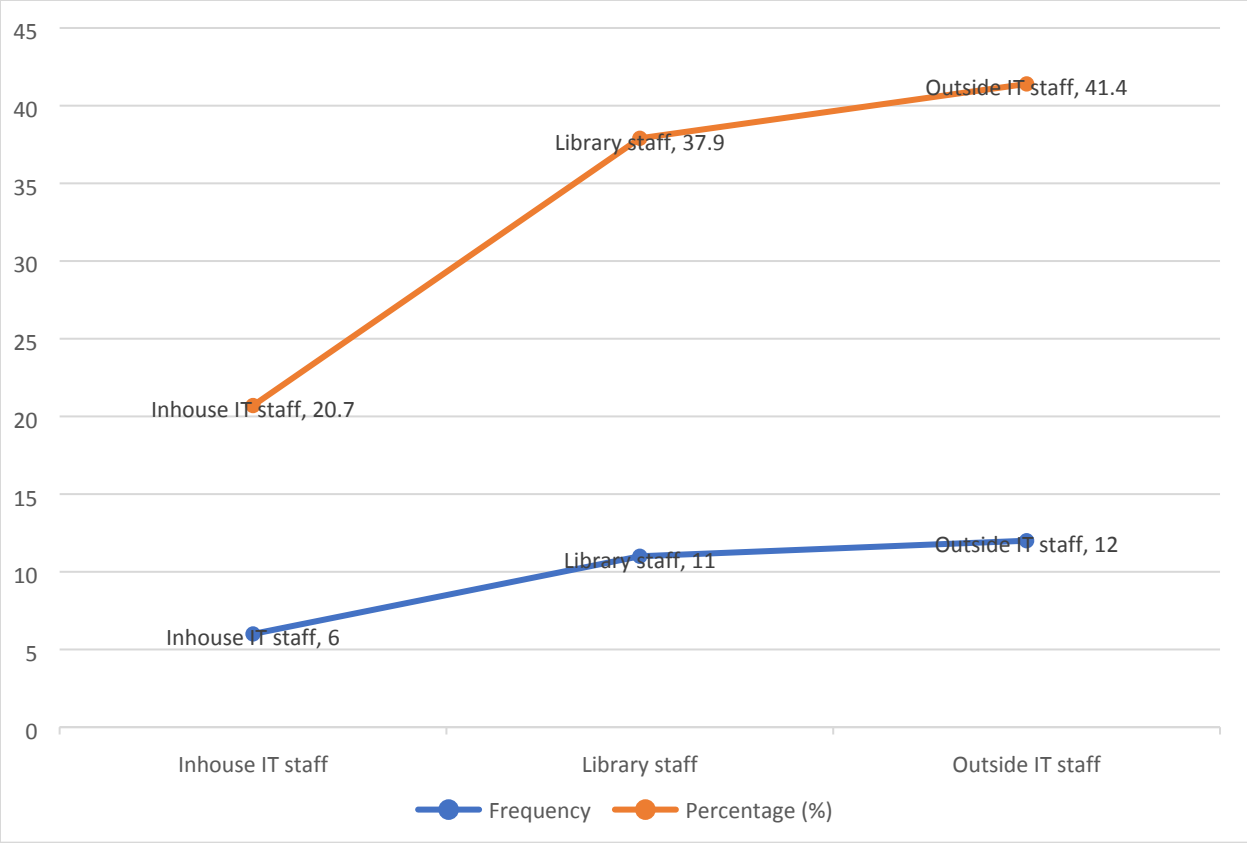

Figure 5: Who handled installation of the Koha in your library? (N=29)

The participating libraries were further asked to reveal identities of those that provide technical support for their Koha systems. Findings revealed that library staff 20 (46.5%) and inhouse IT staff 14 (32.6%) provided most of the required technical support. Outside IT staff 5 (11.6%) and online technical support 4 (9.3%) were another source of technical support but to a lesser extent. It is worth noting that some libraries solicited technical support from two or more sources hence the number of responses to this question (43) was higher than the actual number of libraries using Koha (28) [see Figure 6].

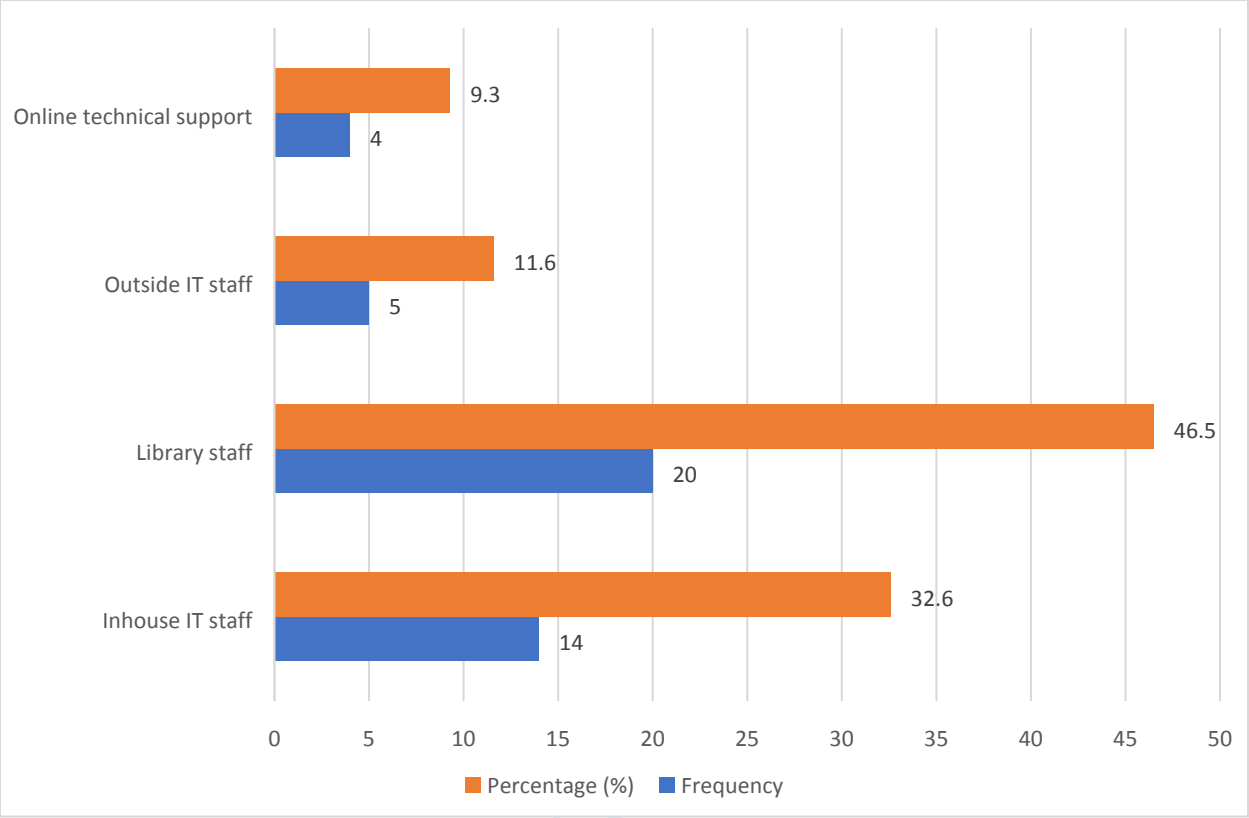

Figure 6: Who provides technical support for your system? (N=43)

Libraries that handled the Koha installation on their own were asked to rate how easy or difficult the task was. Findings captured in Figure 7 show that cumulatively 13 (81.25%) libraries rated the process positively with 6 (37.5%) libraries rating the process as average, 5 (31.25%) libraries rating the process as easy and 2 (12.5%) libraries rating the process as very easy. Conversely, only 3 (18.75%) libraries rated the process poorly with 2 (12.5%) libraries rating the process as difficult and 1 (6.25%) library rating the process as very difficult.

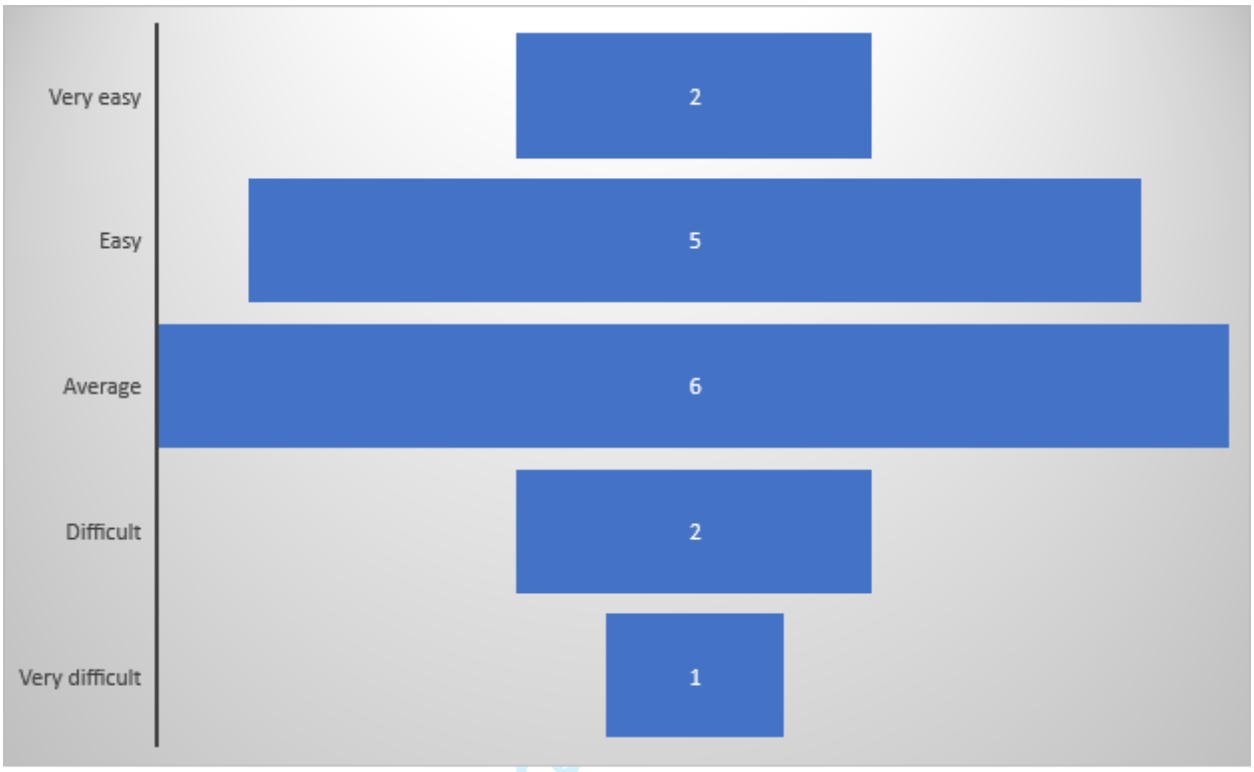

Figure 7: Respondents' assessment of the ease of installation of Koha ILS (N=16)

Findings presented above show that most of the technical support required in the installation and management of Koha ILS in higher education institutions in Malawi is provided by library staff and technical personnel from within the organisation. This finding is in variance to what was obtained in a study conducted by Makori and Osebe (2016) in Kenya who found that most of the information professionals lacked the requisite knowledge, skills and competencies that are essential in handling, managing and supporting Koha ILS. However, the study found that most of the libraries that handled the Koha installation on their own found the process easy, and libraries that could not do the installations on their own solicited outside help, particularly fellow Kenyan libraries that had mastered the feat. Likewise, libraries that could not accomplish the Koha installation on their own in Malawi sought consultancy help from experts from libraries that had the expertise. Similarly, a study of Koha in Australian special libraries conducted by Keast (2011) revealed that technical support for Koha was readily available locally, and its availability had played a pivotal role in boosting the diffusion of Koha. The same study revealed that most of the libraries that had done the Koha installations found the software trouble-free, and were discovered to be very satisfied with it.

Factors that have influenced the selection and use of KOHA ILS by libraries

The researcher assessed the status of Koha and also carried out a performance evaluation of Koha to determine factors that influence the selection and use of Koha ILS by libraries of higher education institutions in Malawi. Findings shown in Table 3 revealed that users rate some of the Koha modules (circulation, administration and Z39.50 Searching) highly. Users also considered Koha to be cost effective in terms of installation and maintenance. The technical aspects of Koha that include display and screen layouts, ease of customization, ease of cataloguing, availability of technical support (inhouse or outside), and easy accessibility of user manuals as some of the factors that influenced the selection and use of Koha. On the other hand, availability of online technical support and some modules such as barcode generation, spine label generation, and serials control did not play a significant role in the selection and use of Koha ILS.

Results of related studies have equally highlighted cost and technical aspects of Koha as the main factors that have assisted in the rapid diffusion of Koha. For instance, a case study on the implementation of Koha at DSC – German School of Charlotte in Charlotte, North Carolina, USA by House (2016) revealed that Koha was selected for installation and use because it has the most online support, is easiest to install and manage, has an intuitive and web-based interface, and could be easily explained to volunteers. Another study done by Singh (2017) on migration to open source integrated library systems in the USA revealed that open source systems ILSs such as Koha can be a cost-effective, highly flexible and functional alternative to proprietary systems. Yet another study on the use of Koha conducted by Amollo (2013) in Kenya discovered that cost and functionalities were the main factors affecting selection and usage of Koha.

Table 3: Assessing the status and performance of Koha (N=26)

Aspect of Koha	Very good	Good	Average	Poor	Very poor	Total
Cost of the system	12	11	3	0	0	26
Cost of maintenance	8	17	1	0	0	26
Range of modules	8	14	1	1	1	25
Ease of customisation	6	11	7	0	0	24
Display and screen layouts	10	9	6	0	0	25
User manuals	7	6	6	2	1	22
Ease of cataloguing	19	6	1	0	0	26
Administration	13	7	3	0	0	23
Authority	7	8	4	0	1	20
Z39.50 Searching	9	8	1	2	2	22
Circulation	16	8	0	1	0	25
Acquisitions	6	4	5	2	1	18
Statistics (Reporting functions)	6	8	4	0	3	21
Technical support (inhouse or outside)	4	16	4	1	0	25
Online technical support	5	5	6	3	0	19
Barcode generation	6	4	5	2	2	19
Spine label generation	2	4	6	1	3	16
Serials control	1	4	6	2	3	16

Challenges libraries faced in using KOHA ILS

In every scenario, certain factors exist that tend to affect adoption and use of the technologies in use if they are not well managed. Cognisant of this, the researcher investigated the challenges that libraries in higher education institutions are facing in using Koha ILS. Findings presented in Table 4 show that lack of human resource capacity, unreliable electricity, Information and Communication Technology (ICT) infrastructure such as computers, servers, etc., unreliable Internet connectivity, organisational procurement policies and national procurement legislation including limited finances are the main challenges with over 70% of the respondents indicating that they agree or strongly agree that these are the challenges they face. On the contrary, poor orientation of users did not feature much as a challenge.

Koha is a web-based ILS. Therefore, installation and use of the system requires heavy investment in ICTs at both institutional and national level that are resource intensive. Coincidentally, Malawi happens to be one of the poorest countries in the world with a gross national income of only US$1,064 (UNDP, 2018). This makes it difficult for many higher leaning institutions in the country to mobilise the required financial resources to ensure optimal performance of Koha ILS. Moreover, some of the infrastructure that is required to support Koha at national level such as electricity and robust Internet infrastructure is lacking. Internet speed is slow due to low bandwidth and interrupted at times due to vandalism whilst electricity supply is equally unreliable (Chaputula, 2012). These factors negatively affect the performance of Koha. Some of the factors noted in the study such as organisational procurement policies, human resource capacity and poor orientation of users mainly pertain to organisational inefficiencies. These too have the potential to negatively impact proper functioning of Koha and need to be tackled.

Table 4: Challenges experienced in using Koha ILS

Challenges faced in using Koha ILS	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	Total
Lack of Information and Communication Technology (ICT) infrastructure such as computers, servers, etc.	12	7	0	5	2	26
Unreliable Internet connectivity	13	6	0	4	3	26
Organisational procurement policies and national procurement legislation	11	8	3	1	2	25
Human resource capacity	8	10	1	3	4	26
Poor orientation of users	5	9	4	4	3	25
Unreliable electricity	8	11	0	3	2	24

Limited finances	14	5	1	3	3	26

Conclusions and recommendations

The purpose of this paper was to investigate use of Koha integrated library system by higher education institutions in Malawi. Findings revealed that 84.2% of libraries in higher learning institutions in Malawi have automated their services whilst only 15.8% are yet to get automated. More findings revealed that 81.3% of the libraries that have automated their services were using Koha ILS and the rest were using proprietary and other open source software. Cost and technical aspects have been discovered to be the main factors that have assisted in the rapid diffusion of Koha. Koha was discovered to be relatively cheaper to install and manage. Findings also showed that Koha has more functional modules than related software. The study also exposed some factors that negatively impacted the use of Koha in the adopting institutions. These included lack of Information and Communication Technology (ICT) infrastructure such as computers and servers, unreliable Internet connectivity, limited finances, organisational procurement policies and national procurement legislation, and human resource capacity. Based on these findings, the paper concludes that Koha is an ILS that is suitable for use by different categories of libraries in Malawi. Its ability to be adopted and maintained at little cost makes it appealing in the Malawi environment where majority of libraries are experiencing financial difficulties. Libraries that have recently adopted Koha and those intending to adopt the software could learn from those that have used Koha for a considerable period of time. This would facilitate smooth operations. Moreover, Koha is capable of supporting emerging Linked Data applications, BIBFRAME metadata model, and Resource Description and Access (RDA) which makes it even more appealing to practising librarians at it simplifies their work.

This study covered the adoption and use of Koha ILS in libraries of higher education institutions in Malawi, focusing on the rate of adoption, factors aiding adoption and challenges encountered in usage. However, it is recommended that future studies should investigate how automated systems like Koha can affect the quality of life of the population, dwelling much on the economic, political, commercial or educational impact.

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Mzuzu University

Library & Learning Resources Centre

Questionnaire for librarians

Introduction

Dear respondent,

My name is Dr Aubrey Chaputula, Senior Assistant Librarian at Mzuzu University Library. I have teamed up with my colleague, Mr Allan Kanyundo, Assistant Librarian at Mzuzu University Library to conduct a study on the **Use of Koha Integrated Library System (ILS) in higher learning institutions in Malawi.**

The study seeks to investigate use of Koha in libraries of higher leanrning institutions in Malawi that includes universities and colleges (private and public). The study is valuable as it will raise awareness of the importance of Koha ILS among higher leanrning institutions not using the software thereby aid in its rapid adoption. The study will also help offer solutions to the challenges institutions that are currently using the software are facing thus assist in improving quality of service delivery.

Participation in this study is voluntary. You may refuse to participate or withdraw from the research at any stage and for any reason without any form of disadvantage. There will be no

monetary gain from participating in this study. Confidentiality and anonymity of records identifying you as a participant will be maintained. If you have any questions or concerns about participating in this study, please feel free to contact the principal investigater, Dr Aubrey Chaputula, using the following email: achaputula@yahoo.co.uk

The questionnaire would take approximately 10 minutes to complete.

Thank you for participating in the study.

Instructions

Answer questions by ticking in appropriate boxes or filling in the blank spaces. Multiple responses are allowed where applicable.

Information about your library

1. Name of your library (optional)

2. Please indicate the type of your library

Public university Library	
Private university Library	
College Library	
Health Science Library	
Other public academic institutional Library	
Other	

3. Is your library automated? (**If the answer to this question is No, go to question 17).**

Yes ◊ No ◊

4. Indicate the year when your library was automated.

5. What type of system is in use?

6. If you are using Koha, what version is in place?

7. When was the Koha first installed in your library?

8. Did you have a pre-existing library system in place before installation of Koha?

Yes ◊ No ◊

9. If yes, what was the name of the system?

10. Please indicate reasons for switching to Koha

The previous ILS was very costly	
Technical support was not readily available	
Previous ILS system did not offer flexibility of customization	
Previous supplier of ILS closed shop	
Other, clarify……	

11. Did you consider installation of another open source software before settling for Koha?

Yes ◊ No ◊

12. Who handled installation of Koha?

Inhouse IT staff	
Library staff	
Outside IT staff	
Other (specify)	

13. Who provides technical support for your system?

Inhouse IT staff	
Library staff	
Outside IT staff	
Online technical support	
Other experts online	

14. If you did the Koha installation yourself, how would you rate it?

Very easy	
Easy	
Average	
Difficult	
Very difficult	

15. Which of the following modules of Koha has your library implemented?

Aspect of Koha	**Yes**	**No**
Cataloguing		
Administration		
Authority		
Z39.50 searching		
Circulation		
Acquisitions		
Statistics (reporting functions)		
Catalogue (OPAC)		

Barcode generation		
Spine labels		
Serials control module		
Course reserves		

16. Please rate Koha on the following aspects

Aspect of Koha	**Very good**	**Good**	**Average**	**Poor**	**Very poor**
Cost of the system					
Cost of maintenance					
Range of modules					
Ease of customisation					
Display and screen layouts					
User manuals					
Ease of cataloguing					
Administration					
Authority					
Z39.50 searching					
Circulation					
Acquisitions					
Statistics (reporting functions)					
Technical support (inhouse or from outside)					
Online technical support					
Barcode generation					
Spine labels					
Serials control module					

17. What challenges have you experienced in using Koha?

Response	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
Lack of Information and communication technology (ICT) infrastructure such as computers, servers, etc.					
Unreliable internet connectivity					
Organisational procurement policies and national procurement legislation					
Human resource capacity					
Poor orientation of users					
Unreliable electricity					
Limited finances					
Other, specify					

18. Are you planning to automate your services soon? If yes, which system are you planning to implement? **(To be tackled by libraries that have not automated their services)**

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THANKS FOR RESPONDING TO THE QUESTIONNAIRE