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CONTENTS

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Predictors of Digital Library Usage by Undergraduate Students at a Namibian University: Perspectives Based on Technology Acceptance Model

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Abstract

This paper aimed at exploring predictors of digital library (DL) usage by undergraduate students at a Namibian University. Applying a quantitative research approach through which copies of a survey questionnaire were self-administered, data was collected from 194 students and the study hypotheses tested by performing Pearson Chi-Square. The study found that a significant association exists between library training and use of digital library; library training and perceived usefulness of digital library; library training and perceived ease of use (PEOU) of digital library; perceived usefulness and actual usage of a digital library and gender and PEOU. Additionally, the study found no evidence to suggest an association between computer efficacy of a user and perceived ease of use of digital library; between PEOU of digital library and perceived usefulness of digital library and between age and PEOU. The study recommends training of library users on digital library so as to achieve optimal use of the DL resources and services.

Keywords: Digital Library, Technology Acceptance Model, Undergraduate Students, Digital Resources

Introduction

Rapid technological development in the 21st Century has increased societal dependence on Information and Communication Technologies (ICT) (Farahat, 2012); development that Al-Adwan, Al-Adwan and Smedley (2013) believe has presented rich opportunities to embed technological innovations within the learning environment. As claimed by Egberongbe (2011), technology is the Century's most significant development affecting scholarly communication and has propelled tremendous shift in institutions of higher learning around the world. Learning process has evolved from conventional face-to-face to e-learning (and blended learning) due to continuous growth of technological innovations and the internet – a mode of study that has become popular in institutions of higher learning (Al-Adwan, Al-Adwan, and Smedley, 2013).

To sufficiently support the teaching, learning and research needs of their host institutions, academic libraries have not been left behind by this tide. Every sphere of their activity has radically been taken over by Information and Communication Technologies (ICT) in order to cope with the shift in the scholarly communication and users' continual sophisticated

information requirements. This has left academic libraries with no option but to embrace technological advancement (Emezie and Nwaohiri, 2013; Ankara and Atuase, 2018); and hence the emergence of Digital Libraries (DL).

Prior research has pointed out how resources in digital libraries are underused due to poor usability (Carlock and Perry, 2008; Chu, 2003). According to Jeong (2011) system utilisation is enhanced through the study of determinants that influence users towards use, acceptance and rejection of an information system (such as a DL). In affirmation to this, Zha, Zhang and Yang (2015) noted that the adoption of digital libraries is significantly affected by students' behavioural intentions. In the same vein, Park et al. (2009) observed that, lack of research on the user side of information system adoption is in part responsible for the underutilisation of information systems (like DL) implemented in developing countries. It is therefore imperative to understand factors that drive acceptance or rejection of a technology by the users as failure to do so may result to implementing a technology that is not willingly accepted and used by users which may result to depletion of resources and time (Cowen, 2009; Isah, Serema and Mutshewa, 2014).

To achieve its mission of providing library users with quality and authentic information resources to support high quality education that promotes excellence in scholarship and research, the International University of Management (IUM) library has a collection that is rich in scope; covering almost all spheres of knowledge including physical and electronic materials. Through the Sirs Mandarin software, the IUM library is automated and hence has a digital section from where students or library users can access digital resources and services. In addition, the library provides access to online databases, ejournals and ebooks to its users (IUM, 2020). The digital section of the IUM library has been in existence for six years. Since its inception, less research has been carried out on the predicting factors that determine the adoption of the digital section of the library so as to aid in strengthening the digital library and overcome its weaknesses, if any. In view of this, this study aimed at exploring the predictors of digital library usage by undergraduate students in Namibia from the perspective of Technological Acceptance Model (TAM). The findings of this study contribute to the ongoing research on the digital transformation of academic libraries and predicting factors for adoption among students in higher learning institutions.

Literature Review and Theoretical Framework

The term digital library as defined by the *Online Dictionary of Library and Information Science* (2020) refers to a library in which a significant proportion of the resources are available in machine-readable format (as opposed to print or microform), accessible by means of computers, and its digital content may be held locally or accessed remotely via computer networks. Expanding on this definition Verma and Verma (2014) argue that a DL is a later stage of electronic library adding that the holdings of a DL are in digital form and easily accessible through the Internet. In contrast to an electronic library, Verma and Verma note that, in digital libraries, high speed data transfer takes place and data is communicated through networks or the Internet. In addition, DL provides an extensive range of Internet based services and it contains multi format information.

To Zha, Xiao and Zhang (2014) DLs are distributed systems with the capability to store various electronic resources and provide convenient access for end users via networks. Similar view of the term was expressed by Rosenberg (2006) who noted a DL as one where users access resources by electronic means and where information is delivered to users electronically. Khiste, Avinash and Deshmukh, (2018) define it as electronic information collections containing large and diverse repositories of digital objects, which can be accessed by a large number of geographically distributed users. Whilst according to Candela, Castelli and Pagano (2012) the term digital library indicates the digital counterpart of a traditional library.

A DL may not occupy a physical space or contain conventional print information resources, but its collection comprises electronic books, journals and newspapers (Mutula and Ojedokun (2008) as cited by Magoi and Gani, 2014) accessible over the Internet and its resources are either born digital (i.e. resources that are created and managed in digital); or digitised resources (resources that are converted

into digital format or in electronic format with the help of appropriate hardware and software) (Verma and Vema, 2014).

Magoi and Gani (2014) opined that there is no single definition for DLs because the definition evolves as research progresses. According to Magoi and Gani (2014), digital libraries, defined in the context of libraries, may be viewed as technical services performed electronically with an entirely electronic application.

Even though varying words are used to define the term digital library, a general consensus derived from existing literature agrees that the term digital library is more appropriate when describing a library whose collections and services are available electronically – normally over the Internet.

Digital libraries have increasingly become a gateway for users to access library resources and services (Lui and Luo, 2011). Agreeing to this, Raza, Mahmood and Warraich (2019) opine that accessibility of information has been made more productive and effective by DLs. Nonetheless, development of digital libraries has not only been uneven in Africa (Zirra, Ibrahim and Abdulganiyyi, 2019), their adoption among university students in some developing countries is low. A study by Mawere and Sai (2018) confirmed this as the study found that there was a low adoption rate of digital libraries among students in many Zimbabwean academic institutions. Similar findings were revealed by Urhiewhu and Emojorho (2015). In Urhiewhu and Emojorho study, there was low usage of library resources in institutions of higher learning in Delta and Edo States of Nigeria. Lack of training, skills and non-availability of online databases were cited as some of the contributing factors to low adoption. To understand and interpret the predictors of digital library adoption by undergraduate students at a Namibian University, this study applied the Technology Acceptance Model (TAM) as its framework. A framework is simply the structure of the idea or concept and how it is put together or rather a model of how one theorises or makes logical sense of the relationships among several factors that have been identified as important to the problem (Sekaran, 2001 as cited in Chibini, 2011).

TAM was adopted because it is a widely used and accepted model that has been tested in different conditions (Mille and Khera, 2010). Empirical evidence and research across prior studies strongly allude that TAM is a valid framework and reliable predictor of IT adoption (Agrawal and Pradas, 1999; Davis, Bagozzi, and Warshaw, 1989; Hu, Chau, Sheng, and Tam, 1999; Venkatesh, 2000). TAM was initially proposed by Davis (1986) with the aim of providing an explanation of the determination of computer acceptance, capable of explaining user behaviour across a wide range of end-users, computing technologies and user populations, while at the same time being both "parsimonious and theoretically justified" (Davis, 1989). The model theorises that a person's intention to adopt a particular system is influenced by two beliefs – Perceived Ease of Use (PEOU) and Perceived Usefulness (PU).

PEOU is "the degree to which a person believes that using a particular system would be free of effort" while PU is "the degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989).

A study by Thong, Hong and Tam (2004) alleged that an application perceived to be easier to use is more likely to be accepted by users. In other words, the easier it is for a user to interact with a system, the more likely he or she will find it useful. A study by Park, Roman, Lee and Chung (2009) found PEOU of the library system to have had a significant impact on PU, which ultimately led to behavioural intention to use. A later study by Alharbi and Drew (2014) validates the relationship between PEOU, PU, and overall impact on behavioral intention to use.

Figure 1 is an illustration of the Technology Acceptance Model (TAM) as formulated by Venkatesh and Davis (1996).

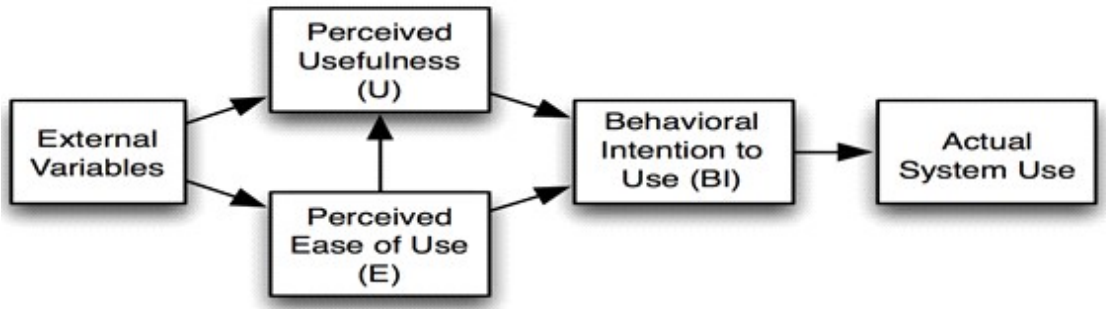

Figure 1: Technology Acceptance Model (TAM) **(Source: Venkatesh and Davis, 1996)**

Application of TAM Model in the Current Study

This study was based on the Technology Acceptance Model by Venkatesh and Davis (1996), albeit some modification. Applying the TAM theory in a DL context; for a student to make better use of the DL he/she should find it easy to use, and for the DL to be used by the students it should be of some relevance to them (PU). As noted in figure 1 above, PEOU and PU are directly influenced by external variables. This study predicted computer efficacy, library training, age and gender as external variables influencing PEOU and PU. The study further predicts that, Computer efficacy, age and gender would influence PEOU while library training would influence both perceived PU and PEOU.

For the purpose of this study computer efficacy was referred to as the proficiency or know-how required to use technological applications effectively while library training referred to the information skills imparted to the user by the library staff so as to enable him/her use the DL resources and services efficiently and effectively to meet his/her information needs.

Figure 2 illustrates the proposed model for this study to understand predictors of DL adoption by undergraduate students.

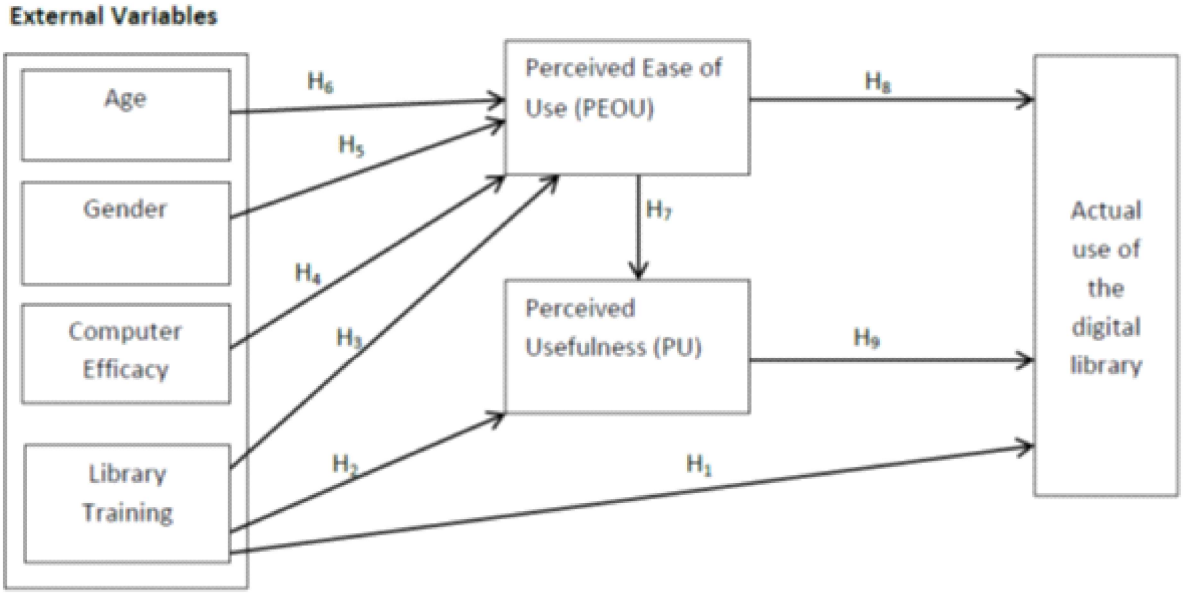

Figure 2: Proposed Research Model

Hypotheses

Based on above modified TAM the following was hypothesized:

H_1: Library training significantly influences the use of a DL

H_2: Library training significantly influences PU of a DL

H_3: Library training significantly influences PEOU of a DL

H_4: User computer efficacy significantly influences PEOU of a DL

H_5: User's gender significantly influences PEOU of a DL

H_6: User's age significantly influences PEOU of a DL

H_7: PEOU of a DL significantly influences its PU

H_8: PEOU of a DL significantly influences actual use of the DL

H_9: Perceived usefulness of a DL significantly influences its actual use

Methodology

Using a quantitative research method, the study used survey questionnaire as the instrument to collect Data. The quantitative research method was applied so as to enable the researchers to collect further data on variables that had been identified from literature. Applying convenience sampling, the researchers self-administered the questionnaire to 286 undergraduate students (older than 18 years) who were given a period of two weeks to complete and return the questionnaire. As part of the convenience sampling, the researchers stationed themselves in the university library and selected faculty classrooms for four days, where they self-administered the questionnaire to students as they walked into the said library and faculty classrooms. As a non-probabilistic sampling technique, the convenience sampling was applied in this research as it enabled the researchers to purposively reach the target research sample. After three weeks, one hundred and ninety four (194) completed questionnaire were returned and hence giving a 67.8% response rate which is representative enough of the sample.

Using the Statistical Package for Social Sciences (SPSS) software, the data was analysed and Pearson chi-square test performed to test the hypotheses. As part of the Pearson chi-square test, the collected data was entered onto the SPSS base module and analyses undertaken descriptive statistics, specifically, crosstab - Chi-Square. The significance level 0.05 was applied to interpret the Pearson chi-square test results.

Results

Tables 1 to 9 presents crosstabulation and chi-square test of the hypotheses as postulated in section above.

H_1: Library Training Significantly Influences Use of a DL

The crosstabulation and chi-square test results of library training*frequency of use of a DL in Table 1 resulted in P-value (0.020). Since the P-value is less than 0.05, the null hypothesis is rejected and hence indicating an association between library training and use of a DL ($\times^2$ (1) = 5.453, P < .020).

Table 1: Hypothesis 1: Library Training Significantly Influence use of a DL

	frequency of use categories		Total	Chi-square	df	p-value
	Acceptable use	not acceptable use				
Library training						
Trained	93(73.2%)	34(26.8%)	127(100.0%)	5.453[a]	1	0.020
Not trained	38(56.7%)	29(43.3%)	67(100.0%)			

H_2: Library training Significantly Influences PU of a DL

With a P-value (0.0005) less than the significant level (a = 0.05) as in Table 2, the null hypothesis is rejected and hence indicating that a significant association between library user training and PU of a DL ($\times^2$ (3) = 34.010, P < .0005).

Table 2: Hypothesis 2: Library Training Significantly Influences PU of a DL

		usefulness of the online library				Total	Chi-square	df	p-value
		Very useful	Useful	Fairly useful	Not useful				
Respondents trained on how to use the online library	Yes	40(31.5%)	66(52.0%)	18(14.2%)	3(2.4%)	127(100.0%)	34.010[a]	3	0.0005
	No	6(9.0%)	25(37.3%)	25(37.3%)	11(16.4%)	67(100.0%)			

H_3: Library training significantly influences PEOU of a DL

Table 3: Hypothesis 3: Library Training Significantly Influences PEOU of a DL

		Perceived Ease of use of the online library interface				Total	Chi-square	df	p-value
		Very easy to use	Easy to use	Fairly easy to use	Not easy to use				
Respondents trained on how to use the DL	Yes	46.5%	37.8%	14.2%	1.6%	100.0%	37.260[a]	3	0.001
	No	9.0%	49.3%	25.4%	16.4%	100.0%			

As in *Table 3*, the crosstabulation and chi-square test results indicate a P-value (0.001) less than the significant level (a = 0.05). As a result, the null hypothesis is rejected and indicating a significant association between library training and PEOU of a DL ($\times^2$ (3) = 37.260, P < .001).

H_4: Computer Efficacy of a User Significantly Influences PEOU of Use of a DL

In *Table 4*, the resulting P-value (.078) is greater than the significance level (0.05); thus the null hypothesis is accepted and hence indicating insufficient evidence to suggest an association between computer efficacy and PEOU of a DL (×2 (3) > = 6.821, P = 0 .078).

Table 4: Hypothesis 4: Computer Efficacy of a User Significantly Influence PEOU of Use of a DL

		Perceived ease of use of the DL interface				Total	Chi-square	df	p-value
		Very easy to use	Easy to use	Fairly easy to use	Not easy to use				
Computer efficacy of a user	Good skills	36.5%	42.1%	15.1%	6.3%	100.0%	6.821[a]	3	0.078
	No good skills	20.0%	40.0%	31.4%	8.6%	100.0%			

H5: User's Gender Significantly Influences PEOU of a DL

The P-value in Table 5 is 0.020 which is less than 0.05 and hence the null hypothesis is rejected. This is an indication that there is a significant association between gender and PEOU of a DL ($\times^2$ (1) = 5.453, p < 0.020).

Table 5: Hypothesis 5: User's gender significantly influence PEOU of a DL

Gender	Frequency	Percentage	Chi-square	df	p-value
Male	104	53.6%	5.453[a]	1	0.020
Female	90	46.4%			

H6: User's age significantly influences PEOU of a DL

The P-value of 0.280 in Table 6 is greater than significant level of 0.05 and hence the null hypothesis is accepted: indicating lack of sufficient evidence on the association between age and PEOU of a DL ($\times^2$ (1) = 3.829, P = 0.280).

Table 6: Hypothesis 6: User's age significantly influence PEOU of a DL

Age	Frequency	Percentage	Chi-square	p-value
18 - 25	55	28.4%	3.829[a]	0.280
26 - 35	97	50.0%		
36 - 45	27	13.9%		
46 - 60	15	7.7%		

H_7: PEOU of a DL Significantly Influences its PU

The P-value (0.001) in Table 7 is less than the significant level (0.05), indicating that the null hypothesis be rejected and hence an indication of a significant association between PEOU of the DL and its PU ($\times^2$ (9) = 163.042, P < 0.001).

Table 7: Hypothesis 7: PEOU of a DL Significantly Influence its PU

		Perceived usefulness of the digital library				Total	Chi-square	df	p-value
		Very useful	Useful	Fairly useful	Not useful				
Ease of use of the DL interface	Very easy to use	38(58.5%)	24(36.9%)	3(4.6%)	0(0.0%)	65(100.0%)	163.042[a]	9	0.001
	Easy to use	5(6.2%)	58(71.6%)	15(18.5%)	3(3.7%)	81(100.0%)			
	Fairly easy to use	2(5.7%)	9(25.7%)	21(60.0%)	3(8.6%)	35(100.0%)			
	Not easy to use	1(7.7%)	0(0.0%)	4(30.8%)	8(61.5%)	13(100.0%)			

H_8: PEOU of a DL Significantly Influences Its Actual Use

Table 8: Hypothesis 8: PEOU of a DL significantly influence its actual use

	frequency of use categories		Total	Chi-square	df	p-value
	Acceptable use	not acceptable use				
Perceived ease of use						
Very easy to use	47(72.3%)	18(27.7%)	65(100.0%)			
Easy to use	56(69.1%)	25(30.9%)	81(100.0%)	3.829[a]	3	0.280
Fairly easy to use	22(62.9%)	13(37.1%)	35(100.0%)			
Not easy to use	6(46.2%)	7(53.8%)	13(100.0%)			

Test results in Table 8 show a P-value (0.280), greater than the significant level (0.05). Therefore null hypothesis is accepted and hence suggesting insufficient evidence of an association between PEOU of a DL and its actual use (($\times^2$ (3)> = 3.829, P = 0.280).

H_9: PU of a DL Significantly Influences Its Actual Use

The P-value (0.015) of the crosstabulation and chi-square test results of PU and actual use of the DL in Table 9, is less than the significant level (0.05); indicating that the null hypothesis is rejected and hence the alternative hypothesis that PU influence use of the digital library is thus accepted. This shows an association between PU and actual use of the digital library (($\times^2$(3) = 10.510, P < 0.015).

Table 9: Hypothesis 9: PU of a DL significantly influence its actual use

	frequency of use categories		Total	Chi-square	df	p-value
	Acceptable use	Not acceptable use				
Perceived usefulness						
Very useful	47(72.3%)	18(27.7%)	65(100.0%)			
Useful	56(69.1%)	25(30.9%)	81(100.0%)	10.510[a]	3	0.015
Fairly useful	22(62.9%)	13(37.1%)	35(100.0%)			
Not useful	6(46.2%)	7(53.8%)	13(100.0%)			

Discussion

As shown in tables 1-9 above, six of the nine hypotheses are supported. However the significance level varied. For instance, the study established a very strong association (p<0.0005) between library training and PU of the DL. Again, a significant association between library training and actual use of the DL (p<0.020) and between library training and PEOU (p<0.001) was established. These findings signify the importance of library training for it is through it that users discover how their information needs could be met and this impacts how they perceive the DL. Again training equips them with the required skills to use the system (DL) which leads to perceiving it easy to use. This ultimately leads to optimal use of the DL. There is need therefore for librarians to equip library users with intensive training on information searching skills to

increase usage of the DL. These findings are in line with those of Khan and Qutab (2016) whose study identified user training as a significant indicator of digital library usage.

On the other hand, the study found insufficient evidence to suggest an association between computer efficacy and PEOU ($p<0.078$). These findings do not agree with Salloum et al. (2019) whose study found computer self-efficacy as one of the external factors that have a significant impact on PEOU. However the findings agree with the findings of Zainab et al. (2017) whose study found no association between computer self-efficacy and PEOU. Based on this then, it can be deduced that being able to use a computer and its applications does not translate to finding a DL easy to use. This may be because using a DL requires more skills to navigate the platform than merely having the ability to use a computer.

In addition, this study sought to find out whether there was any association between PEOU of a DL and its actual use. No association was established ($p=0.280$). However a significant association ($p<0.001$) between PEOU and PU was established. Therefore the influence of PEOU on actual use of the DL as observed in this study is only through PU. Similar findings were reported in a recent study by Rafique et al. (2020). Other study findings consistent with the results of this study are those of Xu and Du (2018) and Salloum et al. (2019) whose studies found PEOU had significant effect on PU and not on actual use or intention to use. This implies that users may perceive the DL easy to use but fail to use if they deem it not useful to address their information need - perhaps due to lack of relevant information resources. It can also be deduced that a system that requires no effort to navigate (easy to use) would be found useful since users can easily search for and access information materials and services. If a DL is easy to use and has relevant resources/ services then probability of users making use of it is high. Librarians should therefore not only ensure a rich DL collection and good services but they should also ensure that DL interface is easy to navigate.

Again, while a significant association (0.020) between gender and PEOU of a DL was established, there was lack of sufficient evidence on the association between age and PEOU of a DL ($P = 0.280$). These findings agree with Alexandrakis et al. (2020) whose findings indicated that age has no statistically significant effect on PEOU.

Finally, the study established a significant association between PU and actual use of the DL (0.015). These findings were in line with those of Ding et al. (2019) and Chaloeyprach and Ketmuni (2021). This suggests that students are more likely to accept and use the DL if it has positive perceived effect on their studies. Therefore, if the DL is well resourced with adequate information materials that address students information needs, then they are likely to perceive it useful and consequently make use of it. DL should thus be resourced with a rich and relevant collection and services that adequately support learning and research needs of the students. et al.

Conclusion

This paper aimed at exploring predictors of online library usage by undergraduate students with perspectives based on TAM. The study tested nine hypotheses out of which six alternative hypotheses were accepted while three null hypotheses were accepted. Library training was found to have direct influence on both PU and PEOU, and as a result, library training has also a direct impact on actual DL usage. The study also found that while gender has a direct impact on PEOU, age has no impact on PEOU. Additionally, the study revealed that computer efficacy has no impact on PEOU. Moreover, this study established that PU of a DL has significant influence on its usage and that PEOU has no significant effect on DL usage. The study also observed that the influence of PEOU on actual use of the DL is only through PU. In addition no enough evidence to suggest an association between computer efficacy of a user and PEOU of the digital library; also, no association was observed between PEOU of the digital library and PU of the digital library.

Based on the above, this study concludes that user training is an important exercise that librarians should never ignore as it is evident that ease of using a digital library and its usefulness thereof are linked to training. Additionally, students would find a DL useful if it is meeting their information needs. Librarians have a role therefore to ensure seamless

access to library resources; ensure the DL has a balance collection that is up-to-date and relevant to the information needs of the students.

Recommendations

This study recommends that a digital library collection should be dynamic and capable of meeting the information needs of students. Hence, a DL collection should be live, balanced and up-to-date on subject context, covering all areas of disciplines offered by the host university so as to be perceived as useful and subsequently utilized by the students.

The study also recommends training of library users so as to achieve optimal use of the DL resources and services. Training should be customised to suit individual needs and also to meet users' personalised needs. Furthermore it is important to pay attention to the different genders undertaking the training to ensure that it doesn't affect the desired overall expected output of the training.

The study further recommends that librarians should embrace online assist applications such as 'ask a librarian' to assist users who may have problems using the DL.

Implications of the Study

Cognisant that technology is here to stay and the fact that most institutions of higher learning are bended towards e-learning, this study has provided some insight for academic librarians to understand some of the factors that may influence utilisation of the digital library – especially in the shift of e-learning and the expectation that they should adequately support teaching, learning and research needs of their user community. The research has pointed out key elements that may influence usage of DL, and therefore librarians should take heed. For instance, they can develop user training programmes such as user information retrieval training courses. This will not only enable the students to learn to use the DL, but help them find it easy to use and also help them understand its usefulness in their learning process.

The study has also addressed the knowledge gap that existed on IUMs digital library user behaviour and has added significant clarification of external variables that could influence perceived usefulness (PU) and perceived ease of use (PEOU) in an academic digital library context. Prior to this study, no research had been carried out to ascertain some of these factors that could play role in DL usage.

Therefore the management of IUM library may use these findings to improve on their DL usage. Future research on DL adoption should explore further about other external variables that could influence PU and PEOU of a DL. The scope of focus can also be broadened by future research to include other category of DL users like the faculty and the postgraduate students.

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Assessment of Information Management in a State Public Service in Nigeria

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Abstract

This study provides an assessment of information management in Oyo State, Nigeria with a view to understanding the information sources used by policy makers in the ministries, current information organisation and storage practices, and level of utiliisation of information. The paper also examined information dissemination practices and perceived benefits of information management as well as the challenges encountered. A sample survey design was used to collect data from 374 staff from the rank of grade levels 07 to 16 in seven of the twenty ministries in the state. Data was collected using a structured questionnaire. The ministries used multiple sources of information; professional/ academic journals and the Internet are the least consulted sources. The ministries seldom shared information/database/datasets. The dominant storage system is file cabinet. Current practice of information dissemination is through paper files, memos and reports, meetings, print media, and telephone. Major information management practices are driven by manual systems and approaches. This report contradicts reported efforts of government to implement egovernment. Investing in information technology infrastructure is required to create enabling environment for transition to egovernance. Enskilling civil servants with capacity for managing information using electronic technologies is necessary to improve information management in the state public service.

Keywords: Information Management, Oyo State, State Public Service, information technology, Nigeria

Introduction to the Study

Information is a resource that enables organisations effectively combine and utilise other factors of production; it coordinates the mobilisation of other resources and assets to enable organisations perform optimally. Information management and its systems are essential means of managing the ever increasing huge amount of information that organisations have to process (Gunnar and Svensson 2012, Cordella and Iannacci 2017, Alvarenga, Matos, Godina and Matias 2020, Watad 2020) Thus, organisations are on regular basis looking for methods to collect, organise and manage their information, and they require effective information management knowledge, tools and technologies to do so (Gunnar and Svensson, 2012). Governments at all levels need efficient information management system to function maximally. The public sector is the pivot upon which the wheel of government machinery rests, and it is often faced with the challenges of modern day administrative trends of performing tasks fast and in a robust, efficient, and accountable manner that takes reduction of cost into consideration. The challenge is how the wealth of information is managed quickly, effectively and securely to achieve government goals and objectives.

Government and other organisations are witnessing information explosion, resulting in information and knowledge indices becoming evidence of social, economic and political progress (*Open Group*, 2007, Brown and Toze, 2017). All organisations, including the public sector, especially have nearly the entire product of administrative decision-making and service delivery in the form of information. The records of an organisation, such as the public sector, constitute her corporate memory which supplement human memory and serve as

guides for effective planning and decision-making (Adewale, Abioye and Isa 2016). Information flow and management are the lubricants that enable the combination of the multiple information and their sources. Improvements in information management will drive and support progress across board by providing civil servants with timely access to high-quality, accurate and relevant information that strengthens decision making and improves operational performance.

Information and records management in Nigeria is yet to attain the level of attention and support that it has received in countries of the developed world Atulomah (2011). For instance, Hamadoja (2011) argued that in Nigeria, the depth of preservation of records is not yet accorded deserved priority; as ancient as record keeping is, public institutions are still deficient in organising, maintaining, and making information accessible despite the presence of microcomputers. Today, majority of government and public institutions still process their payrolls, personnel, and official information manually despite the presence of microcomputers. Files are piled up on top of one another in cabinets without any indexing and cataloguing methods, making information and data access tedious and time consuming.

There is need to provide quality, efficient and effective information management system. It is important to provide government institutions with valuable information that will aid decision-making on ways of improving the existing information management system, the information services and infrastructure, management practices that would make their operations more efficient and effective. There is need for studies on information flow and information management. Since information system and technologies are dynamic, there is need to carry out an assessment of existing information management system and resources in order to assist public organisations in identifying areas where there are problems and decide the most feasible solution based on existing situation and technologies. It is against this background that this study examined the information management behaviours, infrastructure and services needed to manage information in the ministries of the Oyo State.

Problem Statement

Several studies have been carried out in relation to assessment of records and information management process and data processing system in Nigerian public service system (Gunnar and Svensson, 2012;Yahyah, 2006; Atulomah, 2011; Adebayo, 2011, Adewale, Abioye and Isa 2016). Many public organisations handle sensitive and information that constitute part of the public record that must be well-managed, made available and protected, and they need to provide online information and services in a manner that is accessible to the entire public. It is apparent that effective information management system in place can resolve most problems facing the public sector which ranges from alarming rate of misplacement or loss of vital records. There also exist the challenges of inaccurate and slow retrieval of necessary information needed to take decisions or respond to inquiry, delays in payment of staff emoluments and fringe benefits, finding and collating data across different information sources, getting hold of the correct and up-to-date data. But many of these studies assessing information management in public sectors in Nigeria address the problem from entirely sectoral perspective. For instance, all the studies, including the present one that focuses on Oyo State, address the situation with respect to state governments. This study is therefore part of the studies focusing on various states in Nigeria required to accumulate a body of knowledge that captures the information management situation in the public service sector.

Aim of Study

The aim of this study was to examine how information is managed in the public sector in selected ministries in Oyo State Nigeria.

Research Questions

The study was guided by the following research questions:

i. What are the information sources used by ministries in Oyo state?

ii. What is the current state of information organisation and storage practices of the ministries in Oyo State?

iii. What is the level of utiliisation of information in the ministries?

iv. What are the various information dissemination practices used in Oyo state's ministries?

v. What are the benefits of information management to ministries in Oyo state?

vi. What are the challenges encountered in meeting information-related obligations in the ministries?

Literature Review

Information management refers to the economic, efficient and effective co-ordination of the production, control, storage and retrieval and dissemination of information from external and internal sources, in order to improve the performance of the organisation. Information management is the organisation's capability to create, maintain, retrieve and immediately make available the right information, in the right place, at the right time, in the hands of the right people, at the lowest cost, in the best media, for use in decision making. The main challenge facing the information personnel is to ensure that the information resource benefits its potential users in the best way possible. Information management includes indexing, abstracting, information analysis and consolidation, information repackaging, production of trend reports, feasibility studies and viability studies, as well as statistical bulletins (Matovu 2006, Adewale, Abioye and Isa 2016). According to Ralph et al., (2008), information management system is a set of interrelated components that collects, manipulates, stores and disseminates information and provides feedback mechanism to meet an objective. An information system can also be considered as a mechanism used for acquiring, filing, storing, and retrieving an organised body of knowledge. However, Tiamiyu (2003) had earlier opined that information system is designed to organise or process data in such a way that the resultant processed data are most informative to its users.

Asemi, Safari and Asemi (2015) opined that the two vital functions of information management system is the ability to output information to support decision making, co-ordination, control, analysis, etc and receive feedback from which further inputs can be derived. Generally speaking, an information system is composed of computing hardware, software, and communication facilities. These are tangible portions of an information management system. The intangible portion of an information management system, which is very crucial and usually neglected, is the organisational issues of an information system which are user requirements analysis, data capturing and cleaning, data maintenance and updating, information dissemination and utiliisation, etc., all need to be well planned and organised. Any information system, no matter how advanced its hardware and software are, cannot possibly be successful unless management and organisational issues are a top concern (GIS, 1995). To achieve high efficiency, quality and productivity, office automation and information systems will be working together (Brown and Toze 2017).

An information management system (IMS) should have the ability to facilitate managing of information at four stages: input, data processing, output and storage. This information helps administrators to solve problems and seize opportunities. Information management systems (IMS) make it possible for organisations to get the right information to the right people at the right time by enhancing the interaction between the organisation's people, the data collected in its various IT systems, and the procedures it uses. It brings together the raw data collected by the various areas of the organisation, which, while useful for specific functions such as accounting, does not provide, by itself, information that can be used to make decisions. As organisations grow, IMS allows information to move between functional areas and departments instantly, reducing the need for face-to-face communications among employees, thus increasing the responsiveness of the organisation (Alvarenga, Matos, Godina and Matias 2020). Rowley (1998) proposes four different levels of information management: information retrieval, information systems, information contexts, and information environments. Effective information management needs to address issues at all of these levels. Choo (2002) defines information management as a cycle of processes that support the organisation's learning activities: identify information needs, product and services, distributing information, and using information.

A government exists to serve its citizens and is the largest user of information technology (GIS, 2005). Their primary activity is record-keeping. Records, and the information they contain, are a valuable asset that must be managed and protected. Records provide the essential evidence that a particular action or transaction took place or that a particular decision was made. Records support all business functions and are critical to the assessment of policies and programmes, and to the analysis of individual and organisational performance. Without reliable records, government cannot administer justice and cannot manage the state's resources, its revenue or its civil service. It cannot deliver services such as education and health care. Without accurate and reliable records, and effective systems to manage them, governments cannot be held accountable for their decisions and actions, and the rights and obligations of citizens and corporate bodies cannot be upheld.

The public administration process is, to a large extent, virtually a process of data/information processing. Government authorities collect and process various data and information - on individuals, families, organisations, and companies, and then on the basis of these data and information, produce new information for the public, such as policies, strategies, plans, regulations, and various services to the public. Clearly, government is more than simply a user of information system. Each government has to chart policies and strategies to exploit its information resources, to develop its information infrastructure, and to promote the utiliisation of information systems for the purposes of achieving more effective growth of public services (Gunnar and Svensson 2012). Failure to initiate effective and timely action will have serious ramifications for the ability of a government to stimulate effective social and economic development of the country. Matovu (2006), in reviewing the structure of information in Uganda, examines the nature, strength and weaknesses of the conventional information system in Uganda. He pointed out that communication provides the government with the means with which to direct people's attention, opinions and thoughts, thus influencing people's perception with regard to social issues.

Public administration is a network of human relationships and associated activities extending from government to the lowest paid and powerless individual charged with keeping in daily touch with all resources, natural and human, and all aspects of the life of the society with which the government is concerned. Matovu (2006) in his study identified and described the nature and scope of public administration in Uganda. He observed that the introduction of information management system in public administration in Uganda had direct bearing to the attempt to replace the conventional approach to public administration with what had come to be known as new public management. The use of information technology in the public sector has been developed in two dimensions: office automation and information systems. The office automation dimension aspires to raise efficiency and productivity of office business; while the second aims at organizing and utilising information to support administration and management, as well as policy development and decision making, so as to improve effectiveness, efficiency, and productivity of an organisation as a whole.

Information management plays a crucial role in all public administration activities. Without accurate and reliable information, and effective systems to manage them, governments cannot be held accountable for their decisions and actions, and the rights and obligations of citizens and corporate bodies cannot be upheld. Effective information management enables the ministries to reduce costs by minimizing waste and duplication. Effective information management can, for example, remove unnecessary recording for civil servants, enable civil servants to share services and systems, allow for better use of analytics to support cost-based decision making and ensure that specialist administrative skills are utilised effectively in the discharge of their duties (Gunnar and Svensson, 2012).

Information management also increases the effectiveness and performance of civil service in a number of ways. It enables collaboration and information sharing between ministries and other agencies, supports the use of analytics to strengthen intelligence-led and preventive measures and enables civil servants to access critical information remotely. It also helps the civil servants increase public confidence by enabling them to engage with the citizen they serve. Information management encompasses the processes, functions, standards and

technologies that enable high quality information to be created, stored, communicated, valued and used effectively and securely in support of an organisation's strategic goals. Information is the life blood of public service (Brown and Toze 2017).

Ministries face a range of challenges associated with the creation, collection, storage, communication, valuation, sharing and use of data. One of the difficulties with the application of information systems is that with such systems people tend to incline towards concentrating on the technological aspects and a general lack of understanding of the processes. Most administrators tend to have problems with information management in which case managing the creation, flow and delivery of organisational information often constitute a problem; flow of information, funds to facilitate access to latest technology can also constitute a problem. In recent years there are criticisms reported about poor information management, inaccuracies and often non-availability of data and lack of information for purposes of monitoring, regulating and controlling of public service operations (Akindele 2006, Omar, Weerakkody and Sivarajah 2017). Unless properly addressed, these challenges reinforce data silos, inhibit collaboration and hinder data access. They can prevent the civil servants from unlocking the value of the information they hold and undermine improvements in efficiency and performance.

Theoretical Model: Information Management Cycle Model

The Information Management Cycle Model depicts information management as a continuous cycle of six closely related activities: identification of storage; development of information needs; information acquisition; information organisation and storage; development of information products and service; information distribution; and information use (Choo, 2002).

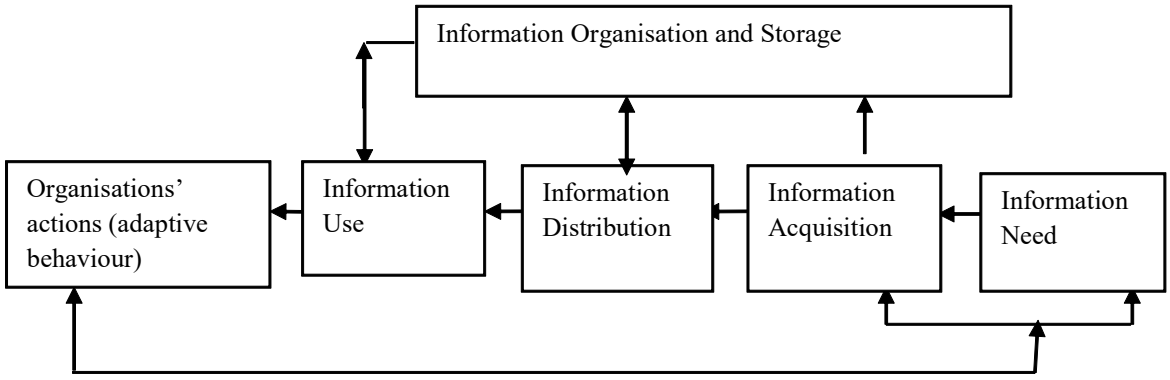

Figure 1: Choo (2002) Information Management Cycle Model

Identification of Information Needs

In the identification of information needs, organisation members recognise the volatility of the environment. Members seek information about its salient feature in order to make sense of the situation, and to have the necessary information to take decisions and solve problems. Public administrators need data concerning issues at hand which require decision making. They need data that is adequate, reliable and easy to use. The value of information is directly linked to how it helps decision makers achieve the organisation's goal. The value might be measured in time required to make decision. Public administrators are often involved in making decisions that affect many people's lives, and may have long term effects on the society. This explains the need for data that is reliable. At the same time, public administrators often handle several problems simultaneously hence; they generally would prefer data presented in a factual format for easy use, fully indexed for easy retrieval, current and thus reliable; and where necessary, data must be flexible enough to permit further analysis (Brown and Toze2017).

Information Acquisition

Information acquisition is driven by information needs and must adequately address these needs. Planning

for information acquisition has become a complex function. The fragmentation of human endeavor into pockets of specialisation has led to a proliferation of information sources and services that cater to these needs. At the same time, organisations increasingly require in-depth treatments of selected issues that are strategic to their growth and survival. Existing sources have to be constantly evaluated, new sources have to be assessed, and the matching of sources to needs had to be regularly re-examined (Choo, 2002). Hence, different ministries are most likely to embark on the acquisition of different types of information.

Information Organisation and Storage

In information organisation and storage, the objective is to create an organisational memory that is the active repository of much of the organisations knowledge and expertise. The volume of data produced and collected needs to be given structure in ways that reflect the interests and information use modes of the organisation and its members. Information technology can raise the efficiency and reliability of the organisation's operational activities. Integrated information management policies ensure that significant information concerning the organisation's past and present are preserved and made available for organisation learning (Weerakkody, Omar, El-Haddadeh, Al-Busaidy (2016).

Information Products and Services

Information acquired and information from memory is package into different levels of information product and service targeted at the organisations different user groups and information needs. This is not a passive repackaging of incoming data. Information products and improving the fit between the information and the needs or preferences of the users (Taylor, 1986).

Information Distribution

The goal of information distribution is to increase the sharing of information widespread information sharing catalyses organisational learning information sharing also creates new insight and knowledge about difficult problems or situations (Huber, 1991). End users should be given the best available information to perform their work and the information should be delivered through channels and modes that dovetail well with users' work patterns.

Information Use

Information is used for the creation and application of knowledge through interpretative and decision making processes. Information use for interpretation and delivery should support the multilevel interaction of social discourse (Choo 2001, Mamman, Isichei and Anza 2016). Information use for decision making involves the selection of alternatives, and information provision and content, should accommodate the kinetic and non-linear nature of the decision process.

Methodology

The location of the study was Oyo State, Nigeria. The study adopted a survey research design. The target population for this study consists of all staff between grade levels 07 and 16 in seven ministries of the twenty ministries in the Oyo State government. Civil servants in this category are expected to possess at least Ordinary National Diploma, or have been in the ministry long enough to rise to the rank of grade level 6, and therefore understand, and participate in, policymaking activities. Generally, people at these levels have better knowledge and understanding of the information management system in their respective departments. The study excluded level 17 officers and the commissioners; studying them would require interviews, an activity the protocols did not permit at the time of the study.

The researcher purposively selected seven ministries (see table 1) based on their perceived high propensity for data generation and consumption. These ministries have a total number of 1122 staff. The researcher used the Bourley's (1989, cited in Okeke 1995) proportional allocation formula was used for selecting the samples, $m = \frac{n_i(n)}{N}$, where m = sample size, n_i = element within the sample frame i.e. Number of staff in each ministry, n = sample or the proportion of the universe used for the study (total sample size); and N = Population of the study.

Table 1: Ministries in the study and samples selected

Selected Ministries	Total	Sample size
Information and Orientation	84	28
Establishments and Training	113	38
Industry, Applied Science and Tech.	95	32
Economic Planning and Budget	174	58
Finance	156	52
Health	323	108
Trade, Investment and Cooperative	177	59
Respondent per Grade	1122	374

Accidental sampling was used to select the respondents based on availability at the time of data collection in each of the selected ministries. Deliberate effort was made to ensure that each grade level was represented. Data was collected using a structured questionnaire.

The researcher administered a total of 374 copies of questionnaire designed for this study in seven ministries. Each respondent was given a copy of the questionnaire while the researcher was available to interpret portions that were unclear to each participating individual. Each of the respondents was required to fill the questionnaire and return it immediately except where the respondent chose to fill and return the questionnaire at an agreed convenient time to the researcher. 320 copies of the instrument were retrieved, out of which 303 were considered fit for use in analysis; others were discarded for inconsistency and lack of vital information.

Findings

Demographic Characteristics of the Respondents

Table 2 shows that 49.5 percent of the respondents were male while 50.5% of the respondents were female. This implies that both genders were fairly well represented. Among the seven ministries assessed, Ministry of Economic Planning and Budgets accounted for 17.5%, Ministry of Finance 13.9%, Ministry of Establishment and Training 10.2%, Ministry of Information and Orientation 9.2% .17.5% in the Ministry of Trade, Investment and Commerce, 22.8% in the Ministry of Health and 8.9% in the Ministry of Industry, Applied Science and Technology. The table also shows that 22.8% of the respondents had been in the service for between 1-5 years, 18.8% between 6-10 years, and 23.8% for between 11-15 years. Furthermore, 10.2% and 24.4% of the respondents have been in the civil service for 16-20 years and 21+years respectively. The result shows that about 58% of the respondents had been with the Oyo State civil service for more than 10 years, hence, they are well familiar with the operations of the service.

Table 2: Socio-Demographic Characteristics of Respondents

Variable	Categories	Frequency	%
Gender	Male	150	49.5
	Female	153	50.5
Ministry	Economic Planning and Budgets	53	17.5
	Finance	42	13.9
	Establishment and Training	31	10.2
	Information and Orientation	28	9.2
	Trade, Investment and Commerce	53	17.5
	Health	69	22.8
	Industry, Applied Science and Technology	27	8.9
Years of working experience	1-5 years	69	22.8
	6-10 years	57	18.8
	11-15 years	72	23.8
	16-20 years	31	10.2
	21 years and above	74	24.4

Addressing the Research Questions

Research Question 1: What are the information sources used by ministries in Oyo State?

Table 3 examines the information sources used in ministries in Oyo state. The table shows that 81.8% of the respondents often sourced information from government publications e.g. gazettes, budgets 14.2% indicated sometimes, 4% of the respondents indicated never sourced for information from Government Publications. Also, the result indicated that 63.4% of the respondents sourced for information from professional/academic journals often, 26.1% sometime does so, and 10.6% of the respondents never source for information from professional/academic journals.

Table 3: Information Sources

DOCUMENT	Often		Sometimes		Never		Mean	S.D
	Freq	%	Freq	%	Freq	%		
Government Publications e.g. Gazettes, Budgets	248	81.8	43	14.2	12	4.0	2.778	0.502
Professional/Academic Journals	192	63.4	79	26.1	32	10.6	2.528	0.677
Newspapers, Magazines	234	77.2	44	14.5	25	8.3	2.690	0.617
Memos, Reports	259	85.5	40	13.2	4	1.3	2.841	0.400
Conference/workshop papers	209	69.0	74	24.4	20	6.6	2.624	0.607
Colleagues	194	64.0	75	24.8	34	11.2	2.528	0.689
Internet	186	61.4	71	23.4	46	15.2	2.462	0.744
Statistical Data	193	63.7	85	28.1	25	8.3	2.555	0.643

The findings on sources of information used in the ministries revealed that majority of the respondents often sourced for information from memos and reports (85.5%), followed by government publications (81.8%), followed by conference/ workshop paper, information from colleagues accounted for 64%, professional /academic journals, statistical data and internet are the least consulted sources for information.

Information Organisation and Storage

Research Question 2: What is the current state of information organisation and storage practices of the ministries in Oyo State?

Table 4 examines the current information organisation and storage practices in ministries in Oyo state. The study found that the current capability of the ministry in updating information as good (98%) followed by accessing information (96%), supply of useful information (95.7%), supply of current and timely, information (95.4%), storage of all required information (93.4%) , Processing of information (95%), retrieval of information (89.1%), protection of data from loss

Table 4: Information Organisation and Storage

Information Organisation and Storage	Good		Poor		Mean	SD
	Freq	%	Freq	%		
Updating of information	298	98.3	5	1.7	1.984	0.128
Accessing information	291	96.0	12	4.0	1.960	0.195
Digitizing of information	261	86.1	42	13.9	1.861	0.346
Processing of information	288	95.0	15	5.0	1.951	0.217
Retrieval of information	270	89.1	33	10.9	1.891	0.312
Supply of useful information	290	95.7	13	4.3	1.957	0.203
Supply of current and timely information	289	95.4	14	4.6	1.954	0.210
Protection of data from loss	267	88.1	36	11.9	1.881	0.324
Sharing Information databases/dataset	248	81.8	55	18.2	1.819	0.386
Protection of information from unauthorized use, falsification	263	86.8	40	13.2	1.868	0.339
Storage of all required information	283	93.4	20	6.6	1.934	0.249

(88.1%), protection of information from unauthorized use, falsification (86.8%), digitizing of information (86.1%) and the least capability is sharing information databases/dataset (81.8%)

Information Storage

The table below examined the information storage used in ministries in Oyo state. Figure 2 revealed that 46.5% of the respondents indicated file cabinet system as their record keeping system, 35.0% indicated computer storage, and 26.4% indicated storage devices: CD, flash drives, 11.6% indicated databases, 4.3% indicated online storage and 2.6% of the respondents indicated others systems of record keeping. The result shows that file cabinet system is the commonest record keeping system and online storage is the least utilise means of keeping records in the ministry.

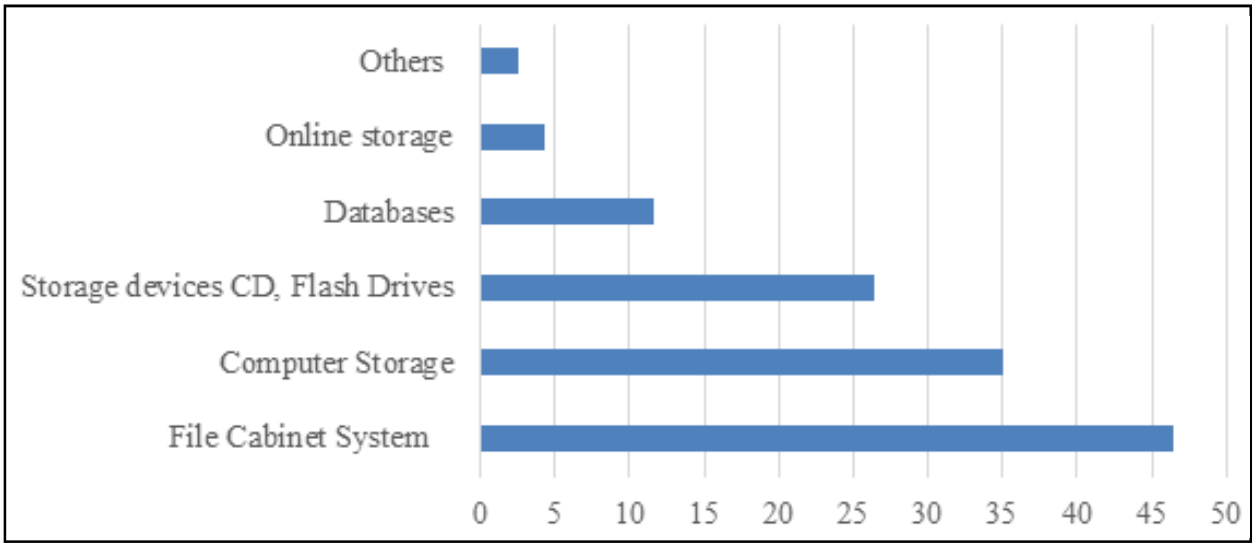

Figure 2: Information Storage system

Information Utiliisation

Research Question 3: What is the level of utiliisation of information to address tasks in the ministries?

Table 5 shows how the various ministries used the information obtained from different sources according to the participants in the study. The table shows that 88.1% of the respondents indicated that they often used information obtained for budget execution, 7.3% indicated sometimes.

Table 5: Information Utiliisation

Tasks	Often Used		Sometimes Used		Never used		Mean	S.D
	Freq	%	Freq	%	Freq	%		
Budget Execution	267	88.1	22	7.3	14	4.6	2.835	0.481
Accounting	260	85.8	36	11.9	7	2.3	2.835	0.430
Fiscal Reporting	216	71.3	66	21.8	21	6.9	2.644	0.608
Cash Management	203	67.0	74	24.4	26	8.6	2.584	0.645
Debt Management	165	54.5	80	26.4	58	19.1	2.353	0.783
Revenue Administration	221	72.9	54	17.8	28	9.2	2.637	0.646
Civil Service Administration	245	80.9	47	15.5	11	3.6	2.772	0.499
Auditing	245	80.9	42	13.9	16	5.3	2.756	0.540

Also, the result indicated that 85.8% of the respondent used the information for accounting often, 11.9% sometime did so, 2.3% of the respondents never used the information obtained for accounting. 80.9% used information for civil service administration, followed by 72.9% for revenue administration and auditing, followed by fiscal reporting 71.3%, 67 % for cash management and 71.3% for fiscal reporting.

Research Question 4: What are the information dissemination practices used in Oyo State's ministries?

From table 6, the often use means of disseminating information is paper files, memos, reports (86.5%), closely followed by meetings (82.2%), records/ archives (79.9%), telephone (74.9%), print media (State publication) (72.6%), television/radio advert (52.1%), bulletin boards (50.5%). E-mail (49.2%), CD-ROM (45.9%), website (45.9%), online databases (45.5%) and intranets (40.6%) are the least use of all the means of information distribution.

Table 6: Information Dissemination Means

Information Dissemination Means	Often used		Sometimes Used		Never used		Mean	S.D
	Freq	%	Freq	%	Freq	%		
Print Media	220	72.6	48	15.8	35	11.6	2.611	0.686
Meetings	249	82.2	41	13.5	13	4.3	2.779	0.509
Website	139	45.9	80	26.4	84	27.7	2.182	0.840
CD-ROM	139	45.9	92	30.4	72	23.8	2.221	0.806
Bulletin Boards	153	50.5	82	27.1	68	22.4	2.281	0.808
Online Databases	138	45.5	62	20.5	103	34.0	2.116	0.886
E-mail	149	49.2	73	24.1	81	26.7	2.224	0.843
Telephone	227	74.9	42	13.9	34	11.2	2.637	0.676
Paper Files, Memos, Reports	262	86.5	28	9.2	13	4.3	2.822	0.483
Records/Achieves	242	79.9	39	12.9	22	7.3	2.726	0.588
Television/Radio Advert	158	52.1	67	22.1	78	25.7	2.264	0.844
Intranets	123	40.6	71	23.4	109	36.0	2.046	0.875

Research Question 5: What are the benefits of information management to ministries in Oyo State? From the result of table 7, it shows that the most rated benefits of information management by the ministries as shown by the respondent is enhanced the knowledge delivery for improved resource allocation (93.1%), enabled the ministry to share high quality information (92.7%), followed by enabled the ministry to share high-quality information securely and effectively with partners (92.7%), closely followed by providing timely access to high quality information held by different organisations (92.1%), Improved the delivery of insight to enable better decision making (89.8%) and support intelligence analysis enabling the identification of links between people, objects, locations and events (89.8%). Reducing the cost in terms of the time used for data collection and entry accounted for 88.8%, reducing the cost in terms of the resources of data collection, storage and retrieval 88.1%.

Table 7: Benefits of Information Management

Benefits of Information Management	Agree		Disagree		Mean	S.D
	Freq	%	Freq	%		
Reducing the cost in terms of the time use for data collection and entry.	269	88.8	34	11.2	1.888	0.316
Reducing the cost in terms of the resources of data collection, storage and retrieval.	267	88.1	36	11.9	1.881	0.324
Providing timely access to high quality information held by different organisations.	279	92.1	24	7.9	1.921	0.271
Enabled the ministry to share high-quality information securely and effectively with partners.	281	92.7	22	7.3	1.927	0.260
Improved the delivery of insight to enable better decision making.	272	89.8	31	10.2	1.898	0.304
Enhanced the knowledge delivery for improved resource allocation.	282	93.1	21	6.9	1.931	0.254
Support data aggregation that turns information into actionable intelligence.	263	86.8	40	13.2	1.868	0.339
Support intelligence analysis enabling the identification of links between people, objects, locations and events.	272	89.8	31	10.2	1.898	0.304

Research Question 6: What are the challenges encountered in meeting information-related obligations in the ministries?

Table 8 presents the day–to-day challenges that occur significantly within the ministry in meeting information obligations as rated by the respondents; the percentage of how often the respondents faced different challenges in the implementation of information management the table revealed that the most often challenge faced was bureaucracy in getting information. (44.2%), closely followed by finding and collating data across different information sources difficulty (43.6%), getting information from a database difficulty (39.6%), required data was often not available quickly enough to act on it effectively (38.3%), Publishing Information online challenge (36%), No up-to-date information (36.0%), Specific information needed not captured (35.6%), knowing the information was there, but getting at it was difficult or impossible. (33.7%), and the challenge least faced by respondents was that some of the information sources produced conflicting result (32%).

Table 8: Challenges Encountered

Challenges	Often		Sometimes		Never		Mean	SD
	Freq	%	Freq	%	Freq	%		
Finding and collating data across different information sources is difficult.	132	43.6	94	31.0	77	25.4	2.18	0.812
Specific information needed not captured.	108	35.6	102	33.7	93	30.7	2.05	0.814
Knowing the information is there, but getting at it is difficult or even impossible.	102	33.7	95	31.4	106	35.0	1.989	0.830
Some of the information sources produce conflicting results	97	32.0	69	22.8	137	45.2	1.87	0.870
Required data is often not available quickly enough to act on it effectively.	116	38.3	86	28.4	101	33.3	2.05	0.846
Bureaucracy in getting information.	134	44.2	88	29.0	81	26.7	2.18	0.825
No up-to-date information	111	36.6	71	23.4	121	39.9	1.97	0.876
Publishing Information online	109	36.0	86	28.4	108	35.6	2.00	0.848
Getting information from a database	120	39.6	97	32.0	86	28.4	2.11	0.818

Discussion of Findings

This study was carried out to assess the information management in Oyo State public service in Nigeria using data collected from the ministries in the state. The study examined information sources, current state of information organisation and storage practices, level of utiliisation of information, information dissemination practices, perceived benefits of information management and the challenges encountered in meeting information-related obligations in the ministries. The ministries used a number of sources of information as this is in line with Kirk (1999) that multiple sources of information enhance capabilities of individuals in the organisation and Choo (2002) that it is beneficial to be provided with information through various sources of good quality information. The findings also showed that professional/academic journals and the Internet are the least consulted sources of information. It also can be inferred that information sources residing in the cyberspace is yet to be fully utilised in all the ministries as discussed by previous studies (Adebayo, 2011). This finding does not agree with Oduwole *et al* (2003) that the Internet which is the most prominent of this source has made possible access to electronic books and journals; various databases and search engines and the need for online public access catalogues. However, various authors (Orna, 1990; Stanat, 1990; Choo, 2002, Brown and Toze 2017) advised that existing sources have to be constantly evaluated, new sources have to be

assessed, and the matching of sources to needs had to be regularly re-examined.

The findings of the study showed that the ministry's capability in updating information (98.3%) and storage of all required information (93.4%) are the most rated among others. From this, it is clear that some mandated requirements are generally managed reasonably well, on the other hand, many ministries are still struggling with sharing information database/dataset, protecting information and falsification, reporting to stakeholders, which are relatively low in coping with the rising demand of information in public sector, a significant gap still exists in this regard in relation to other information management activities. Also it was gathered from the findings from the study that updating information in the public sector has relatively improved as well as supply of information. This is supported by Choo (2002) and Gunnar and David (2012) which states that the volume of data produced and collected need to be given structure in ways that reflect the interests and information use modes of the organisation and its members.

From the research findings, the storage system dominant is file cabinet. Though computer storage system is on the increase (rated 35%) relative to what it was from previous study (Atulomah 2011, Hamadoja 2011), use of storage devices is gaining ground, use of databases and online storage are still relatively very low (11.6% and 4.3% respectively) which corresponds with previous studies. In agreement with Popoola (2009) and Atulomah (2011), for accurate and reliable information, for easy finding and sharing of information in addressing more specific purposes and the need to take advantage of the past experiences can be achieved effectively through use of computer storage system, online storage system. Gunner (2005) and (Choo, 2002) also stressed that there is need for the public sector to embrace the use of databases , online storage in all public sector for effective storage system as memory stored in database constitutes a vital source for decision making

The findings of the survey further revealed that the current practice of information dissemination to end users in the ministry is largely through paper files, memos and reports,(86.5%), meetings (82.2%), print media (72.6%), telephone (74.9%) among others, they are the easiest means of disseminating information to their targeted audience which corresponds with previous studies(Hamadoja,2011) . On the other hand, use of emails (49.2%), website (45.9%), and intranet (40.6%), online database are not often used. According to Ralph et al., (2012), an information system can be manual or computerised. The findings of the study show that the information dissemination in the ministries is more of manual than being computerized.

Though it was revealed that a few ministries had improved in adopting the use of electronic means of information dissemination yet, it is not coherent across all the departments in such ministries. Some ministries have desktop tools which are not connected to serve information sharing and distribution. The research indicates that significant capability gaps exist with regard to electronic dissemination means. Addressing this gap will lead to efficiency gains as online interaction are generally cheaper than dealing with people face – to – face, over telephone or via paper correspondence (Choo 2002, 2011). Enabling more efficient online interaction, intranet will clearly help to address the needs and expectations of the public sector as the use of the web, mobile devices and social networks are increasingly becoming an integral part of the daily lives (Choo 2002). Information leads to decisions and actions that will help the organisation meet its goals. All the decisions taken are based on the quality of the information; the quality of the decision will be influenced by the quality of the information. The decisions in most cases will be actions to focus or refocus organisational objectives, either by changing strategies/approaches or maintaining status quo.

The findings of the study revealed that the most important outcome of information management implementations in the ministries are the provision of timely access to high quality information held by different organisations, facilitation of the sharing of high-quality information securely and effectively with partners, reduction in the cost in terms of the time use for data collection and entry, improvement in the delivery of insight to enable better decision making, enhancement of the knowledge delivery for improved resource allocation, support for data aggregation that turns information into actionable intelligence, reduction the cost in terms of the resources of data collection, storage and retrieval. This supports the

findings of Maurice, James and Manuel (2010) and (Watad 2020) regarding information management capabilities to play critical roles in supporting all administrative processes and enabling the delivery of civil services. Most public sector recognised the huge benefits of efficient and effective information management system in place as it will improve their deliverables. This corresponds to previous studies as well. Thus, the need for increased awareness for commitment from public sector is no longer an issue.

Conclusion

The implementation of information management is expected to face a unique set of challenges. By documenting these challenges, and the thinking behind the corrective action, we can enhance our ability to respond to future challenges. The Study found that meeting information obligations has some related challenges, according to the respondents, there is widespread of bureaucracy in getting information as at the time needed and collating information from different sources is a great challenge. Respondents sometimes encountered the problem of specific information needed not captured. It is obvious that the public sector is still faced with the challenges of making information available to external interested parties and on demand information provision in addition to routine reporting. They are faced with the challenge of finding and collating information from a fragmented and often inconsistent data source which takes time to work through.

Moreover, the study found out that publishing information online is creating real challenge and the obligation of making information available on demand to the stakeholders is adding to the burden which corresponds with previous studies (Atulomah 2011, Hamadoja 2011; Lee, Kim, Park, Park and Oh 2007). However, the study discovered a significant gap in the use of electronic means of information management in some ministries among other key constraints to effective and efficient information management. Akindele (2006) observed that in recent years there are criticisms reported about poor information management, inaccuracies and often non-availability of data and lack of information for purposes of monitoring, regulating and controlling of public service operations. Unless properly addressed, these challenges reinforce data silos, inhibit collaboration and hinder data access. They can prevent the civil servants from unlocking the value of the information they hold and undermine improvements in efficiency and performance.

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A Framework to Integrate Healthcare Records in the South African Public Hospitals Using Blockchain Technology

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Abstract

In the public sector in South Africa, health records are not integrated into a single system and a new file is opened every time a patient consults in a different hospital. This compromises the quality of the medical services as the doctors diagnose a patient without the medical history. At times, healthcare providers find it difficult or impossible to treat the patients without access to the medical history of patients because it involves high risks that include repetition or duplication of treatments and prescriptions. This study conducted literature review to demonstrate a need for a framework which involves the use of blockchain technology for security to integrate healthcare records in the South African public hospitals. It was established that one of the elements that impedes the integration of the health records in South Africa is security of information. A framework that enables public hospitals using blockchain technology for security to integrate health records is suggested. The framework enables public hospitals anywhere in the country to access the complete, accurate and secure health records of a patient, irrespective of where the file was opened. Blockchain can be used to secure such information so that when health records are integrated, a complete, accurate and secure medical history can be generated. In that regard, a health record of a patient can be accessed and added anywhere in the country, leaving a digital trail for a system that can be trusted inherently.

Keywords: Health Records, Medical Records, Healthcare, Patient Records, Blockchain Technology

Introduction

One of the provisions of quality healthcare is a complete set of data that provides a full "picture of the patient's story". This is usually achieved through an Electronic Medical Records System (EMR) (LeSueur, 2017). This is because healthcare institutions like other organisations need a system that can assist them in supporting the implementation of a framework for governance in order to properly run their healthcare service delivery business (Masegare and Ngoepe, 2018). However, lack of integration of healthcare systems, especially in countries such as South Africa, prohibits government from offering quality healthcare to citizens. Many commentators lament of health records that are not integrated into a single system and a new file is opened every time a patient consults in a different hospital. For example, in a study by Marutha (2016) it was established that even within one province in South Africa, health records are not integrated. As such, a new file is opened every time a patient consults in a different hospital within the same province. This is even worse if a patient has to consult in a different province. As a result, this compromises the quality of healthcare as a medical practitioner diagnoses a patient without the full medical history.

Difficulty in accessing health records always affects timely access to healthcare information by healthcare practitioners and results in patients waiting for a long time prolonged unnecessarily. At times, healthcare providers find it difficult or even impossible

to treat the patients without access to the medical history of the patients because it involves high risks that includes repetition or duplication of treatments and prescriptions (Marutha and Ngoepe, 2018). This can be regarded as a burden for patients and their relatives. Eventually, citizens may be judging the quality of healthcare and regarding it as a calamity to the entire community (Brandenburg, Gabow, Steele, Toussaint and Tyson, 2015). Hence, healthcare institutions need integrated health records to achieve improved healthcare outcomes that increase healthcare quality and provide enhanced safety for patients (Alnuem, EL-Masri, Youssef and Emam, 2011).

One technology that is increasingly being discussed as a possible solution to records problems, such as the need for trusted digital records, is identified by Lemieux (2019) as blockchain technology. There are several alternative technologies to blockchain technology such as centralised transaction systems and databases that provide greater scalability, secured cloud storage services and other distributed ledger technologies (Joshi 2018; Wang 2020), but blockchain technology appears to be extraordinary. Blockchain technology does not work like a normal database, since the information shared through it is "encrypted and stored in every node connected to the network and eliminate the possibility of having single point of failure, fraud, and corruption" (Kombe, Manyilizu and Mvuma, 2017). Blockchain technology holds immense promise to revolutionise almost every field, including health, finance, auditing, justice, security and other areas. Srivastava, Parizi and Dehghantanha (2020) underscore that blockchain technology started changing focus from finance to healthcare sector. Wang (2020) alludes that during the corona virus pandemic, healthcare facilities relied much on technologies such as cloud computing as patients were restricted from moving around in between healthcare facilities but this was to be better with the presence of blockchain technology. Blockchain is capable of interconnecting or collaborating with more than one organisation rendering related services together. With regard to healthcare, collaboration in the "hospital electronic health records (EHR) system" may contribute to improved patient waiting times and access to quality healthcare information (Brandenburg, Gabow, Steele, Toussaint and Tyson, 2015). Alnuem, EL-Masri, Youssef and Emam (2011) further state that using electronic health record integration for hospitals also brings about:

> Improving transparency and effectiveness, enhancing accessibility and quality, strengthening quality and satisfaction of patients, reducing medical expenses, management rationalisation of healthcare organisation, and enhancing accountability through public healthcare inspection system.

Patients changing healthcare institutions and healthcare doctors, bring about a problem for informed medical treatment as every doctor and healthcare institution create and use their own health records for the same patients without any possibilities or platform to share the medical background (Allen and Carr, 2009). This eventually compromises the quality of clinical care rendered to the patients. Healthcare institutions and practices need a secured system that can interconnect patients from homes to ambulances, care facilities, diagnostic laboratories and other healthcare facilities, institutions and providers of healthcare services for informed decision-making during healthcare service at all the levels (Allen and Carr, 2009). There are many benefits in the sharing of healthcare information, which provides for quality in caring for patients. Nevertheless, the shared information needs to link to the correct patients and be distinguishable from other healthcare information. The information must also be accessible timeously to appropriate healthcare givers in an appropriately reliable format for easy and timely patient care (American Hospital Association, 2018). Timely and accurate information access will assist in improving healthcare services through a comparative analysis of the background of the medical condition with other practitioners, as well as exchanging of medical information in both public and private practices. This will also enable patients to network with each other on their record about dietary and medical matters (Allen and Carr, 2009). Mathioudakis, Rousalova, Gagnat, Saad and Hardavella (2016) indicate that patients may also need to access their own records where it is deemed necessary to study them and understand the kind of medical care and treatment that were provided to

them. Alnuem et al (2011) list the benefits of sharing electronic healthcare records. These include reduction of time required for movement of physical records between healthcare facilities, availability of more information about patients for accurate services, reduced time and diagnosis costs, reduced medical error for increased quality of care, and finally produce medical information important for planning and strategies for improvement of healthcare services and systems.

Furthermore, it is with the improvement of information technology from time to time that healthcare providers are now able to share healthcare information by storing it and transferring it to each other by means of an electronic system. This may enable them to realise improvement, efficiency and effectiveness in the quality and organisation of healthcare (Mehraeen, Ghazisaeedi, Farzi and Mirshekari, 2017). The introduction of a medical records management system reduces the work of practitioners and allows them to focus on the quality of healthcare. Roland, Guthrie and Thome (2012) underscore that instead of designing computer systems in the clinical services for billing of patients systems also need to be designed in such a way that it is used to render clinical services and measure clinical service quality. They further state that in doing so, records will follow the patients wherever they go when changing from clinical practice or specialist. The reason for this is that medical records "contain a lifelong record of patient's medical care" (Roland, Guthrie and Thome, 2012). Roemer (1970) states that "careful medical record-keeping helps in promoting a better continuity of medical care", to which Mathioudakis, Rousalova and Gagnat (2016) add that "good clinical record keeping should enable continuity of care and should enhance communication between different healthcare professionals". Roemer (1970) further underscores that the achievement of good quality medical care depends on the direction of social action of "establishing proper underlying conditions and influencing system operations", and that quality medical care requires sufficient resources. Technology is necessary in the healthcare services to improve several things, such as handling of health records, safety of patients, quality of healthcare and productivity of providers (Allen and Carr, 2009). Allen and Carr (2009) show that:

> One of the most significant obstacles to improved patient care, at a reasonable cost, is the relative lack of real-time access to current, comprehensive patient medical information that is easily retrievable for patients, healthcare providers, and healthcare payers. To impact the quality of US healthcare, patient information must be captured, updated, and shared with all stakeholders in a timely and effective manner to not only ensure universal access to quality data, but also to extend essential information to key clinical decision makers.

In most of the sub-Saharan countries, blockchain technology is being used for many different purposes from country to country rather than for healthcare. For instance, Ghana used it for registration of landowners and land claims, Ethiopia used it for tracking of coffee exportation, Kenya used it for controlling the process of micro-landing affecting farmers, Eastern and Southern African countries used it for buyer and seller connection in trading for common market. Currently blockchain technology is targeted by many countries in the sub-Saharan countries for different purposes including South Africa, Rwanda, Uganda, Mauritius, Tanzania, Sierra Leone, Democratic Republic of Congo, Botswana, Nigeria, and Senegal (Kombe, Sam, Ally and Finne 2019; Barigaba, 2017; Kombe, Manyilizu and Mvuma, 2017; Gebre, 2018). "Despite early adoption of blockchain technology in different domains in sub-Saharan Africa, the healthcare sector lags behind…" (Kombe, Sam, Ally and Finne 2019). For instance, Malawi is still relying and trusting on manual paper-based medical records that are only kept inhouse within different sections of the hospitals such as clinics, dispensaries, etc. which makes it even more difficult to compile district health information statistics. There is no integration of healthcare records (Tough and Lihoma, 2018). This study aims to develop a framework for integrating health records in South African public hospitals to enable countrywide access to complete, accurate and secure health records through blockchain technology.

Integrating accurate and secure health records through blockchain technology provides a lot of advantages in managing health records

- **A wider access to complete, accurate and secure health records**

Improved quality in health records assists the healthcare institutions to minimise the mortality rate in the healthcare institutions, among others (Dunlay et al, 2008). This is because healthcare services will be rendered free from errors. Privacy of healthcare information, its completeness and access control may be used to balance or satisfy healthcare services to patients (Engelhardt, 2017). The healthcare institutions need to always seem to be striving to improve the quality of patients' healthcare with the assurance of patients' satisfaction, costs saving, keeping confidentiality in privacy of healthcare information and timely access to complete medical history information (Engelhardt, 2017). It is critical for the healthcare providers to have access to the medical history of patients that is complete and free from errors. For instance, the healthcare practitioners need to access reliable information on treatments, diagnosis, prescriptions and laboratory tests to successfully assist patients with required healthcare service (Dubovitskaya, Xu, Ryu, Schumacher and Wang, 2017). Health records must always tell the complete and truthful story about the previous medical transactions on the patients. It is very important that medical practitioners create and provide complete and accurate health records for proper keeping and management of the records to be used for improved patient treatment (Mehraeen et al. 2017). Hartmann and Sooklal (2012) state that:

Dubovitskaya et al. (2017) further elaborates that at times patients happen to consult doctors at many different healthcare institutions and sometimes they happen to be transferred from one institution to another. In the process, institutions need to find a way of sharing their patients' medical background records. "It is vital to have a robust, accurate, reliable, inviolable, and accessible medical record system that is easily shared and understood. Medical records must not degrade or become otherwise inaccurate over time" (Hartmann and Sooklal, 2012). This may assist in resolving concerns about timely information access, and records integrity, quality and legibility in the healthcare institutions (Hartmann and Sooklal, 2012).

Furthermore, sharing of health records in a national platform needs a central database for the central keeping of health records. In this instance, the medical history of patients from different healthcare institutions is stored on and accessed centrally from the national database by all involved healthcare practitioners affiliated to the collaborative system. The benefits are that all information, regardless of who created it or where it was created, will be readily accessible to relevant healthcare givers. The architectural part of this kind of system may not be easy since it needs budget for appropriate resources such as computer hardware, software and information communication technology (ICT) practitioners who will take charge of the creation, administration and maintenance of the system. This is because health records need to be safeguarded against complete loss or theft through unauthorised access, especially in case patients lose their identity cards or documents. Hence, "adequate access control and back-up solutions" are a necessity. Unlike traditional paper-based records sharing, electronic records will be easy to disseminate and share among the collaborating staff in different healthcare institutions geographically located a bit far from each other (Hartmann and Sooklal, 2012).

- **Health records integration in a single system**

The healthcare institutions are currently challenged with healthcare systems that operate in silos even when institutions have a cooperative relationship. These kinds of systems make it difficult for the healthcare practitioner to share or communicate their work which they are providing to the patients on a daily basis, including the medical history contained in the records (Hägglund, Scandurra, Moström and Koch, 2007). It is clear that "electronic medical records (EMRs) are critical and highly sensitive private information for diagnosis and treatment in healthcare" (Dubovitskaya, Xu, Ryu, Schumacher and Wang, 2017). Still, this kind of information "needs to be frequently distributed and shared among peers such as healthcare providers, insurance companies, pharmacies, researchers, patients' families, among others" (Dubovitskaya, Xu, Ryu, Schumacher and Wang, 2017). However, organisations that are not integrated in terms of "structures and systems" risk a long turnaround time in locating misfiled and misplaced patient records in their custody, instead of spending such time treating their patients. Such kinds of healthcare institutions also spend much time opening files from institution to institution, instead of relying on each other to avoid duplication of files

and efforts. Instead such institutions may organise and structure themselves to implement an integrated medical records management system that can be used for collaborative medical information access, communication tools and work coordination (Hägglund, Scandurra, Moström and Koch, 2007). This is because "automatic integration of patient information received from outside sources into a receiving hospital or health system's electronic health record (EHR) enables more timely and effective use for patient care than if the information must be entered manually" (American Hospital Association, 2018). The system can also be used as a tool for documentation (creating and storing healthcare information) (Hägglund, Scandurra, Moström and Koch, 2007). This is simply because "medicine is an increasingly data-intensive and collaborative endeavour" (Mehraeen, Ghazisaeedi, Farzi and Mirshekari, 2017).

- **Health records integration using blockchain technology in the public hospitals**

In the healthcare service, it is important to have standardised interoperable IT systems that allow healthcare providers to share healthcare information nationwide. The main intention must be to share healthcare information across multiple healthcare institutions Pauwels and Grevatt, 2017). For instance, study by Wang (2020) recommends integrating what he calls "IoT, Blockchain and Cloud technologies" for healthcare and telemedicine services. The healthcare industry, whether public or private, needs technology that can be used as a means to share patients' medical history and this is because the key goal is to benefit or secure patients' lives. Blockchain technology is one of the technologies required to achieve these goals since it can "guarantee data security, control over sensitive data, and will facilitate healthcare data management for the patient and different actors in medical domain" (Dubovitskaya, Xu, Ryu, Schumacher and Wang, 2017; Wang 2020). Blockchain refers to the ongoing list of transactions arising from the exchange of a cryptocurrency like Bitcoin and it arises from the process of confirming transactions (Pauwels and Grevatt, 2017; Tanwar, Parekh and Evans 2020).

Methodology

This qualitative study relied on the application of literature review to "provide a balanced and objective summary of research evidence" for the topic in this study (Brereton, Kitchenham, Budgen, Turner and Khalil 2007). The study conducted literature review to demonstrate a need for a framework which involves the use of blockchain technology for security to integrate healthcare records in the South African public hospitals. The authors used keywords and phrases in the themes of the literature review to search for appropriate literature on the google scholar and google search which also links to scholarly databases like sage and emerald to access appropriate literature sources for the study. Keywords and phrases used to conduct the literature searches were derived from the title of the study, as well as from the themes in the content of the paper to get relevant sources that addresses the study. These include integrated healthcare records, South African public hospitals, blockchain technology, medical records, patient records and information security. Abstracts were first assessed through annotated bibliography to ascertain relevancy of each source.

Findings, Discussions and Recommendations of the Findings of the Study

The study established that one of the elements that impedes the integration of the health records in South Africa is security of information. A framework that enables public hospitals using blockchain technology for security to integrate health records is suggested. The framework enables public hospitals anywhere in the country to access the complete, accurate and secure health records of a patient, irrespective of where the file was opened. Blockchain can be used to secure such information so that when health records are integrated, a complete, accurate and secure medical history can be generated.

Leaving a digital trail for a system that can be trusted inherently. The need for hospitals as healthcare facilities to interconnect with each other for ease of records sharing is a critical necessity to ensure continuous quality in the healthcare service provided to patients on a daily basis. This interconnection needs the application of safe and secured information technology such as blockchain.

The system needs to ensure all the necessary safety and security measures to the patients'

information shared on the platform against any changes, alterations, concealment, unauthorised additions and removal as well as destruction of such information. This will avoid misleading unauthentic patient medical histories to healthcare providers shared on the block, or healthcare providers rendering their service in the dark without any patients' medical and health histories as held in another hospital. This may be harmful to the health of the patient receiving the service.

Blockchain technology appears to be relevant for this purpose since it has all the safety and security requirements to maintain the characteristics of a record from the moment it was created and added into the system. It is also capable of maintaining patient information confidentiality by ensuring that only credible or eligible individuals and organisation access the patients' information stored in the system. The implementation of such interconnectivity requires a framework that can guide the process throughout for appropriate implementation.

Recommended Framework to Integrate Health Records

This section presents the framework proposed to integrate healthcare records in the South African public hospitals using blockchain technology. The framework is presented in Figure 1 and it is discussed in four key steps, which are file creation and records capturing, file access and records sharing, file updating and records adding, and file quality assurance. It is proposed that the framework works like a bank account. If a person has an account with a bank, such an individual can access his account in any branch using his identity document or the money in any ATM using his card or even online. A person should be able to access his health records in any healthcare centre irrespective of where such a person first consulted.

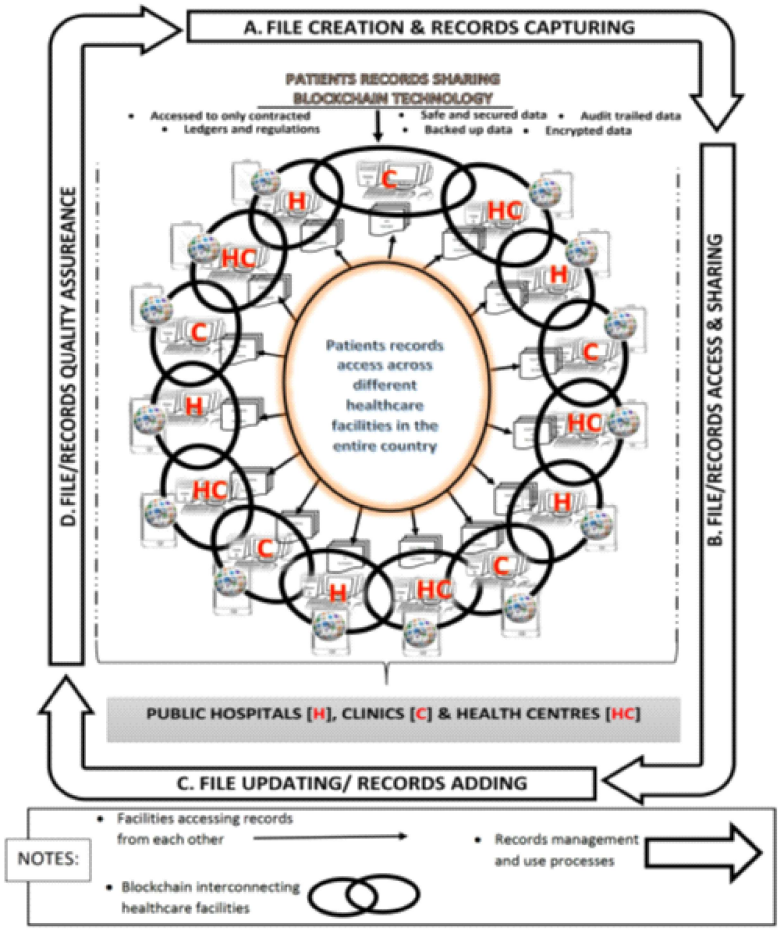

Figure 1: A Framework to Integrate Healthcare Records in the South African Public Hospitals Using Blockchain Technology

The framework to integrate healthcare records in the South African public hospitals using blockchain technology recommended by this study is discussed at the hand of the following four key steps:

A. File Creation and Records Capturing: This is the first stage when the patient visits the hospital or health care institution. In this case, the healthcare provider will have to open or create a file for the patients online using the system that the health institution implemented. The system will also have a blockchain technology layer to provide security and access to other users inside and outside the health institution creating the file. When the same patient visits another healthcare institution, the healthcare provider in such institution should be able to access all files of the same patient in other institutions. This healthcare provider when creating a file for such a patient, the blockchain technology should add a block which alerts other facilities in the chain about such addition of a block. This means the file can also be accessed by other healthcare institutions that form part of the chain for such a patient. The records created will be encrypted for protection against any tempering such as alteration and deletion. Everywhere where the patient consults, a health practitioner would add a block in the chain of that patient's medical file.

B. File Access and Records Sharing: Protection of personal information legislation should be observed when providing access and sharing of information. In this step, healthcare providers are able to access encrypted files stored previously by other providers for checking patients' medical and health history during the healthcare service provision. Patients' information can also be accessed by authorised officials or healthcare providers. Patients should also be able to access their health data through a smartphone or other internet applications (apps) using their login credentials such as password and user identity name anywhere and at any time. However, patients should only be granted permission to access data but not to add blocks in the chain. Every time the file is accessed, the blockchain technology layer will capture a digital trail.

C. File Updating and Records Adding: In this stage, a file may be updated, appended or created by any medical practitioner in any hospital as a block in the chain. Healthcare providers are also able to add new medical information about patients' history in case certain healthcare services or healthcare transactions were conducted for the returning patients needing healthcare service again. Unlike in stage A, here information is just added if the patient is not using the healthcare facility for the first time. The system is also able to keep an audit trail for access and transactions conducted at any given time through any technology, including mobile apps.

D. File Quality Assurance: The healthcare institution involved must also take responsibility to quality assure their records contained through the blockchain technology because they also depend on it. This implies that every member organisation will regularly assure the quality of the records shared through the system. Again, quality will be strengthened through the legislation and ledgers for use of the system, and records contained in the blockchain which will outline the do's and don'ts of records and system for the permanent authenticity, safety, security and confidentiality of patient information. The centrally established body will play a very important role in the monitoring, evaluation and enforcing of compliance to the hospitals involved. This must comprise a specialised team of different areas, including records management and clinical services.

Conclusion

The study provided a more generic framework to which the healthcare organisation may refocus their own environmental requirements and situation during implementation. It is hoped that this framework will assist in ensuring that through blockchain technology in South Africa, healthcare organisations are able to share responsibilities with the use of shared patient medical and health history in enhancing the quality of care. Quality records will ensure quality healthcare since physicians will always be able to make informed decisions and do problem-solving in treating their patients, regardless of where or which institution created the records. For future focus, the researchers intend to approach hospitals in South Africa for the purpose of testing this framework. Once tested, it will be extended to the private health sector so that the country can provide a comprehensive healthcare with the looming implementation of the national health insurance.

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Students Industrial Work Experience Scheme as Correlate of Digital Skills and Competences among Emerging Librarians from Bayero University Library School

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Abstract

The study carried out a post Students Industrial Work Experience Scheme (SIWES) assessment of emerging librarians at Bayero University Library School with a view to ascertain their digital skills and competencies vis-à-vis places they did SIWES. The study was carried out quantitatively using cross sectional survey design that involves correlation. The population of the study comprises 236 emerging librarians (final year students) from Bayero University Library School, out of whom 146 were sampled using simple random sampling technique, respondents of the study comprise 109 of the 146 emerging librarians, of whom 78 (71.6%) are male while 31 (28.4%) are females. Data for the study was collected using questionnaire that tested to 0.799 Chronbach Alpha reliability value. Data collected was analysed using descriptive statistics and Spearman Rank Correlation (Rho). The post SIWES' assessment indicates that emerging librarians from Bayero University Library School have digital skills and competencies to provide contemporary library services, 68.8% had computer skills, 51% had internet and e-service skills, 14% had database management skills while 8% had networking skills. It was further discovered that only doing SIWES in academic libraries has positive statistical correlation with digital skills by (N=53, Rho= .193>0.05) likewise digital competences of emerging librarians only has positive correlation with academic libraries by (N=53, Rho= .166>0.05). It is recommended that library schools in Nigeria should encourage students to undergo SIWES in academic libraries.

Keywords: Digital Skills, Digital Competences, emerging Librarian, Bayero University Library School, Students' Industrial Work Experience Scheme (SIWES)

Introduction

The advancements in information and communication technologies (ICTs) have necessitated a paradigm shift in the focus of library schools towards inculcating the adoption and use of digital tools among emerging librarians. Moreover, in several forums of progressive discussions about the future of librarianship, librarians are constantly urged to heed towards every innovation brought about by Information and Communication Technology, not only in the face of changes in users' preference for web based services, but also due to changes in job specifications that require peculiar digital skills and competences for the job of a librarian (Itsekor and James, 2012). In line with the impetus of ICTs on library and information service provision, Narasap and Kumar (2016) opined that ICTs have ushered in automation and digitisation to revolutionise traditional library practices, and they pose new challenges for greater opportunities that Librarians must brace up to be re-skilled about, especially to foster and sustain the future of librarianship.

An emerging librarian is a student learning to become a librarian, whose relevance to librarianship greatly depends on education received from a library school, they are to apply ICTs to conventional library practices in order to facilitate access and use of information. Thus, emerging librarians are termed as

modern librarians; they are expected to possess those standards and values to effectively function. Thus, the career prospects of an emerging librarian is ensured by those fundamental digital skills and competencies with which they adapt to emerging technological roles that constantly redefine efforts to foster access and use of information, (Gerolimos, Malliari and Iakovidis, 2015).

In view of the need to produce digital librarians, Students' Industrial Work Experience Scheme (SIWES) programmeme is one of the avenues through which emerging librarians are equipped with requisite skills and competence. Essentially, SIWES is an initiative of the Federal Government of Nigeria designed under the Industrial Training Fund to enable students of tertiary institutions in Nigeria acquire practical skills that will support the theoretical knowledge gained in the classroom. According to Abraham-Ibe (2015) SIWES is an appendage to classroom instructions where students directly and practically participate in real work activities before graduation. In particular to case of library and information science education, Ojokuku, Emeahara, Aboyade and Chris-Israel (2015) informed that SIWES expose and prepare the emergence of skilled manpower with the kinds of library work they will be faced with after graduation.

Bayero University Library School is located in Kano State, North-West Geographical Zone of Nigeria. It was established in 1977 and started with Diploma programme on Library Science. It later introduced Undergraduate, Master's and PhD programmes in Library and Information Sciences in 1980, 1990 and 1994 respectively. Among others, the objective of Bayero University Library School is to give successful students a broad and advanced understanding of basic methods and procedures used by modern library and information science professionals, (Farouk, 2010).This study will leverage on the SIWES training received from various places to find out whether emerging librarians have digital skills and competencies for library and information services delivery in the digital era.

Research Objectives

This study is aimed at examining the digital skills and competencies possessed by emerging librarians from Bayero University Library School, the objectives are as follows;

1. To identify the institutions where emerging librarians from Bayero University Library School did their SIWES
2. To identify the digital skills of emerging librarians from Bayero University Library School.
3. To identify the digital competencies of emerging librarians from Bayero University Library School.

Research Hypothesis

H_1: there is statistical relationship between place of SIWES and the digital skills of emerging librarians

H_2: there is statistical relationship between place of SIWES and the digital competencies of emerging librarians

Literature Review

The library school as a fountain for acquiring digital skills and competencies

A library school like every other professional school is an institution of learning, providing skilled training for students to become graduates and be employable as librarians or information and knowledge managers. Accordingly there is a very direct relationship between library schools and the digital skills and competencies expected of emerging librarians. The digital skills and competencies that library schools infuse into their students are those that prepare their emergence as librarians who will use digital tools to provide access to information that are geared towards satisfying information needs of users. In view of the impetus for digital skills and competencies that library schools are expected to infuse into emerging librarians, IFLA (2017) noted that library schools should "draw on unique expertise…to develop key digital literacy skills among students and assist educators in integrating digital skills in curricula". In essence IFLA advocates that digital skills and competencies should have a place in the curriculum of library schools with a view to provide training on contemporary requirements to practice as librarian. In line with IFLA Diso and Njoku (2007)

proposed that the aim of training librarians for the 21st Century should equip graduates with relevant theoretical knowledge and practical skills and techniques that will produce digital librarians for all types of libraries and information centers.

What constitute digital skills and competencies for library and information services are in Ayoku and Okafor (2015), Ansari (2013), Ullah,Iqbal and Hussain (2016), Ukwoma, Iwundu and Iwundu as well as Raju (2016). Hence, the scope of digital skills obtained from library schools include; knowledge and skills on computers (including their hardware and software), Internet, networking and those on operating systems that will enable efficient digital interaction between a librarian and networks, websites, databases and library clienteles. In addition, Khan and Bhatti (2017) noted that digital skills and competencies can be viewed from a tripartite perspective that include; the skills and competencies for developing, managing and protecting digital library contents. Furthermore, Nonthacumjane (2011) informed that though technical competencies still underpin the professional practices of librarianship, a set of archetypal discipline-specific knowledge based skills and competencies have emerged in addition to personal and generic skills that initially breed a librarian. These discipline-specific based skills and competencies include; knowledge of metadata, database development and management, user needs, digital archiving and preservation, collection development and content management system.

Based on analysis carried out on market of newly emerging IT-based jobs in library and information sciences, Shabazi, Fahimnia and Khoshemehr (2016) identified that due to globalisation and increased communication in scientific communities, library schools need to prepare emerging librarians with 75 skills and competencies on 7 areas that have to do with; (a) Computer Basics, (b) Internet, Database and Electronic Services, (c) Web Designing and Management, (d)Basic Programming and Database Management, (e) Computer Networking, (f) Computerised Cataloguing and Library Software and (g) Behavioural Characteristics to get employed for four most after job titles like; System Librarian, Metadata Librarian, Electronic Resource Librarian and Digital Archivist. Furthermore, Shabhazi and Hyedati (2016) ranked the competencies of digital librarian according to their frequency in newly emerging it-based LIS jobs and discovered that the employment of librarians are sought after for their:

(a) Knowledge and skills of searching method (basic and advanced) in databases and on the internet, developing and limiting searching and improving results

(b) Knowledge and skills of information seeking consultation (through calls, email, chat etc)

(c) Knowledge and skills of databases (science direct, EBSCO, John Wiley, ProQuest, Ovid, Emerald, Google Scholar, Medline etc) and the registration procedure

(d) Knowledge and skills of search engines and web directories

(e) Knowledge and skills of digital resource collection development; knowledge and skills of integrated library systems e.g Dspace

(f) Knowledge and skills of digital resources dealers and suppliers

(g) Knowledge of web 2.0 services (social networks, wikis and weblogs etc)

(h) Knowledge of general reference materials and services in the digital environment

(i) Knowledge of basic concepts of computers and windows operating system; knowledge of specialized reference materials and services in the digital environment

(j) Knowledge of free scientific resources websites (reference resources, articles, movies, etc)

On the need for digital skills and competencies among librarians informed that digital skills and competenc are needed to carry out tradition a library operations in the area of acquisition, cataloguing, classification and reader services using digital tools. In addition, Seena and Pillai (2014) remarked that digital skills are highly needed for reference services such as current awareness, selective dissemination of information and reference interviews.

Digital skills and competencies are now inevitable for securing the job of a librarian basically

because of the continuous proliferation of information in electronic sources and the increasing need to access them in electronic format. Thus, evolving developments in librarianship have now necessitated libraries to be selective in employing emerging librarians into their workforce so as to meet the information need of today users who are millennial and technologically savvy, Oyedokun, Oyewumi, Akanbi and Laaro (2018).Moreover, Ayoku and Okafor (2015) noted that with the advent of ICTs and their being incorporated into library services, librarians needed to undergo additional on- the- job training to be well equipped with the skills and competencies to deal with queries on modern search techniques and provide practical guidance to users on finding, borrowing and use of online resources.

In the literature of SIWES in library science Ojokuku, Emeahara, Aboyade and Chris-Israel (2015) expressed that SIWES students gain various degrees of digital skills and competencies that comprise online cataloguing, use of OPAC, Microsoft excel cataloguing, use of KOHA library management software, database operation and image database. On the contrary, Ibegbulam, Ejikeme and Enem (2017) reported that despite adequate availability of training facilities, SIWES students from University of Nigeria, Nsukka, Enugu State College of Education and Micheal Okpara University, Umudike lacked digital skills and competencies because they did not learn digital skills and competencies on: Internet literature search, library database management, digitisation and online cataloguing compared to how they learnt traditional skills and competencies of librarianship.

Where facilities to impart practical skills is not a problem, Ugwanyi and Ezema (2010) noted that the mismatch between the curriculum to teach Library and information science negatively impact on how LIS students acquire digital skills and competencies. Nse (2012) empirically established that the effectiveness of SIWES training which emerging librarians will receive during their SIWES year is proportionate to the skills and competencies possessed by library staff.

Methodology

The study was carried out on emerging librarians (final year students) of Bayero University Library School. The choice of using final year students is not merely because they are the most senior undergraduate students in Bayero University Library School, but because they have acquired requisite practical experience through Students' Industrial Work Experience Scheme (SIWES). Prior to the study, a pilot survey carried out through an interview with emerging librarians who registered to do SIWES at Bayero University Library indicated that they have only received theoretical lectures in class but have not been taken to the computer laboratory for practical knowledge.

The study was carried out using quantitative methodology, and cross-sectional survey design was used to collect data from respondents. Questionnaire was designed and used to collect data from respondents. The questionnaire was tested for reliability using Chronbach Alpha, a score of 0.799 was obtained.

The population of the study comprised 236 emerging librarians from Bayero University Library School during the 2017/2018 academic session. To give every member of the population an equal chance to participate in the study, simple random sampling technique was used with Krejcie and Morgan (1971) formula for determining sample size to obtain a sample size of 146 (approximately 62% of the total population),who were administered with questionnaire to serve as respondents of the study. Data collected was analyzed using Statistical package for Social Science (SPSS) Version 23, presented on tables and analyzed using descriptive and inferential statistics.

Findings

Out of the 146 copies of the questionnaire distributed, 109 or 71.6 % were returned. Of the 109 copies received 78 or 71.6% were male. Table 1 shows the institutions in which the respondents served their SIWES.

Table 1: Institution of SIWES to respondents

Institution	Frequency	Percent
Academic library	53	48.6
Public library	12	11%
National library	3	2.8
Special library	17	15.6
IT based organisations	24	22%

The table 3 shows that emerging librarians from Bayero University Library School did their SIWES in five categories of institutions. Majority comprising 53 (48.6%) did their SIWES in academic libraries while only 17(15.6%) did their SIWES in special libraries.

Table 2: Digital Skills of emerging librarians

Digital skill	Frequency	Percent
Computer skills	75	68.8%
Networking skills	7	8%
Programmeming skills	0	0
Library management	0	0
Web design skills	1	0.9%
Internet and e-service skills	56	51.4%
Database management skills	16	14.7%

Table 2 reveals that emerging librarians from Bayero University Library School possessed five out of seven digital skills which the study inquired about. Data shows that 75 (68.8%) possessed computer skills, followed by 56 (51.4%) skills for Internet and e-service. On the other hand, data shows that emerging librarians possessed only 1 (0.9%) and 7 (8%) skills for web design and networking respectively, and none possessed the skills for programming and use of library management systems.

Table 3: Extent of digital skills among emerging librarians

Digital skill	VH	H	L	VL	Mean	Decision
Computer skills	30(27.5%)	27(24.8%)	15(13.8%)	37(33.9%)	2.5	H
Networking skills	0	4(3.7%)	59(54.1%)	46(42.2%)	1.6	L
Web design skills	4(3.7%)	4(3.7%)	50(45.9%)	51(46.7%)	1.6	L
Internet and e-service skills	44(40.4%)	35(32.1%)	12(11.0%)	18(16.5%)	2.6	H
Database management skills	0	18(16.5%)	52(47.7%)	39(35.8%)	1.8	L
Programming skills	0	1(0.9%)	75(68.8%)	33(30.3%)	1.7	L
Library management System skills	3(2.8%)	6(5.5)	47(43.1%)	53(48.6%)	1.3	L

Table 3 shows that emerging librarians have high skills on internet and e-services and also on computer with mean score of 2.6 and 2.5 respectively. Conversely, they had low skills to operate library management systems with mean score of 1.3, followed by low networking skills and web design skills with mean score of 1.6 respectively. They further had low programming skills with mean score of 1.7.

The respondents were asked to indicate areas of digital competences which they had abilities. The table 4 shows the abilities of respondents.

Table 4: Digital competencies of emerging librarians

COMPETENCIES	FREQUENCY	PERCENT
Install computer programs	33	(30.3%)
Create, save and backup files and documents	40	(36.7%)
Send/share files and documents	44	(40.4%)
Use Microsoft office packages	52	(47.7%)
Scan and digitise documents	18	(16.5%)
Troubleshoot computer problems	27	(24.8%)
Perform basic and advance search in a database or through the internet	48	(44.0%)
Use social networks and web 2.0 tools for library service	41	(37.6%)
Attach documents and send via email	48	(44.0%)
Consult websites for information	63	(57.8%)
Register with a database for scientific information	52	(47.7%)
Download and retrieve documents from a database	72	(66.1%)
Develop library database	6	(5.5%)
Manage library database	6	(5.5%)
Create a virtual group using social media and web 2.0 for collaboration and knowledge sharing with other libraries and users	68	(62.4%)
Bookmark websites	45	(41.3%)
Design website	2	(1.8%)
Use podcast and web conferencing tools (e.g. Skype) for library service	74	(67.9%)
Create a network (e.g. LAN, WAN, MAN)	24	(22.0%)
Write programs	6	(5.5%)
Operate library management software	5	(4.6%)
Create and operate OPAC	22	(20.2%)
Hyperlink pages	19	(17.4%)
Do online cataloguing	5	(4.6%)

Table 4 indicates that emerging librarians from Bayero University Library School had digital competencies, only that they were deficient of those cognate competencies for delivering digital library and information services. Their competencies comprised 72 (68.1%) ability to download and retrieve documents from database/internet, 52 (47.7%) ability to register with scientific database for information, 45 (41.3%) ability to bookmark websites, 48 (44.0%) ability to attach documents and send via email, 63 (57.8%) ability to consult website for information, 52 (47.7%) ability to use Microsoft Office packages, 48 44.0%) ability to perform basic and advance search in a database or through the internet and 68 (62.4%),ability to create a virtual group using social media and web 2.0 for collaboration and knowledge sharing with other libraries and users.

On the other hand, emerging librarians from Bayero University had areas of little digital competencies. some of whom included: 2 (1.8%) ability to design website, 5 (4.6%) ability to operate library management software and do online cataloguing respectively, 6 (5.5%) ability to write programs,6 (5.5%) ability to design and maintain database, 18 (16.5%) ability to scan and digitize documents, 19 (17.4%) ability to hyperlink information and 22 (20.2%)ability to create and operate OPAC.

Table 5: Source of digital skills and competencies

SOURCE	YES	NO
Library school	92(84.4%)	17(15.6%)
Internet café/computer training school	33(30.3%)	76(69.7%)
SIWES	27(24.8%)	96(75.2%)
Conference and workshop	2(1.8%)	107(98.2%)
Online tutorials (e.gyoutube)	49(45%)	60(55.0%)

Table 5 reveals different sources through which digital skills and competencies were acquired by emerging librarians. Data indicates that 92 (84.4%) acquired their skills and competencies from library school, 49 (45.0%) through online tutorials, 33 (30.3%) through internet café/computer training school, 27(24.8%) through SIWES and only 2 (1.8%) had attended conferences and workshops to gain digital skills and competencies.

Table 6: Relationship between place of SIWES and digital competence

VARIABLES	N	Mean	SD	Rho
Digital competence	109	57.5	23.9	
Academic library	53	1.514	0.502	.166**
Public Library	12	1.889	0.314	-.542**
National Library	3	1.973	0.169	-.327**
Special Library	17	1.844	0.364	-.629**
IT-Based Organisations	24	1.779	0.416	-.718**

**.correlation is significant at the 0.01 level (2-tailed)

Table 6 shows that correlation (Rho) between places of SIWES and digital competences is only significant in 1 out of the 4 places that emerging librarians did their SIWES. The value (N=53, Rho=.166>0.05) indicates a weak positive correlation between academic library and digital competence. While the (N=24, Rho=718<0.05) indicates a very strong negative correlation between IT-based organizations and digital competence. Moreover, (N=17, Rho=-.629<0.05)for special library and (N=12, Rho=-.542<0.05) for public library indicate a strong negative correlation respectively, while (N=3, Rho=-.327) indicates a moderate correlation between national library and digital competence.

From results of the correlation, the hypothesis that states that there is statistical relationship between place of SIWES and digital competences is only applicable in academic libraries and not so in special, national, public libraries and IT-Based organisations.

Table 7: Relationship between place of SIWES and digital skills

VARIABLES	N	Mean	SD	Df	Rho
Digital skills	109	17.982	4.426	2	
Academic library	53	1.5138	.50212	2	.193**
Public library	12	1.8899	.31445	2	-.539**
National library	3	1.9725	.16436	2	-.283**
Special library	17	1.8440	.36450	2	-.621**
IT-Based Organisations	24	1.7798	.41628	2	-.718**

**.correlation (Rho) is significant at the 0.01 level (2-tailed)

Table 7 reveals that correlation (Rho) between digital skills and place of SIWES is only significant in 1 out of the 4 places that emerging librarians did their SIWES. The Rho (N=53, Rho =.193>0.05) indicates a moderate positive correlation between academic library and Digital skills, while Rho (N=24, Rho -.718< shows a very strong negative correlation between academic library and digital skills possessed by emerging librarians.

Moreover, the Rho of -.539<0.05 and Rho-.621<0.05 shows a strong negative correlation for digital skills with a public library and a special library respectively. Consequently, Rho of-.283<0.05 indicates a moderate negative correlation between public library and digital skills.

From results of the correlation, the study hypothesis which states that there is statistical relationship between place of SIWES and the digital skills of emerging librarians is only applicable in academic libraries and not in special, national, public libraries and IT-Based organisations.

Discussion of Findings

In this study the places where emerging librarians did their SIWES were correlated with their digital skills and competencies, the discovery is that the correlation is significant and positive in academic library only. Unlike Nse (2012) where it was discovered that majority of emerging librarians did their SIWES in cybercafés, computer business centers and information centers and ended up gaining skills and competencies that are outside the core functions of library services, emerging librarians from Bayero University Library School had acquired some digital skills and competencies for doing their SIWES in academic, public, special, national libraries and IT-based organizations. Moreover, Ojukwu, Emeahara, Aboyade and Chris-Isreal (2015) discovered that when emerging librarians who did their SIWES in library based organisations, they became exposed to new work methods and their professional development was positively influenced.

The various digital skills and competencies that emerging librarians from Bayero University Library

School had and the extent to which they possessed these skills and competencies is indicative of the impact of SIWES on making emerging librarians have digital skills and competence, but unlike Igbebulam, Ejikeme and Enem (2015) that discovered that emerging librarians did not acquire digital skills and competencies on library database management, online cataloguing, internet literature search and digitisation as compared to how they acquired the skills on shelf management, filing catalogue cards, original (manual) cataloguing and subject classification, this study has discovered that because emerging librarians from Bayero University Library School predominantly did their SIWES in academic libraries and they have gained more digital skills and competencies compared to before doing their SIWES.

Findings of the study have shown that the objective of SIWES that seeks to achieve synergy between education and industry as a means of providing requisite digital skills and competences is deficient in some place where emerging librarians are posted to acquire digital skills and competencies from. This can be attributed to inadequate equipment and poorly motivated human resources needed to provide the required training to emerging graduates, (Katuli-Munyoro and Mutula, 2016). Nse (2012) corroborates that SIWES training to emerging librarians is directly proportionate to the skills and competencies possessed by library staff. Similarly, Ogbuanya, Njoku, Kemi and Ogunkelo (2018) outlined some of the challenges affecting the attainment of the objectives of SIWES to include; lack of modern facilities/machineries in training stations, lack of equipped industries to absorb and impart requisite skills to SIWES students, and inadequate training facilities. In all these challenges there is the need to ascertain that where students, emerging librarians are posted to where there is modern training facilities and adequate manpower.

Thus, Jibril, Sabitu, Jamila and Liman (2018), just as Ezeama, Ugwuaniand Ugwu (2014) informed that for librarians to deliver efficient services to users and by extension have the capacity to train others, they themselves should have digital literacy skills and competencies about; electronic mailing, social network, surfing the internet, electronic conferencing, computer operations, multimedia projecting and sharing resources online.

Conclusion

Unlike prior to the study where a pilot survey indicated that most emerging librarians from Bayero University Library School did not have digital skills and competencies, they now have computer skills, networking skills, Internet and e-service skills and database management skills after undergoing SIWES. However, the study has shown that emerging librarians from Bayero University Library School do not have programming and web design skills and competences to deliver library and information services despite having gone through SIWES. Moreover, the study has also shown that digital skills and competencies positively correlate with doing SIWES in academic library only. In essence, other places which emerging librarians chose to do their SIWES did not have the capacity to make them acquire requisite and cognate digital skills and competences for library service.

The placement of emerging librarians (library and information science students) to where they will do SIWES should be carried out bearing in mind that an institution has the requisite facilities and manpower to train upcoming librarians in line with contemporary digital skills and competencies for library services. Essentially, emerging librarians are encouraged to engage in self-development on digital skills and competencies to meet the requirements for being relevant in the profession.

There is the need for a synergy between library schools in Nigeria and professional bodies such as The Nigerian Library Association (NLA) and The Librarians Registration Council of Nigeria(LRCN) to do an accreditation of library and information centres in Nigeria with a view to certify them, not only for service delivery but also for SIWES training on cognate digital skills and competencies for library and information services.

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Information Behaviour of Masters and Doctoral Students in Accessing and Using the Theses and Dissertation Database at the University of Dar es Salaam

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Abstract

The main purpose of the study was to assess ways by which postgraduate (i.e. masters and doctoral) students from the College of Arts and Social Sciences at the University of Dar es Salaam (Tanzania) became aware of University of Dar es Salaam Theses and Dissertations Database (UDSM DATAD). It also sought its perceived usefulness, challenges encountered as well as opinions on access to and use of the database. This was prompted by a reported low usage of the database. The population for the study consisted of 77 masters and 40 doctoral students in the College of Arts and Social Sciences as well as all seven librarians in the section for Reference Services Collection of the University of Dar es Salaam Library. Data was collected through self-administered questionnaire and individual face-to-face semi-structured interviews. Results from the study reveal that only few students were aware of the database and they used it to know what others have done in their research areas as well as finding relevant keywords for searching in other databases. The study recommended that students should be encouraged to use electronic theses and dissertations to improve on their research work.

Keywords: Information Seeking Behaviour, Electronic Theses and Dissertations, Full-Text Databases, Information Needs; Higher Learning Institutions; Information Retrieval.

Introduction

Studies on information behaviour in institutions of higher learning have demonstrated ways by which students accomplish their tasks through utilising various information retrieval systems (Urquhart and Rowley, 2007; Saleh and Large, 2011). These studies note various ways employed by different categories of users to access and use information retrieval systems, according to their information needs, associated tasks, and skills in utilising the systems (Petter et al, 2008). One such type of information retrieval system that is of specific importance in academic environments is databases of theses and dissertations (Sarkar and Mukhopadhyay, 2011). Theses and dissertations are important sources that postgraduate students and established researchers use to retrieve information to support their academic work particularly in research projects (Adio and Arinola, 2012). They also use theses and dissertations to find related literature, compare similar studies and to acquire background information related to their research projects. However, due to lack of awareness of electronic theses and dissertations databases by students and academicians, the use of such systems is poor (Salau and Oyedum, 2019).

Because of the low database search and use skills by many students at the university, it was thus important to understand how the theses and dissertations database at the University of Dar es Salaam (UDSM) is used. This could assist in improving the search interface, search options and

support to users in improving their information search skills. Although the database is known as the University of Dar es Salaam Theses and Dissertations Database (UDSM DATAD), this paper will only refer to the database of theses and dissertations.

Background on the Database of Theses and Dissertations

The University of Dar es Salaam was first established in 1961 as a college of the University of London. In 1963, it became a constituent college of the University of East Africa and became a fully-fledged University in 1970 by an Act of Parliament No. 12 of 1970. The main campus of the University of Dar es Salaam offers a variety of academic programmes in the liberal arts, sciences and engineering and technology. The University also established a number of colleges, schools and institutes as permitted by the act that established the University. Currently, the University has a total of seven colleges, two constituent colleges, seven schools and institutes respectively. It has one main library serving staff, students and researchers. The total number of students is 24,159 (UDSM Annual Report Plan, 2019).

Due to the need to increase research productivity and infusing results from local context, the University of Dar es Salaam Library launched a Database of Theses and Dissertations in 2008 (UDSM DATAD meeting, 2008). The purpose of establishing the database was to aid postgraduate students and researchers in obtaining relevant information that would assist them in fulfilling the requirements for their theses and dissertations. The database is part of the Database on African Theses and Dissertations (DATAD) that was established by the Association of African Universities (AAU) in Accra-Ghana in 1998 (Materu-Behitsa, 2003). The purpose of DATAD in Accra-Ghana was to make available online abstracts of theses and dissertations from 13 universities which included University Yaoundé 1 (Cameroon), Addis Ababa University (Ethiopia), University of Dar es Salaam (Tanzania), Makerere University (Uganda), University of Ghana (Ghana), University of Cheikh Anta Diop (Senegal), Eduardo Mondlane University (Mozambique), University of Zimbabwe (Zimbabwe), University of Jos (Nigeria), Obafemi Awolowo University (Nigeria), Ain Shams University (Egypt), Kenyatta University (Kenya) and CODESRIA (Council for the Development of Social Science Research in Africa - Senegal). When the DATAD of Accra Ghana stopped in 2008 the University of Dar es Salaam Library decided to create its own database that would take up the role that was initially played by DATAD in Accra-Ghana to continue providing access to abstracts of theses and dissertations produced by the University's students (which is called UDSM DATAD). Initially it was made available to students only within the University's Local Area Network due to some restrictions in connection with copyright agreement in the university. However, following some adjustments to the system, abstracts can now be accessed worldwide. Although full text of theses and dissertations cannot be accessed pending rectifications of copyright issues. Users of the database include students, academic staff and researchers within the university. Data on theses and dissertations is added to the database as soon as students submit their completed thesis or dissertation topics to the University of Dar es Salaam main Library.

Problem Statement

Understanding information behaviour of the users of a retrieval system is an important aspect in establishing whether such a system serves to meet their information needs (Ferro, 2017). Based on the above, this study sought to gain an understanding of aspects of the information behaviour of masters and doctoral students at the University of Dar es Salaam's College of Arts and Social Sciences. This was because since the University's library implemented UDSM DATAD, it has not been clear as to whether the database was effectively utilised by the students for the intended purpose. Hence the main objective of this study was to examine the information behaviour of masters and doctoral students in the College of Arts and Social Sciences in accessing and using UDSM DATAD at the University of Dar es Salaam (Tanzania). Specifically, the study sought to (1) determine information behaviour of students with special reference to their awareness of the database; (2); solicit their perceived usefulness to users; (3) identify challenges they faced when accessing and using the databases and measures to mitigate the identified challenges.

The main question of the study was:

> *What is the information behaviour of masters and doctoral students in the College of Arts and Social Sciences in accessing and using the theses and dissertation database at the University of Dar es Salaam (Tanzania)?*

The above question was followed by subsequent sub-questions as follows: (1) What is the information behaviour of students with specific reference to their awareness of the database? (2) What is the perceived importance of the databases? (3) What challenges do they face when accessing and using the database and the suggestions they might have for improving the database as an information retrieval tools. The above sub-questions assisted to guide the study through obtaining relevant data to address the main question.

Research Methodology

This study used a case study research design to collect data through questionnaire and interview. It used quantitative approach to gather statistical data that was useful to quantify opinions, attitudes and behaviours of postgraduate students with regard to accessing and using an electronic theses and dissertations database. This data helped to answer the "how much", "how many", "how often" and "to what extent"type of questions (Johnson and Christensen, 2008). In addition, this study employed a qualitative research approach, which refers to investigations of social phenomena to understand people's social life. It is concerned with the understanding of ways by which individuals behave and form opinions, their experiences and feelings, thereby producing subjective data (Hancock, 2002). The qualitative approach was deemed important in this study as it helped to describe social phenomena occurring among postgraduate students when accessing and using electronic theses and dissertations databases. These phenomena may include behaviour they exhibit when interacting with the system, their opinion on its usefulness and ways in which it helps them meet their information needs. The researcher realised the importance of the aforementioned data collection approaches by designing questionnaire and interview to gather data on awareness, usage patterns, usefulness, attitudes and feelings of students when accessing and using the database of theses and dissertations. A closed-ended questionnaire was developed based on key issues raised in the research questions that guided the study. These were pre-tested among 10 chosen students to test their suitability. In addition, semi-structured interview questions were developed based on the research questions for issues related with awareness of databases by students and methods of accessing the same.

This study was carried out in two phases. The first one was during the writing of a master's dissertation in 2014 and the second phase took place in 2019 as explained further below. During the dissertation writing phase in 2014, the researcher selected a population of postgraduate students (masters and doctoral students in the College of Arts and Social Sciences) and librarians from the Reference Services Collection of the University of Dar es Salaam Library. A purposive sampling technique was used to generate a sample where by the researcher used his judgment to select participants that enabled him to answer the research questions and meet the research objectives. Copies of closed-ended questionnaire were distributed to purposively selected 130 masters' students and 85 doctoral students from the College of Arts and Social Sciences. Only 117 students were able to return filled-up questionnaire. In addition, interviews were conducted to seven reference librarians.

The questionnaire aimed at collecting factual data from postgraduate students on aspects such as the awareness of the database, purposes of use, perceived usefulness and challenges in accessing and using the system. This method was selected as it was considered to be inexpensive, offered greater assurance of anonymity and reduced bias that could be caused by the presence or attitude of the researcher as well as their ability to collect a large amount of data within a short period (McBurney and White, 2009). Face-to-face interviews were used to collect data from seven reference librarians to seek information on aspects of database usage by students such as ways in which the library promoted the use of the database, ways in which the postgraduate students were engaged with the databases, the challenges they encountered and the efforts the

library was making to promote the effective usage of the theses and dissertations databases.

In the second phase, a follow-up study, was conducted in 2019 to find out whether issues identified during the dissertation phase were addressed. These included strategies towards accessing full-text theses and dissertations, appropriate methods to promote access and use of databases, choice of suitable database system and the formation of a national consortium of electronic theses and databases. A purposive sample was drawn from 20 masters and 15 doctoral students who participated during the mini dissertation stage and who were willing to be contacted at later stages. These students were issued with closed-ended questionnaire to provide information on the aforementioned issues.

To put ethical issues into consideration, research clearance was obtained from the University of Dar es Salaam in order to approach authorities at the College of Arts and Social Sciences for permission to carry out the study at the institution and to invite research participants. Students as well as the librarians were asked to sign a consent form which permitted the researcher to use the data collected. Furthermore, to properly organise qualitative data from interviews, responses were labelled using numbers such as Reference Librarian 1, Reference Librarian 2 and so on. Quantitative data was analysed using Microsoft Excel to derive at frequencies and percentages while qualitative data was analysed by creating a table wit the main themes and their corresponding quotes.

Findings for Post-Graduate Students during the Initial Phase

At the time when the study was conducted, most students were at the stages of writing research proposals and reviewing the literature for their research projects while just a few were collecting data and finalising with their research reports. As such, since many were in early stages of their research, this was thought to the appropriate timing when students would be expected to use UDSM DATAD as a tool for finding information to support their research projects. Since both categories of respondents, that is masters and PhD students, were involved in proposal writing stages, there was no distinction made to separate their results (although the tables indicate separate results for both categories).

Awareness of UDSM DATAD

The researcher asked respondents to indicate whether they were aware of UDSM DATAD. This question aimed at determining whether respondents came across UDSM DATAD at different points during their studies. This finding would assist the researcher to determine whether awareness played an influential role in encouraging students to access and use the database. Results from the study revealed that most of the respondents were aware of UDSM DATAD whereas 33.3% were not.

When asked how they became aware, 22.5 % of the students indicated that they were informed about UDSM DATAD by librarians during information literacy training while 19% saw about it on the library brochure while 15.5% saw an advert about UDSM DATAD on the notice board. In addition, the study found that after hearing about UDSM DATAD, 62.4% of the respondents accessed and tried it out whereas 37.6% did not. Out of the 62.4% students who tried it, 38.4% did so in a month's time whereas those who tried it immediately, that is within a day, were only 4.1%. In addition, 31.5% tried it out within a week and 26% did so within a year. Table 1 below summarises their responses.

Table 1: Period between Awareness and Immediate Use of UDSM DATAD

Period	MastersN=44	DoctoralN= 29	TotalN=73	Percentage (%)
Day	2	1	3	4.1
Week	13	10	23	31.5
Month	18	10	28	38.4
Year	11	8	19	26
Over a year	0	0	0	0

Those who did not try it realised that it contained only abstracts and therefore less significant to them. Results indicate further that major reasons that made students used UDSM DATAD were to find out what others had done in their research (24.4% respondents), while 17.9% used it to find relevant keywords for searching in other databases and 12.8% identified research topics from recommendations given for further research.

Perceived Importance of UDSM DATAD

In addition to understanding the usage of UDSM DATAD, students were asked to indicate whether they agreed or disagreed with the fact that the visibility of their work in the institution would be higher if it was availed on the database that could make it easily accessible by colleagues, other researchers and collaborators. A total of 60.2% respondents agreed to the statement above while 39.8% disagreed.

The aspect of the usefulness of the database considered also other features such as access points. The researcher intended to gather data on the usefulness of title, author, subject, year, list of titles and subject disciplines. It was generally felt by students that access points such as author, title, subject, list of titles and subject disciplines were considered useful. For example 32% of students felt that the author field was very effective while 23% of respondents were not happy with the year field. In addition to using UDSM DATAD, students were asked whether they accessed and used other theses and dissertations databases. This question intended to find out whether the respondents were in a position to compare and apply UDSM DATAD features with those they had found in other databases. The study discovered that 78% of the students accessed other databases apart from UDSM DATAD. These included Ohio Link and ProQuest (UMI) Dissertations and Theses Databases, the National ETD portal of South Africa; and Networked Digital Library of Theses and Dissertations (NDLTD) databases. Among these databases, Ohio Link and ProQuest (UMI) Dissertations and Theses Databases were found to be used by 29.2% of all students compared with other databases. Table 2 below provides a summary of other databases accessed by students.

Table 2: Other Databases Accessed by Postgraduate Students

Other databases	Masters	Doctoral	Total	Percentages
National ETD Portal of South Africa	7	4	11	18.7
Networked Digital Library of Theses and Dissertations (NDLTD)	5	4	9	22.9
Ohio Link Electronic Theses and Dissertations Database	9	5	14	29.2
ProQuest Dissertations and Theses Databases (UMI)	8	6	14	29.2

Furthermore students were asked to give their views with regard to using other databases apart from UDSM DATAD. Students were on the view that the university should consider subscribing to more electronic theses and dissertations database than those currently available. This was revealed by 34% of respondents while 33% recommended that the available database should be made known to more users across the university. Students suggested that UDSM DATAD should allow for the provision of full-text access just like with other databases.

As for the 33% of students who did not access and use UDSM DATAD, this study discovered that reasons for the non-use of the database were based on its inability to provide access to full-text materials; which made it difficult for them to use it. While 23.1% of students found that the database could not provide full text to materials, others (15%) commented that UDSM DATAD was not accessible

outside campus where the bulk of the postgraduate students at the University of Dar es Salaam reside.

Challenges of Accessing and Using UDSM DATAD and Recommendations for Improvements

In addition, all the postgraduate students were asked to indicate the challenges they faced when accessing and using UDSM DATAD. Whereas most comments about the challenges were concerned with slow Internet connection and erratic electricity power supply, there were other challenges that were directed to the failure by the database to meet users' needs. For example, 11.1% of students commented about the absence of options for being notified of new information added to the database. Moreover, the database was not regularly updated and it was not possible to save the search results. On improvements that could be made on the database, respondents gave various opinions. For example 29.1% respondents were of the view that UDSM DATAD should allow access to full-texts while other 26% recommended that should also be accessible off-campus. Table 3 below summarises recommendations by students on improving UDSM DATAD usage.

Table 3: Recommendations for Improving UDSM DATAD Usage

Recommendations	Masters N=81	Doctoral N=36	Total N=117	Percentages (%)
UDSM DATAD should allow access to full-text materials	24	10	34	29.1
The library should promote UDSM DATAD to more users across campus	23	8	31	26.5
More improvements on the UDSM DATAD search interface are needed	8	5	13	11.1
More search options should be added	9	6	15	12.8
UDSM DATAD should be accessible outside campus	17	7	24	20.5

In short, results from this study reveal that, to some extent, students appreciated UDSM DATAD and considered it useful in supporting their academic work. This was evident from some aspects pointed out by the postgraduate students such as its search features and options, its usefulness in making their research work available to colleagues and raising the profile of their institution. However, students were not happy with UDSM DATAD as it lacked certain features that would make it even more useful in supporting their work in terms of its search interface and options. These included its failure to provide full-text information and access from within and from outside the university.

Findings for Librarians

A total of seven librarians participated in this study and interviews were conducted to find out several aspects on approaches used to promote access to UDSM DATAD and other databases to students. Librarians were also expected to provide information on perceived usefulness of the UDSM DATAD to postgraduate students, challenges they faced in managing UDSM DATAD and efforts being applied to overcome them. The data was collected through hand-recorded interviews and reported in the form of verbatim quotations. In order to avoid revealing their identities, numbers were used in place of their names. Reference librarians were asked to comment on approaches in place that were used to promote access to UDSM DATAD and other databases. The purpose of this question was to find out how the students became aware of UDSM DATAD. One of the respondents commented as follows:

> *There are several ways to promote students' and staff's awareness of UDSM DATAD and other electronic theses and dissertations database. These include distribution of brochures to different colleges and postings on notice-boards all over the UDSM campus. The second approach is done by staff from the reference section by approaching different departments, schools and college heads and informing them about UDSM DATAD and others electronic resources. Lastly is through Orientation courses and Information literacy programmes taken at the UDSM library.* (Reference Librarian I)

This comment shows that the common approaches applied at the University of Dar es Salaam were mainly the notice-boards, library brochures, word of mouth, orientation sessions and information literacy training in the library. Librarians were asked to comment on how they perceived the usefulness of UDSM DATAD to postgraduate students. The responses of the librarians indicate that they appreciated the usefulness of UDSM DATAD in supporting students' academic activities as one of their comments in verbatim quotations illustrates:

> *UDSM DATAD is very important since it can support research activities by providing students and researchers with overviews of various research topics which have already been done. From UDSM DATAD, students and researchers can see what has been done on their desired topic, and from UDSM DATAD they can get ideas that help them formulate their new topics of interest and avoid repetitions.* (Reference Librarian VI)

From this comment, it was learned that librarians appreciate the importance of UDSM DATAD in supporting postgraduate students' academic work by helping them to find out what literature says about certain topics, learn appropriate research methodologies and helps them to be able to formulate new research topics from what others have already done. The librarians were also asked to comment on challenges the library faced in managing UDSM DATAD. A number of challenges were raised as the following response illustrates:

> *There are many challenges. Here are a few of them: inadequate bandwidth, inadequate and frequent electricity power cuts which hinder access to UDSM DATAD. Currently, there are few computers used to access UDSM DATAD and other electronic resources in the library. Thus, more and new efforts are needed to market and promote UDSM DATAD*. (Reference Librarian IV).

It is apparent from the study findings that the serious challenges the library faced included inadequate bandwidth and erratic power supply that prevented regular access to UDSM DATAD. Other impediments included poor and slow connectivity to the UDSM DATAD server and the limited nature of UDSM DATAD access since the students could do little with the abstracts that were available. Despite these challenges, the study found that various efforts were being made by the University to overcome them. Librarians mentioned various efforts such as continued support to enhance access and use of the UDSM DATAD through the provision of information literacy training and encouraging students to use electronic theses and dissertations database as a supplement to other electronic and non-electronic resources available in the library. The responses from one of the librarians can be exemplified by the following comment:

> *I have been providing one-to-one training sessions to students on how to access and use UDSM DATAD.* (Reference Librarian VII).

This and other comments by librarians indicate that although users faced difficulties in accessing and using UDSM DATAD, assistance from the librarians helped to encourage the users of the database to get better returns. Librarians were also asked to air their

views on accessing and using UDSM DATAD. One of the librarians responded as follows:

> *The electronic theses and dissertations are very important as far as research is concerned. Therefore, the UDSM DATAD database should be made useful by being made available all the time to the users. Training for the users is necessary to teach them how to retrieve easily the information.* (Reference Librarian V).

It was realised from reference librarians that efforts should be made to procure more computers to provide students with access to UDSM DATAD and that regular training sessions on awareness and search skills be held to boost the students' use of UDSM DATAD and other databases they access in their MA, MSc and PhD studies. The implication is that the value of UDSM DATAD would be enhanced when the students can access more than just the titles and abstracts.

Findings from Follow-Up Survey

As was pointed out in the methodology sub-section above, a total of 20 masters and 15 doctoral students were issued with questionnaire to seek their opinion on improvements to be made on UDSM DATAD database. Among the issues included suggestions on strategies towards accessing full-text theses and dissertations. All 35 students agreed that theses and dissertations were accessible in full text formats and that the database allowed users to print and download the same. However, it was noted that the database could only be accessible within the university's LAN and no access could be obtained outside the university. In order to make users aware of the database, several options were made available by the library management. Therefore when students were asked to point at the most popular marketing strategies made by the library, they came up with a number of methods.

Information literacy (IL) sessions, university opening days as well as university research week were the mostly used methods in promoting the databases while a few mentioned the use of media such as the university's television, newspapers and social media. In addition to the above, a follow-up question was asked to students in order to affirm the deployment of a new system that had more features than the previous one. This was due to observations made during the first phase of the research that students were not happy with the database interface, absence of features such as help tools, search suggestions and others. As such, the following were mentioned as being present in the new system:

Table 4: Suggestions on the Choice of Database System Based on Features

Proposed feature in system	Masters N=20	Doctoral N=15	Total N=35	Percentages (%)
Refining search results	8	4	12	34.3
Suggesting other search engines/tools	3	2	5	14.3
Options to save/export search results	2	2	4	11.4
Options to share results on the web	4	3	7	20
Options to print searched documents	2	2	4	11.4
Presence of thesaurus/term lists	1	2	3	8.6

Discussion

From these results, it was observed that information literacy plays a role in making library users aware of information resources including theses and dissertations databases and could, therefore, be a driving mechanism for influencing students to access and use them (Besseah et al, 2017) . In addition, traditional methods such as using brochures were considered to be effective ways of communicating the availability of electronic resources in libraries and

particularly the Database of African Theses and Dissertations (DATAD), as was noted by Materu-Behitsa (2003) in Accra, Ghana. It was expected during this study that one effective means by which users became aware of UDSM DATAD would be the library's website. However, the findings indicate that this was not the case since at the time when the research was being conducted the link to UDSM DATAD was not even available on the University of Dar es Salaam's Library website. Nevertheless, the study found that apart from information literacy training, users became aware of UDSM DATAD through common means such as library brochures, notice-boards and supervisors.

The findings from this study signify the relevance of electronic theses and dissertations database for being useful tools for assisting students in finding background information on their topics and learning about what others have written about similar topics. By knowing what other have done about similar topics electronic theses and dissertations database become useful in assisting students to find background information on their topics and therefore shape their research topics (Haridasan and Khan, 2009). Theses and dissertations databases promote institutional visibility to communities within the country and beyond. Furthermore, electronic theses and dissertations database allow students' work to be recognised among their peers and experts in similar and related fields of studies. Electronic theses and dissertations also assist in raising the profile of the institution, making it known among other institutions within and outside the country (Fasae et al, 2017). Results from this study contrast with others such as Webley et al, (2011) who revealed that databases such as the National ETD portal in South Africa, also includes various features such as recent submissions, collections statistics and options to search by using different access points such as title, institutions, year of publication and others. In addition, a number of theses and dissertations available through this portal can be accessed in full-text format. Based on results from this study, it can be argued that the effectiveness of an electronic theses and dissertations database depends on its wide accessibility and its ability to include appropriate search options that are more user-friendly

Much as the students were made aware of the availability of online databases such as UDSM DATAD, several factors may inhibit them from trying them out. For example, databases only providing access to bibliographic information without providing links to full-text information are likely to discourage users from using them (De Groote and Dorsch, 2003). Other reasons for users' failure to utilise databases even after learning about them, which to some extent differ from the ones noted in this study, include the irrelevance of the database to the users' needs and as such they may lose interest in accessing and trying it out (Dadzie, 2005). Therefore, for a database to be relevant to users, it should contain useful content and be regularly updated. With regard to challenges encountered by users when accessing and using UDSM DATAD, results from this study imply that the failure by users to access and use electronic theses and dissertations database might result from insufficient marketing strategies, poor infrastructure such as networks, reservations about the relevance of the resource and lack of skills of accessing and using such databases. The aforementioned challenges are similar to studies conducted by other researchers such as Ezema and Ugwu (2013) who found that Nigerian universities face several challenges including poor ICT infrastructure, poor funding, irregular power supply, and poor Internet connectivity to mention but a few. Other studies such as Salmi (2008) in Arab States and Ubogu (2006) in South Africa found that problems associated with a fear of plagiarism and copyright issues have contributed to students not being encouraged to access and use electronic theses and dissertations database.

Conclusion

Results from a follow-up study reveal that as a result of earlier suggestions on improving UDSM DATAD, a number of transformations have been put in place. For example, the database system was changed from Greenstone to Dspace with more features and capabilities including the ability to browse and search, the ability to provide external references, download full text theses and dissertations, field search (such as title, author and others) as well as accessing material in a database from Google Scholar. In addition, the library improved its marketing strategies for creating publicity for the database through teaching it in information literacy sessions,

demonstrations during university open days and the research week which takes place each year. To some extent, these methods helped a lot in marketing the databases to users. Through efforts by the university, the Tanzania Commission for Universities (TCU) formulated a committee to oversee the formation of an electronic theses and dissertations portal at a national level, as the case with South Africa which has shown significant results (Webley et al, 2011).

Furthermore, results from this study indicate that although users faced difficulties in accessing and using UDSM DATAD, assistance from the librarians helped to encourage the users of the database to get better returns. The literature reveals that librarians play an important role in encouraging access and use of electronic resources through promoting and marketing of such resources to users as well as in training them on effective ways of accessing and using the same (Dhanakar *et al*., 2008). Therefore, it can be noted that librarians play a role in encouraging postgraduate students to make good use of UDSM DATAD.

From the views given by students and librarians, it can be noted that they generally appreciated the availability of UDSM DATAD and were enthusiastic that given improvements, the database would be a useful tool to support the research activities among postgraduate students. In other words, UDSM DATAD as presently constructed was deemed useful; however, the information users at the University wanted more so that they could make optimum use of the database.

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Use of Electronic Resources by Undergraduates in Selected Private University Libraries in South West Nigeria

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Abstract

The purpose of this study is to focus on the use of electronic resources by undergraduates in three private university libraries in South-west, Nigeria. It further seeks to examine the frequency of use of e-resources and problems encountered by undergraduates while using electronic resources. A survey research design was adopted for the study. The population of the study was 4,913 undergraduates of mission-owned private universities in South-west, Nigeria. A stratified sampling technique was used to draw a sample size of 370. Data was collected with a questionnaire. The findings showed that the majority of the respondents used e-resources to find relevant information in their area of studies; wrote term papers/did their assignments, and updated their knowledge. The findings also showed that e-resources were regularly used among undergraduates. The study concluded that poor connectivity and electricity failure constituted the major challenges to the use of e-resources among undergraduates. The study recommended that efforts should be made by universities and library management in the selected institutions to improve on the bandwidth and enhance the Internet connectivity.

Keyword: E-resources, Use of e-resources, Undergraduates, Private Universities.

Introduction

Electronic resources (also known as E-resources) are documents that are made available to users, in digital formats, through a computer-based information retrieval system (Sejane, 2017). Nwachukwu, Abdulsalami, and Salami (2014) submitted that the use of electronic resources is the extent to which users utilise the electronic resources to meet their information needs. The use of e-resources no doubt has numerous benefits for libraries as patrons can now retrieve information resources without restriction across the globe, which was practically impossible in the past. Therefore, academic libraries can go beyond the information resources present in the physical library to enable access to information in remote servers.

There are several benefits one stands to gain with the use of electronic resources. E-resources make it possible for users to access new tools and applications for information seeking and retrieval. They have become indispensable research devices that complement the print resources in the academic library. These resources serve as genuine sources of information that students could use to help their research writing, do their class assignments and term papers, search for information on their subject areas, and so on.

The sudden embrace of electronic resources in educational institutions is a result of the changes brought about by the advancement in information technology. These technologies have increasingly become commonplace in university libraries due to some factors characterising the educational environment today. In a university community where students are engaged in research activities, the provision of e-resources becomes essential because the resources contain frequently updated information.

Significantly, libraries play supporting roles in assisting universities in fulfilling their mandates of

teaching, learning, and research. Indeed, university libraries provide information resources in various formats to meet the information needs of the entire university community, most notably students. Jude-Iwuoha (2015) opined that the university library serves the academic community and its programmes range from the needs of diploma students, undergraduate students, postgraduate students, to those teaching and non-teaching staff.

Undergraduate students tend to be the most critical stakeholders in these citadels of learning. There would be no university without them. Indeed, undergraduates are young boys and girls who enrol for various programmes of studies in universities with high expectations. In this 21st Century, undergraduates are full of energy, highly curious, long to socialise, full of activities, and prefer the most accessible platform where their needs, including information needs, are met.

No matter how active undergraduates are, their primary purpose in university is for academic reasons. As such, there are many educational activities that any serious-minded undergraduates will engage in from time to time. These activities include but are not limited to assignments from lecturers with clear and specific instructions on the usage of a particular database available in the library. Completing online applications, online course registration, browsing through the library's Online Public Access Catalogue in search of a specific book in an automated library, and writing of project are other notable tasks that undergraduate students involve. Without any doubt, these activities will prompt undergraduates to visit libraries. Therefore, attempts by librarians to meet the information needs of their users, especially undergraduate students, necessitate the inclusion of electronic resources into libraries' collections.

There are various types of electronic resources for the usage of undergraduates in Nigerian universities. Some of these include electronic journals, electronic books, electronic magazines, electronic newspapers, Internet resources, CD-ROM, and e-databases like Ebscohost, AGORA, JSTOR, BioOne, National Virtual Library, Access to the online library of Thomason learning, Betham Journals, Emerald Journals, and a host of others.

Undergraduates need the use of electronic resources for quick access to information, provision of better and faster access when compared with information accessed via print resources. Ukachi (2013) believed that electronic resources help to increase access, rate of use, and effectiveness and establish new ways for students to use the information to be more productive in their academic activities. In a related study, Negahban and Talawar (2009) submitted that electronic resources are the backbones of educational institutions. These scholars strongly believed that electronic resources serve as factors that motivate students, as they provide them with the opportunity to transmit, acquire or download, process and disseminate information on any subject of interest.

Electronic resources can also be accessed in the hostile, library, or at the classroom conveniently without any time barrier. The accessibility of e-resources is made possible via the online platform through networks, provided the user has access privileges in terms of the user's name and password. Indeed, e-resources play significant roles in libraries, most notably in academic libraries where they are used to promote research and academic excellence. Ukachi (2013) posited that the information needs of students and knowledge seekers are taken care of through different information sources, especially with electronic information resources dominating as a result of their ability to be accessed, even remotely.

However, literature has revealed that electronic resources are grossly under-utilised by undergraduates in Nigerian universities despite the potentials they hold for effective learning and research (Madondo, Sithole and Chisita, 2017; Margaret-Mary and Mabawonku, 2013). Indeed, literature has reported low use of electronic resources by undergraduates in university libraries (Adeniran, 2013; Ukachi, 2013). The impression is that many of the undergraduates are either unaware of the availability of electronic resources in their libraries or find some of the e-resources inaccessible. If private universities have invested a considerable amount of money in the subscription and maintenance of electronic resources, it will be fair enough on the part of users to fully utilise them.

The need to achieve greater utilisation of the electronic resources by undergraduates who constitute a significant percentage of the user community and are in the majority in most universities, makes it necessary to examine the effective and

efficient use of electronic resources. Based on the above-stated premise, the study investigated the use of electronic resources by undergraduates in three mission-owned private university libraries.

Therefore, this study was conducted as its findings would be of immense benefits to undergraduate students, university libraries, and librarians in the selected institutions. The findings of the study would help to improve usability of e-resources by students. The findings would also serve as a basis for justification to maintain constant renewal of subscription of e-resources by university libraries; help librarians to manage their limited funds and would also improve library service delivery.

Objectives of the Study

The main objective of the study is to examine the use of electronic resources by undergraduates in selected private university libraries in South-west, Nigeria. The specific objectives of the study are to:

1. identify the purposes of the use of e-resource by undergraduates in the selected private universities;
2. examine the frequency of use of e-resource by undergraduates in the selected private institutions; and
3. identify challenges of using electronic resources by undergraduates in the selected private universities

Research Questions

The following research questions were asked in the study:

1. What are the purposes of the use of e-resources by undergraduates in the selected private universities?
2. How frequently are e-resources being used by undergraduates in the selected private institutions?
3. What are the challenges of using electronic resources by undergraduates in the selected private universities?

Literature Review

Urhiewhu and Omah (2016) investigated levels of electronic information resources usage among undergraduate students in Taraba State University Library, Jalingo, Taraba State. Findings from the study revealed that the Internet via cybercafé was the major facility used to access electronic resources by undergraduate students of Taraba State University Library Jalingo, Taraba state. Fyneman, Idiedo and Ebhomeya (2014) researched the extent of use of electronic resources and the type of electronic resources used by undergraduates in universities in Nigeria. Engineering students from Rivers State University of Science and Technology and Niger Delta University, Bayelsa State. The findings of the work revealed that students from the two universities constantly made use of electronic resources. The findings also revealed that undergraduate students used electronic resources such as NUC virtual library, HINARI, E-journals, CD-ROMs, AGORA, and EbscoHost. However, the findings of the study showed that students were not very satisfied with the use of e-resources as a result of poor infrastructure and slow Internet connectivity. Based on the findings of the study, electronic resources were available, but accessibility was a challenge to the students. Owolabi, Idowu, Okocha, and Ogundare (2016) in a study on the utilisation of e-resources by a group of students of University of Ibadan, it was reported that e-resources like e-journals, e-mail services, Internet, e-databases, and cybercafés were available for the use of students in the said university and these resources were regularly used by them to support their research, online application/registration, communication with friends and colleagues, complete assignments, academic course works, sourcing for materials for project writing, and other personal purposes.

Madondo et al (2017) found out from a study on the use of electronic resources by undergraduate students of Africa University, Faculty of Management and Administration, Mutare, Zimbabwe that only three electronic databases: Emerald, Taylor and Francis, and Ebrary were frequently used by the undergraduates in the institutions they under-studied. The findings of the study also established that there was low usage of e-resources by undergraduate students from the same faculty due to socio and technical challenges. Based on the findings, the researchers discovered that students lacked adequate hands-on skills necessary to retrieve information from subscribed e-resources, hence low usage.

Omosekejimi, Eghworo and Ogo (2015) researched students of Federal University of Petroleum Resources (FUPRE), Effurun on the usage of e-resources. The objectives of the study were to find out the level of undergraduates' awareness of e-resources, ascertain the purpose of the use of e-resources and identify problems faced by students in the use of e-resources. The study found that all respondents were not unaware of the Internet with a 100% response rate in this university. The finding also revealed a high level of awareness for e-books (79.8%) and e-journals (62.2%) among undergraduates in FUPRE. Based on the findings, all respondents in this study used e-resources for assignments and to access e-mail while 98% of the respondents used e-resources for research purposes. From the finding of the study, the Internet was regularly used by the students. A study conducted by Tyagi (2012) on 160 users of IITK P.K. Library revealed that the users showed interest in the use of various databases like Science Direct, Web of Science, and a host of others for various purposes. Awareness among the users about the availability of online journals was found satisfactory. Online journals were mostly used for research needs, and PDF was the most preferred format. A research was conducted by Alhassan (2015) on undergraduates' utilisation of e-resources in two universities in Niger State, Nigeria showed that 89.23% of the respondents were fully aware of the existence of e-resources in their university libraries; with a great number of students (93.85%) that indicated usage for the resources. The findings also revealed that of all the available electronic resources, in the two universities, Internet services (97.69%), e-mail services (85.39%), and e-books (73.08%) were indicated to be used by respondents; whereas the use of CD-ROM, though available in the library, was not being patronised by students. Sixty-eight per cent of the total respondents from the two universities indicated the fact that they do not use CD-ROM. The findings of the study, further revealed that the majority of the respondents from the two universities used e-resources to source for materials for the project. Quadri, Adetimirin, and Idowu (2014) investigated the availability and undergraduates' utilisation of e-resources through students from Babcock and Redeemer Universities. The findings of the study showed that the most readily available e-resource was the Internet with 83.5% and 92.8% response rates from both Babcock University and Redeemer's University, respectively. The findings also revealed that undergraduates from the two universities majorly used electronic resources for the writing of assignments and projects.

Adeniran (2013) examined undergraduates' usage of electronic resources at Redeemer's University. A sample of 256 students which comprises 200 to 400 level students was used. The findings also showed that majority of the students did use electronic resources available in the library regularly. The study also revealed writing of the assignment, research and information as some of the major purposes why undergraduates make use of e-resources.

In spite of the abundance of literature on the use of electronic resources in Nigerian universities, no comparative study has been carried out to centre on the use of electronic resources by undergraduates in mission-owned private universities in South-west, Nigeria. This gap so identified forms the crux on which this research work is anchored.

Research Methodology

This study adopted the use of a survey design. The target population of the study consists of undergraduates in three selected mission-owned private universities that are ten years and above in South-west Nigeria. The justification for the selection of only three states (Ogun, Osun and Oyo) in the study is the fact that the researcher was interested in studying Arts, Social Sciences and Sciences based students in mission-owned private universities that were ten years and above. The selected institutions share these characteristics in common. For time constraint, the oldest university was selected in each of the South-west states, namely: Babcock University, Ilishan-Remo, Ogun State; Bowen University, Iwo, Osun State and Ajayi Crowther University Oyo, Oyo State. The study was carried out in 2020.

Table 1: Mission Owned Private Universities that are ten years and above in South-west, Nigeria as of 2020

S/N	University	Year of Establishment	Ownership
	Ekiti State (0)	None	-
	Lagos State (0)	None	-
	Ogun State (4)		-
1.*	Babcock University, Ilishan-Remo	1999	Seventh Day Adventist Church
2.	Covenant University, Ota	2002	Winners Chapel
3.	Crawford University, Igbesa	2005	Apostolic Faith Mission
4.	Crescent University, Abeokuta	2005	Islamic Mission for Africa
	Ondo State (1)		
5.	Wesley University of Science & Technology, Ondo	2007	Methodist Church, Nigeria
	Osun State (4)		
6.*	Bowen University, Iwo	2001	Nigerian Baptist Convention
7.	Fountain University, Osogbo	2007	NASFAT
8.	Joseph Ayo Babalola University, Ikeji-Arakeji	2006	Christ Apostolic Church
9.	Redeemer's University, Ede	2005	Redeemed Christian Church of God
	Oyo State (1)		
10.*	Ajayi Crowther University, Oyo	2005	Anglican Communion

Source: institution's website of each university. The oldest university is asterisked (*) in each state.

Table 2: Population and Sample Size

S/N	University	Population	Sample Size
1	Babcock University	1840	139
2	Bowen University	1931	145
3.	Ajayi Crowther University	1142	86
	Total	**4913**	**370**

The total population of undergraduate students was 4913, which cut across the three (3) selected faculties; namely: Arts, Social Sciences and Sciences. These comprise Babcock University (BU) = 1840, Bowen University (BUI) = 1931, and Ajayi Crowther University (ACU) = 1142.

Babcock, Bowen and Ajayi Crowther Universities had eleven (11), sixteen (16) and ten (10) departments respectively in the selected faculties. Because the population is finite, Yamane formula was used to determine the sample size at 0.05 level of precision:

$$n = \frac{N}{1 + N(e)^2}$$

Where n = sample size

N = population

e = level of precision (Singh and Masuku, 2014).

The sample size for the total population of 4,913 is n = 370

Therefore, the sample size for the study is 370. A stratified sampling technique was used for this study. The method was used to draw the sample of each of the selected institutions proportionally, for a true representation.

Babcock University, for the selected faculties, is made up of eleven (11) departments altogether. These include Departments of History and International Studies, Languages and Literary Studies, Religious Studies, Music and Creative Arts, Economics, Mass Communication, Political Science and Public Administration, Social Work and Human Service, Agriculture and Industrial Technology, Basic Sciences, and Microbiology. Of these eleven departments: four (4) departments are from each of the Faculties of Arts and Social Sciences; while three (3) departments are from the Faculty of Sciences.

The sample size for Babcock University (BU) is 139. Therefore, one hundred and thirty-nine (139) students were selected across the three (3) faculties, from 100 to 400 level students in proportion to the number of departments that constitutes each of the faculties for fair. Thus, at Babcock University, 51 students were selected from each of the Faculties of Arts and Social Sciences and 37 students from the Faculty of Sciences.

On the other hand, Bowen University, for the selected faculties, is made up of sixteen (16) departments altogether. These include Departments of Communication and Performing Arts, English, History and International Studies, Philosophy and Religion, Economics, Industrial Relations and Personnel Management, Mass Communication, Political Science, Sociology, International Relations, Biological Sciences, Biochemistry, Chemistry and Industrial Chemistry, Computer Sciences and Information Technology, Mathematics and Statistics and Physical and Solar Energy. Of these sixteen departments: four (4) departments are from the Faculty of Arts, and six (6) departments are from each of the Faculties of Social Sciences and Sciences.

The sample size for Bowen University (BUI) is 145. Therefore, one hundred and forty-five (145) students were selected across the three (3) faculties, from 100 to 400 level students in proportion to the number of departments that constitutes each of the faculties for fair representation. Thus, at Bowen University, 37 students were selected from the Faculty of Arts and 54 from each of the Faculties of Social Sciences and Sciences. Ajayi Crowther University, for the selected faculties, is made up of ten (10) departments altogether. These include Departments of English, Religious Studies, History and International Studies, Economics, Communication and Media, Biological Sciences, Chemical Sciences, Earth Sciences, Mathematical Sciences, and Physical Sciences. Of these ten departments: three (3) departments are from the Faculty of Arts, two (2) from the Faculty of Social Sciences and five (5) departments from the Faculty of Sciences. The sample size for Ajayi Crowther University (ACU) is 86. Therefore, eighty-six (86) students were selected across the three (3) faculties, from 100 to 400 level students in proportion to the number of departments that constitute each of the faculties for fair representation. Thus, at Ajayi Crowther University 26, 17, and 43 students were selected from Faculties of Arts, Social Sciences and Sciences respectively.

A questionnaire was adopted as an instrument for the collection of data for this study. The questionnaire was used to gather data from undergraduate students in the selected institutions. A set of questionnaire was developed and tagged as "Questionnaire on the Use of Electronic Resources by Undergraduates in selected Private University Libraries in South West, Nigeria". This was developed by the researcher following the research questions. Three hundred and seventy (370) copies of the questionnaire were administered to the respondents in their various departmental lecture rooms and library. The respondents were requested to fill and return the questionnaire immediately to ensure maximum response. Data collected were coded using Statistical Package for Social Sciences (IBM-SPSS) version 23.0 and the data were analysed using frequency count, percentage, tables, and bar chart.

Results

A total of 370 copies of the questionnaire were administered to undergraduates in Babcock University, Bowen University and Ajayi Crowther University. A total of 347 participants responded and completed the survey questionnaire giving a response rate of 93.8%. Table 3 presents the data collection process.

Table 3: Distribution of the Questionnaire, Response Rate and Percentage Used for Analysis

S/N	Name of Institution	Questionnaire Administered	Valid Questionnaire Retrieved/ Used for the Analysis	Missing/Invalid Questionnaire
1.	Babcock University	139	131 (94.2%)	8 (5.8%)
2.	Bowen University	145	136 (93.8%)	9 (6.2%)
3.	Ajayi Crowther University	86	80 (93.0%)	6 (7.0%)
	Total	**370**	**347 (93.8%)**	**23 (6.2%)**

Research Question 1: What are the purposes of the use of e-resources by undergraduates in the selected private universities?

The researcher sought to ascertain the purpose of using electronic resources by undergraduates. To achieve this, ten possible purposes were highlighted. The results of the finding from undergraduates are presented in Table 4.

Table 4: Purpose for the Usage of Electronic Resources by Undergraduates

I use e-resources for:	**Yes**		**No**	
	Freq.	**%**	**Freq.**	**%**
doing my assignment/term paper	334	96.3	13	3.7
writing my research (e.g. writing of project/long essay)	315	90.8	32	9.2
updating my knowledge	331	95.4	16	4.6
complementing classroom teaching	276	79.5	71	20.5
routing study	264	76.1	83	23.9
keeping up-to-date on information outside my specialization	280	80.7	67	19.3
assisting other students in search of vital information	258	74.4	89	25.6
prepare for a professional examination	256	73.8	91	26.2
finding relevant information in my area of study	337	97.1	10	2.9
locating books on the shelf in the library	175	50.4	172	49.6

N= 347

As shown in Table 4, the respondents' major purposes for using e-resources were: for finding relevant information in their area of studies (97.1%), doing their assignments/term papers (96.3%), updating their knowledge (95.4%), writing research, e.g. writing of project/long essay (90.8%), as well as keeping up-to-date information outside their specialization (80.7%). Moreover, other purposes for the respondents using electronic resources as revealed in the study included: for complementing classroom teaching (79.5%), routing study (76.1%), assisting other students in search of vital information (74.4%) and for preparing for professional examination (73.8%). However, 175 (50.4%) of the respondents indicated that they used e-resources for locating books on the shelf in the library. They actually refer to the usage of the Online Public Access Catalogue (OPAC). It can, therefore, be deduced that undergraduates were really using electronic resources for academic purposes, although their usage of OPAC was on average (50.4%) based on the findings.

Research Question 2: How frequently are e-resources being used by undergraduates in the selected private institutions?

The frequency of use of e-resources by undergraduates in the selected private institutions was sought.. The results of the findings are presented in Table 5.

Table 5: Frequency of E-resources Usage by Undergraduates

How often do you make use of e-resources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily	127	36.6	36.6	36.6
	Few times a week	114	32.9	32.9	69.5
	Weekly	28	8.1	8.1	77.5
	Monthly	8	2.3	2.3	79.8
	Occasionally	70	20.2	20.2	100.0
	Total	347	100.0	100.0	

As revealed in Table 5, 127 (36.6%) of the respondents frequently made use of e-resources on a daily basis, 114 (32.9%) used e-resources for few times a week, 28 (8.1%) used them on a weekly basis, while 70 (20.2%) of the respondents made use of e-resources occasionally and 8 (2.3%) of the respondents used them once in a month. It can be deduced from the finding (as showed in Table 5), that below the average of the respondents, 127 (36.6%) frequently made use of e-resources.

Research Question 3: What are the challenges of using electronic resources by undergraduates in the selected private universities?

This section sought to identify the challenges faced by undergraduates while using e-resources. Eight possible challenges were highlighted. The results of the findings from the undergraduates are presented in Figure 1.

Figure 1 shows that the most common challenge in the use of electronic resources identified by the respondents was poor connectivity (low Internet speed). A majority of the respondents 309 (89.0%) considered this as a challenge. This was followed by electricity failure 234 (67.4%), low coverage of available e-resources 202 (58.2%) and lack of well-organised home page of library 166 (47.8%). Next on the challenge confronted by undergraduates in the use of e-resources was the inadequate number of computer terminals 163 (47.0%). This was followed by a lack of assistance from librarian 154 (44.4%) and lack of Internet facilities 145 (41.8%).

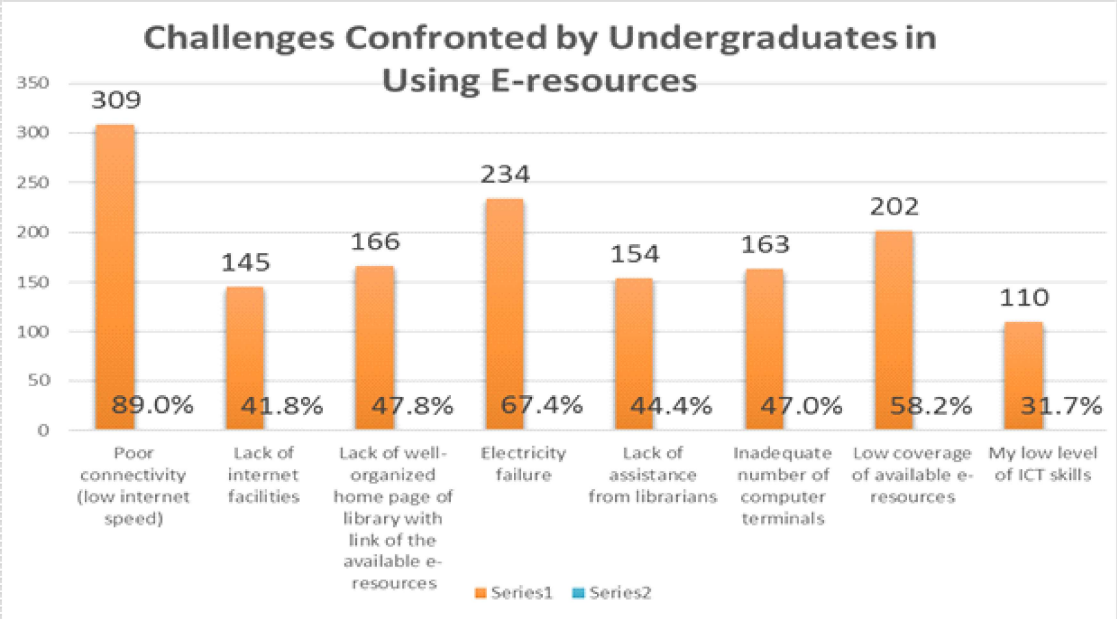

Figure 1: Challenges Confronted by Undergraduates in Using E-resources N=347

Most of the respondents did not consider the low level of ICT skills 110 (31.7%) as a challenge; this result attested to the finding on their ICT skills. It is obvious from the results that poor connectivity (low Internet speed) and electricity failure posed serious challenges to the use of electronic resources by the undergraduate students of the selected institutions, in South-west Nigeria. This is a reflection of the situation in Nigeria, which demands urgent attention.

Discussion

On the purpose of using e-resources, finding relevant information in the students' area of studies is the highest, followed by doing their assignment/ term papers, updating their knowledge and writing research, e.g. writing of the project. Keeping up-to-date on information outside their specialisation followed; next was for complementing classroom teaching, routine studies, assisting other students in search of vital information as well as for preparing for professional examination while locating books on the shelf in the library is the least reason for the usage of e-resources by undergraduates in selected private university libraries in South-west, Nigeria. This finding is in agreement with some past studies (Quadri et al., 2014; Alhassan, 2015; Omosekejimi et al., 2015; Owolabi et al., 2016) that identified purposes of using e-resources by undergraduates to include: research writing, writing of assignment and sourcing materials for project writing. It can be deduced that the primary purpose behind the usage of e-resources by undergraduate students in the selected institutions is for academic purpose.

On the frequency of use of e-resources by undergraduates, the finding shows that majorityof the undergraduate students in South-west, Nigeria frequently made use of e-resources. The finding suggests that e-resources usage is high among undergraduates. This finding concurs with the findings by Owolabi et al., 2016. That study reported that the majority of the undergraduate students regularly made use of e-resources. However, the finding differs from those of (Adeniran, 2013; Margaret-Mary and Mabawonku, 2013; Ukachi, 2013; Omosekejimi et al., 2015; Madondo et al., 2017) who reported low usage of e-resources among undergraduates.

On the challenges confronted by undergraduates in using electronic resources, the finding revealed the major challenges to include poor connectivity (low Internet speed), electricity failure and low coverage of available e-resources. This finding shows that the greatest challenge that the respondents faced within the use of electronic resources is poor connectivity (low Internet speed)

as indicated by 89.0% of the respondents. Electricity failure also poses a challenge to students' use of electronic resources as 67.4% of the respondents attested to this. These challenges can disrupt the use of e-resources and discourage students from learning through this platform, making them prefer using print resources. This is in support of the findings by Fyneman et al. (2014); Quadri et al. (2014); Omeluzor, Akibu and Akinwoye (2016); Owolabi et al. (2016); Fabunmi (2017) and Lavanya and Santharooban (2018) that poor Internet connectivity is a factor that affects access to and usage of electronic resources.

The finding on the challenges of using e-resources by undergraduates also agrees with the findings by (Emwanta and Nwalo, 2013; Bankole, Ajiboye and Otunla, 2015; Ugwu and Orsu, 2017; Toyo, 2017) who found out that unstable power supply constitutes a hindrance to the effective utilisation of e-resources. It is of note that students did not consider the low level of ICT skills as a challenge to the use of e-resources. This finding corroborates that of Toyo (2017).

The implications of the finding on the challenges facing students in using e-resources are that stable Internet connection, constant power supply, and adequate coverage of available e-resources are facilitating conditions that enhance the use of e-resources. So, when the problem of poor Internet connectivity continues, it could lead to under-utilisation of these resources, which would, in turn, affect students' learning and academic achievement. Efforts should be made by ownership of private universities, in South-west, Nigeria in tackling the problem of low Internet speed. Besides, electricity failure and low coverage of available resources would lead to under-utilisation of electronic resources.

This situation calls for the intervention of the university management in ensuring facilitating conditions for the use of technology and electronic resources by the students and the university community at large.

Conclusion

While it is known by now that undergraduates in selected private universities in South-west Nigeria make use of electronic resources mainly for academic purpose on a regular basis. Poor Internet connectivity and epileptic power supply are said to be the major challenges confronting the usage of e-resources by undergraduates. Students need to be encouraged to maintain high patronage for the usage of e-resource. One of the ways to do this is by the university libraries to properly address the challenges that students are confronted with when using electronic resources.

University management, libraries and librarians must consider the future of undergraduates, not just their own interests, and do their possible best to encourage high usage of electronic resources by undergraduates by ensuring that the challenges identified are overcome..

Recommendations

Based on the findings of this study and the conclusions which are drawn, the following recommendations are directed to university libraries, librarians in selected institutions, university management, and Federal government:

· The study has revealed poor connectivity as the greatest challenge to the use of e-resources among undergraduates. Therefore, efforts should be made by university and library management in the selected institutions to improve the bandwidth and enhance the Internet connectivity. This will facilitate students' accessibility to e-resources.

- To solve the challenge of electricity failure as revealed in the study, university management in the selected institutions should introduce an independent power supply scheme so that there would be effective and unhindered use of e-resources.

- Similarly, the Federal Government of Nigeria can assist to tackle the problem of electricity failure in the nation by using solar energy to generate electricity.

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The Use of Open Access by Medical Librarians in Nigeria: A Survey of Knowledge and Practices

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Abstract

Open access (OA) publications on the Internet are increasing and assuming important routes for disseminating scholarly information. Consequently, Open access management has become an inescapable feature of modern library services. The study examined knowledge of open access models, licensing types, resources, and practices in medical libraries in Nigeria. Questionnaire was the instrument for data collection. Participants were Fifty–one librarians from thirty-six medical libraries. Result shows high (e"72.5 percentage) awareness of open access green, gold, hybrid models, creative commons and public domain licensing types. However, less than half understand the full meaning and implementations of the models. Understanding was higher for OA licensing types. There was also high awareness of OA databases and resources but low use of the resources for information services. Open access services offered by the respondents are creating links to open access databases on library websites and directing patrons to OA publications. The study concludes that medical librarians need to improve their knowledge and skills of open access management to enable them build diverse collections that are relevant to Medical library patrons in the digital age.

Keywords: Open Science, OA, Open Access Management, Scholarly Communication, Medical Libraries, Health Science Librarians

Introduction

Open access (OA) publications on the Internet are increasing and assuming important routes for disseminating scholarly information. From predominantly subscription-based journals and books, medical libraries are now inundated with collection and management of various open access journals, books and resources. Open science is the movement to make online scientific research and data freely accessible to all without restrictions to their use and distribution. Open data and open access are forms of the open science movement. Open access is a generic term that describes free access to online peer reviewed publications such as journal articles, books and other knowledge publications, distributed without licensing restrictions enabling users unlimited use and sharing. Open access (OA) publications are propelled by legal rights that enable them to be freely accessed, distributed, shared and used on the Internet by anyone, anywhere, irrespective of location, without infringement of copyright laws and therefore users are free from legal repercussions.

Some of the enabling licensing types are creative commons licences and non-licenced works in public domain. Many of these publishers of open access journals recoup cost and maintain their business through article processing charges (APC) where authors pay stipulated fees determined by the publishers for publication of their articles.

Open access is proving beneficial to knowledge transfer in various aspects. "They bring the results of academic research to unprecedented numbers of scientists, university lecturers, medical researchers, patients, inventors, students, and the general public—democratising access to knowledge, accelerating discovery and fueling"(Open Society Foundations, nd.). According to Swan, (2012) "Through open access, researchers and students from around the world gain increased access to knowledge; this leads to opportunities for equitable economic and social development, intercultural dialogue, and has the potential to spark innovation. Publications receive greater visibility and readership, and the potential impact of research is heightened."

There are various models of open access publishing which are categorised by nature and timing of removal of legal restrictions to the access. The terms Gold, Green, Hybrid and Bronze OA represents the various models of open access. Publishers of peer reviewed Gold Open Access journals provide immediate open access to all articles on their websites and they are freely accessible to all who have access to the Internet. Green Open Access is the model of an author, self-archiving a version of non-open access article or its preprint in an open access repository such as institutional repositories. Hybrid open access is an open access model where publishers of a subscription journal provide gold open access for some articles while others are for subscription.

Managing Open Access Scholarly Publications in Medical Libraries

Open access publications relevant to all specialties of health sciences are dispersed in numerous web portals. The open access movement is boasted by availability of online repositories and databases that index and archive open access publications and provide search features for easy retrieval of content. *PubMed Central* is the National Library of Medicine digital archive of open and freely accessible articles and books in biomedical sciences. Directory of Open Access Journals (DOAJs), Directory of Open Access Books, Open Access Theses and Dissertations, Directory of Open Access Repositories (DOAR), etc are OA repositories that are having a general subject scope but are relevant to the collection of medical libraries because they also index health science literature. Bentham Open and Scientific Research Publishing are open access scientific and biomedical publishers.

Librarians engage with the open access movement through curation of resources and collection management. Institutional repositories are tools that are used to archive intellectual outputs of an institution including open access publications for greater visibility. It is the duty of librarians to scan the online environment to identify potentially useful open access resources that may be required by the patrons. These contents and links are disseminated through library facilities such as websites. Records and links are also included in discovery tools, online public access catalogue (OPAC) and electronic resource lists. Free electronic collections are capable of enriching a library's collection especially for those with limited budget for resource acquisition. Librarians can download free and open access e-books and other resources without copyright restriction to build local repositories according to the needs of the users (Anyaoku, 2019).

Knowledge of sources of open access resources, electronic resource acquisition, cataloguing, web content management, copyrights laws and open access models are important part of the competencies required for collection and management of open access resources. When scanning the online environment to identify relevant open access resources. Librarians by the nature of their duty as copyright protectors, need to understand the copyright indices governing open access and how to differentiate between open access, subscription-based and online pirated resources. There is a high rate of pirating of electronic publications; with about four million e-books pirated online (The Society of Authors, 2019).The knowledge of legitimate sources and illegally copied publications will prevent them from violation of copyright laws and protect the libraries from legal repercussions. Knowledge of open access management will also assist the librarians to manage. The purpose of the study was therefore to determine awareness and knowledge of the open access models and licensing as well as OA practices in medical libraries in Nigeria.

Research Questions

The following questions guided the research:

1. What is the level of awareness and knowledge of open access publishing models and licensing by medical librarians in Nigeria?
2. What is the level of awareness of open access resources by the medical librarians?
3. What is the level of use of open access resources to offer information services?
4. What are the open access practices in the medical libraries?
5. What are the medical librarians' sources of knowledge acquisition on open access management?

Literature Review

Open access licensing

A licence is a legal instrument that stipulates how creative outputs can be used and distributed. These rights usually give the creator an exclusive right over the use and distribution of the work for a certain period. Proprietary or subscription-based works are protected by intellectual property rights such as copyrights, patents, trademarks and industrial property rights. These are licences granted to persons to exclusively own and control the distribution of their creative outputs or inventions. According to Bailey, this means that others cannot copy the work, distribute it, publicly display/perform the work or create derivative works of it without the permission of the creator or rights holder (Bailey, 2018).

Copyright is an intellectual property right given to the originator of intellectual output such as books, journal articles, films, music for a fixed number of years, to exclusively print, publish, perform, film etc. the creative output. Copyright infringement or piracy is the use of works protected by copyright law without permission. Copyright is founded on the principle that authors own the right to their intellectual creations and can determine whether, and under what conditions, others may use their works. Copyright law enables authors to monetise their work, underpinning the publishing and creative industries as a whole. Copying an author's work without consent, offering it for sale and downloading it are all copyright infringements (*The Society of Authors*, 2019).

As noted, Open access (OA) publications are driven by legal rights that enable them to be freely accessed, distributed and used on the Internet without infringement of copyright laws. Creative Commons licences are open access licences that are designed to enable creators retain copyright while allowing others to copy, distribute, and use of their works — at least non-commercially. Every Creative Commons licence also ensures licensors get the credit for their work they deserve (https://creativecommons.org/licences/). Bailey (2018) explained that the Creative Commons Organisation created a series of licences that creators and rights holders can place on their work to indicate that they permit certain reuses. The licences include three elements: An icon or short text line indicating the licence, a "human readable" version of the licence (example) and the full legalese version. These licences are made available free and can even be integrated within a site, such as YouTube or Flickr, to enable the site to make the licences available to their users.

Materials on public domain are not protected by intellectual property laws such as copyright, trademark, or patent laws. Anyone can use a public domain work without obtaining permission from the original owner. Works fall into a public domain because the intellectual property rights have expired, it never had copyright protection the work was explicitly donated to the public domain and the work is a work of the U.S. Government (Open Education Resources, nd). Works in Public domain can be an important part of library collections. Libraries can digitise relevant print resources in public domain and upload to their digital archives or freely create hyperlink on the website and OPAC so that they can be freely accessed by their patrons who might need them.

Librarians' Engagement with Open Access

Open access (OA) publications on the Internet are increasing and assuming important routes for disseminating scholarly information. Consequently, OA management has become an inescapable feature of modern library services. Many librarians are responding to the open access movement by

establishing technical infrastructures and tools for their management and dissemination such as library websites, institutional repository, OPAC, and others. Some have moved to the forefront of open access movement with various initiatives that are meant to create awareness and encourage users to key in to open access movement. Zhang (2014) reported that the Chinese library community has been standing at the forefront of promoting open access. The author enumerated some open access activities of the National Science Library (NSL) as setting up an Open Access Promotion Portal to distribute news, reports and research on OA, organising annual OA Week for promotion of open access in China and establishing an Information Policy Centre to support research and the promotion of open access. American Library Association (ALA) (2007) enumerated various ways librarians can support the open-access movement to include:

- Plan workshops for faculty about why open access is important to them and what they should know when publishing.
- Advocate for the inclusion of open-access journals in the pool of publications used when evaluating for tenure.
- Educate public library users on how open-access issues impact their ability to access pertinent information, particularly medical and other scientific information.
- Encourage the use of open-access repositories and journals by including them in our electronic resources, LibGuides and other local information sources.
- Promote the copyright rights of authors by educating faculty on negotiating with publishers regarding the deposit of published articles in digital repositories for access and preservation.

Libraries have also been designated as OA publishers. Engeszer and Sarli (2014) reported that the growing acceptance of OA publishing has afforded libraries with opportunities to assume the role of publisher. They are using the greater availability and affordability of digital publishing platforms to explore new methods of communicating and disseminating the research results of campus authors.

Some previous researchers have studied implementation and management of open access by librarians. Sanjeeva and Powdwal (2017) studied Open Access implementation in institutes' libraries in Mumbai. The study found that majority of the librarians were involved in open access advocacy to their researchers. The most used method was sending emails and posters to promote Open Access. In addition, University libraries and larger institutes arranged talks by experts to promote Open Access. Bulock, Hosburgh and Mann (2015) study revealed that the systems and procedures librarians deployed to manage OA resources include content link resolvers, Online Public Access Catalogs (OPACs), database and journal lists, discovery services and research guides. Respondents reported that the biggest challenges of OA management are the huge number of available resources, inconsistent metadata and lack of OA collection development criteria. Lwoga, and Questier (2015) in a study of Open access behaviours and perceptions of health sciences faculty and roles of information professionals in Tanzania revealed that there was a strong support for promoting OA issues on campus; however, this positive support with various open access related tasks did not translate into actual implementation of OA activities. Findings indicated that few librarians were engaged with OA activities, such as monitoring Internet sites and reading literature that discuss OA issues.

Literature and empirical studies have depicted the state of involvement of some librarians in open access management. The present research was designed to determine the engagement by medical librarians in Nigeria.

Methodology

This is a survey research. The population of study is medical librarians in Nigeria. The Medical Library Association membership had a list of 112 names. Questionnaire was the instrument used for data collection. The questionnaire was created and distributed online through SurveyMonkey survey tool (http://www.surveymonkey.com/). The questionnaire link with cover letter was distributed through the email list and WhatsApp platform of the Association in July 2019. Fifty – one medical librarians from thirty - six medical institutions responded to the survey.

Respondents' demography is shown in table 1. Results were analyzed using simple percentages and mean scores. The results are presented in figures and tables.

Findings

Background of Respondents

As revealed in Table 1, majority of the respondents were female (52.9%) and most of the respondents had Master's degree and above (64.7%). Most of the respondents were working in academic medical library (72.1%)

Table 1: Respondents' Demography N=51

	F	%
Gender		
Male	23	45.1
Female	27	52.9
Missing	1	2.00
Qualification		
PhD	10	19.6
Master	23	45.1
BLS	15	29.4
Others	2	3.9
Institution		
Academic medical library	37	72.5
Hospital library	8	15.7
Medical Research Institute Library	3	5.9
Missing	3	5.9
Years of services		
1 - 5 <	7	13.7
6 – 10	15	29.4
11 – 15	13	25.4
16 – 20	4	7.8
> 21	11	21.6

Awareness and Understanding of Open Access Models and Licensing Practices

Awareness and understanding of open access models and licensing practices by medical librarians is shown in figure 1 and table 2.

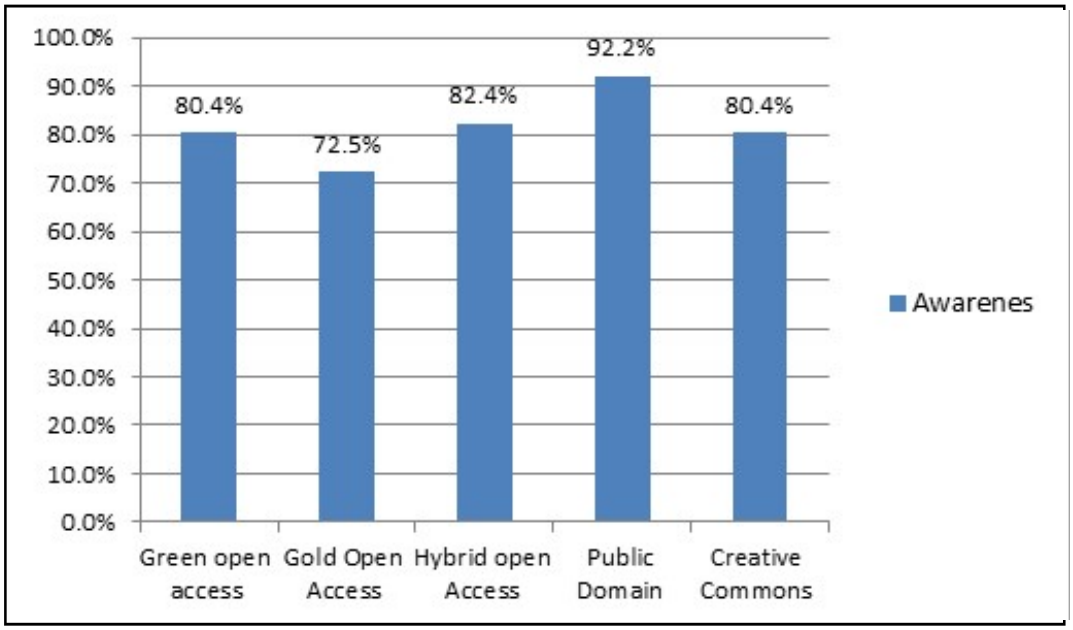

Figure 1: Awareness and knowledge of open access models and licensing practices-

Results from figure 1 show a high awareness of open access models. Most of the respondents affirmed having heard of the open access models and licensing practices. Large majority 42 (82.4%) have heard of Hybrid open access and Green open access. 41 (80.4%). However, the figure is lower for respondents that are aware of gold open access 37 (72.5%). For licensing, almost all 47 (92.2%) are aware of public domain while 41 (80.4%) indicated awareness of Creative Commons.

Respondents were requested to indicate their level of knowledge of open access models. The result is presented in table 2.

Table 2: Respondents Knowledge of implementations of open access models and licensing

	Extensive Knowledge	Basic Knowledge	Aware but no Knowledge	Not aware of the topic	Weighted Average
Green Open Access	10 (19.61%)	12 (23.53%)	19 (37.25%)	10 (19.61%)	2.43
Gold Open Access	9 (17.65%)	10 (19.61%)	18 (35.29%)	14 (27.45%)	2.27
Hybrid Open Access	12 (23.53%)	13 (25.49%)	17 (33.33%)	9 (17.65%)	2.55
Public Domain	16 (31.37%)	19 (37.25%)	12 (23.53%)	4 (7.84%)	2.92
Creative Commons	14 (27.45%)	14 (27.45%)	13 (25.49%)	10 (19.61%)	2.63

Table 2 presents the level of Knowledge of open access models by the medical librarians. Despite high majority having encountered the concepts as shown in Figure 1, Table 2 revealed the percentages that have full Knowledge of the open access publishing models were low. Less than half of the respondents acknowledged they have a basic or extensive Knowledge of the implementation of hybrid open access (49.02%), Green open access (43%).and Gold Open Access (37.25%).

However, Knowledge was higher for open access licensing types, public domain (68.62%) and creative commons (54.9%).

Awareness and Use of Open Access Resources in Medical Libraries

Tables 3 and 4 present awareness and use of open access resources for information services by the medical librarians.

Table 3: Awareness of Open Access Resources

Open Access Resource	Aware (%)	Not aware (%)
Directory of Open Access Journal	98	2
Directory of Open Access Books	92	8
Open Access Theses and Dissertations	90	10
Directory of Open Access Repositories	88	12
PUBMED Central	88	12
HINARI	98	2

A list of open access and freely accessible resources and databases was provided and respondents were requested to indicate their awareness of the availability of the resources for information services. Table 3 shows a high awareness of open access resources. Almost all respondents 49 (98%) claim awareness of the existence of Directory of Open Access Journals and HINARI. Most 46 (92%) also affirmed knowledge of the existence of Directory of Open Access Books (DOAB), and Open Access Theses and Dissertation (45, 90%). Equal high percentage 44(88%) claimed awareness of Directory of Open Access Repositories (OpenDOAR) and PubMed Central a repository of open and freely accessible publications in health and biomedical sciences

Respondents who indicated awareness of open access resources were requested to indicate their level of use of these resources for services in the library. The result is presented in table 4.

Table 4: Level of use of open access resources for services in the library n=50

	Use Very/ often	Use occasionally	Aware but do not use	Not aware at all
Directory of Open Access Journals (DOAJ)	24 (48.00%)	14 (28.00%)	11 (22.00%)	1 (2.00%)
Directory of Open Access Books (DOAB)	14 (28.00%)	17 (34.00%)	15 (30.00%)	4 (8.00%)
Open Access Theses and Dissertations (OATD)	17 (34.00%)	16 (32.00%)	12 (24.00%)	5 (10.00%)
Directory of Open Access Repositories (OpenDOAR)	14 (28.00%)	15 (30.00%)	15 (30.00%)	6 (12.00%)
PubMed Central	22 (44.00%)	7 (14.00%)	15 (30.00%)	6 (12.00%)
HINARI	32 (64.00%)	10 (20.00%)	7 (14.00%)	1 (2.00%)

Results from table 4 reveal that the open access / free resources most frequently used (Very often and often) by the respondents for information service to users was HINARI as 32 (64.00%) used it frequently. The table shows that less than half indicated frequent use of other resources: Directory of Open Access Journals (48%), PubMed Central (44%) and Open Access Theses and Dissertations (34.00%). Less number 14 (28%) affirmed frequent use of Directory of Open Access Books of Directory of Open Access Repositories.

Open Access Practices in Medical Libraries in Nigeria

Table 5: Open access practices in Medical libraries in Nigeria

S/N	Open access practices	Frequency	%
1.	Have links to open access databases and resources on library website	25	50
2.	Direct patrons to open access publications	25	50
3.	Collect and deposit open access books and journals as part of e-resources	22	44
4.	Educate patrons about OA, copyright issues and predatory journals	18	36
5.	Establish institutional repositories	14	28
6.	Establish Open Educational Resources (OER)	11	22
7.	include bibliographic records for OA books and journals in the library catalogues	10	20
8.	Provide hosting services for open access journals.	6	12
9.	Hold open Access week events to promote awareness	4	8
10.	We do not offer open access services	15	30

Table 5 reveals types of open access management and services offered by the respondents in their libraries. Half of the respondents indicated they created links to open access databases on library websites and direct patrons to open access publications. Other services reported by the respondents were collecting and depositing open access books and journals as part of e-resources (44%). Patrons were educated about OA, copyright issues and predatory journals by (36%) of the respondents. Some of the respondents (28%) indicated their libraries established institutional repositories and established Open Educational Resources (OER) (22%). Ten respondents (20%) noted that they included bibliographic records for OA books and journals in the library catalogues while only (12%) provided hosting services for open access journals.

Avenues for Acquisition of Knowledge and Skills on Open Access Management

Training avenues and respondents need for further training show that 63.3% of the respondents attended workshops and conferences to acquire knowledge of open access management and practices. In-house presentations constituted (38.8 %) and online webinar was (26.5%), and (22.5%) revealed they had never attended any training on open access management. Majority (80%) of the health librarians indicated that they need further training on open access management in libraries

Discussion

The research sought to find out the level of awareness and knowledge of implementations of open access publishing models and licensing by medical librarians in Nigeria. The findings established that there was a high awareness of open access models and licensing types among the 51 respondents. Most of the respondents affirmed having heard of hybrid OA (82%), Green OA (80.4%), and Gold OA (72.5%). Respondents were also highly aware of creative commons licences (80.4%).and public domain policies (92.2%) that propel open access publications. However, despite the high level of awareness of the topics, the

percentages that possess full knowledge of the models were low. Less than half of the respondents acknowledged that they had full knowledge of the implementations of gold, green and hybrid open access models. Understanding was higher for creative commons and public domain practices.

This low level of understanding of open access models by the librarians implies that these librarians may not be very conversant with the intricacies of open access management. Consequently, its exploration may be limited in the libraries leading to them missing the opportunities to provide vital resources needs by library users. Such knowledge is also prerequisite for managing resources such as institutional repositories. It is pertinent to note that though majority of the study respondents are from academic health sciences libraries, it is only 19.6% of the respondents that indicated they had an extensive knowledge of Green open access. This is an important avenue for uploading content into institutional repositories through self-archiving by users. Poor understanding of the implementation of Green Open Access model indicate that these librarians may not be advocating and inculcating skills to get their primary users involved in contributing to open access self-archiving practices. Librarians' minimal knowledge of creative common licences may not be able to differentiate between open access publications and online pirated copies of publications especially e-books. They may be at risk of being unable to different between copyright protected work, open access, and pirated works thereby capable of violating the copyright law. Fisk (2009) noted that librarians not knowing about or understanding digital piracy put themselves and institutions at risk for criminal and civil prosecution. Also, without this knowledge, they may not properly guide and teach their users to adhere to copyright provisions.

Awareness and Use of Open Access Resources

Results indicate a high awareness of open access and freely accessible resources by the medical librarians. High percentages (e—88%) were aware of the availability of Directory of Open Access Journal and HINARI, Directory of Open Access Books (DOAB) Open Access Theses and Dissertations, Directory of Open Access Repositories, and PubMed Central. Findings show that the only resource used frequently by the respondents for information service is HINARI (64.00%). There was minimal use of other freely accessible and open access repositories. The topmost use of HINARI compared to other resources is not unexpected considering that there is great publicity and continuous professional and user training on the use of the resource by Research4life organisation. HINARI provide online access to subject related peer-reviewed biomedical journals, books, and databases from the world's leading academic publishers to non-profit academic and research institutions, governmental and policy making departments in low income countries free or at low cost subscription based on a country's Gross National Product (GNP). Its content includes freely accessible articles from subscription-based journals and peer reviewed open access publications.

Result revealed that less than half of the medical librarians frequently use *PubMed Central*. This database provides access to free full texts of peer reviewed articles and research reports in the biomedical sciences. It is therefore an important resource that can add value to the collections of medical libraries in Nigeria. The low level of use of open and freely accessible resources indicate that these librarians despite their high awareness of the resources may not be creating awareness of their existence and teaching skills for effective access of their contents. Consequently, many of their patrons may not be aware of their importance for free access to quality information and research findings.

The findings of the study are similar to other findings among librarians that showed good level of awareness of OA publications; concepts and support but possess little Knowledge about OA initiatives, and poor translation into actual implementation of OA activities (Bulock, Hosburgh and Mann, 2015; Lwoga, and Quetier, 2015; Musa, 2016). These contradictory findings have been observed and reported by Tenopir, Dalton, Christian, Jones, et.al. (2017) that within the last several years, many studies have shown that academics' awareness of open access journals has steadily increased. However, awareness does not always equate to understanding or acceptance of OA and its different models

Open Access Practices in the Medical Libraries

The study shows low indices in open access practices by the medical librarians. The study revealed that only half (50%) of the librarians offer OA services by creating links to open access databases on library websites and directing patrons to open access publications. Less than half of the respondents engaged in other practices such as collecting and depositing open access books and journals as part of e-resources (44%), educating patrons about OA, copyright issues and predatory journals (36%). Lower percentages of respondents (28%) indicated their libraries established institutional repositories and establish Open Educational Resources (OER) (22%). Twenty percent include bibliographic records for OA books and journals in the library catalogues while only (12%) provide hosting services for open access journals. The practices though not highly encompassing, the responses attest to the librarians' involvement in some forms of open access management in their libraries. However, there is need for improvement to full engagements.

Sources of Knowledge on Open Access Management

Training and retraining are important for professional development for knowledge and skills acquisition for proper management of open access resources in libraries. The medical librarians revealed the major avenue they acquired knowledge of open access management and practices was in conferences and workshops (63.3%). Other skills acquisition avenues indicated by 38.8% of the respondents were in-house staff workshops or presentations, and online webinar (26.5%). 22.5% revealed that they had not attended any training on open access management. Importantly, majority (80%) of the health librarians indicated that they needed further training on open access management in libraries.

Conclusion

Open access resources can contribute in enriching a library's collections by adding to the diversity of collections in the library. Medical Librarians in the study indicated good awareness of open access models, licensing and resources. However, they have low full knowledge of these concepts. The study also showed low open access management practices in the medical libraries. The result is significant because it reiterated what was reported in the literature on high awareness of librarians on open access publications and concepts but poor translation into actual implementation of OA activities. Since open access publications and repositories have assumed important route for disseminating scientific and biomedical information, it is imperative that the medical librarians institute inclusive collection management of open access resources with subscription based resources. They also need to improve their knowledge and skills of OA management. This is necessary for building the diverse collections relevant to the information needs of library patrons in the digital age.

Recommendations

Based on the findings of the study the following are recommended:

1. The results of the study show that there is need for the medical librarians in the study to explore all avenues to acquire open access management knowledge. Outside the formal education setting, conferences, workshops and recently online webinars provide platforms for creating awareness of emerging professional phenomenon and inculcating of skills including on collection management of library resources.
2. Open and free access repositories such as PubMed Central and HINARI are specifically designed to provide relevant and current medical information. Considering their importance and usefulness, the medical librarians when providing literature access services to patrons should use them often. In addition, the librarians should continuously create awareness of their availability and importance in providing quality medical information.
3. Medical librarians in Nigeria should improve on open access practices. They should create awareness of quality open access publications through links on library websites, offer training on OA resources and how to effectively search

them as part of information literacy modules as well as inculcate skills for identification of predatory open access publications.

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The Gaps and Zone of Tolerance in Service Provision at the African Court on Human and Peoples' Rights Library in Arusha, Tanzania

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Abstract

The study sought to investigate the gaps and zone of tolerance in service provision at the African Court on Human and Peoples' Rights library in Arusha, Tanzania. The target population was 94 library users. The study employed LibQUAL and SERVQUAL protocols to assess the service adequacy gap (SAG), service superiority gap (SSG), zone of tolerance (ZoT) and Desired Mean (D-M) scores. The findings revealed several gaps between the users' expectations and perceptions of service quality, with library services falling below the users' expectations. Furthermore, the users' expectations exceeded their perceptions. The gaps generally showed the library performing well in human aspects but needing to improve in the information-collection and physical aspects. The study recommends that the library should allocate resources to ensure that the human aspects of the library remain at high levels of service quality, but take action to remedy the information-collection and physical aspects of the library.

Keywords: Gaps, Zone of Tolerance, Service Quality, LibQUAL, SERVQUAL, African Union, African Court

Introduction

A great deal of interest has been focused on service quality in libraries and how to measure it. According to Parasuraman, Zeithaml and Berry (1985), the most pervasive definition of quality currently in use is the extent to which a product or service meets and or exceeds a customer's expectations. Service quality and customer satisfaction are important concepts that libraries and other service organisations must understand in order to remain competitive in service delivery (Damtew 2015:9). In order to retain and grow their *clientele*, libraries need to identify and understand their clients' expectations and perceptions. Measurement of library service quality is therefore an important aspect of library management.

The survival of libraries depends on the extent to which users' expectations are met or satisfied (Kaushik 2013): users are satisfied when services meet or exceed their expectations. According to Parasuraman et al. (1988), Ikenwe and Adegbilero-Iwari (2014), and Sharma and Kadyan (2016), clients are best suited to judge and assess user expectations. Service quality measurement involves the identification of user expectations, perception and satisfaction levels, and areas where large expectation-perception gaps exist. Expectations are identified through quality assessment studies that reveal gaps between clients' perceptions and expectations. These gaps are then used to assess the quality of library services (Onwukanjo and Men 2017). Identification of these gaps helps eliminate quality barriers as well as determine service priorities (Somaratna, Peiris and Jayasundara 2010:2). User expectations and perceptions are important measures of service quality. Reducing the gap between user expectations and the perception of service provided is what defines service quality (Somaratna et al. 2010). The gap discrepancy between desired service expectation and actual service perception is therefore

among the key concepts and measures of service quality. According to Somaratna et al. (2010:1), assessment of service quality through gap studies provides important feedback for libraries. Areas that need improvement emerge from analysis of the differences (gaps) between the perceived levels of performance and the expectations (desires) of customers (Parasuraman et al. 1985). Library management can then work on improving service quality in those areas. It is this feedback that is used for library management.

Parasuraman et al (1985) observe that service quality is a function of the differences between expectation and performance along the quality dimensions. Jayasundara, Ngulube and Minishi-Majanja (2009:182) define service quality as a function of the gap between customers' expectations of a service and their perceptions of the performance of actual service delivery by an organisation. They further argue that customer expectations are not static; they are based on user experiences, which change overtime. In studies based on the gaps model, users are requested to describe the following three aspects:

(a) Minimum acceptable level of service

(b) Desired/expected level of service

(c) Perceptions of the service provided

Theoretical Framework Underpinning the Study

The gaps model of expectations (Figure 1) offers service organisations a framework for assessing service quality in the form of the gaps that exceed (or fail to meet) customers' expectations. (Hernon, Altman and Dugan 2015). This study adopted the gaps model of service quality to assess the level of service quality in the African Court library. The model was developed by Parasuraman et al. (1985), and more recently described in Zeithaml and Bitner (2003). It has served as a framework for research in the services sector for years. The model is an improvement on and was developed to address the shortcomings of Grönroos's model of service quality. Parasuraman et al (1985) expanded on Grönroos's work and developed the concept of expectations and perceptions of service quality, thereby creating the gaps model of service quality. In defining the gaps model, Parasuraman et al. (1985) focus on the discrepancy between customers' expectations and perceptions. According to Hernon (2002), the model measures customer perceptions of service quality by identifying differences, or gaps, between customers' expectations and perceptions of service. Customers compare the service they experience with what they expect and when it does not match their expectations, a gap arises. The model identifies four specific gaps leading to a fifth overall gap between customers' expectations and perceived service.

According to the model, customers have expectations prior to using a service. These expectations provide a barometer against which customers' experiences (and service performance) can be compared (Hernon 2002). Therefore, customer expectations become subjective judgments based on how far the customers believe a particular attribute is important for excellent service (Hernon 2002). The gaps that exist, according to the model (Seth and Deshmukh 2004), are described as follows:

Gap 1: Customer expectations of service and management's perspective of these expectations: This is the difference between the real expectations of the customers and what the management perceives as their expectations. In this situation, management is not aware of the customers' expectations. It may be caused by inadequate research or a complete lack of market research, poor upward communication or failure to have strong relationships with the customers. It is also known as the knowledge gap (Yarimoglu 2014).

Gap 2: Specifications of service quality and management's perspective of customer expectations: This gap arises where companies identify the needs of consumers, but they lack the means to deliver to expectations. It is a complete mismatch between services on offer and what customers expect. Also known as the policy gap (Yarimoglu 2014), it could affect the service quality perception of the consumer.

Gap 3: Service quality specifications and service actually delivered (service performance gap):
This gap may be caused by failure to adhere to set service designs and standards, failure to match supply and demand, human resource deficiencies, and customers who do not fulfil their roles. It may also

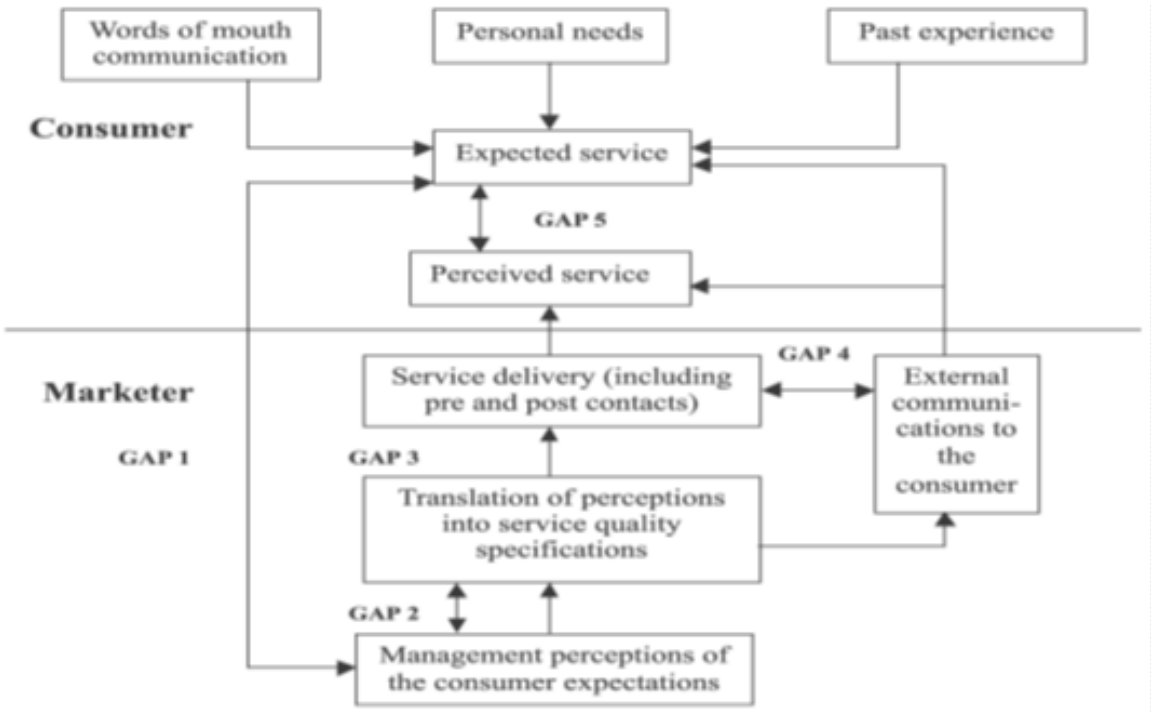
be caused by service intermediaries, where they exist. It is also known as the delivery gap (Yarimoglu 2014).

Gap 4: Service delivery and external communication to customers about that delivery (i.e. whether promises match delivery): This is the failure to match performances to the promises that were given by the organisation. It happens when companies fail to inform customers of special efforts to assure quality that are not obvious or apparent to them. It is also known as the communication gap (Yarimoglu 2014).

Gap 5: Customers' expectation of service and perceived service delivery: This gap depends on the size and direction of the four gaps associated with the delivery of service quality on the marketer's side. It is also known as the service quality gap (Yarimoglu 2014).

Gaps 1 to 4 contribute to the development of gap 5, which is the difference between what customers expect to receive from the service, and what they believe they actually received. This is the most important gap because if the perceived service were to fall short of the customers' expectations, they would become disappointed and dissatisfied.

According to the model, there are five key discrepancies (or gaps) that relate to managerial perceptions of service quality and tasks associated with service delivery to customers. Gaps 1, 2, 3 and 4 are identified as functions of service delivery. Gap 5 relates to the customer; therefore, it is considered to be the real measure of service quality.



Source: Parasuraman et al. (1985)

Figure 1: Gaps model of service quality

The purpose of the study was to assess the gaps and zone of tolerance in service provision at the African Court on Human and Peoples' Rights library in Arusha, Tanzania, with a view to determining the level of service quality at the library. Specifically, the study sought to do the following:

- Determine the extent of users' acceptance of service (ZoT)
- Assess the extent to which performance exceeds desired expectations (SSG)
- Determine the extent to which the library meets minimum expectations (SAG)
- Measure the relative strengths and weaknesses of library service quality (D-M score).

Research Methodology

The study adopted a quantitative approach to assess the gaps and zone of tolerance in service provision at the African Court on Human and Peoples' Rights library. The quantitative approach was deemed the most appropriate based on the quantitative nature of the data that were sought to achieve the objectives of the study. The target population of the study comprised 94 users of the African Court library, including 65 internal and 29 external users. Given the small size of the target population, sampling was not required. Data was collected using a questionnaire, which was administered to all the respondents 2017. Of the 94 questionnaires that were distributed, 87 were returned and were found useful for the study.

The study used a questionnaire to collect data in consisting of closed-ended questions. The questionnaire was developed along the dimensions of LibQUAL and SERVQUAL protocols. LibQUAL and SERVQUAL are widely used tools to assess the quality of services in libraries. LibQUAL consists of 22 core questions spread across three dimensions, namely *affect of service*, *information control*, and *library as a place*. Similarly, SERVQUAL consists of 22 statements comprising the following five dimensions: tangibles, reliability, responsiveness, empathy, and assurance. Developed by Parasuraman et al (1988), SERVQUAL was later redesigned such that respondents were required to rank service quality in a three-column format: minimum, desired and perception of service performance (Parasuraman et al. 1994). This formed the basis for the LibQUAL model. According to SERVQUAL developers, there are two main gaps in the measurement of service quality. One is the measure of service superiority (MSS), which is the gap between perceived service and desired service, it is also known as the service superiority gap (SSG). The other is the measure of service adequacy (MSA), which is the gap between perceived service and minimum service, also known as the service adequacy gap (SAG) (Berry and Parasuraman 1991). At either end, are the minimum and desired service expectations. The range in between is the zone of tolerance (ZoT), which represents the range of service performance which customers or users consider satisfactory.

In order to determine the level of service quality from the customers' perspective, gap scores of 22 service quality attributes were calculated using the ratings of three levels of LibQUAL's customer expectations (minimum, desired and perceived) and those of SERVQUAL (desired and perceived).

Given its quantitative nature, the data, were analysed using descriptive statistics through the Statistical Package for Social Sciences (SPSS) software. Weighted means were computed and used to identify the various gaps needed for the study. To find the level of service quality, a five-step process was followed.

Step 1: Mean scores

A mean score refers to the arithmetic average of a collection of numbers. Mean scores were calculated for customers' minimum, desired and perceived levels of service quality for each of the service quality statements in LibQUAL and SERVQUAL. The following formula was used:

Mean score = Sum of all observations / Total number of observations

Step 2: Service adequacy gap (SAG)

Service adequacy is applied as an indicator of the extent to which the African Court library is meeting the minimum expectations of its users. This was calculated by subtracting the minimum mean score from the perceived mean score, both of which were obtained in Step 1, on any of the 22 statements. The following formula was used:

SAG = Perceived mean – Minimum mean

If the SAG is a negative score, it is an indicator that the customers' perceived level of service quality is below their minimum level of service quality.

Step 3: Service superiority gap (SSG)
The service superiority gap (SSG) score is an indicator of the extent to which the library is exceeding the expectations of its customers. The SSG score was calculated by subtracting the desired score from the perceived score on every one of the 22 service quality items. The following formula was applied:

SSG = Perceived mean – Desired mean

If the superiority gap score is positive, this is an indicator that the customers' perceived level of service quality is above their desired level of service quality.

Step 4: Zone of tolerance (ZoT)
The zone of tolerance (ZoT) is the range from the minimum service rating to the desired service rating. The perceived levels of service fall within this zone. According to Berry and Parasuraman (1991), if the service performance is below the ZoT, it creates disappointment, frustration and dissatisfaction. According to Parasuraman (2004), the ZoT is:

> *"the range of expectation rather than a single standard level of expectation which is bounded by desired service at the top and minimum service at the bottom. So, it may be said that the zone of tolerance is a range in which users are willing to accept variations in service delivery".*

The following formula was used to calculate the ZoT:

ZoT = Desired mean – Minimum mean

Step 5: D-M score
The ZoT goes hand-in-hand with the D-M score measure. Perceived scores that fall outside the ZoT will result in scores that have D-M values, which are either less than 0 or more than 100. According to Dennis and Bower (2007:11), the D-M score is a standardised score that is used to analyse LibQUAL data and to present the information. It is computed by dividing the SAG (obtained in Step 2) by the ZoT (obtained in Step 4). The quotient is then multiplied by 100. This gives a score that will range from 0 to 100. The D-M score is therefore the location of the perceived level of service in relation to the minimum acceptable level of service (represented by "0") and the desired level of service (represented by "100").

D-M score = (SAG / ZOT) x 100

The D-M score integrates all the above three scores. According to Dennis and Bower (2007:11), it enables librarians to place the customers' perceptions of service quality in the context of their expectations. For researchers, the D-M score is a vital tool in the analysis and presentation of findings because it allows for meaningful and well-organised comparisons. The D-M score was used in this study to assess and present the relative strengths and weaknesses inherent in the quality of services at the African Court library.

D-M score interpretation
The D-M score interpretation standard was adopted for interpreting the D-M scores on each of the 22 core items and the requisite corrective action required. This standard is shown in Table 1.

Table 1: D-M score interpretation standard

D-M score	Evaluation	Action required
> 100	Exceeds expectations	Maintenance
71–100	Meets expectations	Maintenance
60–70	Not so problematic	Monitoring
51–59	Potentially problematic	Close monitoring
=50	Mid-point in ZoT	Requires improvement
40–49	Mildly problematic	Requires improvement
15–39	Problematic	Requires special improvement
0–14	Considerably problematic	Requires immediate improvement
< 0	Below minimum expectations	Dire need for immediate improvement

Source: Adapted from Dennis and Bower (2007:11–12)

The D-M score lies in the zone of tolerance and is usually between 0 and 100. A higher D-M score indicates a perception of better service quality. A D-M score of 50 lies in the middle of the zone of tolerance. This means that the score is halfway between the minimum level of acceptable service and the desired level of service, which also means that the adequacy gap and superiority gap scores are of equal size. Therefore, a service item with a D-M score of 67.20 shows that the library is closer to the desired level of service than to the minimum level of service. That means that the library is 67.20% of the way to meeting the customers' desired level of service.

Perceived scores that fall outside the zone of tolerance will result in scores that have values which are either less than 0 or more than 100. If the perceived score falls below minimum, the D-M score will be negative (the adequacy gap will also be negative). Scores below zero indicate that the library services do not meet the minimum service standards of customers. If a service item has a negative D-M score, this is an indicator that it is in urgent need of attention and should be immediately attended to. When the perceived value is greater than the desired value, the D-M score will be greater than 100 (there will be a positive superiority gap). If the scores exceed 100, it is an indication that the library is exceeding the level of service the patrons' desire. On the other hand, a D-M score of 200 does not indicate that the library is performing twice as well as user's desire. Rather, it means that the service provided is being perceived at a level that exceeds the desired level of service by the size of the zone of tolerance (desired + zone). The items with D-M scores that fall beyond the zone of tolerance do not need improvement, but the scores may indicate that limited resources are being allocated inefficiently.

Results and Discussions

Service Quality Measures in LibQUAL

Table 2 presents the scores obtained using five service quality measures in LibQUAL. The first column shows the identifier for each of the 22 service quality attributes (ID). The next three columns provide the mean scores calculated based on user ratings for minimum expectations (M), desired expectations (D) and perceptions (P). Since all five methods use mean scores, the minimum mean (M), desired mean (D) and perceived mean (P) are computed first. The rest of the columns present the scores for each method each service quality measures (SAG, SSG, ZoT and D-M score).

Table 2: Service quality measures in LibQUAL

ID	Minimum mean (M)	Desired mean (D)	Perception mean (P)	ZoT (D-M)	SAG (P-M)	SSG (P-D)	D-M score (SAG/ZoT x 100)
Affect of service (AS)							
AS-1	6.13	6.69	6.77	0.56	0.64	0.08	114.29
AS-2	5.48	6.01	4.56	0.53	–0.92	–1.45	–173.59
AS-3	5.55	6.45	6.47	0.9	0.92	0.02	102.22
AS-4	5.63	5.78	6.63	0.15	1	0.85	666.67
AS-5	6.54	6.89	7.16	0.35	0.62	0.27	177.14
AS-6	5.41	5.53	6.49	0.12	1.08	0.96	900
AS-7	6.29	6.36	6.62	0.07	0.33	0.26	471.43
AS-8	5.87	6.29	6.31	0.42	0.44	0.02	104.76
AS-9	5.93	6.38	5.38	0.45	–0.55	–1	–122.22
Mean scores	5.87	6.27	6.44	0.39	0.4	0.17	102.56
Information control (IC)							
IC-1	5.24	6.25	5.44	1.01	0.2	–0.81	19.8
IC-2	5.09	4.91	5.2	–0.18	0.11	0.29	61.11
IC-3	5.75	6.9	4.82	1.15	–0.93	–2.08	–80.87
IC-4	5.79	6.49	4.52	0.7	–1.27	–1.97	–181.43
IC-5	4.92	5.56	5.62	0.64	0.7	0.06	109.38
IC-6	5.78	6.15	5.67	0.37	–0.11	–0.48	–29.73
IC-7	6.09	6.32	6.36	0.23	0.27	0.04	117.39
IC-8	5.1	5.68	4.92	0.58	–0.18	–0.76	–31.04
Mean scores	5.47	6.03	5.32	0.56	–0.15	–0.71	–26.79
Library as a place (LP)							
LP-1	5.1	6.44	5.47	1.34	0.37	–0.97	27.61
LP-2	5.23	6.64	4.1	1.41	–1.13	–2.54	–80.14
LP-3	5.77	6.02	6.17	0.25	0.4	0.15	16
LP-4	5.17	6.45	6	1.28	0.83	–0.45	64.84
LP-5	3.46	4.2	3.93	0.74	0.47	–0.27	63.51
Mean scores	4.95	5.95	5.14	1.00	0.19	–0.82	19
Overall	**5.52**	**6.12**	**5.67**	**0.59**	**0.15**	**–0.45**	**25.42**

Extent of Users' Acceptance of Service (ZoT: LibQUAL)

The ZoT is the difference between minimum expectations and desired expectations (Rehman 2012:4). It measures the extent to which customers are willing to accept a variation in service delivery. In most studies, perceived levels of service can be found within this zone. Any performance falling below the ZoT is unsatisfactory for users (Berry and Parasuraman 1991). In Table 2, column 5, the overall mean for the ZoT in LibQUAL is 0.59. The score for the ZoT in the AS dimension is 0.4; the same score for IC is 0.56, while the score for LP is 1. The scores show that customers are willing to accept a wider variation (1.0) in service quality in the LP dimension than in AS or IC.

The findings, therefore, indicate that African Court library customers have a very small margin for error in service delivery, but very high expectations (as evidenced by a desired mean of 6.12). According to Nadiri and Mayboudi (2010), the inherent nature of services makes it difficult to ensure consistent service delivery from all employees in the same organisation, and even by the same service employee from day to day. The findings are consistent with those of a study by Nadiri and Mayboudi (2010),

who established that users have a narrow ZoT with regard to the services provided by research libraries. They are also comparable to a study by Shoeb (2011) who studied the ZoT in a private university library in Bangladesh. The study also revealed that perceived services were lagging behind the desired services though the gaps were not much higher. Shoeb's study established that the overall scenario of the ZoT was inside the tolerable level by all users and only one attribute was problematic.

In Table 2, the perceived scores that fall outside the ZoT are the entire AS dimension, IC-3, IC-4, IC-6 to IC-8 and LP-2. It is important that perceived levels of service do not drop below the minimum level. If this were to happen, customers would become dissatisfied and probably cease using African Court library services. Should this happen, the African Court would have to consider closing the library and moving the resources to other functions of the African Court. Hence it can be stated that maintaining high-quality services in the perspectives of customers is key to its continued survival, especially, in view of the limited and ever-shrinking resources.

Extent to which Performance Exceeds Desired Expectations (SSG)

This section presents and discusses the SSG according to findings obtained through LibQUAL and SERVQUAL protocols. The study sought to measure the extent to which performance exceeds desired expectations, known as SSG. This was done using LibQUAL and SERVQUAL. It is defined as the difference between the *Perception* score (actual service delivered) and *Desire* score (Rehman 2012:4). It is a measure of the extent to which the library's performance exceeds the desired expectations of its users. The SSG is calculated by subtracting the desired score from the perceived score on each one of the 22 service quality items (i.e. the formula SSG = P – E). If the perception score of any service is equal or above the desired level, then that service is considered as exceptionally well rendered. On the other hand, perception scores below the desired level show that libraries are not meeting users' needs.

SSGs in LibQUAL

In Table 2, column 7, the SSG mean scores for the LibQUAL dimensions are as follows: AS (0.17), IC (–0.71) and LP (–0.82). Thus, only the AS dimension has a positive score while the IC and LP have negative sores. Table 3 shows the SSG in LibQUAL arranged from the highest to the lowest, in order to identify the positive and negative gaps.

Table 3: Service superiority gaps in LibQUAL

Service quality statement	Minimum mean score (M)	Desired mean score (D)	Perception mean score (P)	SSG (P-D)
AS-6	5.41	5.53	6.49	0.96
AS-4	5.63	5.78	6.63	0.85
IC-2	5.09	4.91	5.2	0.29
AS-5	6.54	6.89	7.16	0.27
AS-7	6.29	6.36	6.62	0.26
LP-3	5.77	6.02	6.17	0.15
AS-1	6.13	6.69	6.77	0.08
IC-5	4.92	5.56	5.62	0.06
IC-7	6.09	6.32	6.36	0.04
AS-8	5.87	6.29	6.31	0.02
AS-3	5.55	6.45	6.47	0.02
LP-5	3.46	4.2	3.93	–0.27
LP-4	5.17	6.45	6	–0.45
IC-6	5.78	6.15	5.67	–0.48
IC-8	5.1	5.68	4.92	–0.76
IC-1	5.24	6.25	5.44	–0.81
LP-1	5.1	6.44	5.47	–0.97
AS-9	5.93	6.38	5.38	–1
AS-2	5.48	6.01	4.56	–1.45
IC-4	5.79	6.49	4.52	–1.97
IC-3	5.75	6.9	4.82	–2.08
LP-2	5.23	6.64	4.1	–2.54

Table 3 shows that the number of quality statements with positive gaps and those with negative gaps are evenly matched. There are 11 quality statements with positive gaps and 11 with negative gaps. The highest SSG gaps in LibQUAL are realised in AS-6, AS-4, IC-2, AS-5 and AS-7. The majority of these are in the AS dimension. The lowest SSG gaps in LibQUAL are realised in LP-2, IC-3, IC-4, AS-2 AS-9 and LP-1. The majority of these are in the LP and IC dimensions. The quality statement with the largest positive SSG is AS-6 *Employees who deal with users in a caring fashion* while the one with the largest negative SSG is LP-2 *Quiet space for individual study.*

SSG is the difference between perception score (actual service delivered) and desire, thus SSG = P – D (Rehman 2012). It is an indicator of the extent to which the library's performance exceeds the desired expectations of its users. The SSG is calculated by subtracting the desired score from the perceived score on each one of the 22 service quality items. To get the overall SSG score of the library, the overall mean score of the users' desires is subtracted from the overall mean score of perceptions. The LibQUAL and SERVQUAL protocols are based on the basic assumption that if a negative SSG score is obtained, this would mean that the performance is below expectations, translating into a low service quality perception. If a positive score is obtained this would mean that the performance exceeds expectation, translating into high service quality (Awan, Azam and Asif 2008; Parasuraman et al. 1988; Somaratna et al. 2010:2). LibQUAL and SERVQUAL were therefore

developed based on the notion that to deliver high-quality service there should be no gap between the users' expectations and perceptions (Papanikolaou and Zygiaris 2012).

In Table 2, column 7**,** the overall average SSG for the library in LibQUAL is –0.45. The score is negative, an indicator that overall the services provided by the library are inferior compared to users' desired expectations. The negative superiority gap shows that the library is not meeting the expectations of its members (Hamzavi, Kazemi, Hossinifar, Hashemain and Khazaei 2014:32). Therefore, in line with the gap theory, since the respondents' expectations are higher than their perceptions, this is an indication that there is a service quality gap in the African Court library services (Lin, Sheu, Pai, Bair, Hung, Yeh and Chou 2009:5).

The findings are similar to those of a LibQUAL study by Mkhonta (2015) of the Information Resource Centre at the American Embassy in Swaziland, which also established a negative overall SSG of –0.14. Thus for both libraries, the services provided are inferior when compared to customers' desired expectations. They do not meet or exceed the desired expectations of their customers. Other similar LibQUAL studies by Naidu (2009) at Mangosuthu University of Technology, and Simba (2006) at Iringa University College of Tumaini University, also established wide gaps between user perceptions and expectation of service, indicating that the libraries are not meeting the expectations of their users.

The SSG mean scores for the LibQUAL dimensions are as follows: AS (0.17), IC (–0.71) and LP (–0.81). According to these scores, only the AS dimension has a positive score and thus exceeds the expectations of users. The dimensions of IC and LP have negative SSG scores, which means that they fall below the expectations of users.

These findings are confirmed by the perception scores in this study which reveal high scores for AS and low scores for IC and LP. The individual service quality statements that have the largest SSG are all in the AS dimension. These are AS-6, AS-4, AS-5 and AS-7. These statements exceed the expectations of users. The findings are consistent with a LibQUAL study by Hamzavi et al. (2014) at Kermanshah Medical University library that found positive SSG scores for AS and negative scores for IC and LP. The largest superiority gap in Hamzavi's study belonged to the LP dimension, indicating that the overall library space was far from meeting users' expectations. These findings are also similar to those of Mkhonta (2015) which reported the dimension with the lowest SSG as LP, followed by IC. In conformity with this study, both had negative SSG means. The findings are similar to those of LibQUAL studies in Nigeria by Opaleke (2002:100–105), and Ireland by McCaffrey and Breen (2016). Opaleke's study observed that most libraries in Nigeria operated below the recommended 6% of the institutionary budget. Hence it is not surprising that the study revealed inadequate physical facilities which may have led to adverse effects such as noise, dust, disturbances, mutilation and other damage to collections. Opaleke concluded that most libraries do not measure up to the expectations of their users, especially in the physical aspects of libraries.

In Table 3, it can be noted that the services are inferior in half of all the attributes because the SSG scores are negative. The service quality dimension with the most SSG scores is AS where seven out of nine attributes received positive SSG scores. The worst perceived service quality dimension is LP since four out of five attributes received negative SSG scores. The IC dimension also received negative scores except for two attributes relating to information skills (IC-2) and easy-to-use access tools (IC-6) that allow customers to find information on their own.

The service quality statements with the lowest SSGs are LP-2, IC-3, IC-4 and AS-2. It can be seen that these fall under the dimensions of LP and IC. Of particular interest is LP-2 (*Quiet space for individual activities*). This variable scored an SSG of –2.54, making it the worst performer in meeting user expectations. Users found the library environment noisy, especially due to conversations by clients and use of cellphones. These findings on individual service quality statements are consistent with those of Simba (2006:116) who established that the library performed poorly in the following service quality statements: electronic journals, photocopiers, interlibrary loans, electronic databases, a quiet library environment and a library web page with useful information. A study by Porat (2016) at Israeli academic libraries also identified high levels of noise at the libraries, which adversely affect the service quality.

SSGs in SERVQUAL

Table 4 shows the SSGs in SERVQUAL. Three dimensions have a positive SSG. These are *Assurance* (0.23), *Empathy* (0.39) and *Responsiveness* (0.01). Two dimensions have a negative SSG score. These are *Reliability* (–0.73) and *Tangibles* (–0.79).

Table 4: Service Superiority Gaps in SERVQUAL

ID	Service quality statement	Perception (performance) mean (P)	Expectation mean (E)	SSG (P-E)
EM-1	Library staff give users individual attention	5.35	5.08	0.27
RL-3	Library staff provide services as promised	5.4	5.15	0.25
EM-5	Library staff understand the specific needs of the users	5.2	5.06	0.14
RS-4	Library staff are never too busy to respond to users' questions	5.41	5.27	0.14
AS-3	Library staff are always courteous	5.33	5.24	0.09
RS-3	Library staff promptly serve the users	5.25	5.18	0.07
TA-2	Facilities are visually appealing (e.g. computer, audio-visual, shelves, tables, chairs)	5.21	5.15	0.06
AS-1	Behaviour of library staff instils confidence in users	5.22	5.17	0.05
AS-4	Library staff are knowledgeable to answer users' queries and questions	5.33	5.28	0.05
AS-2	Library users feel safe when transacting with the library	5.25	5.21	0.04
TA-4	Library staff are neat in appearance at all times	4.97	4.93	0.04
EM-4	Library staff have the users' best interests at heart	5.14	5.12	0.02
RS-1	Library staff are willing to help users	5.33	5.23	0.1
EM-3	Library staff give personal attention to the users	5.23	5.22	0.01
EM-2	The library has convenient opening and closing hours	4.89	4.94	–0.05
RL-5	The library has error-free records (e.g. users list, library database, accessions list)	4.93	5.09	–0.16
RL-1	The library staff show a sincere interest in solving users' problems	5.09	5.29	–0.2

RL-4	The library staff provide services at the promised time	5.34	5.54	–0.2
RS-2	The library staff keep users informed about when services will be performed	5.15	5.45	–0.3
RL-2	When the library staff promise to do something at a certain time, they do it	4.79	5.21	–0.42
TA-1	The equipment is modern and in good condition	4.79	5.21	–0.42
TA-3	Materials (e.g. brochures, statements or signs) associated	4.97	5.44	–0.47

There are 14 service statement items that have a positive score, and eight service quality statements with a negative score. Those with a positive mark indicate the service statements that meet or exceed the expectations of the respondents, hence higher service quality. The top-five positive gaps were realised in the following service statements:

1. Library staff give users individual attention (0.27)
2. Library staff provide services as promised (0.25)
3. Library staff understand the specific needs of the users (0.14)
4. Library staff are never too busy to respond to users' questions (0.14)
5. Library staff are always courteous (0.09)

Table 4 further shows that the following eight service quality statements have negative SSG gap scores:

1. Materials associated with services are visually appealing (–0.47).
2. Equipment is modern and in good condition (–0.42).
3. When the library staff promise to do something at a certain time, they do it (–0.42).
4. The library staff keep users informed of when services will be performed (–0.3).
5. The library staff provide services at the promised time (–0.02)
6. The library staff show a sincere interest in solving users' problems (–0.02).
7. The library has error-free records (–0.16).
8. The library has convenient opening hours (–0.05)

These findings provide an indication of service areas in which the African Court library needs to improve as these service areas have the largest negative scores, a clear indicator of low service quality. The overall expectation mean for users in SERVQUAL is 5.16, while the overall perception mean is 5.2. Calculating the SSG using the formula SSG = P – E (5.16 - 5.2) gives a result of –0.04, which means that the library is performing far below the expectations of its users. Therefore, in line with the gap theory, since the respondents' expectations are higher than their perceptions, this is an indication that there is a service quality gap in the library services (Lin et al. 2009:5). The library services generally fall short of user expectations. This result confirms the SSG score of –0.45 in the LibQUAL test.

Of the five SERVQUAL dimensions, three dimensions have a positive SSG while two dimensions have a negative SSG. Those with a positive SSG are *Assurance* (0.23), *Empathy* (0.39) and *Responsiveness* (0.01). This result indicates that the library has exceeded the expectations of its users in these dimensions. Those with a negative SSG are *Reliability* (–0.73) and *Tangibles* (–0.79). This means that the library has fallen short of user expectations in these dimensions. These findings exactly mirror those of a SERVQUAL study by Tan

and Foo (2009), at the Singapore Statutory Board Library, which also established positive SSG gaps (though not in the same order) in *Assurance, Empathy,* and *Responsiveness,* and negative gaps in *Reliability* and *Tangibles.*

Table 4 shows the findings of the service quality gap score for each service quality statement, arranged from the largest to the smallest in order to easily identify the positive gaps and negative gaps. The data from this table shows 14 service statement items that have a positive score, and eight service quality statements with a negative gap score.

These statements with a positive SSG score indicate that the service quality statements meet or exceed the expectations of the respondents, hence higher service quality. It is important for any library to ensure that it meets the users' expectations by providing a high-quality service. It can be seen that the majority of the quality statements with positive SSG scores come from the *Assurance* and *Responsiveness* dimensions. This is confirmed by the LibQUAL and SERVQUAL perceptions findings of this study that show users have high regard for the human aspects of the library. For the past six years there have also been intensive training programmes for library staff (and other staff) which give them an edge in service provision and attending to user needs. These are funded by the parent organisation, the African Union and by development partners such as the European Union, the German *Gesellschaft für Internationale Zusammenarbeit* (GIZ) and the African Capacity Building Foundation.

The study also reveals eight service quality statements with negative SSG gaps (Table 4). It is apparent that all these service quality statements with negative SSG scores come from two dimensions, *Reliability* and *Tangibles*. These findings are confirmed by the SERVQUAL perceptions test of this study that also determines that users have low perceptions of *Tangibles* and *Reliability* dimensions. Possible reasons for this are mentioned elsewhere in this study. They include cases of high noise levels in the library emanating from users and cell phones, and various disturbances, such as the door leading to the documentation unit, and frequent closures for recruitment interviews. In addition, there is no space for group activities and use of audio-visual resources. The facilities housing the library are also temporary and were not constructed for this purpose.

The findings are similar to those of a study by Kanguru (2014) that evaluated the quality of library services at the Aga Khan University (AKU) library in Kenya. The findings of the study established that the expectations of AKU library users are higher than their perceptions. Kanguru's findings also established that there are service quality gaps in a number of library services offered by the AKU library. This is demonstrated through the gap analysis between the library users' perceptions and the users' expectations of the AKU library. The studies, however, differ in that Kanguru's study has more service quality statements with a negative score than those with a positive gap score. This means that there are more service qualities at AKU library that do not meet the expectations of AKU library users. In contrast, the current study has more service quality statements with a positive gap score than those with a negative score.

The findings in the present study are consistent with those of a SERVQUAL study by Tan and Foo (2009), at the Singapore Statutory Board Library which not only established that user expectations exceed perceptions, but it also had overall expectation and perception scores close to those of this study. The findings also corroborate those of a study by Asogwa (2014), which used SERVQUAL to evaluate the service quality of academic libraries in developing countries. Asogwa's study revealed that overall, there is a significant difference between the perceptions and expectations of library users and that academic libraries do not satisfy users' expectations. In Asogwa's study (2014), factors such as a lack of modern facilities, poor funding and weak e-leadership quality were found to negatively affect the quality of library services**.** Greater efforts should be channelled in closing the gaps between the perceptions and the expectations of library users.

The findings are inconsistent with those of other researchers, such as Filiz (2007) in university libraries in Turkey whose findings of gap analysis indicated that the quality of service does not fall short of the users' expectations; users are generally satisfied with the service providers. The libraries in Filiz's study had consistent and frequent service quality studies over the years, which provide opportunities to identify and address shortcomings in their services, while this

is the first service quality study for the African Court library.

Extent to which the library is Meeting Minimum Expectations (SAG: LibQUAL)

The difference between the perception score (actual service delivered) and minimally acceptable score is known as the service adequacy gap (SAG). It is calculated by subtracting the minimum mean score from the perceived mean score on the 22 statements, thus its formula is SAG = P – M. It points out the extent to which the library is meeting the minimum expectations of users. A negative SAG score indicates that the users' perceived level of service quality is below their minimum level of service and libraries can use this to identify areas needing improvement (Jones and Kayongo 2008:495–496). A positive score indicates that the users' perceived level of service quality is above their minimum level of expectations. The higher the service adequacy score, the better the library's performance. In general, the perceived scores tend to fall within the ZoT; in other words, they tend to be lower than the desired scores, and higher than the minimum scores (Jones and Kayongo 2008:495–496). It is within the ZoT that the perceived scores should drift if respondents view service as adequate.

In Table 2 column 6, the overall service adequacy gap in LibQUAL is 0.15. The SAG gap for AS is 0.57, the same gap for IC is –0.15 while the gap for LP is 0.19. Thus the SAG for IC is the only one with a negative score.

As can be seen in Table 2, column 6, the overall SAG for the African Court library is 0.15. The gap is positive and above zero, which means that the African Court library is meeting the customers' minimum expectations, but barely. This means that there are areas in which the library is not meeting the minimum expectations of users. The implication of this score is that the African Court library needs to ensure that its services do not fall below the customers' minimum level of expectation. The library can do this by working to ensure that this figure stays positive and that it does not drop to a negative. These findings are similar to those of a LibQUAL study by Mkhonta (2015) at the Information Resource Centre of the US embassy in Mbabane, Swaziland, which also established a positive overall SAG (0.66). Thus for both libraries, the services provided are meeting the minimum expectations of users.

In Table 2, column 6, the mean SAG score for AS is 0.57, while that of IC is –0.15. The mean SAG for LP is 0.19. This shows that the library is meeting the minimum expectations in AS, but barely meeting them in LP. However, the library is falling below minimum expectations in IC, and therefore is not meeting the minimum expectations of users.

This finding has been reflected in the perceptions test where the IC dimension scored far below the AS dimension, although slightly higher than the LP dimension. A possible explanation for this is that the collection is largely made up of legal resources while the great majority of the users are not lawyers. The collection is also largely made up of items in French and English, which disadvantages users who speak other African languages, especially Arabic, Portuguese and the official language of the host nation, Swahili. Over the last two years, the number of new books in the library has dwindled due to budgetary reductions by the parent body. This has reduced the quality of the collection in the eyes of the legal officers.

It can also be seen that overall, the SAG scores are negative in eight out of 22 statements. This is an indicator that the library is falling below the minimum expectations in these statements. Of the three LibQUAL dimensions, LP has four positive service quality statements out of five, AS has seven out of nine, and IC has four out of eight.

The findings are consistent with those of a study by Rehman (2012) on public and private sector university libraries using LibQUAL. Like the present study, Rehman's study revealed that private sector university libraries are generally meeting the minimum requirements of their users, except for the IC dimension. By contrast, in Mkhonta's study (2015) all groups had positive SAGs, which means that the US government has invested resources into meeting the minimum expectations of its library users. The African Court library should emulate this.

The African Court library findings on the SAG are slightly inconsistent with those of LibQUAL studies by Kachoka and Hoskins (2009), Pretorius (2011) and Rohman (2016), all of which indicated that all SAG gaps are negative, meaning that the libraries are not meeting the minimum expectations of users. According to the study, the cause of this is

high minimum expectations by users, which also happens to be the case with the African Court library. The findings at the African Court library are also consistent with those of Rohman's study (2016) which found that users are least satisfied with the physical aspects while they rate the human aspects of the service as the best dimension.

Relative Strengths and Weaknesses of Library Service Quality (D-M scores in LibQUAL)

According to Dennis and Bower (2007:10), SAG, SSG and ZoT scores alone do not reflect the full picture of customers' assessment of library service quality. They therefore suggest an additional measure, namely the D-M score. The D-M score is a standardised measure used to analyse data and present information in a clearer manner (Dennis and Bower 2007:11). It further determines service quality by examining the multiple scores provided by customers from a different angle.

The D-M score lies in the ZoT and is usually between 0 and 100. Perceived scores that fall outside the ZoT will result in scores that have D-M values which are either less than 0 or more than 100. The higher the D-M score, the better the perception of service quality. Table 2, column 8 shows the D-M scores for the library services. The overall mean for the D-M score in LibQUAL is 25. The mean for the D-M score in the AS dimension is 142.25. The same score for IC is –26.79, while the mean score for IC is 19. The scores show that the library exceeds expectations in the dimension of AS but performs below expectations in the dimensions of IC and LP. From the D-M score interpretation standard in Table 1, the library's D-M score of 25.42 lies between 15 and 39, which implies that the quality of the library service is problematic and requires improvement.

Conclusion

The study sought to establish the service quality of library services by investigating the gaps between various service quality variables in the LibQUAL and SERVQUAL models. To calculate the level of service quality, the study measured SAG, SSG, ZoT and D-M scores. These findings provide an indication of service areas in which the African Court library needs to improve as these service areas have the largest negative scores, which is a clear indicator of low service quality.

The overall mean score for SSG is negative, which indicates that library services fall short of user expectations in some aspects of service. The SSG aspects with a positive mean score are the human-related aspects of *Assurance*, *Empathy* and *Responsiveness* in SERVQUAL and *Affect* of service in LibQUAL. This indicates that the library exceeds the expectations of its users in the human dimensions of service quality but does not meet expectations in aspects of information collection and physical attributes of the library. On the other hand, those with a negative score are in the information-collection and physical aspects of the library, which means that the library service is falling below par in these service areas. Unlike in the SSG, the overall SAG result is positive and above zero. This is an indicator that the African Court library is meeting the customers' minimum expectations. But further scrutiny of the SAG results show a similar pattern to those of the SSG, that the library is meeting users' minimum expectations in the human aspects of the library (*Assurance*, *Empathy* and *Responsiveness* in SERVQUAL and AS dimension in LibQUAL) but falling short in the aspects of information collection and physical state of the library.

The D-M score results follow a similar pattern to those of the SAG and the SSG. The scores also show that the library exceeds expectations in the dimension of AS but performs below expectations in the dimensions of IC and LP. This is confirmed by the overall D-M score of 25, which indicates that there are aspects of the library that require special improvement. The library meets the minimum acceptable level of service but is very far from meeting the users' desired level of service.

The ZoT scores show that the scores that fall outside the ZoT are in the service quality statements of the entire AS dimension (by exceeding expectations) and IC-3, IC-4, IC-6 to IC-8 and LP-2 (by falling below expectations). These are scores that are either above 100 or below zero.

It can therefore be concluded that while the library service quality exceeds expectations in the human-related aspects of service quality, it needs to improve on aspects of library collection and physical state of the library. There are service quality gaps

that should be addressed in order to improve service quality and increase user satisfaction.

Recommendations

The gaps study has shown that there are aspects of library services that need improvement. According to the results, there are some negative gaps in the information collection and physical aspects of the library. The library needs to take action to improve these areas. For information collection, there is a need to diversify the collection to include library resources in other subject areas, other than law. The collection is also largely in English and French. The library needs to include resources in other languages of the African Union such as Portuguese, Arabic and Swahili. Regarding the physical aspects of the library, issues especially concerning lighting, equipment, noise levels, ventilation and congestion in the library need to be addressed. Library users are very satisfied with the human aspects of the library services; the library should either keep them at the same levels or improve on them. It is therefore recommended that the library should ensure that human aspects of the library remain at the same high levels of service quality, but allocates resources to remedy the information-collection, physical, space and equipment aspects of the library.

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Gender and Educational Differences in the Agricultural Information Needs of Plantain Farmers in Ikenne Local Government Area of Ogun State, Nigeria

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Abstract

One way to address challenges faced by plantain farmers is by identifying their agricultural information needs. This study investigated gender and educational differences in the agricultural information needs of plantain farmers in Ikenne LGA of Ogun State, Nigeria. It found that the agricultural information needs of plantain farmers statistically significantly differed according to gender and education. Agricultural information needs differed according to stages such as preparation, planting, post-planting, harvesting, post-harvesting. Agricultural information was needed most in the preparation stage (mean=2.71). Plantain farmers' information needs ranged from good soil selection (mean=2.86) through to marketing (mean=2.20) of the produce. The study recommended that any information provided by the extension worker in a particular community should be based on the identified information needs of the farmers within that community.

Keywords: Gender, Education, Information Needs, Plantain Farmers, Farm Stages,

Introduction

Plantain farmers' poor knowledge and inability to adopt new agricultural technologies affect their productivity (Elum and Tigiri, 2018). Therefore, agricultural information is needed to bring about a change in the way plantain farming is done as well as in other dimensions of plantain production. The inadequate knowledge of improved practices contributes to low plantain production in Nigeria (Akinyemi *et al* 2010). Providing agricultural information makes technical know-how accessible to the rural farmers as well as increases their knowledge about production, processing, transportation and other marketing dimensions of agriculture (Okwu and Iorkaa, 2011). Provision of relevant agricultural information should start with the analysis of the farmers' agricultural information needs. This is because the information needs of plantain farmers are based on their specific farming activities. Their agricultural information needs encompass innovations, advice, techniques, skills, technologies and regulations on environmentally safe practices.

The specific agricultural information needs of farmers must be considered in order to overcome their decision-making constraints. One way to overcome decision-making constraints among farmers is to provide them with relevant agricultural information that could improve their knowledge (FAO, 2015). Relevant agricultural information are often provided to farmers especially the rural farmers through formal or informal education. Plantain farmers need formal or informal education to understand any agricultural information they receive from extension services so as to make decisions whether or not it can be utilised. Agricultural information received from extension services should impact both gender since the male and female plantain farmers face similar decision-making constraints. Gender of the farmer is considered in division of

labour, planning of crops, accessing of credit and extension services as well as productivity. The productive capacity of female farmers in the Nigerian agricultural sector is placed lower than the male even though they make up three quarters of the workforce (FMARD, 2016; Olakojo, 2017). Looking at the critical role that agricultural information plays in ensuring productivity, one would wonder if there is any difference in the agricultural information needs of male and female farmers. One would also wonder if there is any difference in the agricultural information needs is attributable to the education of plantain farmers.

Statement of Problem

Plantain Farming in Nigeria is challenging because of an outdated land tenure system that constrains access to land (about 1.8 ha/farming household), very low level of irrigation development (less than 1 percent of cropped land under irrigation), inadequate storage facilities and poor access to market (*FAO*, 2017). The plantain farmers face challenges like unfavorable weather conditions, pests, diseases, technological advancement, infrastructure, bureaucracy, exploitation by middlemen and market conditions that are beyond their control and a lack of financial capacity that limits them to a subsistence level of production. The persistence of these challenges could be attributed to the inability of extension services to meet the agricultural information needs of the plantain farmers. Not only is this situation complicated by differences in the agricultural information needs of both the male and female gender but also the educational background of plantain farmers. The rationale for focusing on gender and education among other demographic characteristics like age, family size, marital status, is attributable to their research and development significance in meeting the agricultural needs of farmers, world over. Research on demographic characteristics of farmers has been conducted in different parts of the world but their results cannot be generalised. There exists a potential gap in adopting the results of these researches in the context of the Nigerian plantain farmers. Addressing this research gap will have practical benefits as well as inform future policy objectives in the provision of extension services to farmers in the rural communities. It would contribute empirical evidence on the gender and educational differences in agricultural information needs of farmers in rural communities.

The Aim and Objectives of the Study

The aim of the study was to find out if there were gender and educational differences in the agricultural information needs of plantain farmers in Ikenne Local Government Area of Ogun state, Nigeria. The objectives were to:

1. describe some demographic characteristics of the plantain farmers
2. determine the agricultural information needs at the stages of planting preparation, planting, post-planting, harvesting and post-harvesting

Research Questions

The research questions asked include

1. What are the demographic characteristics of plantain farmers?
2. What agricultural information do plantain farmers need at the stages of planting preparation, planting, post-planting, harvesting and post harvesting stage?

Research Hypothesis

H_0 There are no significant gender differences in the agricultural information needs of plantain farmers

H_0 There are no significant educational differences in the agricultural information needs of plantain farmers

Literature Review

Plantain products have remained one of the few food products driving the Nigerian economy in the last few years. It is important in the diet of many Nigerian families (Okoruwa, Sowunmi, Ogundele and Omigie, 2014) and serves as a handy food in the kitchen as well as a raw material for many popular delicacies and snacks (Aina, Ajiola, Bappah, Ibrahim and Musa, 2012). Plantain farming has been a significant economic activity for income generation for both large

scale and small scale farmers (Idumah et al, 2016). It is common among people living in rural communities. Plantations of plantain offer lucrative farm products that provide a viable prospect for the socio-economic development of rural communities. Plantain is produced in large quantities in the rural communities of Edo, Delta, Ogun and Ondo states. Other producing states are Rivers State, Cross River, Imo, Anambra, Lagos, Kwara, Benue, Plateau, Kogi, Abia and Enugu (Map of world, 2016). Plantain farming has a strong grip on the Nation's economy. Nigeria is ranked among the 20 important plantain producing and consuming countries in the world (FAO, 2017). The annual production of plantain in Nigeria surpasses 2.5 million metric tons (Ayanwale, Fatunbi and Ojo, 2018).

Since plantain farming has such a strong grip on the Nation's economy; it deserves to be supported with relevant information to sustain its level of production. Inadequate provision of information through extension services reduces the production and marketing of plantain (Ayanwale et al., 2016). Information has long gained recognition as the fifth factor of production and its value in ensuring the sustenance of the present level of agricultural productivity in Nigeria cannot be overemphasised. Information consists of processed data that has meaning to the user, and is of value for decision making. The value of a piece of information comes from the potential gains or losses derived from its use in a particular decision making process. This is particularly true of an information-dependent sector like the agriculture. Agricultural information is a vital resource used by farmers to make the best use of other resources at their disposal for agricultural production. The same way a physician cannot make the right prescription except the right diagnosis is first and foremost made, the agricultural information expert cannot provide the relevant information to the farmer if certain issues are not straightened out. One of such issues is identifying the required information or information need.

The information need is often understood as an individual's or a group's desire to locate and obtain information to satisfy a conscious or unconscious need. The best form of information to provide to a farmer is not the general information but need-based information. Studies have shown that farmers' information needs include quantity, timing of inputs and activities such as appropriate soil type, improved seedlings for maximum yield, credit availability, quantity of fertilizer, application timing, disease awareness, disease prevention and control, information relevant to harvesting stage, storage methods and marketing information. The female farmers have high agricultural information needs especially in areas of insecticide, fertilizer, improved variety of crops and farm implements (Okwu and Umoru, 2009). Most farmers need agricultural information on their product markets, government schemes like subsidies, credits, transportation, fertilizer and seed availability as well as new crop innovations (Bachhav, 2012). In other words, finding out the exact information a particular farmer needs at a material time is the starting point in the process of providing relevant information. Plantain farming, like most other crop planting has seasons and stages. It follows a cycle and the information that will be relevant at one stage of the cycle might not be immediately relevant at the next stage.

Agricultural information needs of plantain farmers cover various stages such as the planting preparation, planting, post-planting, harvesting and post harvesting stages. The agricultural information needs of plantain farmers at the planting preparation stage include weather/climate information. Weather, climate change and agriculture are inextricably linked. The effect of climate change is greatly felt in the plantain production because these crops fare differently under different weather conditions. It is globally acknowledged that severe changes in climate pose serious environmental threats (Samuel, Oyedeji and Akerele, 2017). The agricultural production system in Nigeria is predominantly rain-fed. The rain-fed system is vulnerable to seasonal changes which affects the output of farmers who depend on this system for agricultural production. There are some crops that thrive when there is plenty rainfall. An example is rice. There are others that do not do so well when rainfall is much, beans is one of such. Hence, extreme rainfall patterns and/or variability becomes a critical production risk (Olayide, Tetteh and Popoola, 2016). The climatic factors that can influence the growth and yield of crops include temperature, rainfall, light, relative humidity and wind (Enete, 2010; 2014). Providing timely weather/ climate information to farmers will go a long way in assisting them in making informed decisions that will

in turn impact positively on their financial returns. Based on such information, the farmer will be able to make a decision to channel his efforts and finances towards such crops that will do better under a predicted weather. Climate prediction information therefore becomes useful for farmers in their decision regarding which crops to plant within a particular growing season. Climate information includes information on drought, heat, air waves, rainfall etc.

Once the farmer decides on what crop he wants to plant, the next step is gathering information for soil selection. Soil is that unconsolidated mineral or organic materials on the earth surface on which plants are grown. It is a complex body composed of five major components: mineral matter, organic matters, water, air or gases and organisms (FAO, 2015). It is unarguably a key element in agriculture without which, we cannot grow plants. Scholars like Bareja (2011) argue that the information on soil type and site selection is very vital to the performance of farming activity. Soil selection involves using information to choose the right geographical location that matches the soil requirements of a particular crop. The soil requirement of a particular crop includes such specific characteristics as soil type, depth of the soil, organic matter content, soil texture, and soil fertility level. Other land features such as elevation, slop and terrain are also part of the factors a farmer needs to consider in his soil selection. In addition to soil selection, the site/location also needs to be given serious consideration. In choosing the plantain farm site, access to supplies, equipment, skilled labour and market are some of the key factors to be considered. Possible occurrence of flood, drought, and volcanic eruption should also form part of the considerations when choosing a plantain farm site.

In addition, plantain farmers need information on sucker selection. Sucker selection is a very important aspect of plantain farming, because choosing the right plantain sucker is critical to getting the desired outcomes in terms of harvest (Okwu and Umoru, 2009). Unfortunately, many plantain farmers do not have the information needed to select good suckers. Many of them are unaware that the quality of the suckers you plant will determine the harvest you will get at the end of the day. Many are unaware that selecting plantain suckers from a disease infested field can result in poor quality of harvested crops. This is where the role of the agriculture information expert comes in. Therefore, timely disseminating relevant agricultural information to the farmers will help them avoid the risk associated with problematic or disease infested plantain suckers. Growing strong and health crops requires good quality plantain suckers that can either be bought from trusted sources or produced by the farmer. The selected plantain suckers must contain living, healthy tissue in order to grow.

Selection of good quality plantain suckers can obviously be used to improve the quality of crop (Bachhav, 2012). There are several diseases that are transmitted via the plantain suckers. If plantain suckers from an infested field are used to grow the next crop, these will immediately cause serious problems. Sucker selection should thus start by obtaining plantain suckers from healthy plants. The small, shriveled plantain suckers contain less nutrition and should be removed to ensure the growth of stronger and healthier plantain suckers. Although sucker selection is mainly aimed at obtaining healthier plants, it can also be used to maintain and improve the quality of the crop variety. Some plants may have characteristics that are more suitable than those of other plants. Farmers can observe these characteristics during the growing season and mark the preferred plants with a ribbon or with a stick. At the harvest, the suckers of these plants can be reserved for growing in the next season. In this way, the farmer slowly improves the quality of his plant variety, and by extension, the overall productivity. The selection of the plantain suckers may be based on characteristics such as the size of the plant, color or size of fruits, number of stocks per plant among others. Selection can also aim at keeping suckers of plants that suffered less attacks by insects or diseases.

Information on available agricultural credit facilities is very critical to rural farmers especially in Nigeria because it helps to guarantee and sustain agricultural growth. Agricultural credit facilities could be funds borrowed by individuals, farm business and others for use in producing, storing, processing and marketing crops and livestock products. This includes all loans and credit advances granted to borrowers to finance and service production activities relating to agriculture, fisheries and forestry. The credit could

take the form of loans, where a lender (banks, credit union and farm credit schemes) gives money or property to a borrower and the borrower agrees to return the property or repay the money, usually with interest at some future time. Lack of agricultural credit is seen as a major militating factor against agricultural production and development in Nigeria (Akinbode, 2013). Most of the Nigerian farmers, both subsistent and commercial farmers, rely on external sources of finance to be able to meet the requirements in terms of the cost of labour. The federal government realising this need has established some credit schemes through collaboration between the Central Bank of Nigeria (CBN) and the Federal Ministry of Agriculture and Rural Development (FMAandRD). These include Agricultural Credit Guarantee Scheme (ACGS) and Agricultural Credit Support Scheme (ACSS). In 2016, the World Bank approved a $200million credit to support the Nigerian government in her efforts to enhance the agricultural productivity of small and medium scale farmers in the country (World Bank, 2017). Approximately 60,000 individuals were to benefit from this credit, 35% of whom were expected to be women. Unfortunately, not many of the farmers were aware of this credit facility (Ayanwale, Oluwole and Ojo, 2016). A good number of them did not know whether or not they qualified to apply or how to go about applying for it. These farmers need to know that the easiest way to access these credit facilities is through cooperative societies. They can easily gain information from cooperative societies on specific details such as condition for accessing, maximum amount that can be accessed, interest rate and payback period of the credit facility.

At the post-planting stage, plantain farmers need information on fertilizer. Fertilizer, from the perspective of agriculture, may be described as the artificial soil nutrients used by farmers to enhance maximum agricultural yields. Fertilizer helps restore loosed soil nutrients. Scholars like Oso and Ayodele (2014) argued that farmers were aware of the benefits of the application of fertilizer in causing high yield and improving crops. They pointed out that one constraint to the application of fertilizer was attributable to its availability when needed. To this end, it is important that plantain farmers get information on availability of fertilizer, the precise location to get it, how they can apply for it and the cost per bag or ton as the case may be. Also, information on how to apply the fertilizer, the quantity per acre as well as when to apply it would all be helpful to the plantain farmers.

Nigerian plantain farmers also need information on disease prevention and control. A good number of plantain farmers have no idea on how to prevent or control diseases in their farms. The few that have heard about the use of disinfectants may not know much about dilution rate. Crops suffer from diseases that farmers sometimes find difficult to cope with. Control of crop diseases begin with correct diagnosis of the problem. Disease outbreaks can cause significant economic damage to farms and crops. Thus, the plantain farmer has a duty to prevent crops from getting infested with disease, and should they get infested, it is his/her duty also to take measures to control the spread of such diseases. The plantain farmers need information on cultural methods of crop disease control like sanitation, crop rotation, host eradication and improvement of crop environment.

Another stage during which the plantain farmers need information is during harvesting. Harvesting refers to the act of removing a crop from where it was growing and moving it to a more secured location for processing, consumption or storage. Harvest losses have a number of causes such as rough handling, harvesting at maturity, lack of processing, contamination, high temperature and humidity (Adeniji, Tenkouano, Ezurike, Ariyo and Vroh-Bi, 2010; Akinyemi, Aiyelagbe and Aykeampong, 2010). Farmers need information on harvesting methods and techniques. Ayanwale, Fatunbi and Ojo (2016) suggested that plantain growers associations should be equipped with adequate information on agronomical practices that would reduce loss using the mass media. Many farmers have access to radio through aired programmes on modern agronomical practices would help plantain farmers know exactly when to harvest their plantain to prevent quick ripening and reduce losses. In addition, disseminating information to plantain farmers using mass media would ensure proper handling thus reducing losses. Furthermore, innovative techniques of harvesting and technology available for harvesting are key areas of information need.

The gap in plantain farmers' information needs result in losses when poorly addressed at post-harvest stage. Reduction in post-harvest loss can be achieved through the identification and provision of the right information to farmers. Farmers' information needs regarding post-harvest in plantain farming revolves

round timely harvesting, proper handling, processing options, storage facilities and transportation. At this stage, product storage information offers the opportunity to reduce food losses and increase farmers' income. Plantain farmers need information on how best to store their farm produce in a way that loss will be minimised. Post-harvest losses for plantains have a number of causes including rough handling, harvesting at maturity just before the fruit ripens, lack of processing options, contamination from spoiled fruits and inadequate storage and transportation (Adeniji et al., 2010). Rough handling and transportation often cause splitting, scuffing and other types of damage to plantain. Also, high temperature and humidity shorten the shell life of plantain leading to increased rot and waste (Akinyemi et al, 2010).

At the post-harvest stage, effective product marketing information is also needed by the plantain farmers. At this stage, farmers are very passionate about the sale of their farm produce. This is because after harvesting, the next thing on the plantain farmer's mind is how to sell his/her produce in order to improve his quality of life and that of his family. Therefore, information on areas/places where the demand/price for plantain farm product is high would be highly valued. In addition to information on demand, plantain farmers also need information on transportation to prospective markets. Rural plantain farmers do not have direct market access or direct participation. Their marketing options are primarily limited to sale for local consumption (Akinyemi et al., 2010). They face an absence of large scale collectors putting them at a disadvantage. There are many intermediaries in the marketing process of plantain in Nigeria (Adeoye et al, 2013). Women play a significant role in marketing of plantain, regulating the quantity and price as well as permitting of new entrants to the sale (Dzomeku et al 2011).

Methodology

The study used a cross-sectional survey research design. The study population was drawn from the OGADEP list of farmers in Ikenne local government area of Ogun State. The study sample was selected in four stages. At the first stage, cluster sampling was used to group the farmers according to the major crops cultivated. Purposive sampling was used in the second stage to select plantain because it was a common cultivated crop among the farmers. Plantain farming appeared attractive to the farmers because it can be cultivated along with other crops and requires relatively low inputs like fertilizer and labour. At the third stage, three rural communities; Ilishan, Irolu and Ijesha were purposely selected because these were notable plantain producing communities. At the fourth stage, a purposive sample of 250 plantain farmers were selected from OGADEP list of farmers in these communities. These plantain farmers were identified with the assistance of extension agents and key informant members. They received informal training, and regular context specific information from extension agents. Unstructured interviews with 18 participants and a questionnaire were used to collect data from the sample between 2018 and 2019. The return rate was 99.2%. Data collected was coded and analysed with the aid of the IBM Statistical Product and Service Solution Version 21 to generate descriptive and inferential statistics. Descriptive statistics such as frequency count and percentage were used to present findings on demographics and level of agricultural information needs. Inferential statistics from the independent samples Mann-Whitney U and Kruskal-Wallis tests were used to present the gender and educational differences in the agricultural information needs of plantain farmers.

Findings

Demographic Characteristics of the Plantain Farmers

This research question examines the demographic characteristics of the responding plantain farmers. Table 1 presents demographic characteristics of the responding plantain farmers in Ilishan, Irolun and Ijesha communities in Ikenne LGA of Ogun State, Nigeria. It shows that 50% of the respondents were male and 50% were female. About 27.6% of the respondents were below the age of 30 years. This implies that these respondents were within the youthful age. Majority of the respondents had formal education as 60.8% of them attained primary and secondary educational level while 26.4% attained the tertiary education. The table also shows that many plantain farmers in the communities operated at a small scale. Only 5.6% of the plantain farmers cultivated above nine hectares of farmland.

Table 1: Demographic characteristics of respondents

Classification		Frequency	Percentage
Gender	Male	131	52.4
	Female	119	47.6
Age	30 and below	69	27.6
	31-40	60	24
	41-50	57	22.8
	51+	64	25.6
Educational background and level	Primary School	52	18
	Secondary School	60	24
	Technical Education	42	19.6
	Tertiary Education	66	26.4
	No Education	30	12
Size of farm (hectares)	Less than one	72	28.8
	One to three	68	27.2
	Three to six	55	22
	Six to nine	41	16.4
	Above nine	14	5.6

Plantain Farmers' Agricultural Information Needs at the Stages of Planting Preparation, Planting, Post-Planting, Harvesting and Post Harvesting Stage

This question attempts to identify various agricultural information needs of the plantain farmers at the planting preparation, planting, post-planting, harvesting and post-harvesting stages.

Table 2: **Agricultural information needs of plantain farmers at various stages**

Stages	Agricultural information needs	Mean	Mean
Preparation	Good soil for planting	2.86	2.71
	Farm credit facilities	2.6	
	Good sucker plants	2.67	
Planting	Sucker treatment	2.4	2.40
	Timely weather/climate	2.41	
	Planting depth/spacing	2.44	
Post-planting	Fertilizer application	2.76	2.67
	Weeding	2.38	
	Disease and pest control	2.32	
Harvesting	Harvest	2.33	2.35
	Preserve products	2.32	
	Store products	2.4	
Post-harvesting	Effective marketing	2.2	2.70
	Transportation	3.02	
	Product pricing	2.86	

Table 2 shows that some of the specific agricultural information needs of plantain farmers at the planting preparation stage includes information on good soil for planting (mean=2.86), farm credit facilities (mean=2.60) and good sucker plants (mean=2.67). At the planting stage, the specific agricultural information needs of farmers include information on sucker treatment (mean=2.40), timely weather or climate (mean=2.41) and planting depth/spacing (mean=2.44). For the post-planting stage, the specific agricultural information needs of plantain farmers were fertilizer application (mean=2.76), weeding (mean=2.38) and disease and pest control (mean=2.87). The table also shows that at the harvesting stage, the specific agricultural information needs of plantain farmers were harvest methods (mean=2.33), preservation of products (mean=2.32) and storage of products (mean=2.4). And at the post-harvesting stage the specific agricultural information needs of plantain farmers were effective marketing (mean=2.20), transportation (mean=3.02) and product pricing (mean=2.86). The plantain farmers had their highest agricultural information need at the preparation stage with a mean score of 2.71. The planting, post-planting and harvesting stages had means scores of 2.40, 2.67 and 2.35 respectively. The post-harvesting stage is the second highest stage of agricultural information need with a mean score of 2.7.

H_0 There are no significant gender differences in the agricultural information needs of plantain farmers

Table 3: Gender distribution of agricultural information needs of plantain farmers

Agricultural information needs	Mean rank		X^2	P Value
	Male	Female	Value	
Storage	184.11	60.97	116.000	0.000
Planting depth and spacing	183.72	61.41	168.000	0.000
Marketing	183.34	61.82	217.000	0.000
Sucker treatment	183.57	61.57	187.000	0.000
Harvest	183.18	62.00	238.000	0.000
Climate/ weather	183.07	62.13	253.000	0.000
Good sucker plants	181.52	63.83	456.000	0.000
Soil for planting	180.14	65.35	636.500	0.000
Pricing	180.14	65.35	636.500	0.000
Fertilizer application	179.92	65.59	665.000	0.000
Credit facilities	179.05	66.55	780.000	0.000
Transportation	178.11	67.58	902.000	0.000
Weeding	178.30	67.37	877.500	0.000
Disease and pest control	175.92	69.99	1,189.000	0.000
Preservation	174.98	71.03	1,312.000	0.000

Table 3 is the Mann-Whitney U test showing that there are gender differences in the distribution of agricultural information needs of plantain farmers. Generally, the agricultural information needs were statistically significantly higher among the male than the female plantain farmers as indicated in the mean ranks. The agricultural information needs on how to store plantain had the highest rank mean score, X^2 (1) = 116.000, p=0.000, with a rank mean score of 184.11 and 60.97 for male and female plantain

farmers respectively. This rank was followed by the agricultural information needs on planting depth and spacing and marketing. On the other hand, preservation was the least ranked agricultural information needed, $X^2(1) = 1, 1312.000, p=0.000$, with rank mean score of 174.98 and 71.03 for male and female plantain farmers respectively. These results imply that there is an overall significant difference in the agricultural information needs of male and female plantain farmers as the P-values are lower than the alpha value of 0.05. Therefore, the hypothesis that there are no significant gender differences in the agricultural information needs of plantain farmers is rejected.

H_0 There are no significant educational differences in the agricultural information needs of plantain farmers.

Table 4: Educational distribution of agricultural information needs of plantain farmers

Agricultural information needs	Mean Ranks					X^2 Value	P Value
	Primary	Secondary	Technical	Tertiary	No education		
Sucker treatment	43.00	153.00	94.73	217.09	43.00	238.543	0.000
Climate/ weather	39.89	156.45	102.00	213.41	37.00	237.062	0.000
Disease and pest control	53.50	138.03	123.44	214.00	17.10	235.413	0.000
Credit facilities	39.00	143.04	115.87	215.00	39.00	234.659	0.000
Harvest	46.00	154.00	91.80	214.95	46.00	229.474	0.000
Storage	54.00	154.38	80.38	214.00	54.00	227.839	0.000
Planting depth and spacing	51.00	154.78	85.83	213.00	51.00	225.209	0.000
Marketing	53.00	153.50	82.08	214.67	53.00	223.899	0.000
Soil for planting	50.50	143.50	96.05	216.23	50.50	223.572	0.000
Pricing	50.50	143.50	96.05	216.23	50.50	223.572	0.000
Transportation	43.00	153.00	118.00	205.50	30.50	223.480	0.000
Fertilizer application	60.50	145.00	101.89	214.32	27.17	221.574	0.000
Good sucker plants	41.00	161.38	105.17	204.00	41.00	221.140	0.000
Weeding	61.57	148.32	100.50	211.45	27.50	212.082	0.000
Preservation	63.56	138.00	108.00	213.68	28.00	210.672	0.000

Table 4 is the result of a Kruskal-Wallis H test showing the educational differences in the distribution of agricultural information needs of plantain farmers. It shows that there were statistically significant educational differences in the distribution of agricultural information needs of plantain farmers with the P-values lower than the alpha value of 0.05. Pairwise comparison show statistical significant differences were found between the agricultural information needs of plantain farmers having primary and no education (p=1.000); technical and secondary (p=.404) on credit facilities; primary and no education (p=1.000) on good soil; primary and no education (p=1.000) on good sucker; primary and no education (p=1.000) on climate/ weather; primary and no education (p=1.000), primary and technical (p=.135), none and technical (p=.278) on planting depth and spacing; none and primary (p=.247), technical and secondary (p=1.000) on disease and pest control; primary and no education (p=1.000) on harvest; primary and no education (p=1.000), primary and technical (p=.599), no

education and technical (p=.937) on storage; primary and no education (p=1.000), primary and technical (p=.405) on effective marketing; no education and primary (p=1.000), technical and secondary (.079) on transportation; primary and no education (p=1.000) on pricing.

Based on mean rank order, their highest agricultural information needs was how to treat plantain suckers, $X^2 = 238.543$, p=0.000, with scores of 43.00: 153.00: 94.73: 217.09: 43.00 for primary, secondary, technical, tertiary and no education respectively. On the other hand, the need for agricultural information on preservation was least ranked, $X^2 = 210.672$, p=0.000, with mean rank scores of 63.56: 138.00: 108.00: 213.68: 28.00 for primary, secondary, technical, tertiary and no education respectively. This implies that education affects the perceptions of plantain farmers on their various agricultural information needs. Their perception differed because the plantain farmers had various levels of education. The farmers with higher level of education considered their agricultural information needs differently from other plantain farmers with less education. Therefore, the hypothesis that there are no significant educational differences in the agricultural information needs of plantain farmers is rejected.

Discussion of Findings

Results of the demographic data revealed that an equal number of male and female respondents participated in the study. It was revealed that above a quarter of the respondents were of youthful age and another quarter was above the age of 51years. Also, it showed that more than half of the total number of the respondents had the attended formal education ranging from primary school and above. This corroborates the finding of Ashaye *et al* (2017), Oso, Olaniyi and Ayodele (2014) as well as Oke, Ogunleye and Kehinde (2019) on the education status of farmers. Oke, Ogunleye and Kehinde (2019) found that 96.6% of plantain farmers had primary education. Oso, Olaniyi and Ayodele (2014) found that 26% and 21.2% among 170 and 146 of the plantain farmers were not educated in Ondo and Ekiti States. The high literacy level indicated by 88% of the plantain farmers with formal education from primary to tertiary level has the tendency of enhancing the utilisation of agricultural information especially when it requires that farmers read labelled products to understand the technology being promoted (Fakeyade *et al*, 2014; Oso, Olaniyi and Ayodele, 2014). Many plantain farmers in the communities operated at a small scale while a few cultivated above nine hectares of farm. This could be because the plantain farmers had limited access to credit facilities to expand, corroborating the view of Mgbenka and Mbah (2016).

Plantain farmers appeared to have several agricultural information needs. Findings reveal that their information needs include credit facilities, planting space, transportation and pricing among others. It was revealed that the plantain farmers in the communities studied indicated that they needed agricultural information on credit facilities (mean=2.60). World Bank had on March 23, 2017 approved a $200 million credit to further support the Nigerian government in her efforts to enhance the agricultural productivity of small and medium scale farmers in the country. It had estimated that approximately 60,000 farmers would benefit from this credit, 35% of whom were expected to be women (World Bank, 2017). The interview revealed that many of the plantain farmers were unaware of the available credit facilities. Many among those that were aware did not know how to go about applying for it. They also did not know whether or not they qualified to apply. These plantain farmers need to know that the easiest way to access these credit facilities is through cooperative society. Thus, information on cooperative society formation is useful to farmers.

Agricultural information was needed by the plantain farmers at all stages. This implies that timely, relevant and accurate information is crucial to the effort of the plantain farmer at every stage of farming. The plantain farmers had the highest agricultural information need at the planting preparation stage (mean=2.71) and this was closely followed by the post harvesting stage (mean=2.7). This implies that the plantain farmers need more information on good soil for planting, plant spacing and good sucker plants. The plantain farmers needed agricultural information on the good soil for planting at the preparation stage (*Mean*=2.86). The information on soil type and site selection is very vital to the performance of any agricultural activity

especially farming (Bareja, 2011). Plantain farming is soil nutrient exhausting, but the intercropping with arable crops on a relatively fertile land as well as the application of fertilizer raises the output (Oso and Ayodele, 2014). Agricultural information on planting space for the plantain suckers was needed at the planting stage (mean=2.44). IITA (2014) recommended a spacing of 3m x 2m for 1hectare and this should contain 1667 plants or a spacing of 2.5m x 2.5m should contain 1600 plants to give the plants the maximum amount of sunlight.

Agricultural information on transportation (mean=3.02), effective marketing (mean=2.20) and product pricing (mean=2.86) were needed by the plantain farmers at the post-harvest stage in order to maximize profit. These findings are consistent with the views of Oladele (2006) confirming that agricultural information is fundamental to improving marketing and distribution strategies as well as identifying profitable opportunities. Lack of adequate agricultural information due to lack of extension services militates against the marketing of plantain (Ayanwale, Oluwole and Ojo, 2016). Plantain distribution is complex as farmers either harvest and transport the product to nearby markets, allowing small-scale wholesalers, retailer and consumers to purchase directly or trade collectors collect the products from farmers and transport to wholesalers to retailers and finally to consumers (Akinyemi et al, 2010). Hence, the failure to provide needed information at the post-harvest stage could lead to losses that will eventually affect the income.

The results from the Mann-Whitney U test showed that there were statistically significant differences between male and female in terms of agricultural information needs. The agricultural information needs were higher among the male than the female plantain farmers. This implies that the male plantain farmers had more agricultural information needs than the female. This result corroborated the study of Olakojo (2017) that reported a gender difference in favour of male farmers. Other studies reported contrary findings which indicate that the female farmers have more agricultural information needs than the male counterparts (Okwu and Umoru 2009; FAO 2015). The female plantain farmers were believed to have more agricultural information needs because they played significant roles in marketing of plantain products, regulating their quantity and prices as well as permitting new entrants to the sale (Dzomeku et al 2011). Moreover, if the gender difference was mild, this would imply that both male and female farmers faced similar constraints.

There were statistically significant educational differences in the agricultural information needs of these plantain farmers since the P-values were lower than the alpha value of 0.05 as seen in the results of the Kruskal-Wallis H test. Evidence of statistical significant differences could be found in the agricultural information needs among plantain farmers having primary and no education, technical and secondary on credit facilities; primary and no education on good soil; primary and no education on good sucker; primary and no education on climate/ weather; primary and no education, primary and technical, no education and technical on planting depth and spacing; no education and primary on fertilizer application; no education and primary, primary and technical on weeding; no education and primary, technical and secondary on disease and pest control; primary and no education on harvest; no education and primary as well as technical and secondary on preservation; primary and no education, primary and technical, no education and technical on storage; primary and no education, primary and technical, no education and technical on effective marketing; no education and primary, technical and secondary on transportation; primary and no education on pricing.

Also, the agricultural information needs of plantain farmers that had secondary, technical and tertiary were high compared to those who had only primary and no education. This implies that education has an impact on the agricultural information needs of plantain farmers. Acquisition of formal education by plantain farmers is worthwhile as the educated plantain farmers appear more confident than their illiterate counterparts (Mgbenka and Mbah, 2016). The educated plantain farmers would quickly understand and make appropriate use of agricultural information on new farming techniques (Sanusi, Oyedeji and Akerele, 2017) in areas such as fertilizer application, pest management and disease control on their interaction with related information resources that might be introduced to them. This is a potentially important finding as it demonstrates the value of education in meeting agricultural information needs.

Conclusion

This study concludes that addressing their agricultural information needs would lead to the success of the plantain farmers. This is because identifying and timely providing the needed agricultural information would help in addressing any challenges the plantain farmers encounter. These plantain farmers had varying agricultural information needs across the various stages. They had the highest need for agricultural information at the preparation stage. Their agricultural information needs ranged from good soil selection to marketing of the produce. The men and women had different agricultural information needs. Their agricultural information needs also differed according to their education. The study recommends that any extension worker selected to work with or among plantain farmers in a particular community should be an indigene of that community or at least, someone who understands and speaks the language of the people. This is because extension workers are knowledgeable in identifying and disseminating information. It is believed that they would be able to package the right information in the most appropriate way in which it would reach the target group of plantain farmers.

Implication of the Study

Findings from this study imply that agricultural information is needed by the plantain farmers at all stages. However, the male had more agricultural information needs than the female plantain farmers. Education also affected the perceptions of plantain farmers on their various agricultural information needs. Therefore, it is important to take into cognizance these differences in the planning of policy and extension services.

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