Library Philosophy and Practice (e-journal)   Libraries at University of Nebraska-Lincoln

2021

Information Systems Evaluation in Ghanaian Academic Libraries Using DandM IS Success Model

Patience Emefa Dzandza Ocloo Dr.
University of Ghana, pedzandza@ug.edu.gh

Lizette King Dr.
University of the Western Cape, lking@uwc.ac.za

Information Systems Evaluation in Ghanaian Academic Libraries Using DandM IS Success Model

Abstract

The use of Information Systems (ISs) has been widely accepted and proven to increase the service quality in many organizations. Academic libraries have embraced the use of ISs and have implemented them to perform different activities. The efficient utilization and management of ISs in libraries will help libraries to derive maximum benefit from adopted ISs. The researchers therefore used the DeLone and McLean IS success theory to determine the impact of IS management on the quality of the IS and the use of the IS. The researchers solicited responses using questionnaire from all the staff members who use any electronic system in libraries that were purposively selected. The research revealed that the management of ISs affects the quality thereof. Quality of ISs affects use, and use affects the benefits gained from use.

Keywords

DandM IS success model, Information system, system evaluation, academic libraries, Ghana, information systems management

1.0: Introduction

Information Systems (ISs) 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 ISs (Boddy *et al.*, 2005). In the service sector, it is important to improve or maintain quality service. This can be done by ensuring that ISs are always functioning to the optimum. It therefore calls for IS managers in organizations to constantly manage ISs (Bharati and Berg, 2003).

It is necessary to note that, though major industries - including libraries - have invested much capital into the development and acquisition of ISs Maguire (2002) to transform service provision Ashish Rao *et al.* (2018), with studies even looking at the application of artificial intelligence in libraries Bagchi (2020), most of the ISs installed in organizations have been heavily underutilized Maguire (2002), others have not yielded the maximum output desired Ravichandran and 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 *et al.*, 2005).

Also, there is a research gap in existing literature from Africa on how the information systems implemented in libraries are used. Though some works have been done on library automation and its impact on academic libraries such as; Boateng, Agyemang, and Dzandu (2014), Thompson and Pwadura (2014), Mutula (2012), Adanu (2006), Adogbeji and Adomi (2005), Amekuedee (2005) and Garcha and Buttlar (1996). This study, therefore, sought to determine the effect of management of IS on use in Academic libraries in Ghana using the DeLone and McLean Information Systems Success Model by formulating the following hypotheses:

1

- H1 Management of an IS affects the quality of an IS in academic libraries in Ghana

- H2 The quality of an IS affects the use of the IS in academic libraries in Ghana

- H3 IS use affects service provision in academic libraries in Ghana

- H4 Challenges affect the use of an IS in academic libraries in Ghana

2.0: The DeLone and McLean Information Systems Success Model

A number of abbreviations have been used to refer to the DeLone and McLean Information Systems Success Model in the existing literature. Major ones include the DMSM Moturi and Mbiwa (2015), DandM information systems success model Bernroider (2008), ISSM Chen *et al.* (2016), DandM IS success model (Hossain, 2016) and (Fleischman *et al.*, 2010). To ensure consistency, the researchers are using 'DandM IS success model' as the preferred term.

In 1992, DeLone and McLean developed a framework for conceptualizing and operationalizing IS success. It was based on theoretical and empirical IS research done and published by different researchers between 1970s and 1980s, the communication research of Shannon and Weaver and the information 'influence' theory of Mason. This they illustrated in 2003 in Fig 1.
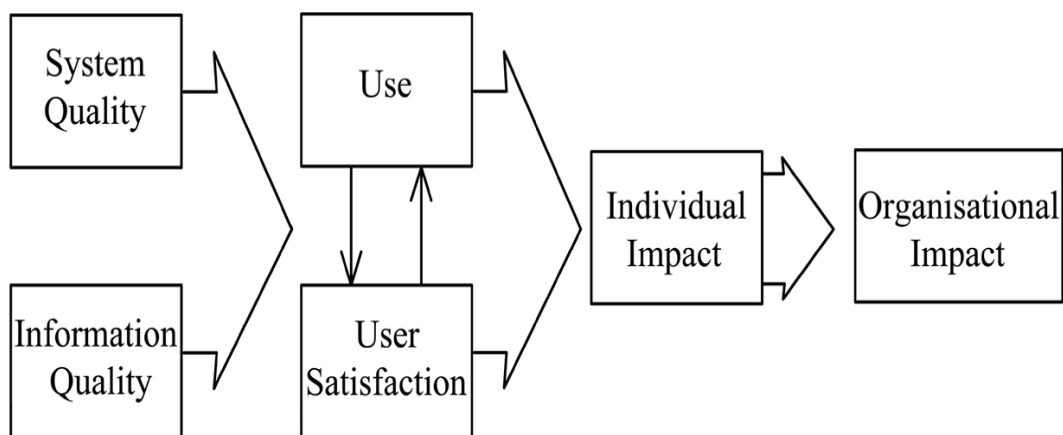
Fig 1: DandM IS Success Model

In 2003, DeLone and McLean updated the original success model based on research contributions since the publication of the original model, and this is based on changes in the role and management of information systems.

The updated DandM IS success model, as shown in Figure 2, consists, according to Delone and Mclean (2004), of six interrelated dimensions of information systems success which were explained by Delone and Mclean (Delone and McLean, 2003);
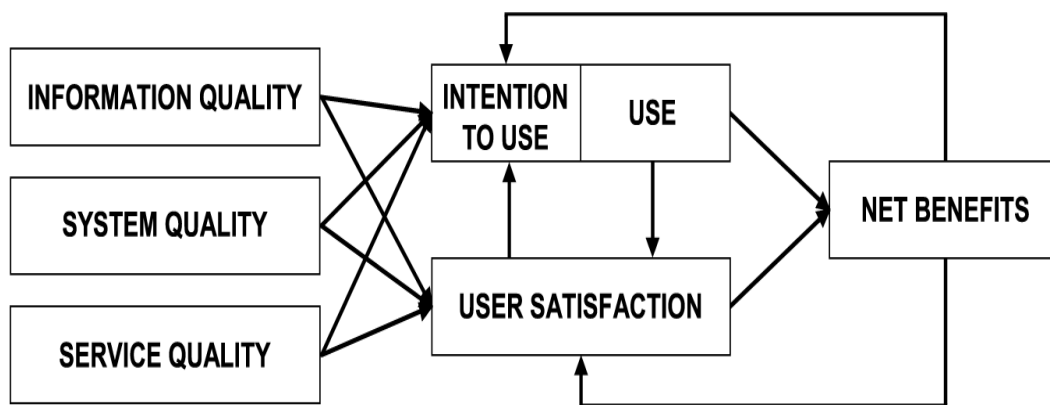
Source: DeLone and McLean (2003)

Fig. 2: The updated DandM IS Success Model

'System quality', the required features of an IS; usability, availability, reliability, adaptability and response time are what users will expect from an IS

'Information quality': the content of an IS; IS content should be made personal, complete, relevant, easy to understand, and secured.

'Service quality', encompasses all the services provided by the vendor and the IS department.

'Usage' measures the extent to which users interact with the IS including visit to a Web site, navigation within the IS, through information retrieval to execution of a transaction.

'User satisfaction': this relates to the entire experience of users from logging onto an IS till the end of their transaction.

'Net benefits': the concept of benefit comprises issues such as; what benefit is, who gains the benefit and the level at which benefit is determined.

3.0: Application of the DandM IS success model in this research

For the purpose of this study the variables in the model will be adopted to mean;

'System quality', the desired characteristics of the specific IS that are used in the libraries selected for this study. Specific qualities to look out for will include usability, availability, reliability, adaptability and response time.

Information quality': the content of data in the different IS used in the libraries selected for this study. Specific qualities to look out for will include IS content customization, completeness of data and information, relevance of content and whether or not content is easy to understand and are secure.

'Service quality', will be determined by the support services provided by vendors of IS, Internet and other IS/IT service providers and technical support from the IS department.

'Usage' by staff accessing any of the IS of the libraries to perform any official transaction eg; cataloguing, retrieval of information, posting announcement etc.

'Net benefits': the benefit will be determined using staff and the outcome of the use of the different IS to the individual staff and the net benefit to the libraries.

The researchers added the variable management: all the internal organizational strategies put in place to ensure IS functions appropriately.

This theory, though criticized by researchers on the premise that the concept 'system use' is not an appropriate IS success measure Wu and Wang (2006) and that the model concentrate on the evaluation of just a particular stage of the IS development Leem and Kim (2004), is very relevant to this study as it is situated within the objectives of the study. The model is used to determine how management of IS in academic libraries led to quality information systems, quality information and quality services. It is further used to determine how quality information, system and service led to further usage or non-usage of the system also led to user satisfaction. The model further determines the net benefit the organizations will derive from managing and using the system. The adopted and modified model is illustrated in Figure 3.
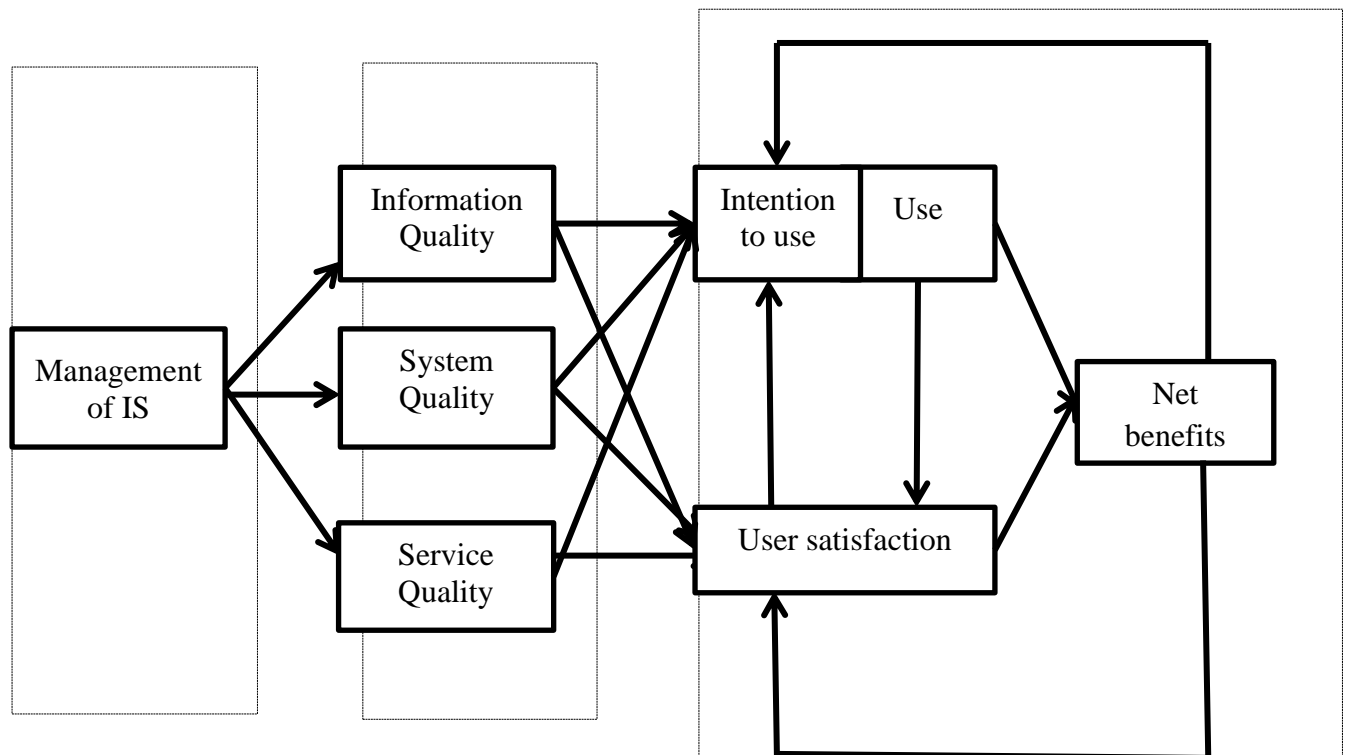
Fig. 3: Adopted and modified updated DandM IS Success model

4.0: Methodology

The researchers purposively selected nine university libraries among the topmost universities in Ghana based on university web ranking and reviews (4international colleges and universities, 2016).

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. This was done to enable the researchers to solicit responses covering every function that is performed in the libraries. A total number of 202 staff excluding library heads were used as respondents to collect quantitative data. Of the 202 questionnaires distributed, 149 were returned resulting in a response rate of 73.7%.

5.0: Findings

5.1: Main IS use by staff

The respondents were asked to indicate the major IS used. The analyzed results show that the majority (83.3%) use Library Management Systems (LMS) as the major IS in their line of duty. Digital Asset Management (DAM) system drew 8.7% of use. Four (2.7%) use Automated finger print indexing system and Springshare reservation system, three (2%) use office suite, another three (2%) use Institutional email, and the last two (1.3%) use a content management system.

5.2: Quality of the information from the IS used by respondents

The researchers assessed the quality of information from the IS used in the libraries by determining; desired output, availability of information from IS and accuracy of output data. Information quality is one of the key components of the DandM IS success theory (Delone and Mclean 2004).

5.2.1: Desired output

In assessing the quality of the information generated by the IS use by the respondents, as illustrated in figure 4, a total of 57% of them strongly agreed or agreed that the IS they use provides the desired output. Thus, indicating that the IS provides output that is exactly what is needed for decision making. However, 22.1% of the respondents strongly disagreed or disagreed that the IS provides them with the desired output.
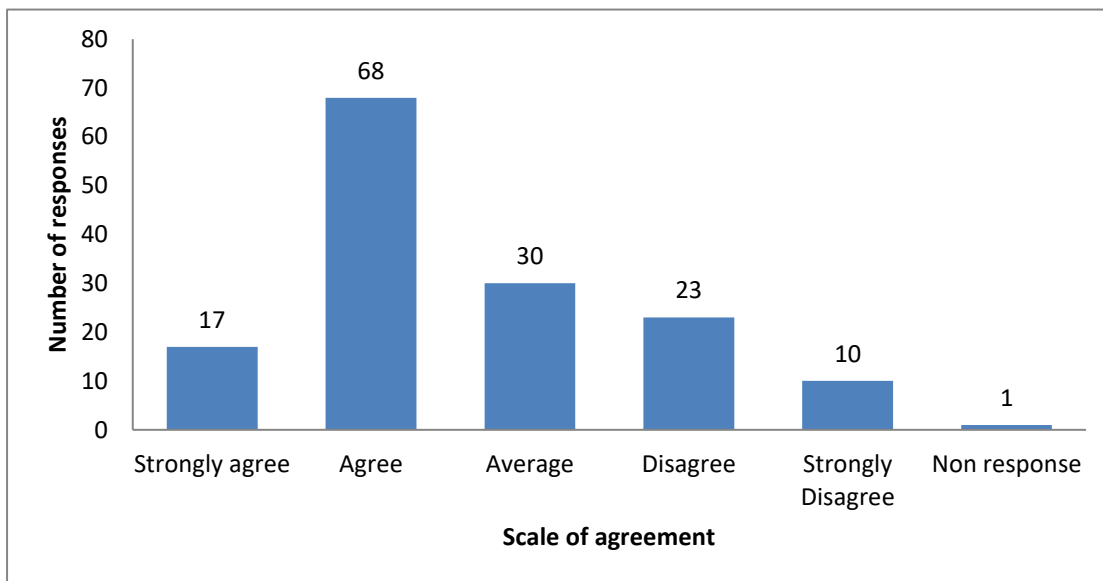
Figure 4: IS provides desired output (n=149)

5.2.2: Availability of information from IS

As shown in table 1, 57.7% of respondents strongly agreed or agreed that information needed from the IS is always available. Only 9.4% strongly disagreed or disagreed. Comparing this data to the data generated on desired information, it can be inferred that, though the IS use by the libraries generate information to some extent, it is not always the desired information to some of the staff.

Table 1: Information from IS always available (n=149)

Level of agreement	Frequency	Percent
Strongly agree	14	9.4
Agree	72	48.3
Average	48	32.2
Disagree	13	8.7
Strongly disagree	1	0.7
No response	1	0.7
Total	149	100.0

5.2.3: Accuracy of output data

In response to rating the accuracy of data received from the IS after accurate input of data, a quite worrying low 49.7% of the respondents indicated accurate data, while 19.4% indicated inaccurate recall. This should be a cause of concern to the managers of the ISs as trust is not reflected and misleading information might lead to wrong decision making. Frequency of responses is illustrated in figure 5.
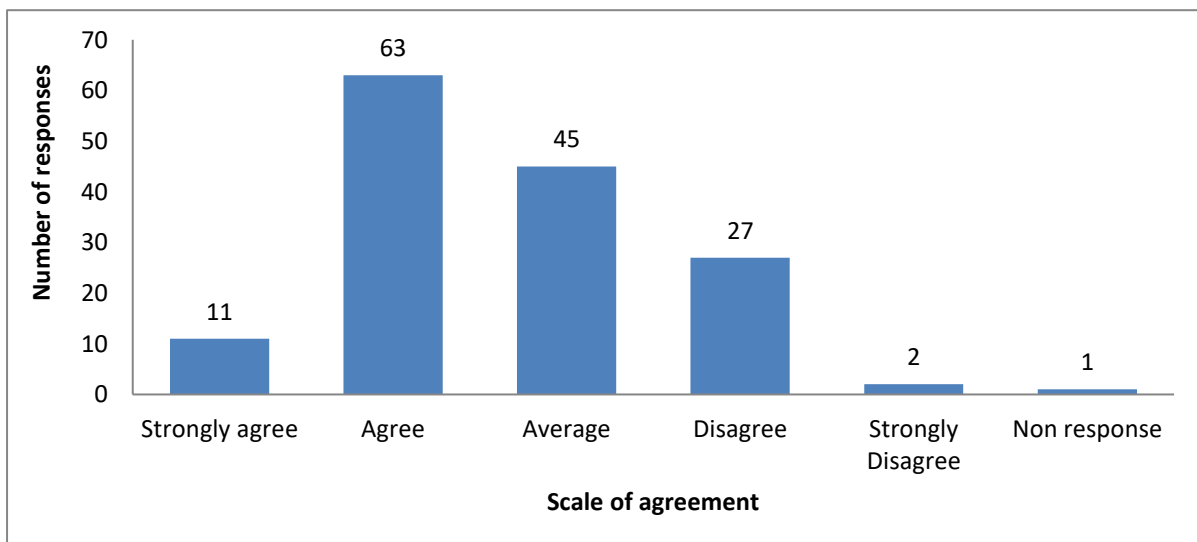
Figure 5: Accuracy of output data (n=149)

5.3: Quality of ISs used by respondents

The research is based on the premise that the quality of an IS affects its use as was indicated in the DandM IS success theory. It was therefore prudent to determine the quality of the ISs used by staff with seven criteria; ease of use, ease of learning the use of the IS, ease of accessing information from the IS, IS meeting unit's requirement, IS includes necessary features and functions, adaptability of IS user interface and IS response time which are all elements identified as factors that make ISs successful.

5.3.1: Ease of Use

In indicating the ease of use, 42.3% rated it as easy to use, 39.6% as not easy to use, while 17.4% didn't express an opinion. The marginal difference of 2.7% is not convincing and should be addressed by system designers. See table 2 for details.

Table 2: Ease of use of IS (n=149)

Level of agreement	Frequency	Percent
Strongly agree	11	7.4
Agree	52	34.9
Average	26	17.4
Disagree	43	28.9
Strongly disagree	16	10.7
Non response	1	0.7
Total	149	100.0

5.3.2: Ease of learning the use of the IS

Indicating how easy it is to learn using the IS, seven (4.7%) intimated they strongly agree that the system is easy to learn, 56 (37.6%) agreed it is easy to learn how to use the system, 34 (22.4%) indicated it is averagely easy to learn how to use the system, however, 37 (24.8%) and fourteen (9.4%) disagreed and strongly disagreed respectively to the statement that is easy to learn how to use the IS. See Figure 6.
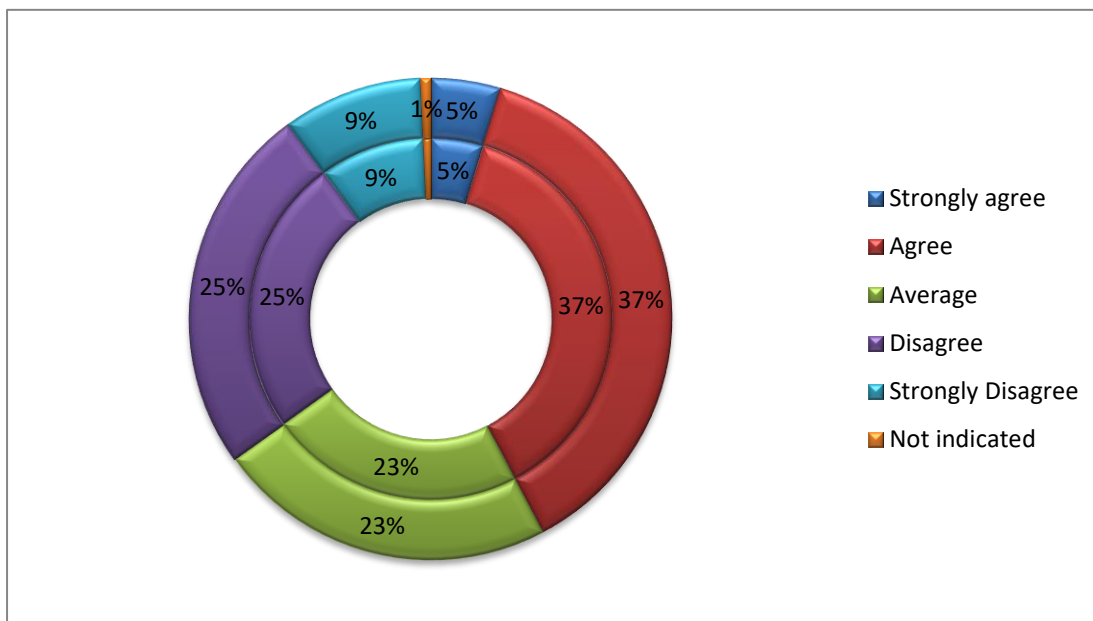
Figure 6: Ease of learning the use of IS

5.3.3: Ease of accessing information from the IS

In determining the ease of accessing information from the IS, the majority (60.4%) of respondents reacted negatively indicating that it is not easy to access information as illustrated in figure 7.
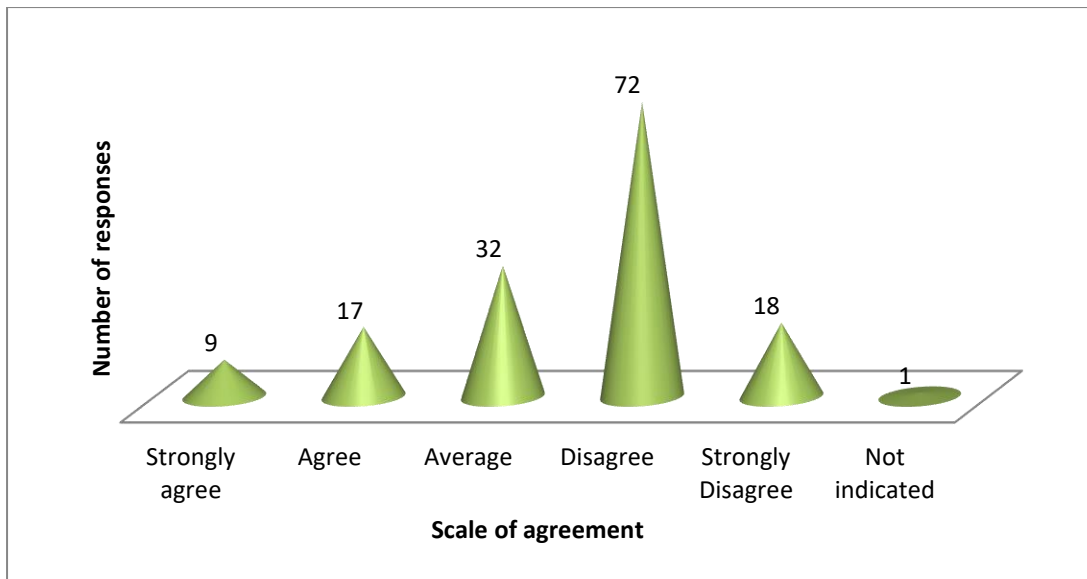
Figure 7: Ease of accessing information from the IS (n=149)

5.3.4: IS meets unit's requirement

The quality of the IS was also judged by its ability to meet the requirements of different library units. Only 45% agreed that the ISs meet their unit's requirements, while 33.6% disagreed. It means that the ISs used in the libraries studied have not been tailored enough to meet the specific needs of the units. This is depicted in figure 8.
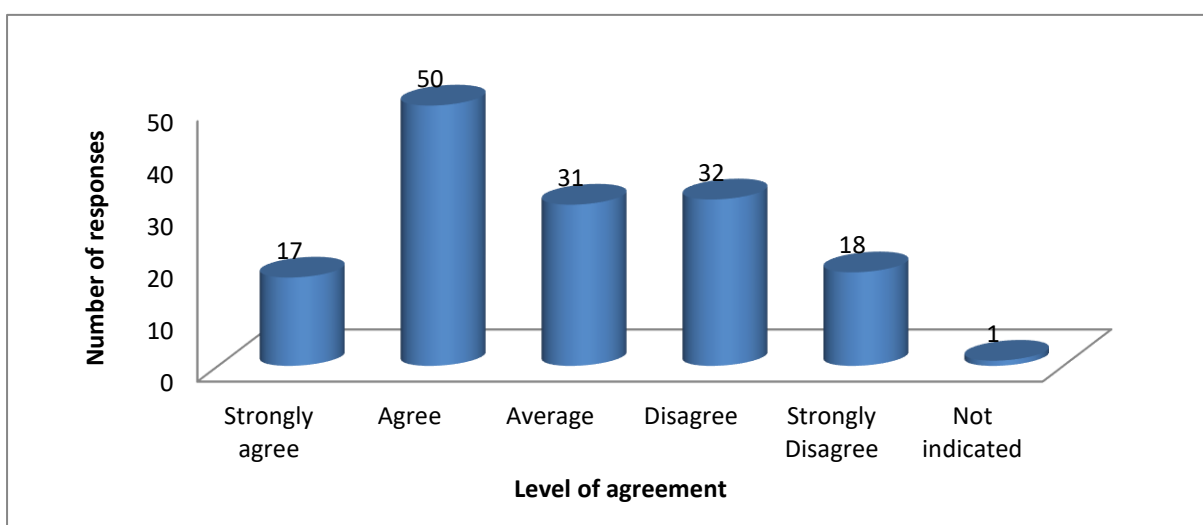
Figure 8: IS meets unit's requirement (n=149)

5.3.5: IS includes necessary features

As shown in Table 3, the majority of the respondents 56 (37.6%) agreed that the IS they use includes necessary features that meet their work schedules and job requirements, while 24 (16.1%) each disagreed and strongly disagreed.

Table 3: IS contains necessary features (n=149)

Level of agreement	Frequency	Percent
Strongly agree	13	8.7
Agree	56	37.6
Average	30	20.1
Disagree	24	16.1
Strongly disagree	24	16.1
No-response	2	1.3
Total	149	100.0

5.3.6: Adaptability of IS user interface

In indicating if the user interface of the IS use can be easily adapted, the responses were dispersed with 45 (30.2%) indicating average, 39(26.2%) disagreed while 38 (25.5%) and seven (4.7%) respectively strongly agreed and agreed. This result is portrayed in figure 9.
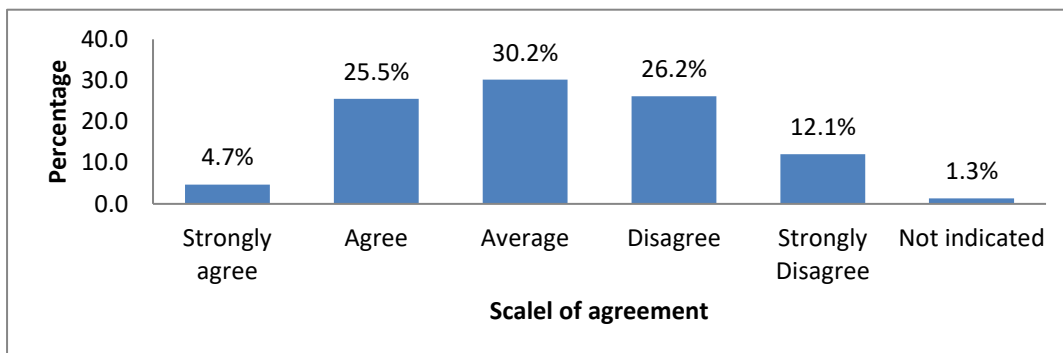
Figure 9: Ease of adapting IS user interface (n=149)

5.3.7: IS response time

Respondents indicated their level of agreement on how quickly the IS responds. Seven (4.7%) strongly agreed, the majority 42 (28.2%) agreed, 38 (25%) indicated average, 39 (26.2%) disagreed while another 20 (13.4%) strongly disagreed. Table 4 shows the results.

Table 4: Quick response of IS (n=149)

Level of response	Frequency	Percent
Strongly agree	7	4.7
Agree	42	28.2
Average	38	25.5
Disagree	39	26.2
Strongly Disagree	20	13.4
No-response	3	2.0
Total	149	100.0

5.4: Management support for IS

To determine the level of support management gives to the use of ISs, ten comments were provided for staff to indicate their level of agreement. For the purpose of analysis, the ten comments have been categorized into three main groups as: availability of strategic plan and policy, information from management to staff regarding IS and provision of resources.

5.4.1: Availability of IS policy

Data collated on the responses to the support respondents receive from management with regards to the use of ISs 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 is shown in table 5.

Table 5: IS plan, policy and standard availability (n=149)

Strategic plan for IS use is available			Policy for IS use is available			Standard for IS use is available		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	15	10.1	Strongly agree	16	10.7	Strongly agree	12	8.1
Agree	47	31.5	Agree	46	30.9	Agree	50	33.6
Average	37	24.8	Average	36	24.2	Average	39	26.2
Disagree	38	25.5	Disagree	35	23.5	Disagree	37	24.8
Strongly Disagree	8	5.4	Strongly Disagree	13	8.7	Strongly Disagree	9	6.0
No-response	4	2.7	No-response	3	2.0	No-response	2	1.3
Total	149	100.0	Total	149	100.0	Total	149	100.0

The lack of a policy or lack of awareness of existing IS policies demote the efficient use of the IS due to the absence of guidance on usage in general and for specific purposes.

5.4.2: Information provision on IS by management

The data gathered reflect that only 26.8% of respondents were consulted before the installation of the IS, while only 38.9% were educated on the impact of the IS on their jobs (see table 6). Likewise, information provision after installation of ISs 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 (see table 7).

Table 6: Information on IS before installation (n=149)

Staff consultation done before IS installation				Staff educated on the impact of IS on their jobs		
Level of agreement	Frequency	Percent		Level of agreement	Frequency	Percent
Strongly agree	7	4.7		Strongly agree	16	10.7
Agree	33	22.1		Agree	42	28.2
Average	31	20.8		Average	36	24.2
Disagree	62	41.6		Disagree	37	24.8
Strongly disagree	14	9.4		Strongly Disagree	16	10.7
No response	2	1.3		No response	2	1.3
Total	149	100.0		Total	149	100.0

Table 7: Information on IS after installation (n=149)

Management encourages and appreciates the use of IS			Management discusses problems with IS with staff			Staff views are solicited to improve IS		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	20	13.4	Strongly agree	14	9.4	Strongly agree	8	5.4
Agree	50	33.6	Agree	33	22.1	Agree	32	21.5
Average	41	27.5	Average	48	32.2	Average	38	25.5
Disagree	25	16.8	Disagree	32	21.5	Disagree	51	34.2
Strongly Disagree	11	7.4	Strongly Disagree	20	13.4	Strongly Disagree	17	11.4
No response	2	1.3	No response	2	1.3	No response	3	2.0
Total	149	100.0	Total	149	100.0	Total	149	100.0

5.4.3: Provision of resources

The data in table 8 shows that only 49.7% and 38.9% of respondents confirmed the availability

of qualified IT staff and required equipment respectively.

Table 8: Availability of resources (n=149)

Qualified IT staff have been employed				Computer devices are available		
Level of agreement	Frequency	Percent		Level of agreement	Frequency	Percent
Strongly agree	22	14.8		Strongly agree	10	6.7
Agree	52	34.9		Agree	48	32.2
Average	32	21.5		Average	38	25.5
Disagree	24	16.1		Disagree	31	20.8
Strongly Disagree	17	11.4		Strongly Disagree	20	13.4
No response	2	1.3		No response	2	1.3
Total	149	100.0		Total	149	100.0

5.5: Maintenance of ISs

Three factors were enquired about in the study. 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. 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. Specific details are outlined in table 9.

Table 9: Updated IS (n=149)

Current version of IS has been installed				IS is maintained regularly				Computers and related devices are maintained regularly		
Level of agreement	Frequency	Percent		Level of agreement	Frequency	Percent		Level of agreement	Frequency	Percent
Strongly agree	11	7.4		Strongly agree	8	5.4		Strongly agree	7	4.7
Agree	48	32.2		Agree	45	30.2		Agree	48	32.2
Average	47	31.5		Average	46	30.9		Average	41	27.5
Disagree	28	18.8		Disagree	32	21.5		Disagree	32	21.5
Strongly disagree	12	8.1		Strongly disagree	15	10.1		Strongly disagree	17	11.4
No response	3	2.0		No response	3	2.0		No response	4	2.7
Total	149	100.0		Total	149	100.0		Total	149	100.0

The second factor considered under maintenance is training. Responses revealed that training in general received low priority among the libraries studied. As shown in table 10, only 30.9% of respondents intimated they were adequately trained before the installation of the IS, 33.5% receive refresher training regularly and 34.9% are trained when the system is upgraded.

Table 10: Training on IS use (n=149)

Adequate training before the installation			Receive refresher training on IS use			Trained any time IS is upgraded		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	8	5.4	Strongly agree	13	8.7	Strongly agree	7	4.7
Agree	38	25.5	Agree	37	24.8	Agree	45	30.2
Average	54	36.2	Average	40	26.8	Average	41	27.5
Disagree	32	21.5	Disagree	37	24.8	Disagree	35	23.5
Strongly Disagree	15	10.1	Strongly Disagree	19	12.8	Strongly Disagree	17	11.4
No response	2	1.3	No response	3	2.0	No response	4	2.7
Total	149	100.0	Total	149	100.0	Total	149	100.0

Thirdly the researchers enquired of how promptly managers attend to IS challenges. In rating how promptly IS managers attend to the difficulties and challenges encountered with ISs use, as shown in table 11, only 36.9% of respondents rated the response above average while only 32.2% rated responses to system failure above average.

Table 11: Prompt response to system challenges and breakdowns (n=149)

Challenges with use are attended to promptly		
Level of agreement	Frequency	Percent
Strongly agree	7	4.7
Agree	48	32.2
Average	45	30.2
Disagree	31	20.8
Strongly Disagree	16	10.7
No response	2	1.3
Total	149	100.0

IS breakdowns are attended to promptly		
Level of agreement	Frequency	Percent
Strongly agree	10	6.7
Agree	38	25.5
Average	45	30.2
Disagree	35	23.5
Strongly Disagree	19	12.8
No response	2	1.3
Total	149	100.0

5.6: Use of IS and skill to use IS by staff

Use is defined by Delone and Mclean(Delone and Mclean, 2004) as the level of interaction of staff with an IS. Use of an IS is affected by system quality and information quality in the DandM IS success model.   Analysis of the results of this study indicated in table 12, proved that 45% of the respondents have always perform their jobs using the ISs that are available, while 45.6% regarded the IS as being always available and flexible to use. This affirms the claim of Delone and Mclean(Delone and Mclean, 2004) that in the MandD success "use" is affected by system quality and service quality.

Table 12: Use of IS (n=149)

Always performs job with IS		
Level of agreement	Frequency	Percent
Strongly agree	17	11.4
Agree	50	33.6
Average	37	24.8
Disagree	33	22.1
Strongly disagree	10	6.7
No response	2	1.3
Total	149	100.0

IS is always available and flexible to use		
Level of agreement	Frequency	Percent
Strongly agree	16	10.7
Agree	52	34.9
Average	43	28.9
Disagree	23	15.4
Strongly disagree	13	8.7
No response	2	1.3
Total	149	100.0

5.7: Impact of IS use

The impact of IS use by staff was measured by four factors. Namely staff level of knowledge, information recall, effectiveness of job performance and productivity.

## 5.7.1: Impact of IS on staff level of knowledge

With regards to the IS providing respondents with the opportunity to learn new things in their work environment, 51.7% agreed, while 23.5% strongly agreed. This is an indication that the majority of respondents (75.2%) have experienced an increase in knowledge through the use of ISs to perform their duties. This is shown in figure 10.
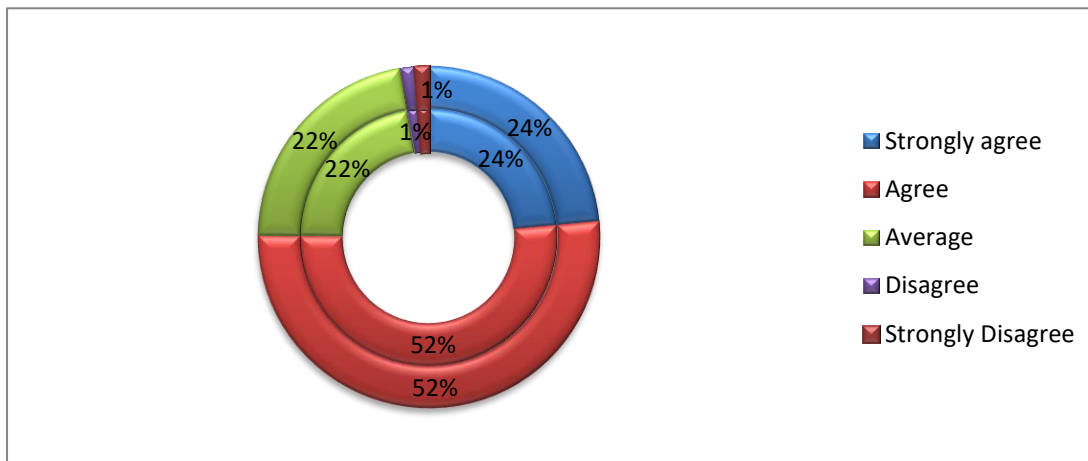
Figure 10: Impact of IS on knowledge (n=149)

5.7.2: Impact of IS on information recall

On the impact of ISs on information recall, 49.7% of respondents agreed and 20.1% strongly agreed that the use of an IS enables them to remember and recall information needed to perform their tasks. This is illustrated in figure 11.
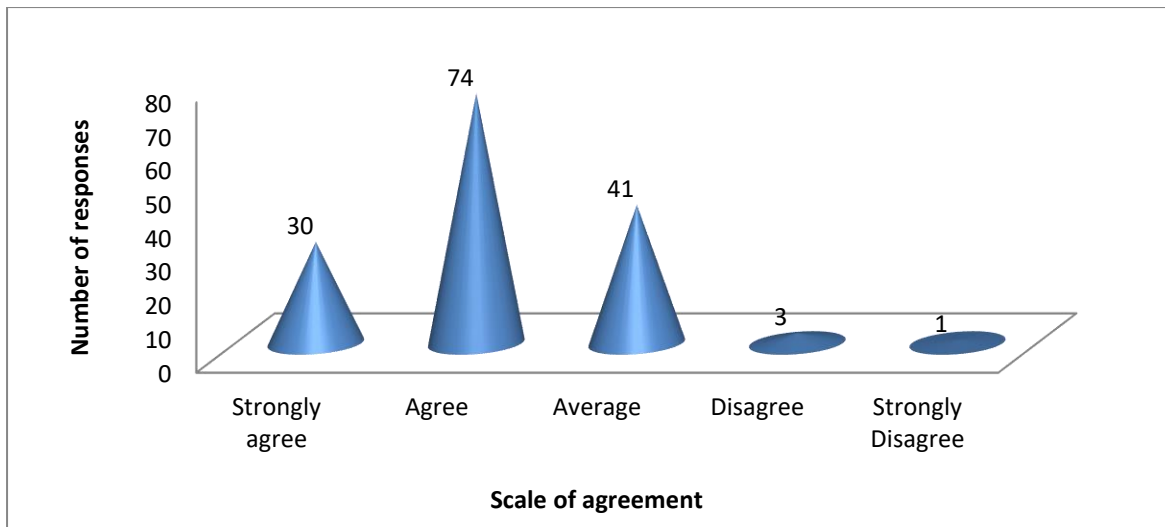
Figure 11: Impact of IS on information use (n=149)

5.7.3: Impact of IS on job effectiveness and productivity

Data rating of IS impact on efficiency and productivity reflected as shown in figures 12 and 13 respectively indicate that that, 40.9% library staff members agreeing and 26.8% strongly agreeing to a high impact on efficiency. The majority of respondents (77.2%) either agreed (51.7%) or strongly agreed (25.5%) that IS use on productivity has a high impact.
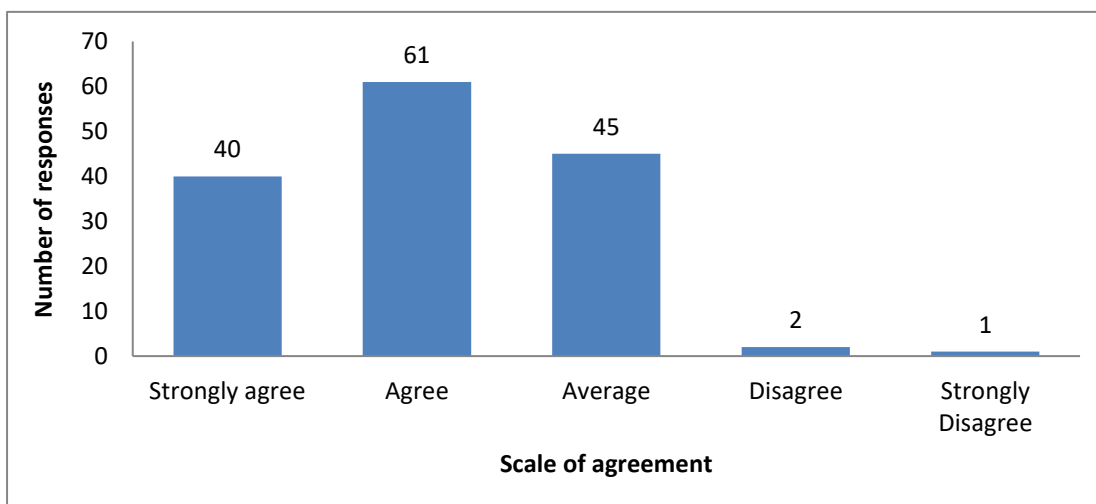
Figure 12: Impact of IS on job effectiveness (n=149)
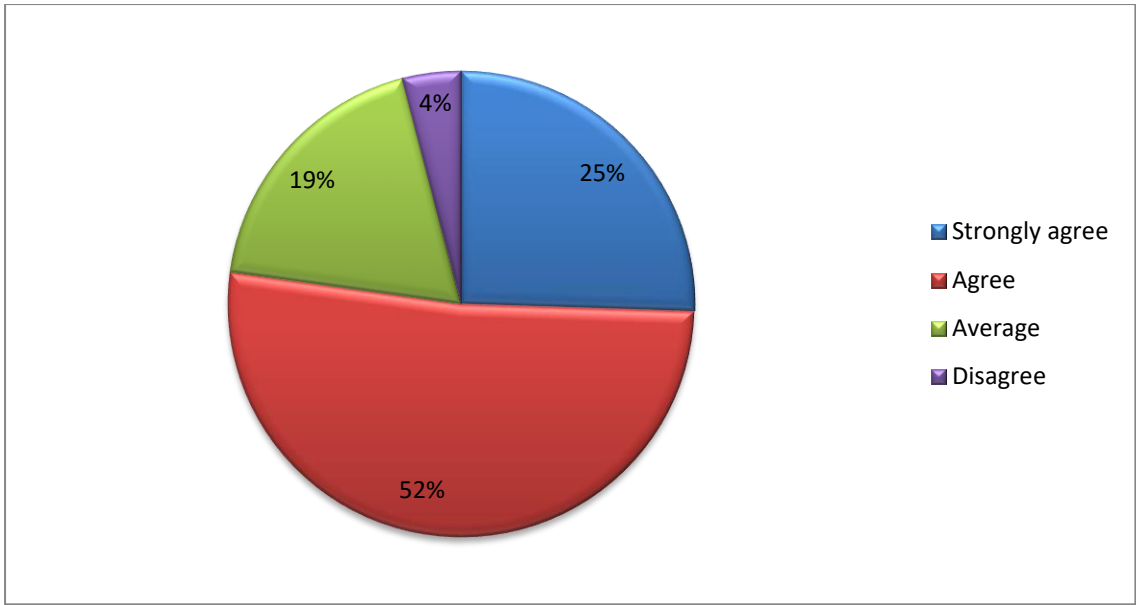
Figure 13: Impact of IS on productivity (n=149)

5.8: Challenges encountered with use of ISs

Respondents identified a number of challenges with regard to the use of IS, regular system failure or downtime (65.1%) and slowness of the system (71.1%), see table 13. Most respondents (71.8%) pinpointed insufficient bandwidth as another major challenge, (60%) identified internet and power downtime, see table 14. Another set of challenges was the availability of resources and IT personnel as 69.8% of library staff labeled the lack of modern ICT equipment as reason for ineffective use of the ISs. The lack of qualified ICT staff was regarded as a challenge by 65.1% of respondents, see table 15.

Table 13: System failure and slowness (n=149)

Regular system downtimes are encountered		
Level of agreement	Frequency	Percent
Strongly agree	49	32.9
Agree	48	32.2
Average	49	32.9
Strongly disagree	1	0.7
No response	2	1.3
Total	149	100.0

IS is slow		
Level of agreement	Frequency	Percent
Strongly agree	33	22.1
Agree	73	49.0
Average	38	25.5
disagree	3	2.0
No response	2	1.3
Total	149	100.0

Table 14: Internet and power challenges (n=149)

Regular internet downtime		
Level of agreement	Frequency	Percent
Strongly agree	44	29.5
Agree	54	36.2
Average	46	30.9
Disagree	3	2.0
Strongly disagreed	0	0.0
No response	2	1.3
Total	149	100.0

Insufficient bandwidth		
Level of agreement	Frequency	Percent
Strongly agree	47	31.5
Agree	60	40.3
Average	35	23.5
Disagree	4	2.7
Strongly disagreed	0	0.0
No response	3	2.0
Total	149	100.0

Regular power outages/surges		
Level of agreement	Frequency	Percent
Strongly agree	42	28.2
Agree	57	38.3
Average	40	26.8
Disagree	6	4.0
Strongly Disagree	1	0.7
No response	3	2.0
Total	149	100.0

Table 15: Lack of resources (n=149)

Lack of modern IT equipment		
Level of agreement	Frequency	Percent
Strongly agree	44	29.5
Agree	60	40.3
Average	39	26.2
Disagree	4	2.7
Strongly disagreed	0	0.0
No -response	2	1.3
Total	149	100.0

Lack of qualified IT staff		
Level of agreement	Frequency	Percent
Strongly agree	42	28.2
Agree	55	36.9
Average	40	26.8
Disagree	7	4.7
Strongly disagree	3	2.0
No response	2	1.3
Total	149	100.0

5.12: Testing of hypotheses

H1: Management of ISs affects the quality of ISs in academic libraries in Ghana

To test H1, a Spearman's correlation was run to determine if managerial support and maintenance affect the quality of ISs. The analysis shows that there was a strong positive correlation between management and IS quality (rs = .553, n = 147, p < .001). The study therefore accepts H1.

H2: The quality of an IS affects the use of the IS in academic libraries in Ghana

Spearman's correlation was used to statistically determine if the quality of an IS affects the use of the IS. Findings indicate a strong positive correlation between the quality of an IS and the IS use (rs = .656, n = 147, p < .001). The study therefore accepts H2.

H3: IS use affects service provision in academic libraries in Ghana

To test H3, Spearman's correlation was used to determine the relationship between IS use and service provision. This reflects a strong positive correlation between IS use and service provision (rs = .528, n = 147, p < .001). H3 as stated is accepted.

H4: Challenges affect the use of ISs in academic libraries in Ghana

H4 was stated to determine whether challenges encountered affect the use of ISs. Spearman's correlation was used and the result depicts a moderate negative correlation between challenges encountered and IS use (rs = -.344, n = 147, p < .001). Thus, H4 as stated in this study is accepted.

6.0: Conclusion

The study provided a unique opportunity for testing the MandD success model in a Ghanaian IS use context with already existing challenges and provided evidence to fill the gap in the Ghanaian library literature on the quality of IS in libraries and its impact on service provision.

Though academic libraries in Ghana have adopted different ISs to perform different library services, they do not perform enough maintenance activities to ensure the effectiveness of the IS. Likewise, management 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.

These factors were proved by statistical evidence in this study as having effect on IS use. When an IS is being managed it increases the quality of the IS which ultimately affects the use of the IS. Thus, the more quality features an IS possesses, the more staff will use the IS. The more the staff of the library use the IS, the more positive effect the IS has on library service delivery.

The findings thus validate the MandD IS success model for determining the impact of the quality of IS which is attained through effective management practices on the use and outcome of the IS. All variables identified in the theory have been appropriately used and estimated relationships were established and proven to be accurate through statistical means.

7.0: Recommendations

Every library should adopt an IS policy to ensure that ISs are properly managed and used for the specific purposes for which they have been acquired. Management factors should be specifically outlined in the policy to serve as guidance.

Adequate information and training on ISs should be provided to staff before and after the installation of IS. This will enable library staff appreciate and use the ISs for specific library functions for which they have been acquired as the ability to use the system is a pre-requisite to the effect of the system.

IS projects and maintenance cost should be assigned a specific percentage of every libraries' budget. This will ensure that the IS, which has become a compulsory element of library process, is easily taken care of.

Acknowledgement

8.0: References:

4international colleges and universities. (2016), "Top universities in Ghana", available at: http://www.4icu.org/ (accessed 30 July 2016).

Adanu, T.S.A. (2006), "Planning and implementation of the University of Ghana library automation project", *African Journal of Library, Archives and Information Science*, Vol. 16 No. 2, pp. 101–108.

Adogbeji, O.B. and Adomi, E.E. (2005), "Automating library operations at the Delta State University library, Nigeria", *Library Hi Tech News*, Vol. 22 No. 5, pp. 13–18.

Amekuedee, J.O. (2005), "An evaluation of library automation in some Ghanaian university libraries", *The Electronic Library*, Vol. 23 No. 3, pp. 442–452.

Ashish Rao, K., Rao, M. and Shivananda Bhat, K. (2018), "Perception of semi-professionals in using ICT in Manipal academy of higher education libraries", *DESIDOC Journal of Library and Information Technology*, Vol. 38 No. 5, pp. 370–375.

Bagchi, M. (2020), "Conceptualising a library chatbot using open source conversational artificial intelligence", *DESIDOC Journal of Library and Information Technology*, Vol. 40 No. 6, pp. 329–333.

Bernroider, E.W.N. (2008), "IT governance for enterprise resource planning supported by the DeLone-McLean model of information systems success", *Information and Management*,

Vol. 45 No. 5, pp. 257–269.

Bharati, P. and Berg, D. (2003), "Managing information systems for service quality: a study from the other side", *Information Technology & People*, Vol. 16 No. 2, pp. 183–202.

Boateng, H., Agyemang, F.G. and Dzandu, M.D. (2014), "The pros and cons of library automation in a resource challenged environment: a case study of KNUST library", *Library Philosophy and Practice*, Vol. Paper 1061, available at: http://digitalcommons.unl.edu/libphilprac/1061.

Boddy, D., Boonstra, A. and Kennedy, G. (2005), *Managing Information Systems: An Organizational Perspective*, Pearson Education Ltd, Edinburg.

Chen, J.-F., Chang, J.-F., Kao, C.-W. and Huang, Y.-M. (2016), "Integrating ISSM into TAM to enhance digital library services: a case study of the Taiwan digital meta-library", *The Electronic Library*, Vol. 34 No. 1, pp. 58–73.

Delone, W.H. and Mclean, E.R. (2004), "Measuring e-commerce success: applying the DeLone & McLean information systems success model", *International Journal of Electronic Commerce*, Vol. 9 No. 1, pp. 31–47.

Delone, W.H. and McLean, E.R. (2003), "The DeLone and McLean model of information systems success: a ten-year update", *Journal of Management Information Systems*, Vol. 19 No. 4, pp. 9–30.

Fleischman, G., Walker, K. and Johnson, E. (2010), "A field study of user versus provider perceptions of management accounting system services", *International Journal of Accounting & Information Management*, Vol. 18 No. 3, pp. 252–285.

Garcha, R. and Buttlar, L.J. (1996), "Profiling African libraries: automation in Ghana, Kenya and Nigeria", *Library Review*, Vol. 45 No. 6, pp. 25–35.

Hossain, M.A. (2016), "Assessing m-Health success in Bangladesh: an empirical investigation using IS success models", *Journal of Enterprise Information Management*, PT, Vol. 29 No. 5, pp. 774–796.

Leem, C.S. and Kim, I. (2004), "An integrated evaluation system based on the continuous improvement model of IS performance", *Industrial Management & Data Systems*, PT, Vol. 104 No. 2, pp. 115–128.

Maguire, S. (2002), "Identifying risks during information system development: managing the process", *Information Management & Computer Security*, Vol. 10 No. 3, pp. 126–134.

Marnewick, C. (2017), "The reality of adherence to best practices for information system initiatives", *International Journal of Managing Projects in Business*, Vol. 10 No. 1, pp. 167–184.

Moturi, C. and Mbiwa, P. (2015), "An evaluation of the quality of management information systems used by SACCOs in Kenya", *The TQM Journal*, Vol. 27 No. 6, pp. 798–813.

Mutula, S.M. (2012), "Library automation in sub Saharan Africa: case study of the University of Botswana", *Program*, Vol. 46 No. 3, pp. 292–307.

Ravichandran, T. and Lertwongsatien, C. (2014), "Effect of information systems resources and

capabilities on firm performance : a resource- based perspective", *Journal of Management Information Systems*, Vol. 1222 No. September 2015, pp. 237–276.

Thompson, E.S. and Pwadura, J. (2014), "Library automation at the University for Development Studies: challenges and prospects", *New Review of Academic Librarianship*, Vol. 20 No. 1, pp. 66–77.

Wu, J.H. and Wang, Y.M. (2006), "Measuring KMS success: a respecification of the DeLone and McLean's model", *Information and Management*, Vol. 43 No. 6, pp. 728–739.