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# Management of Information Systems in Academic Libraries in Ghana

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## ABSTRACT

Academic libraries in Ghana have adopted information systems for library functions and services. This study sought to find out how academic libraries in Ghana manage the information systems they use. Interviews and a questionnaire were used to solicit responses from nine academic libraries in Ghana. Findings revealed that majority of the libraries studied did not have an Information Systems Policy and staff were mostly not consulted before the installation of the Information Systems.

## KEYWORDS

Information system; information system management; academic libraries; Ghana

## Introduction

Information Systems (IS) are developed to provide accurate and timely information to help users make work processes efficient, integrate business process and link an organization to its stakeholders. For this reason, it is of absolute necessity for managers of organizations to ensure the efficient use and quality of IS (Boddy, Boonstra, & Kennedy, 2005). In the service sector, it is important to improve or maintain quality service. This can be done by ensuring that IS are always functioning to the optimum. It therefore calls for IS managers in organizations to constantly manage IS (Bharati & Berg, 2003).

IS use in an organization is a complex process and the management thereof should be of great importance. This has not been the case as many organizations use unstructured means to manage IS. The management of an IS should be seen as a well-organized process and as part of the organizational processes which will enhance the quality of service. Information technology implementation in all organizations demands competent management (Anisimov & Reshetnikov, 2011). It has been noted that, there is evidence of ‘technology management gap’ in most organizations (Irani & Love, 2000) and libraries cannot be excluded. Maintaining IS across different organizations has been very difficult especially in terms of determining needs of organization, designing and managing the IS to ensure the needs are fulfilled (Pilemalm, Lindgren, & Ramsell, 2016).

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It is necessary to note that, though major industries – including libraries – have invested much capital into the development and acquisition of IS, most of the IS installed in organizations have been heavily underutilized (Maguire, 2002), others have not yielded the maximum output desired (Ravichandran & Lertwongsatien, 2014) and a number of them have failed (Marnewick, 2017) causing leading investors in the IS industry like Microsoft, Cisco, Hewlett Packard and IBM to fund academic studies on how to make IS projects sustainable (Boddy, Boonstra, & Kennedy, 2005). They therefore advise managers not to leave the tasks of use and management of IS to IS staff as they are mostly concerned with the design of the systems and not whether the systems are functioning appropriately or are being used to the optimum.

A few studies, e.g., Boateng, Agyemang, and Dzandu (2014), Thompson and Pwadura (2014), Mutula (2012), Adanu (2006), Adogbeji and Adomi (2005), Amekuedee (2005) as well as Garcha and Buttlar (1996), have been conducted in Africa and Ghana on library automation in academic libraries, but these concentrated on the automation process, the impact thereof on libraries and the challenges experienced. Very little has been done to determine how the IS that are implemented during automation are managed to enhanced library services. Academic libraries in Ghana are confronted with a number of challenges including, but not limited to, IS failure, obsolete technology or inappropriate IS, lack of skills to use the IS, insufficient computer and internet facilities and lack of funds (Amekuedee, 2005; Boateng, Agyemang, & Dzandu, 2014; Thompson & Pwadura, 2014). This study, therefore, sought to determine how IS are managed in academic libraries in Ghana.

### ***Objective of the study***

The main objective of the study was to examine how academic libraries in Ghana manage their IS.

### ***Research questions***

- (1) What types of IS are being used in academic libraries in Ghana?
- (2) How are IS in academic libraries in Ghana managed?

### ***Literature review***

Management of IS has been noted to have significant impact on its success or otherwise. A successful IS is one used to achieve the purpose for which it was developed. The continuous use of an IS determines its value (Fattahi & Afshar, 2006), thus for organizations to derive maximum value from their IS, the systems must be managed to make them available for continuous use. Researchers have indicated the importance of IS management and in some cases its effect on the quality and use of the system. Anisimov and Reshetnikov (2011) indicate that poor and miss-management of IS cause great financial loss

to organizations though IS are adopted as business process solutions to help reduce cost and downtime. This means that the continuous functioning and use of the IS are a prerequisite to its success. Bajgoric (2006) thinks that for this to be achieved, it calls for the IS to be managed in the areas of; operating infrastructure, system-application-network uptime, data bases, data access, backup and storage, security and protection, IT-operations and human resources. Likewise Wu and Wang (2006) state that IS quality is determined by the level of stability, acceptable response time to user request, how user-friendly interfaces are and the ease of use of the system. These can only be achieved if post implementation activities are carried out properly.

Due to the importance of IS management, a number of studies have looked at post implementation activities on IS and their effect on IS use and success. Bharati and Berg (2003) conducted a study on the impact of an IS on service quality using the DeLone and McLean model. The study showed that system quality indirectly impacts on service quality. The study noted that ease of use of IS helps customers to be served better, and leads to quality service. Bharati and Berg (2003) recommend that managers should pay attention to both the quality of an IS and employee IS performance to increase the quality of services provided with the IS. This was confirmed by Rafique et al. (2021) and Izuagbe (2021) that the quality and usefulness of online systems use in libraries affect their use positively. This gives the indication that IS management has direct effect on the quality of the IS and its use.

Researchers have not only shown the importance of IS management on IS use, but have indicated that IS management is a process and should be carried out regularly. In this quest, Beynon-Davies, Owens, and Williams (2004) reviewed relevant literature on IS evaluation and developed a model emphasizing the importance of an organizational learning feedback loop. The model proposed that after an IS has been implemented, an appropriate time should be assigned to allow the organization to undertake what is termed a summative evaluation or postmortem analysis of the system. This analysis is very important since no system is ever complete. The summative evaluation may produce relevant proposals which may be used to modify or extend IS applications, in other words, maintain the system. This enables management to maintain the IS effectively. In the same vein, Marnewick (2017) is of the opinion that IS must be subjected to benefit management. This will enable the organization to determine whether the IS are beneficial to and can ultimately deliver value to the organization. In order to derive the maximum benefit from any IS, the IS must be subjected to management standards. When managers are not adhering to these best practices and standards, the IS does not become beneficial to the organization. Marnewick (2017) noted that IS managers do not fully comply with management practices or best standards, but report of deriving value from their IS projects.

Responsibility for IS management in libraries has been placed in the domain of both librarians and IT professionals. Fattahi and Afshar (2006) are of the opinion that in the library field, management or housekeeping of IS is the responsibility of both IS professionals and librarians. The experience of both librarians and IT professionals need to be combined to optimize the functionality of the IS enhancing it to add value to information. Baker (2008) argues that for strategic information management and for libraries to be able to manage the vast information resources they are exposed to in the digital age, technology is needed. Technology management must consider trends, trajectories and capabilities to track the development of IS to ensure effective service delivery.

The capabilities of an IS is realized when the most is made out of the system by its users. For this to be achieved, system users should be made to see the system as their own and be able to use it for personalized task via less complex user interfaces. Internal library factors such as strong leadership support by management, stipulated library goals for using the IS, strong indication of how each individual work role is affected by the use of the IS, staff motivation to use the IS, provision of enough and functioning equipment, satisfactory and regular technical support and a convenient office environment help to manage library IS better (Skretas, 2005).

Despite the many evidence that exist in the literature on the effect of IS management on its use leading to its success, Gbadamosi (2012) alerted that, on the contrary, routine maintenance of systems by system administrator in libraries is lacking. Due to the lack of sufficient information on IS procedures, it has been noted to affect the use of IS in libraries (Mugridge & Poehlmann, 2015). Swanepoel, Toit, Brakel, and Van (2001) also asserted that libraries need a management protocol to manage IT, and in particular IS. Mutula (2004) noted that in Africa, ICT initiatives lack technical support, ICT policy coupled with poor information provision. This was supported by Makori (2013) who also identified lack of ICT policy as a major setback to IS deployment in libraries in Kenya. In a study in Nigeria, Tella, Edward, Akanbi-Ademolake, and Akande (2021) noted the challenges faced by libraries in implementing open-source library system to include; lack of trained personnel, erratic power supply and lack of finance. Tella, Edward, Akanbi-Ademolake, and Akande (2021) defined these challenges as threats to IS use in libraries.

Many of the challenges faced by African libraries in the use of IS are as a result of poor management practices. Review of the literature shows that there is the need to manage IS projects in libraries in Africa to increase the benefits that are derived from IS use. This study is therefore relevant in the context of Africa to investigate how IS in academic libraries in Ghana are managed.

## Methodology

A combination of qualitative and quantitative methods was adopted. To determine the management functions and overall organizational policy on IS, the researchers needed to interact with the heads of the IS and head librarians through interviews in order to solicit relevant information for answering the research questions. The researchers also used a questionnaire as a quantitative tool to solicit responses from all other staff who use IS to determine how the IS are managed for effective service delivery. The questionnaire used for the data collection is attached as [appendix A](#). The interview guides for head librarians and heads of IS are attached as [appendix B](#) and [C](#) respectively.

The researchers used 30% of the population of the Consortium of Academic and Research libraries in Ghana (CARLIGH), based on Durrheim and Painter's assertion (Durrheim & Painter, 2006) that for a small population size, a sample size of 30% should be used. CARLIGH has as its members thirty (30) university libraries of which eight (8) are public universities and twenty-two (22) are private universities (CARLIGH, 2020). Thus nine (9) university libraries were selected as the sample size.

The population was divided into two strata: public universities and private universities. To determine the sample size from the two strata, 30% of the population was calculated resulting in nine (9) universities. The number of libraries in a stratum (8 and 22 respectively) was divided by the total population of 30 and multiply by nine (9). This is based on Durrheim and Painter's (Durrheim & Painter, 2006) suggestion that the same proportion of units should be selected from as many strata as there are in the population. This led to the selection of two (2) public and seven (7) private universities as research sites for the study. The researchers purposively selected these nine university libraries, with the reason that they are among the top libraries that have implemented IS as at the time of the study.

The researchers solicited responses using questionnaire from all the staff members who use any electronic system in all the nine libraries that were purposively selected. The total number of 202 staff excluding library heads was used to collect the quantitative data. Interviews were also conducted to solicit responses from all library heads and all IT/IS heads of the libraries selected for the study.

Of the 202 questionnaires distributed, 149 were returned resulting in a response rate of 73.7%. Of the nine libraries studied, eight library heads were interviewed. As the ninth library had a staff member in the position titled 'Systems Librarian,' he was interviewed in place of the head librarian. The researchers also interviewed five IT unit heads of the nine libraries studied. Again the 'Systems Librarian' of the ninth library was interviewed in place of the IT head. Two libraries do not receive support from their IT unit, while the

staff of the IT unit assigned to the remaining library was not available during the time of data collection.

### **Findings**

Findings are presented under the themes; type of IS use in academic libraries in Ghana, Funding and institutional support, availability of IS policy, information provision before IS installation, information provision after IS installation, provision of resources, system maintenance activities, training of staff, response time to system failure and evaluation of IS.

#### ***The type of is use in academic libraries in Ghana***

The data collected in this study established that all nine (9) libraries that participated in this study use a library management system (LMS). The five (5) main LMS identified were Sierra, Destiny, Librarysoft, Koha and Alexandria. All nine libraries have official library websites. All nine libraries use one social media platform or the other, eight (8) libraries use Facebook, two (2) use WhatsApp, three (3) use Twitter and two (2) use SMS for reaching out to library users and for interacting with staff.

Seven libraries indicated the use of a Digital Asset Management System (DAMS). All seven institutions using DAMS specifically use Dspace. Ezproxy for off campus access by six (6) libraries. Other IS use in the libraries are; CCTV by two (2) libraries and 3 m security system by one (1) library for security, Libguide by one library and Discovery by one (1) library for creating subject content and searching resources respectively.

#### ***Funding and institutional support***

Responses from head librarians on issues of availability of funds, sources of funding and institutional support for IS projects were sought.

Findings reveal that all nine (9) libraries depend on internal institutional funds. Two (2) libraries receive in addition to their internal funds, funding from outside their institutions as well. Only five (5) of the librarians indicated they have ample funding and institutional support available for IS projects. Detailed responses are shown in [Table 1](#).

#### ***Availability of IS policy***

To determine the availability of IS policy, three comments were given on the questionnaire for respondents to indicate their level of agreement to help determine whether or not their libraries have a strategic plan, policy and/or standards in place regarding IS use. With regards to the availability of IS policy, 41.6% (62) agreed or strongly agreed. Responses to the availability of IS policy also revealed that 41.6% (62) agreed or strongly agreed. Responses to availability of IS standard was not much different, as 41.7% (72) agreed or strongly agreed.

**Table 1.** Source of funding (n = 9).

Themes		Responses
Funding and institutional support available	Internal/ External	<b>Librarian 1</b> - <i>The initial IS project was sponsored by a donor. I think we have enough money; I think the library is bless, I have a lot of money I have not even spent; it is the bureaucratic process of accessing the money that makes my work difficult. You have to plan and start the requisition process early in the year or semester. Sometimes, by the time you get approval to take the money, the financial year is close to the end and the money goes back to chest.</i>
	Internal	<b>Librarian 5</b> - <i>With regards to finance, we do not have any challenges . . . if you are able to convince them, they will provide you with what you have requested for.</i>
	Internal	<b>Librarian 6:</b> <i>Management supports us financially when we are acquiring software from internally generated funds</i>
	Internal	<b>Librarian 7</b> - <i>We had the support of our institution; upon informing them of the challenges with Librarysoft, they gave us the go ahead to implement Koha. The training and installation costs were all paid for promptly.</i>
	Internal/ External	<b>Librarian 9</b> - <i>Yes we receive all the funds from the university from the library user fee charged to students; the Alexandria was partly funded through a project</i>
Funding and institutional support not available	Internal	<b>Librarian 2</b> - <i>We are supposed to be paying for Destiny annually, for the past 6 or 5 years we have not paid so we do not get technical support from the developers again, and other services like data from them. I do not think the university is ready to pay such an amount. In case the system breaks down I can only depend on my backup</i>
	Internal	<b>Librarian 3</b> - <i>We never paid for Librarysoft after the initial payment . . . I think that is how come it never worked . . . The institution later hosted the IR in cloud but due to the fact that we could not meet our financial obligations, we lost all data about 3 years ago.</i>
	Internal	<b>Librarian 4</b> - <i>The university advertised for bidding and the least amount quoted was 45,000 Ghana cedis. Knowing my university could not raise such an amount what we did was to fall on students from our computer science department who formed a team to help us install Koha. We promised the students some money . . . some of the students have been paid and others have not. They keep calling me even though they have completed school. But the library issues are not of priority now.</i>
	Internal	<b>Librarian 8</b> - <i>I have indicated that dedicated IT staff should be employed in the library a thousand and one times; we have interviewed someone but there was no money to pay.</i>

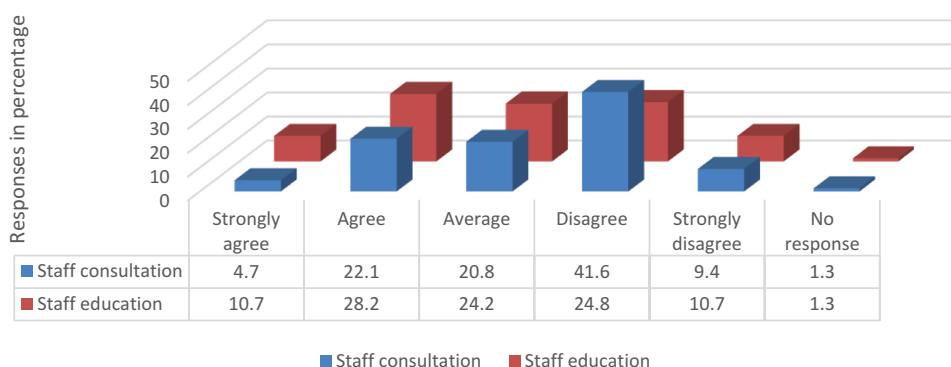
Findings revealed that 41.6% of the respondents indicated that their libraries have an IS policy, 41.6% a strategic plan and 41.7% an IS standard. As shown in Table 2, this was corroborated by qualitative data from heads of libraries indicating four (44.4%) libraries having an IS policy.

### **Information provision before IS installation**

Responses to two statements on the questionnaire on information provision before IS installation show that 26.8% (40) of the respondents agreed or strongly agreed to the statement that they were consulted before the IS was installed. As to whether respondents were educated on the impact the IS will have on their job performance before installation, 38.9% (58) agreed or strongly agreed. This is elaborated in Figure 1.

**Table 2.** Availability of is policy.

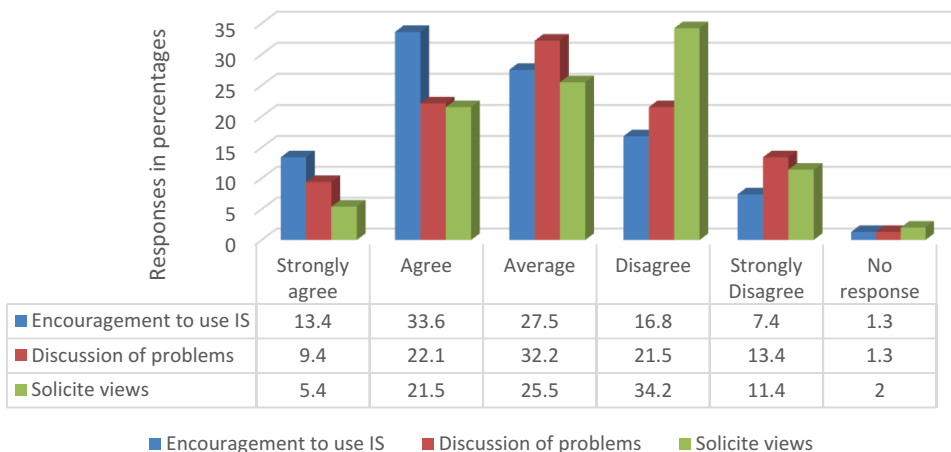
Themes	Responses
IS policy available	<p><b>Librarian 1</b> - I am sure the university will have an IT policy but I have not seen it. I believe the IS one will be part of it.</p> <p><b>Librarian 4</b> - We do have an IS policy subsumed in the library management policy</p> <p><b>Librarian 5</b> - The entire university has an IS policy</p> <p><b>Librarian 7</b> - We have an IS policy for the whole university. It contains information on the different documents that are generated electronically, security, migration, infrastructure and human resource</p>
IS policy not available	<p><b>Librarian 2</b> - I have done a draft</p> <p><b>Librarian 3</b> - We do not have an IS policy</p> <p><b>Librarian 9</b> - We do not have IS policy</p> <p><b>Librarian 6</b> - We have not actually drawn one</p> <p><b>Librarian 8</b> - The library does not have an IS policy</p>



**Figure 1.** Information on IS before installation (n=149).

**Information provision after is installation**

Figure 2 reflects responses from three categories on the questionnaire to determine information exchange on the IS between management and library staff after the IS has been installed. On the issue of management encouraging staff to use the



**Figure 2.** Information on IS after installation (n=149).

IS, 47% (70) strongly agreed or agreed. With management discussing problems of the IS with staff, 31.5% (47) strongly agreed or agreed. The data reveal that staff are not really consulted to provide information on how to improve the system, as only 26.9% (40) strongly agreed or agreed to this statement.

### **Provision of resources**

Respondents were provided with two statements to determine their level of agreement on whether their libraries have the required resources to run the IS. The first statement was on availability of qualified IT staff and the second on availability of computing devices. The data shows that 49.7% (74) agreed or strongly agreed to having qualified IT staff. With regards to availability of computing devices, 38.9% (58) agreed or strongly agreed they have satisfactory level of computing devices. The qualitative data also showed that all nine library heads indicated lack of adequate equipment to use the IS.

### **Maintenance of IS**

To determine the level of maintenance of IS in academic libraries in Ghana, responses were sought on; system maintenance activities, training, response time to system failure and evaluation of IS.

#### ***System maintenance activities***

The IT heads and the system librarian were asked to supply details of the kind of maintenance work they undertake to improve the system and ensure usage. The responses reflected in [Table 3](#) indicate that all IT heads perform some level of maintenance work on the systems. Four (4) of the respondents undertake upgrades, three (3) use query generation to embark on maintenance work and two (2) does maintenance on hardware.

#### ***Frequency of maintenance***

The IT heads and the systems librarian were asked to indicate how often they embark on maintenance activities. As shown in [Table 4](#), two (2) respondents undertake maintenance every morning, one (1) monthly, while the rest (3) did not have a fixed schedule on maintenance activities.

[Figure 3](#) reflects the level of agreement of respondents to three statements to indicate how updated the IS used are. Responses reveal that 39.6% (59) of respondents strongly agree or agree that current version of IS has been installed for them, 31.5% (47) indicated average and 40 (26.9%) disagreed or strongly disagreed. Three respondents did not response.

**Table 3.** System maintenance activities.

Themes	Responses
Upgrade	<p><b>IT 1</b> - <i>What I do is to go the developer's site and learn about the software. When I find any interesting feature I cross check from the library to determine if we have that feature or not then I implement it. The developers are at version 4 and we are still using version 1.</i></p> <p><b>IT 2</b> - <i>I carry out maintenance work every morning by running queries on the server. I blow dust off the servers quarterly and carry out upgrades whenever they are available. I can even work virtually on the servers wherever I am. I ensure I do this because when the system breaks down, I am the one who all the staff will be worrying so I do this to stay out of that kind of trouble.</i></p> <p><b>IT 3</b> - <i>To improve the system we do monitoring, update and upgrade the software</i></p> <p><b>IT 4</b> - <i>The library systems are of major concern to me because I know how important library systems are in an academic environment so once an upgrade is released, I give the upgrade a maximum of five months for major bugs to be corrected. Back up for Koha and DSpace are done monthly</i></p>
Query generation	<p><b>IT 1</b> <i>I also do queries at the back end of the system using the feature called (create list) to generate list from the system to see if the metadata is accurate</i></p> <p><b>Librarian 2</b> - <i>I use the internal checks of Destiny to ensure it is working well. It tells the uptime and downtime and the usage</i></p> <p><b>IT 2</b> - <i>I carry out maintenance work every morning by running queries on the server. I blow dust off the servers quarterly and carry out upgrades whenever they are available. I can even work virtually on the servers wherever I am. I ensure I do this because when the system breaks down, I am the one who all the staff will be worrying so I do this to stay out of that kind of trouble.</i></p>
Maintenance of physical equipment	<p><b>IT 2</b> - <i>I carry out maintenance work every morning by running queries on the server. I blow dust off the servers quarterly and carry out upgrades whenever they are available. I can even work virtually on the servers wherever I am. I ensure I do this because when the system breaks down, I am the one who all the staff will be worrying so I do this to stay out of that kind of trouble.</i></p> <p><b>IT 5</b> - <i>By ensuring the servers are function well and backing up the data</i></p>

On the issue of IS being maintained regularly, 35.6% (52) strongly agree or agree, 30.2% (46) indicated average, 31.6% (47) disagreed or strongly disagreed. Three respondents did not indicate their level of agreement.

In ranking the comments whether computers are maintained regularly, 36.9% (55) respondents strongly agreed or agreed, 25.5% (41) indicated average, 32.9% (49) disagree or strongly disagreed. There was no response from four respondents to this question.

### **Training of staff**

In determining the level of training respondents received on IS use, respondents were asked to indicate their level of agreement to training before installation, refresher training and training on changes to IS. Responses, as

**Table 4.** Frequency of maintenance.

Themes	Responses
Every morning	<b>Librarian 2</b> - <i>Every morning I enter the servers virtually from my desktop to do updates and also check if all library computers are working well.</i>
Monthly	<b>IT 2</b> - <i>I carry out maintenance work every morning by running queries on the server.</i> <b>IT 3:</b> <i>We do this monthly</i>
As and when needed	<b>IT 1</b> - <i>I do maintenance work on the system as and when there is a problem or when out of curiosity I want to try new features.</i> <b>IT 4</b> - <i>I do maintenance work quite regularly though I don't have a schedule but</i> <b>IT 5</b> - <i>we do this as and when needed</i>

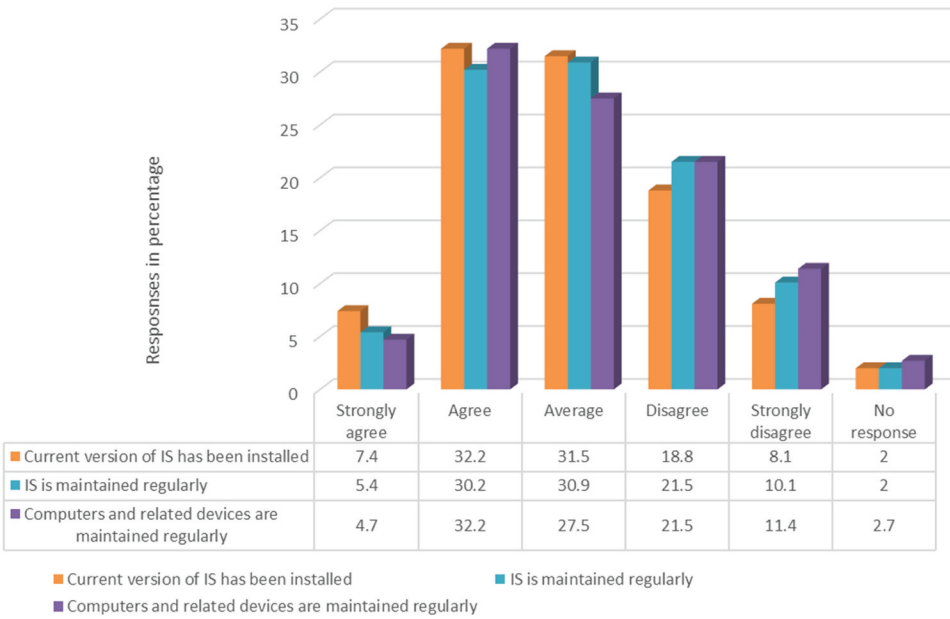


Figure 3. Updated IS (n=149).

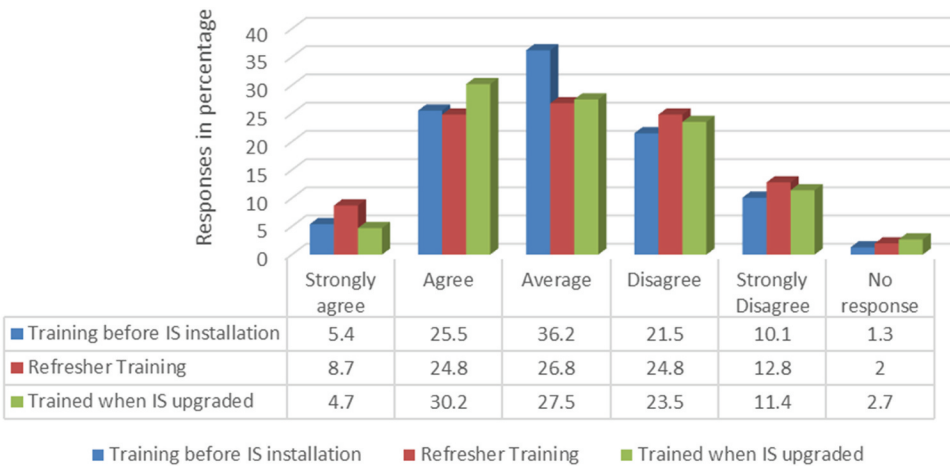


Figure 4. Training on IS use (n=149).

shown in Figure 4, reveal that with regards to sufficient training before installation, 30.9% (46) strongly agreed or agreed to being adequately trained before installation. Almost an equal number 31.6% (47) disagreed or strongly disagreed to have enough training before installation of IS.

On receiving ongoing training, a total of 33.3% (50) strongly agreed or agreed while a total of 56 (37.6%) disagreed or strongly disagreed. The figures for training after upgrades were not much different as a total of 52 (34.9%) agreed or strongly agreed while 52 (34.9%) disagreed or strongly disagreed.

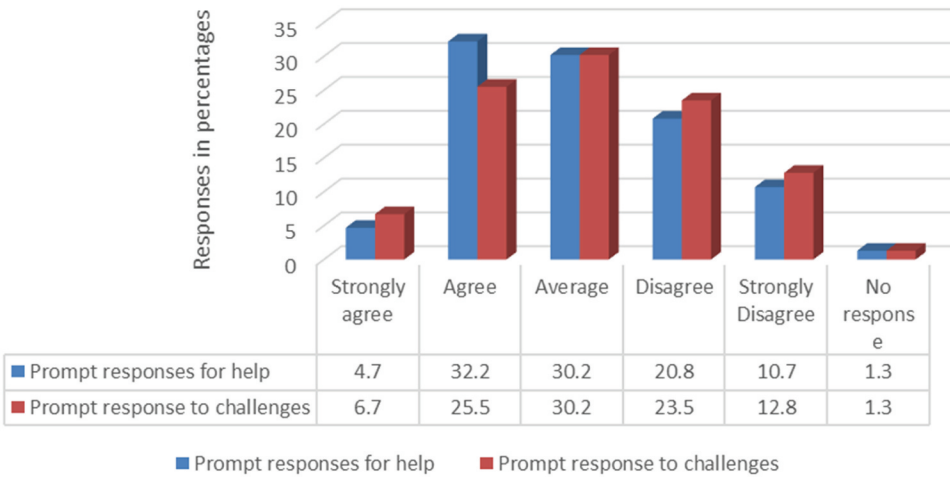
**Table 5.** Training for library staff (n = 9).

Theme	Responses
Internal Training	<p><b>Librarian 1</b> - We also do a lot of in-house training for all the IS we have even on the use of the web site for staff.</p> <p><b>Librarian 2</b> - I organize training for all library staff every semester on all four campuses</p> <p><b>Librarian 4</b> - I personally trained them after the installation of Koha. Occasionally I train them and my doors are always open to them for walk in consultations. Just this morning, one staff came in with a problem which I helped him resolve</p> <p><b>Librarian 5</b> - We mostly do internal training</p> <p><b>Librarian 6</b> - We have regular training internally and also take advantage of GLA and CARLIGH trainings, we have also benefited from some collaborative training programmes with other university libraries</p> <p><b>Librarian 7</b> - We do internal training for our staff from time to time in addition to association workshops</p> <p><b>Librarian 8</b> - The people who installed Koha helped with initial hands on training</p> <p><b>Librarian 9</b> - We give hands on in-house training and also staff benefit from periodical workshops</p>
Workshops	<p><b>Librarian 1</b> - We take advantage of all the association we belong to and attend their training programmes</p> <p><b>Librarian 2</b> - We also attend other workshops</p> <p><b>Librarian 3</b> - Once a month we participate in virtual training by vendors and we take part in local training programmes</p> <p><b>Librarian 6</b> - We have regular training internally and also take advantage of GLA and CARLIGH trainings, we have also benefited from some collaborative training programmes with other university libraries</p> <p><b>Librarian 7</b> - We do internal training for our staff from time to time in addition to association workshops</p> <p><b>Librarian 8</b> - We send our staff for training organized by library association and other institutions</p> <p><b>Librarian 9</b> - We give hands on in-house training and also staff benefit from periodical workshops</p>
Virtual Training	<p><b>Librarian 3</b> - Once a month we participate in virtual training by vendors and we take part in local training programmes</p>

**Table 6.** Training for IT staff.

Themes	Responses
Self-training /workshops	<p><b>Librarian 2</b> - I do attend training to enhance my skill and also read on the IS to see how best I can develop them</p> <p><b>IT 1</b> - What I do is to go the vendor's site and learn about the software There has been a number of international opportunities to help train us on the IS</p> <p><b>IT 2</b> - What I do is to read around the library systems regularly and also watch YouTube videos to keep myself on top of my task. I have also participated in some training programmes</p> <p><b>IT 3</b> - With regards to training, I attended a few workshops; I do a lot of self-training with online resources and forums</p> <p><b>IT 4</b> - I am still reading and learning from communities that are using it to help advance on what is done in the library currently, I have also attended a few local workshops</p> <p><b>IT 5</b> - I have benefited from some local workshops and we read around to help enhance the system</p>
Vendor support	<p><b>IT 1</b> - I also use the virtual classroom of the developers to train for the job. So far I have participated in about 3 administrative training sessions</p> <p><b>IT 5</b> - And also because we are on a proprietary software, we receive vendor support for the LMS</p>

With regards to training, all the librarians acknowledged that their staff are given training on IS before and after the installation. The most used methods of training as shown in Table 5 are in-house training (eight responses), workshops and seminars (seven responses) and virtual training (one response).



**Figure 5.** Prompt response to system challenges and breakdowns (n=149).

**Training for IT staff**

Responses with regards to training for IT officials and the system librarian, indicate as can be seen in Table 6, that all of them depend on self-training and local workshops. Only two benefit from vendor support.

**Response time to system failure**

Respondents were to rate how promptly system challenges and breakdowns are attended to. Responses to the two statements show that, 55 (36.9%) of the respondents agreed or strongly agreed that challenges are attended to promptly, while a total of 47 (31.5%) disagreed or strongly disagreed. Responses to IS breakdowns being attended to promptly revealed that 48 (32.2%) agreed or strongly agreed and a higher number of respondents 54 (36.3%) disagreed or strongly disagreed. Details are reflected in Figure 5.

**Evaluation of IS**

When asked if the IS have ever been evaluated, only two (2) librarians acknowledged evaluating the system. As method of evaluation, one (1) library generated data from the IS while the other used student surveys. The outcomes of both evaluations lead to the purchase of more equipment and one library had to work on internet stability. Table 7 contains detailed responses.

**Discussion**

Findings are discussed under the themes; type of IS use in academic libraries in Ghana, funding and institutional support, availability of IS policy, information provision before and after IS installation, provision of resources, system

**Table 7.** Evaluation of is (n = 9).

Themes	Method of Evaluation	Outcome	Responses
<b>IS not evaluated</b>			<p><b>Librarian 1</b> - <i>The library IS have never been evaluated. Since I assumed this role, the library IS have never been evaluated. But I think it will be good to do that so that we will know if the systems are performing well or not and if it is detected that training is required that will be done. It is important to do that.</i></p> <p><b>Librarian 2</b> - <i>I have never evaluated the IS but Destiny has been proven as a robust system. Other universities have used it. There is a track record and we bought a standard one 2011 and no extra cost was involved a part of the cost of the software.</i></p> <p><b>Librarian 3</b> - <i>We are still setting it up. We have not taken much statistics yet. But I know Koha can generate reports which can be used to evaluate the system so long as we have internet</i></p> <p><b>Librarian 4</b> - <i>I have not done any formal evaluation. But I can say that Koha has served as well. Destiny was a bit complex to use though destiny could do more than Koha</i></p> <p><b>Librarian 5</b> - <i>The performance of Destiny was never evaluated</i></p> <p><b>Librarian 6</b> - <i>We never did any formalized evaluation</i></p> <p><b>Librarian 8</b> - <i>We have never evaluated the IS, but I expect Koha to perform certain functions for us so if I log on to the system and it is not functioning well it means the system is not meeting my needs</i></p>
	<b>IS evaluated</b>	Through data generation	Purchase of equipment
	Survey of students	Purchase of equipment stable internet	<p><b>Librarian 7</b> - <i>We started some sort of evaluation, we tried finding out if Koha will be convenient for use for the students, from the evaluation we noticed we needed a dedicated PC for people to use and then we also looked at internet service to determine how well the Internet can support our system.</i></p>

maintenance activities, training of staff, response time to system failure and evaluation of IS.

This study provides evidence that one of the major flaws in IS management in academic libraries in Ghana is lack of routine evaluation and delayed response to system failures. The researchers are therefore recommending that library managers and IT staff should therefore liaise and carry out IS evaluation at least two times in a year. They should also put in all effort to ensure that there is minimum system down times in libraries, alert users anytime such issues occur and respond to request promptly.

User engagement is an essential component of IS management. This can be done through information provision and training. It is evident from the findings that information provision and training were both regarded not

enough though essential to IS use. Information provision on IS throughout the various stages of its development, use till the end of its lifetime is very important. Library staff should be engaged as major stakeholders of library IS issues. Their input should be solicited before, during and after the installation of the IS.

Likewise, training of both library and IT staff in the use of IS for specific library functions should be made a priority in libraries as this will enhance the skill of staff to use and appreciate the systems.

### **Type of IS use in academic libraries in Ghana**

Findings reveal that the libraries studied use IS to support different activities; information resource management with the use of LMS and DAM; website and social media for marketing of library resource and services; CCTV and 3 m security system to ensure safety of resources and Ezproxy, Libguide and Discovery to promote accessibility of available resources. The adoption of different IS in academic libraries in Ghana to automate their routine activities is an effort to make library process efficient as intimated by Boddy, Boonstra, and Kennedy (2005) as reason for developing and adopting IS.

### **Funding and institutional support**

IS projects are expensive and therefore enough budgetary provision must be made even if the IS is an open source to cater for the purchase of equipment. The optimum utilization of any IS is based on the reality that the IS and equipment to aid its use are made available and this cannot be done without financial resources. In ascertaining the source of finance and how willingly university management supports an IS project, it came to fore that, all nine libraries depend on internal funding from their institution for their IS projects. Seven of the libraries which are all private universities, solely depend on internal funding. The two public university libraries receive external support through grants for their IS projects in addition to the internal funds received from their institutions.

Four of the librarians however indicated that though IS projects are to be funded internally, they lack institutional support from the university management directly leading to delays in providing funding. The 44.4% of librarians lacking institutional support and finance regarding installed ISs confirm the assertion of Tella, Edward, Akanbi-Ademolake, and Akande (2021) that many libraries lack finance to run IS projects effectively. Lack of acceptable institutional support and finance is likely to affect the acquisition of required equipment and maintenance of the IS which will then affect the quality of the information system.

Lack of finance in support of IS projects in Ghana and other African countries is as well documented in existing literature such as Amekuedee (2005); Boateng,

Agyemang, and Dzandu (2014) as well as Thompson and Pwadura (2014). This situation puts pressure on managers to ensure the smooth running of the systems because without financial support, it is difficult to provide the essential resources and service support needed for the IS.

### **Availability of IS policy**

An IS standard or policy is a document approved by top management of an organization that provides information on the type of IS that should be used in the organization, the services that the IS support, level of authorization for use, resource provision, measures to ensure effective use among others. The policy serves as the yardstick in ensuring IS quality and employee IS as recommended by Bharati and Berg (2003) as managerial activities to help in seamless use of IS for service delivery.

Data collated on the responses on the availability of IS policy show that 41.6% of the respondents indicated that their libraries have an IS policy, 41.6%, a strategic plan and 41.7% an IS standard. This was corroborated by qualitative data from heads of libraries indicating four (44.4%) libraries having an IS policy. This is in line with the assertion of Anisimov and Reshetnikov (2011) that management of an IS is not well structured in organization and corroborates the finding of Makori (2013) and Mutula (2004) that in parts of Africa, a number of libraries lack IS or ICT policies. The lack of a policy or lack of awareness of existing IS policies demotes the efficient use of the IS due to the absence of guidance on usage in general and for specific purposes.

### **Information provision before and after IS installation**

Effective utilization of IS in organizations is determined by the amount of information provided to staff before and after the installation thereof as information enables staff to understand the role of the IS in the organization, how it promotes the objectives of the organization and to see the systems as their own (Baker, 2008). It is therefore essential for every management to provide all needed information to staff before the IS is installed and when changes are made. Data from questionnaires reflect that 26.8% of respondents were consulted before the installation of the IS, while 38.9% were educated on the impact of the IS on their jobs. Thus, information provision on or about the IS before installation was scored very low. This confirms Mutula (2004)'s earlier finding that library staff in Africa did not receive enough information on IS initiatives in their libraries.

Likewise, information provision after installation of IS was provided to 31.5% of respondents when problems about the IS were discussed and 26.9% when their views on improving the IS were solicited. This means that the majority of the users of the IS in academic libraries in Ghana are not part of the

feedback loop proposed by Beynon-Davies, Owens, and Williams (2004) as an essential element of a successful IS.

### **Provision of resources**

Operating infrastructure is one of the IS management dimensions recommended by Bajgoric (2006). This is to enable enough provision of both technical and human resource for any IS project. Without these elements, the IS implementation strategy is weak and will lead to system down time and ultimate failure. Both quantitative and qualitative data to determine the availability of resources to run the IS were collected. The quantitative data showed that 49.7% and 38.9% of respondents confirmed the availability of qualified IT staff and required equipment respectively. This is in contrast to Skretas' (Skretas, 2005) prerequisite of resource provision as an internal factor for effective IS use. Insufficient provision of both technical and human resource for running IS in academic libraries in Ghana is possibly as a result of lack of finance and institutional support as noted in this study.

### **System maintenance activities**

Boddy, Boonstra, and Kennedy (2005) indicate that it is essential to ensure the quality of an IS through regular maintenance. To determine maintenance carried out by the libraries studied, three factors were enquired about in the quantitative data. The first was on updating of the IS which revealed scores below 40% with regards to current versions being installed and the IS as well as computers and other devices regularly maintained. This is confirmed by the data from the interview with IT heads which indicated only 50% of them carry out updates regularly. Results are contrary to findings of Mugridge and Poehlmann (2015) reflecting library staff being satisfied with maintenance work on the IS, but confirms the opinion of Gbadamosi (2012) that most IS lack routine maintenance. Once the systems are not updated regularly, their original quality is lost affecting the use of the system and the quality of the information generated.

Training was considered by the researchers as an element of system maintenance as efficient use of the system will largely be determined by how well-trained staff are in the use thereof. Responses revealed that training in general received low priority among the libraries studied. Only 30.9% of respondents intimated they were trained to their satisfaction before the installation of the IS, 33.5% receive refresher training regularly and 34.9% are trained when the system is upgraded. The lack of sufficient training should be a major concern for library managers as there is enough evidence in the literature proving African library staff's lack of necessary skills in the use of ICT (Amekuedee, 2005; Boateng, Agyemang, & Dzandu, 2014; Thompson & Pwadura, 2014).

In contrast, the head librarians denoted training their staff before IS installation and after installation through in-house training, workshops and seminars. The quantitative data on training from the questionnaires is therefore contrary to qualitative data collected during interviews with head librarians. It can therefore be concluded that though staff are provided with some training opportunities, the amount of training is not considered enough to enable them to use the system independently and maximally. This is also evident from the interviews with IT heads who pointed toward being dependent on self-training and workshops to enhance their library IS project skills.

Wu and Wang (2006) listed level of stability and IS response time as factors that affect the quality of IS. It is therefore essential that, librarians and IS managers in libraries must take all necessary steps to stabilize the IS environment all the time. In rating how promptly IS managers attend to the difficulties and challenges encountered with IS use, only 36.9% of respondents rated the response above average while only 32.2% rated responses to system failure above average. The inability of IT staff to promptly respond to system challenges could possibly lead to negative impact on IS use as stipulated by Rafique et al. (2021) and Izuagbe (2021). This finding gives room for worry and should call on both library managers and IT staff to see IS management in libraries as a common responsibility Fattahi and Afshar (2006), Baker (2008) and Skretas (2005).

Though Marnewick (2017) recommended regular IS benefit analysis to determine if an IS is performing as expected, this activity is basically lacking in academic libraries in Ghana as only two of the libraries have ever carried out an evaluation exercise on their IS. Thus, majority of the IS projects lack postmortem analysis of the system, a process Beynon-Davies, Owens, and Williams (2004) proposed to be used to modify the system. The low level of evaluation component of IS maintenance is an indication that both head librarians and IT staff have not taken the management components of IS as a serious task because without proper evaluation, no one can ever determine if an IS generating the required value for which it was implemented.

## Conclusion

IS adoption and use in libraries have become an essential part of the library processes. IS are investments to the library and the clientele to help attain user satisfaction on the parts of both staff and users. Libraries cannot achieve this ultimate aim of IS adoption without prudent management processes in place.

This study revealed the nature of management practices carried out in academic libraries in Ghana and brought to fore that most Ghanaian academic libraries do not have an IS policy and do not perform enough maintenance activities to ensure the effectiveness of the IS. Managements of the institutions have not put enough measures in place to ensure availability of both technical and human resources to aid the effective use of the IS. Information provision

to library staff on IS issues and training opportunities to equip staff to utilize the IS were deemed inadequate.

### **Recommendations**

An IS policy is very essential in any organization that utilizes one IS or the other in order to provide acceptable guidance and managerial support for effective implementation and use of IS. IS standard or policy in fact is a must have for every organization in the 21<sup>st</sup> century due to the fact that IS has become the mode of service delivery in all organizations. The study revealed that majority of the libraries do not have an IS policy, the researchers therefore recommends that every library should adopt an IS policy to ensure that IS are properly managed to enhance their efficiency and user satisfaction. Sufficient awareness of existing IS policy should also be created.

Financial provision for IS is a major investment in every library. Lack of finance has been noted a major challenge in this study. The availability of funds directly affect resource provision for IS use. Ghanaian academic libraries should therefore prioritize IS projects in their budgetary allocations. Head librarians should take initiatives to lobby senior management to see the need for IS investment, seek external source of funding through grants and partnerships with donor agencies.

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## APPENDIX A: QUESTIONNAIRE

Dear Respondent,

This questionnaire seeks to solicit your views for a PhD degree at the Department of library and Information Science, University of the Western Cape on the topic: USE AND MANAGEMENT OF INFORMATION SYSTEMS (IS) IN ACADEMIC LIBRARIES IN GHANA.

A consent form from the University of the Western Cape has been provided to solicit your consent to participate in this research. Kindly note that by completing the form you agree to take part in this study.

You are assured that all responses will be strictly used for academic purposes and your responses will be treated with confidentiality.

Please do not indicate your name on the questionnaire

Thank you for your cooperation.

**Patience Emefa Dzandza**

pedzandza@ug.edu.gh

### Section A: Background of Respondent

1. In which of the following libraries do you work?  
a. UG   b. KNUST   c. Central   d. VVU   e. WUC   f. PUC   g. Ashesi  
h. MUC   i. RUC
2. Which staff rank do you belong to?  
a. Senior staff   b. Senior member
3. What is your highest level of education?  
a. Diploma   b. Bachelors   c. MA/MSc   d. MPhil   e. PhD
4. In which section of the library do you work?  
a. Reference   b. circulation   c. cataloging   d. acquisition   e. electronic support  
f. Other .....
5. What is your knowledge level of ICT in general?  
a. Excellent   b. Good   c. Average   d. Poor   e. Very poor
6. What is your knowledge of ICT applications in libraries?  
a. Excellent   b. Good   c. Average   d. Poor   e. Very poor

### Section B: Use of Information Systems

7. Do you use the library management system to perform any functions?  
a. Yes   b. no
8. If yes, which functions do you use the library management system to perform? You may choose more than one.  
  
a. Acquisitions  
b. Cataloging  
c. Circulation  
d. Course Reserves  
e. OPAC  
f. Serials management  
g. Other .....

8b. Describe briefly how you use the system to perform the functions in 8 above  
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9. Do you have a line supervisor?

a. Yes b. no

10. Do you generate information with the library management system for your supervisor?

a. Yes b. no

11. If yes, what type of information do you generate with the system?

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12. Do you use a word processor (Microsoft word) for your daily office activities?

a. Yes b. no

13. If yes, please indicate what specifically you use it for

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14. Do you use database tools (Microsoft Access) for your daily office activities?

a. Yes b. no

15. If yes, please indicate what specifically you use it for

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16. Do you use spreadsheets (Microsoft Excell) for your daily office activities?

a. Yes b. no

17. If yes, please indicate what specifically you use it for

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18. Do you use presentation tools (Microsoft PowerPoint) for your daily office activities?

a. Yes b. no

19. If yes, please indicate what specifically you use if for

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20. Please indicate any other office suite you use in your official line of duty and what you use it for .....

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1. Do you use Twitter for you daily office activities?

a. Yes b. no

22. If yes, please indicate what specifically you use it for

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23. Do you use Facebook for you daily office activities?

a. Yes b. no

24. If yes, please indicate what specifically you use it for

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25. Do you use LinkedIn for you daily office activities?

a. Yes b. no

26. If yes, please indicate what specifically you use it for

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27. Do you use Xing for you daily office activities?

a. Yes b. no

28. If yes, please indicate what specifically you use it for

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29. Do you use Google+ for you daily office activities?

a. Yes b. no

30. If yes, please indicate what specifically you use it for

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31. Do you use Snapchat for you daily office activities?

a. Yes b. no

32. If yes, please indicate what specifically you use it for

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33. Do you use Tumblr for you daily office activities?

a. Yes b. no

34. If yes, please indicate what specifically you use it for

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35. Do you use YouTube for you daily office activities?

a. Yes b. no

36. If yes, please indicate what specifically you use it for

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37. Do you use WhatsApp for you daily office activities?

a. Yes b. no

38. If yes, please indicate what specifically you use it for

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39. Please indicate any other social media tool you use in your daily official work and what you use it for .....

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40. What specific information system do you use **MAINLY** in your work duties?

- (a) Library Management System
- (b) Library Service platform
- (c) Digital Asset Management System (eg. DSpace)
- (d) Content Management System (eg. LibGuide)
- (e) Office Suite
- (f) Social Media
- (g) Institutional E-mail
- (h) Other .....

**Please evaluate the IS you indicated in question 40 with comments and scale from all the sections below:**

**Section C: Personal impact of IS use in library**

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
41. I have learnt much through the presence of the IS					
42. The IS enhances my awareness and recall of job related information					
43. The IS enhances my effectiveness on the job					
44. The IS increases my productivity					

45. Please provide reasons for the responses you provided in section C .....

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**Section D: Information-Quality**

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
46. Information available from the IS is important for decision making					
47. The IS provides output that seems to be exactly what is needed					
48. Information needed from the IS is always available					
49. Information from the IS is in a form that is readily usable					
50. Information from the IS is easy to understand					
51. 52. Information from the IS appears readable, clear and well formatted					
52. Though data from the IS may be accurate, outputs sometimes are not					
53. Information from the IS is concise					
54. Information from the IS is always timely					
55. Information from the IS is unavailable elsewhere					

56. Please provide reasons for the responses you provided in section D .....

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**Section E: System Quality**

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
57. Data from the IS often needs correction					
58. Data from the IS is current					
59. The IS is missing key data					
60. The IS is easy to use					
61. The IS is easy to learn					
62. It is often difficult to get access to information that is in the IS					
63. The IS meets my unit's requirements					
64. The IS includes necessary features and functions					
65. The IS always does what it should					
66. The IS user interface can be easily adapted to one's personal approach					
67. The IS system is always up-and-running as necessary					
68. The IS system responds quickly enough					
69. The IS requires only the minimum number of fields and screens to achieve a task					

70. Please provide reasons for the responses you provided in section E . . . . .  
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**Section F: Management Support**

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
71. There is a strategic plan regarding IS use and management in the library					
72. There is a policy regarding IS use and management in the library					
73. There is a standard regarding IS use and management in the library					
74. Staff are consulted before IS are procured and installed					
75. Staff are informed and educated on the impact the IS can have on their job performance and overall library output					
76. Staff views are solicited on how to improve the use of IS in the library					
77. The management encourages using the system and appreciates the optimal use of the system to meet its goal					
78. The management discusses problems regarding the system					
79. Qualified IT staff have been employed					
80. All the necessary computing devices needed to utilize the IS have been provided					

81. Please provide reasons for the responses you provided in section F . . . . .  
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**Section G: Maintenance**

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
82. The library has installed the current version of the IS I use in my line of duty					
83. Information from the IS is up-to-date.					
84. I received adequate training on the use of the IS before its installation or before I assumed duty					
85. I receive refresher training on the use of the IS					
86. I am trained any time the IS is updated or changed					
87. Regular maintenance work is carried out on the IS					
88. Regular maintenance work is carried out on computers and related devices					
89. When I encounter challenges with IS I am attended to promptly once I call for help					
90. When there is a system break down, the IS unit responds promptly					

91. Please provide reasons for the responses you provided in section G .....

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**Section H: use and future use of IS**

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
92. I always do my job using the IS.					
93. I find the IS is available and flexible to always use.					
94. I have enough training to continue using the IS					
95. I will need more training if I want to use the system to the optimum					

96. Please provide reasons for the responses you provided in section H .....

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**Section I: Challenges encountered with IS use**

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
97. The library experiences regular system downtime or failure					
98. The IS is usually slow					
99. We lack modern IT equipment					
100. I have inadequate IT skills and this hinders my efficient use of the IS					

(Continued)

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
101. I received insufficient training on the use of the IS and this hinders my efficient use of the IS					
102. Most of my colleagues have insufficient IT skills and this hinders the cooperate use of the IS					
103. There is a lack of qualified IT staff to provide support services					
104. We experience regular downtime from our Internet service provider					
105. We have insufficient bandwidth					
106. We experience regular Power outages/surges					

107. Please provide reasons for the responses you provided in section I . . . . .

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108. Please specify any other challenges you experience with the use of IS in your line of duty: . . . . .

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109. Please indicate what should be included/what librarians would like to see in an envisaged national IS standard for Ghana

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110. Please feel free to provide any other comment

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## **APPENDIX B: INTERVIEW SCHEDULE FOR LIBRARY HEADS**

1. What types of IS are you using in your library?
  - LMS
  - ILS
  - DAM
  - CMS
  - Electronic Security System
  - Social media
  - Office Suite
  - Others .....
2. What are the main reasons of adopting such systems?
3. Do you use any open source IS? Why?
4. What informed the choice of the specific ISs you are using?
5. When were the systems implemented?
6. Can you give a little historical background to the implementation of the systems?
7. Did you have the support of you institution regarding the use of ISs?
8. Did you receive enough funding for the implementation of the systems?
9. What was the source of funding?
10. Have you ever changed your library management systems? Why or why not?
11. What was the intended purpose for implementing the specific ISs?
12. What specific functions do you use the ISs to perform?
13. Do you think your staff have the required ICT skills to use computerized system?
14. What benefits have the library gained from the use of the specific IS?
15. Has the use of the IS enhance staff performance? Explain?
16. Are the expectations of the library regarding the use of ISs being met?
17. How do you ensure the ISs are being used for the specific reasons for which there were acquired?
18. How do you measure the performance of the ISs?
19. Has the use of the ISs ever been evaluated?
20. How was the evaluation done?
21. What were the results of the evaluation
22. Has the performance of the IS ever been evaluated?
23. How was the evaluation done?
24. What were the results of the evaluation
25. Do you have an IS management policy in place? Give reasons
26. What factors will you want an IS management policy to address?

27. In your opinion, do you think your staff are happy using the system and do you think they will like to continue using it? Please provide reasons, supply reasons
28. If not, which system(s) would they prefer?
29. What type of training was given to staff with regards to the use of the IS?
30. Are there continues training programmes?
31. What forms do they take?
32. What are the challenges encountered with the use of IS in your library?
33. Any other comments?

**APPENDIX C: INTERVIEW SCHEDULE FOR IT HEADS**

1. What type of IS do you have in the library?
  - LMS
  - ILS
  - DAM
  - CMS
  - Electronic Security System
  - Social media
  - Office Suite
  - Others .....
2. Are the systems cloud base or hosted on local servers?
3. Are all the systems and data from the different system integrated fully and consistent? How?
4. With regards to the Library management system, which modules in the system are you using?
5. Have you been able to integrate the library management system into the university’s wide information systems? If yes how?
6. What services do you provide as a library from the library website
7. How do you use the library website to enhance service delivery?
8. From your professional point of view, do you think the library is making maximum use of the IS available? Why?
9. Does the library have enough equipment to run the system fully?
10. How often do you experience system breakdowns?
11. What are the causes of such down times?
12. What do you understand by IS maintenance as an IT professional?
13. How do you improve the IS?
14. How often do you carry out maintenance work?
15. How do you think the use of the system can be improved?
16. What forms of training did you and other library staff receive regarding the use of the IS?
17. What challenges do you encounter with the system?
18. Any other comments?