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Editorial Feature

Big Data Industry: Implication for the Library and Information Sciences

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University of Pittsburgh (2007) defines Big Data as the sets of data that are so large and complex to use effectively and efficiently. Chen and Zhang (2014) on their part define Big Data as a collection of very huge data sets with great diversity of types, that it is difficult to process by using state of the art processing approaches or traditional data processing platforms. They point out that a data set can be called Big Data if it's formidable to capture, curate, analyse and visualise using current [or conventional] technologies. Penn State College of Information Science and Technology (nd) looks at Big Data differently as a process that is concerned with the exploration, development, and applications of scalable algorithms, infrastructures, and tools for organising, integrating, retrieving, analysing, and visualising, large, complex, and heterogeneous data. SAS Institute (nd) characterises Big Data in five ways which can deciphered in 4Vs and C, namely: Volume (that organisations collect data from variety of sources including business transactions, social media, sensor or machine to machine data); Velocity (that data streams in at unprecedented speed and must be dealt with in timely manner); Variety (that Big Data comes in all types of formats-structured, numeric, unstructured text documents, email, video, audio, and more); Variability (that Big Data flows can be highly inconsistent); and Complexity (that Big Data comes from multiple sources, which make it difficult to link, match, cleanse and transform across systems).

Realistically, Big Data cannot be measured in Megabyte (for example, a book or photo) or Gigabyte (for example, a movie), but in Terabyte (for example, all books in the world), Petabyte or Exabyte (for example, all books in multimedia formats in the world), Zettabyte or Yottabyte (for example everything recorded in human history) (Gray and Belew nd) because of huge volumes involved. Bieraugel (2016) adds that Big Data cannot be stored or analysed by conventional hardware and software because traditional hardware can handle Megabyte and Kilobyte sized data sets, while Big Data can handle Terabyte and Petabyte sized data sets. Hagstroem (2015) and ; Shaw(2014) point out that the sources of Big Data include Web services, social media, open data services (such as governments), archived information in libraries, repositories, digital archives, phones, credit cards, television, computers, the infrastructure of cities, sensor equipped buildings, trains, buses, planes, bridges, factories… and [surveillance systems], satellite, navigation systems and more. Big Data was estimated at 2.8 Zettabytes of the global data in 2012. By 2020, the data is expected to increase by 50 fold. Hagstroem (2015) points out that only 0.5 percent of available data globally are currently analysed because of the limitations of traditional computational, data storage and retrieval tools.

Big Data analytics has therefore emerged as a field of data science or e-science that provides high performance computational tools to analyse the huge volumes of data (Big Data) generated daily

worldwide in order to afford insights into untapped and trapped data in the traditional relational database systems of the past (Hagstroem, 2015). Big Data analytics has therefore great potential to generate answers to myriad of complex problems facing humanity from climate change, conflicts, biodiversity, earth tremors, poverty, hunger, migrations, and insecurity among others by illuminating the hidden patterns into huge volumes of data stored in databases and data warehouses that remain untapped.

The importance of Big Data need not be over emphasised. Chen and Zhang (2014) assert that Gartner listed the top ten strategic technology trends for 2013 and top 10 critical technology trends for the next five years, and Big Data is listed in both the two. Shaw (2014) in an article in the Harvard Magazine of March-April 2014 titled 'Why Big Data is a big deal' points out that understanding Big Data leads to insights, efficiencies, and saved lives. SAS Institute (nd) observes that Big Data can be analysed from any perspective to find answers and enable cost reductions; time reductions; new product development; strategic business moves; optimised offerings and smart decision making. Moreover, by analysing Big Data, businesses can be helped to determine root causes of failures, defects and issues, and detect fraudulent behaviour in an organisation. Besides, Big Data is being widely used in banking to understand customers and boost satisfaction; in education to identify at-risk students, enable students to make adequate progress, implement effective system for evaluation and support; in government to manage utilities, running agencies, dealing with traffic congestion or preventing crime; in health care to manage patient records, prepare treatment plans, generate prescription; in manufacturing to improve production and quality; and in retail to build customer relationships and design market differentiation programmes (SAS Institute nd). Davenport and Dyche (2013) assert that…the primary value from Big Data comes not from data in its raw form, but from the processing and analysis of it and the insights, products, and services that emerge from the analysis…

Bieraugel (2016) attributes the increasing growth and interest in the Big Data to the motivation to lower costs of servers to house the data, the release of open source software tools to manage distributed computing, the creation of massive data sets, and the need for businesses and other entities to leverage value out of the data they collect. SAS Institute (nd) adds that faster processors, distributed Big Data platforms (for example, Hadoop), parallel processing, virtualisation, large grid environments, high connectivity and throughputs are other factors driving the growth of Big Data industry.

Chen and Zhang (2014) are of the view that Big Data has the potential to make prominent growth of the world economy by enhancing the productivity and competitiveness of enterprises and the public administrations. In the US, for example, it is estimated that Big Data industry produces 140,000 to 190,000 deep analytical talent positions and 1.5 million data savvy managers. Big Data science is being used in nuclear research, astronomy, e-commerce, atmospheric science, genomics, biogeochemistry, bioinformatics, social network analysis, and retail entities.

A number of academic disciplines are leveraging Big Data. For example, according to Shaw (2014) government faculties in the US are doing some type of data analysis with scholars in sociology, economics, public health and medicine. In marketing, Big Data is being used for client differentiation and preferences based on purchase analysis or trends. In law, Big Data is being applied to predict the likely outcome of cases, especially in supreme courts. Credit card companies are using Big Data to understand and evaluate the risk of default, and crime fighting agencies are using Big Data to allocate resources by predicting when and where crimes are likely to occur. In the United States, Big Data has been used to predict flu outbreaks faster than is possible using patient admission records.

Big Data is therefore having transformative impact in all academic fields. In the library and information sciences, though Chen and Zhang (2014) assert that Big Data has drawn huge attention from researchers, major strides have not been made. Potential areas of use of Big Data in library and the information sciences could include: search strategies development for Internet searching, research data management, data curation, accessible internet text indexing, natural language processing and retrieval, data privacy, access and usability issues; developing user friendly interfaces for data mining; keyword indexing, Boolean searching, relevance feedback, recall and precision enhancement, advanced information retrieval processes, and information extraction ,among. Bierraugel (2016) points out that

it is important for librarians to know and understand Big Data and how it can be used to facilitate basic research, how companies leverage Big Data, how Big Data creates competitive advantage for organisations, and how they (librarians) can make Big Data visible, accessible and usable by creating taxonomies, designing metadata and developing systematic retrieval methods. In addition, librarians can use Big Data tools to analyse data sets to make them simple, searchable and usable.

In the United States, some LIS schools have pioneered curricular and research into Big Data domain. For example, the University of Pittsburgh has introduced courses that are aimed at developing skills for employment in the Big Data industry. Such courses include, but are not limited to data mining, adaptive information systems, cloud computing, data analytics, information visualisation, and neural networks. Penn State College of Information Science and Technology (nd) on the other hand offers information retrieval and search, scalable machine learning, learning predictive models, semantic complex event processing (CEP), Big Data privacy and security, discovery Informatics, and Big Data applications in informatics (including Health Informatics, Security Informatics, Social Informatics), among others. Cornell University (nd) offers in contrast the following courses in Big Data domain: data science, industrial data and systems analysis, data mining and machine learning, ubiquitous computing, natural language processing, and designing technology for social impact. Similarly, Harvard has introduced a course in data science, and is contemplating offering other new courses in Big Data domain such as computation biology, and quantitative genetics in order to leverage improved methods of processing and mining Big Data.

Analysis and use of Big Data is not without challenges. University of Pittsburgh (2007) asserts that the major challenge associated with Big Data is the rate of growth, diversity of multiple data sets and formats. The other challenges occur in data capture, storage, searching, sharing, data inconsistencies and incompleteness, scalability, timeliness and data security because of variety of data formats of the data from different sources (Chen and Zhang, 2014).

The emerging field of Big Data has therefore tremendous impact in all academic fields and promises great potential in creating new skills in various academic sectors including the information sciences in the areas of data management, curation and archiving, search and retrieval, interdisciplinary research, and the LIS curriculum. The other potential areas to grow skills in the library and information science are high intensity performance computing, advanced statistical and computational methods, virtual reality systems, diversity formats data management, digital preservation and curation, among others. Big Data provides another milestone in the development of science for the librarians to reinvent themselves and become more relevant in a dynamic and rapidly changing information environment that has attracted many players.

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Open Data Portals in Africa: An Analysis of Open Government Data Initiatives

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Abstract

African countries like other developed nations are beginning to open up data towards attaining transparency and accountability. A better understanding by citizens of what a government does and the level of performance achieved can be better understood by making public sector data open. Citizens can therefore hold their government accountable for not meeting up with stated goals and misconducts. This study employs a survey through content analysis to evaluate the extent of implementation of open data portals. Variables used for the evaluation are Berners-Lee 5 star of open data, implementation technology, data formats, licensing, major data sets and functionality across the African continent. A total of twenty-two data portals from seventeen different countries were assessed. Seven of the data portals representing 32% of the total number of the data portals were implemented using Drupal tool (Dkan). About 60% of the portals under investigation are national initiatives, and Nigeria has the only regional/state initiative and the only two independent organisation data portals. The only two university related-initiatives as well as the only city-based data portal were from South Africa, while a specialised data portal dedicated to the Ebola crisis was captured from Sierra Leone. The dates for the creation of the data portals span from 2011 to the current year (2015). The result indicates that an appreciable effort is being made in the creation of data portals; however, more countries need to take the giant stride to data provisioning in the open formats. More data sets also need to be populated onto the portals. Movement towards attaining the 5-star status of open data portals is in progress but a lot needs to be done towards attaining this. There is also a need to complement the efforts of national governments, and this could be done by regional/state, cities, universities, and independent organisations.

Keywords: Data Portal, Open Data, Visual Data, Data Formats, 5 Star of Open Data

Introduction

Different types of data are produced and collected by many public organisations in the course of performing their tasks. These organisations, such as government, education and development cooperation, are in a transition from closed, formal organisations towards open and networked models of organisation (Broek et al., 2012). The basis for the open and networked nature of organisations is more enshrined in the use of information and communication technologies which is a veritable tool in the preparation, packaging and distribution of data and information alike.

Making public sector data open helps citizens to better understand what a government does and the level of performance achieved. Citizens can therefore hold their government accountable for not meeting up with stated goals and misconducts. As a considerable amount of these government data are

increasingly becoming more easily accessible and can be used in conjunction with information from other sources, achieving this is feasible. This position is more strengthened in that open data initiatives are springing up across the world, including Africa. These initiatives are government and academic and not for profit organisation. Apart from the transparency and accountability perspective to open data platforms, they can also help generate insights into how to improve government's performance. Ubaldi (2013) opined that increased data transparency provides the basis for public participation and collaboration in the creation of innovative, value-added services. Additionally, data openness is eventually expected to improve the decision making of both governments and individuals. Finally, open government data (OGD) is also seen as an important source of economic growth, new forms of entrepreneurships, and social innovation.

As initiatives towards open data are springing up in government, academic and private domains across the continent, there is a need to take a cursory look at the present status of the data portals so as to identify their strong points as well as weak points to serve as a basis for standardized deployment. Ubaldi (2013) is of the opinion that the public is expected to be able to use government data to make better decision and improve the quality of their lives, for example making specific databases easily accessible, such as through mobile apps, to better inform their choices; while governments are expected to be able to more easily access a wider range of datasets to foster evidence-based decision making. Achieving this requires data to be made available through the open data initiatives, to come with the right licensing regime, to be in the right format, to be standard and built on the right technology.

While it could be argued that there are about six dimensions to an open data initiative, this study takes a critical look at the technical dimension as it relates to the development and management of data portals. Other dimensions could include political, legal, organisational, social and economic. In evaluating the technical perspective, issues such as five stars of open data, deployment technology, licensing types, data formats/presentation, applications and search functions were investigated. This study therefore aims to provide an evaluative view of the data portals at present and compare them with set standards. This could form a basis for improvement and provide more insight into how such initiatives could be addressed.

Literature Review

The Open Data Handbook (2010) defines open data as data that can be freely used, reused and redistributed by anyone - subject only, at most, to the requirement to attribute and share-alike. It refers to data that is available as well as accessible in a convenient and modifiable form, reusable and redistributable and should enable universal participation; for example, everyone must be able to use, reuse and redistribute - there should be no discrimination against fields of endeavour or against persons or groups. On the other hand, the Open Data White Paper of HM_Government (2012), published by the UK government, defines open data as data that meets the criteria of being accessible at no more than the cost of reproduction, without limitations based on user identity or intent, in a digital, machine readable format for interoperation with other data and free of restriction on use or redistribution in its licensing conditions (HM_Government, 2012).

Recently, open data has begun to gather considerable momentum. This is evidenced by the provisioning of wide array of government data that are significant not only because of the quantity and centrality but also because most government data are public by law (OKF, 2012) and that entails access and reuse of public information (Naser and Concha, 2012). In order to become more transparent and to work closer with citizens and companies, public administrations worldwide are starting up open data portals (ODP), which are repositories providing structured access to the opened-up data. This is stimulated by the idea that open government data reuse can open up economic opportunities, can promote transparency and accountability or can support the reform of public services (Davies, 2010).

The adoption and creation of open data portals is widespread in advanced democracies. However, countries and independent organisations in Africa are also making considerable efforts to not only open up data, but also to provide a central repository for access, which is a welcome development. The attention of governments and organisations to open up data is not only stimulated by the strategies of the front runners as demonstrated by the US government, but also by the development of technologies which

enable the creation of new services based on the open data (Huijboom and Van den Broek, 2011). Various technologies thus exist that can be used to evaluate and analyse individual elements of these portals, but there is the absence of a single scale of measure that can be used to gauge the overall performance of these portals.

Data portals are built on technologies and platforms that support the provisioning of the data in a prescribed format. CKAN (Comprehensive Knowledge Archive Network) is the world's leading open-source data platform (Almon, 2014). It is a software solution that makes data accessible by providing tools to streamline publishing, sharing, finding and using data (CKAN). CKAN has been adopted by various levels of Open Data Portals (ODPs). The Edo State Open data portal, publicdata.eu, data.gov.uk, data.gouv.fr, among others, run on CKAN. CKAN requires technically-savvy people to implement and maintain their project solution (Open Data Monitor, 2014). Socrata provides a commercial platform to streamline easy data publishing, management, analysis and reusing, by allowing export of data in many formats such as comma separated values (CSV), JavaScript object notation (JSON), xls, xml, portable document format (PDF), as well as Resource Description Framework (RDF) (Wilson and Cockburn, 2014) empowering users with the ability to customise the data set metadata according to individual requirements (Open Data Monitor, 2014).

The Kenya, Chicago, Bristol and New York City government open data portals are hosted by Socrata. Junar is a cloud-based open data platform with integrated features of data collection, enrichment and analysis. Junar allows the publisher to choose what data to collect and how to present them. The platform encourages social conversations between open data administrators and end users in order to help publishers to understand what data the end users want and find valuable. The Bahia Blancc City open data portal is hosted by Junar. DKAN is a Drupal-based open data platform with a full suite of cataloguing, publishing and visualisation features.

Compared with CKAN, DKAN is seamlessly integrated with Drupal content management system; thus, it can be easily deployed with Drupal and customised using different Drupal themes. DKAN provides user analytics and data users can upload, tag, search, and group data sets via a web front-end or APIs. In addition, they can also collaborate, comment, and share information via social network integration. The current deployment of DKAN instances include the Morroco open data portal, Sierra Leone's Ebola data jam, Nigeria's Visual Data, among others. The Open Government platform is a set of open source tools that allow any user to "promote government transparency and greater citizen engagement by making more government data, documents, tools and processes publicly available". The listed platforms are not exhaustive as developers can also develop platforms from the scratch for implementation on the various sites and data portals.

In 2006, Tim Berners-Lee proposed a 5-star model to describe different characteristics of open data and its usefulness for people wishing to reuse it; it is being used globally as a model for accessing data readiness for re-use. In essence, this 5-star model is a re-user's Maslow pyramid wherein the first star reflects its basic needs and the fifth star, its finest hour (EPSI, 2010). The 5-Star model was described in terms of the data availability on the web, machine-readability, non-proprietary formats, RDF Standards, and linked RDF standards, with each star representing each of these stated properties (Berners-Lee, 2006).

A 1-star rating as provided by Berners-Lee (2006) refers to the availability of the data on the web, readable by the human eye, usually represented in portable document format (PDF) which is arguably the most widely used file format for representing documents in a portable and universally deliverable manner (King, 2013). The ability to capture the exact appearance of output from nearly any computer application in a form that can be subsequently viewed or printed on nearly any computing device has made it invaluable for the presentation of content for which the author wishes to have total control of the presentation. However, data in the first star categories cannot be easily reused because it is in a closed document format (EPSI, 2010).

When the data is not only available on the web, but also available in a structured, machine-readable format, then it is deemed to have a 2-star rating. The re-user can thus access these files in the spreadsheet (xls) format, and this provides a step up to the single star rating. A 3-star rating is achieved when the user is able to access the files in established Comma Separated Version (CSV) files. CSV files are very useful formats because they are compact and thus suitable to transfer large sets of data with the same

structure. However, the format is so cumbersome that data is often useless without documentation since it can be almost impossible to guess the significance of the different columns. It is therefore particularly important for the comma-separated formats that documentations of the individual fields are accurate (Open Data Handbook, 2010). A data set having four-star rating means that the data is now in the web, as opposed to being on the web through a URI, Universal Resource Identifier, which allows for bookmarking and linking. A five-star rating means that the data is not only in the web but also linked to other data, fully exploiting its network effect and available in (RDF). RDF is a W3C-recommended format that makes it possible to represent data in a form that makes it easier to combine data from multiple sources. RDF encourages the use of URLs as identifiers, and this provides a convenient way to directly interconnect existing open data initiatives on the web.

Facts cannot be copyrighted, but that does not mean that data and databases are exempt from legal discussions and licensing requirements, even if the intention is to share the data openly (Watters, 2011). This therefore justifies the introduction of licensing within the context of open data. Open data licenses facilitate the use and potential reuse of data, and provide the benefits of enhanced organisational efficiency and cost saving, leading to greater interoperability of data as well as increased user awareness of the license terms, enabling better compliance (Korn and Oppeinheim, 2011).

Licensing is very important for the community to trust that the data will not be closed off; however, finding a suitable open access license for data can be tricky in part because intellectual property in data is treated fairly differently in different jurisdictions (Rochkind, 2008). Creative Commons, CC Zero, Open Data Commons and The Open Government License are some of the most recognised licenses. The Creative Commons open data license is fast becoming one of the most used and recognised standard licenses for providing access to data and other resources (Korn and Oppenheim, 2011). They permit the free of charge copying, reuse, distribution and, in some cases, the modification of the initial creator's creative work, without having to obtain permission every time from the rights holder. This is found to be useful within open data context.

CC Zero (CC0) is a tool also created by Creative Commons to facilitate the release of content, data, datasets and databases into the public domain, for example by the copyright owner waiving all its rights, including the database right and the right to be identified as the creator. The open government licence facilitates the reuse of government and other public sector information. As with creative commons licences, the open government licence is available in a machine-readable form as well as a "human-readable" form. Unlike the creative commons license, it (open government licence) defaults to the governing legislation to which the licensor has their place of business. It does not permit copying of logos, registered trademarks and other IP such as patents, and includes specific non-endorsement clauses (Korn and Oppeinheim, 2011).

The functionality provided by the data portals provides another criterion for assessing them. A fully functional data portal can be largely described as one that is easily accessible, searchable; provides datasets that are downloadable and in no one specific export format; provides applications for information provided on the portals such as the use of infographics as demonstrated by Ghana open data initiative, Kenya open data, Visual Data Nigeria; and also provides a medium for analysis.

The usefulness of the information provided to the users can be described as a function of its accessibility, as only the data that is available and accessible can be used for the required purpose. It is important, therefore, that information is presented in an accessible way, in a range of languages and formats that can be easily used and understood by the intended audience (NHS, 2010). Data analysis as defined by the Northern Illinois University is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data.

According to Shamoo and Resnik (2003) various analytic procedures "provide a way of drawing inductive inferences from data and distinguishing the signal (the phenomenon of interest) from the noise (statistical fluctuations) present in the data". The use of infographics and visuals present a way of data analysis. Infographics are increasingly becoming a common useful tool in education, entertainment, storytelling, broadcasting, and more. Madsen (2014) defined Infographics as graphic visual

representations of information, data or knowledge intended to present complex information quickly and clearly. The provision of such functionality on a portal increases the level of accessibility such a portal provides, as studies have shown that 90% of the information we remember is based on visual impact (Costill, 2013).

A typical data portal holds a large database of information. Searching is by flipping through the various pages available which can prove strenuous and time-consuming; therefore, a functional portal will not only make the data available, but will also provide means of searching through the database by employing keywords and filters and other variables. The acquired data should also be downloadable by users in formats that can facilitate reusability. Functionality is thus enhanced by providing a wide array of formats in which the desired dataset can be exported into.

Open data initiatives around the world are characterised by a great extension of the number of data sets made available for access by public administrations, constituencies, businesses and other actors, such as journalists, international institutions and academics, to mention a few. These datasets usually rely on selection criteria, based on a technology-driven perspective, rather than on a focus on the potential public or social value of the data to be published (Viscusi, Castelli and Batini, 2014). The aforementioned technologies and criteria are the premises upon which the analysis in this paper is based.

Methodology

This survey seeks to evaluate data portals across African countries with open data initiatives. The countries selected for this assessment were arrived at based on their efforts in moving forward towards requiring proactive disclosure of government data as part of their right to information (RTI) laws as presented by Open Data Barometer (2015). Through a comprehensive search of the World Wide Web (www), data portals in these countries were identified. Other initiatives were also identified outside the countries presented in the Open Data Barometer report. Therefore, this survey conducted from 16th to 19th February, 2015 reflects data portals in the entire Africa continent as at the time of this research.

Specifically, the evaluations of the various data portals from the different countries are based on the following parameters:

Technology Used for Implementation:

The technology used for building the open data site/ applications including those present on the portals such as Ckan, Dkan, Junar, Socrata, prognoz, opensoft, etc, are as follows:

- Open data 5-star Evaluation - A 5-star evaluation (Berners-Lee, 2006) based on the availability of data on the portal, making the available data structured, the use of non-proprietary formats, the use of URIs to denote things, and linking of the data to other data to provide context;
- Format- The formats in which data is published on the data portal such as csv, xls, json, xml etc and the adherence to the use of non-propriety formats;
- Major datasets- The major datasets that are frequently published on the data portals;
- Open data licensing - The open data licensing agreement used to share and modify datasets on the data portal if available;
- Functionality- Features on the data portal that enable users to perform specific tasks while using the portal.

Results

The varieties of open data portals surveyed include initiatives from national governments, regional/state government, universities, city, independent organisations, as well as specialised portals. About 60% of the portals under investigation are national initiatives. Nigeria is identified with the only regional/ state initiative and the only two independent organisation data portals. South Africa however, is credited with the two university-related initiatives, as well as the only city-based data portal recorded. Sierra Leone provided a specialised data portal dedicated to the current Ebola crisis. The dates for the creation of the data portals span from 2011 to 2015 when the study was done.

Technology used for Implementation

Data portals can be implemented and managed using various technologies including web application tools such as Ckan, Dkan, Lunar, Socrata, JavaScript, Qu, OpenSoft, and more. These technologies are important in the day to day management, maintenance of the data portals and regular updates of datasets contained in them so as to make such up to date and allow for easy access to current data and meaningful information by users. Within the open data portal implementation sphere of African countries, the result shows a combination of proprietary and open source platforms. Evidence also shows that some portals are designed from the scratch without leveraging the power of existing data portal technologies.

The technologies used in the development of the data portals and the proportion of their deployment across the investigated platforms are as follows: A total of twenty-two data portals from seventeen different countries were assessed. Seven of the data portals representing thirty-two percent of the total number of data portals were implemented using Drupal tool (Dkan). Four of the data portals representing eighteen percent of the total number of data portals were implemented using JavaScript. Two of the data portals representing nine percent of the total number of data portals were implemented using Prognoz. Another two of the data portals representing nine percent of the total number of data portals were implemented using Joomla. The remaining seven data portals representing 4.5 percent each were implemented using different technologies such as: Socrata, Apache Tomcat Server, Ckan, WordPress, Node JS, HTML and ASP.NET. While Ckan seems to be a popular platform for the creation of data portals, its complexity and difficulty to adapt might have contributed to its very low patronage.

Open Data 5-Star Evaluation

The data portals under investigation were evaluated using the open data 5-star evaluation. This is based on the 5-star deployment schemes for open data as suggested by Berners-Lee (2006). A careful presentation of the attributes relating to each star level has been discussed in the introduction. Each data portal was rated based on the presence of a higher level open data star feature. This implies that if a data portal has any of its data in non-proprietary formats such as csv but not in excel, it will be given a 3-star rating, which applies to all other star level ratings.

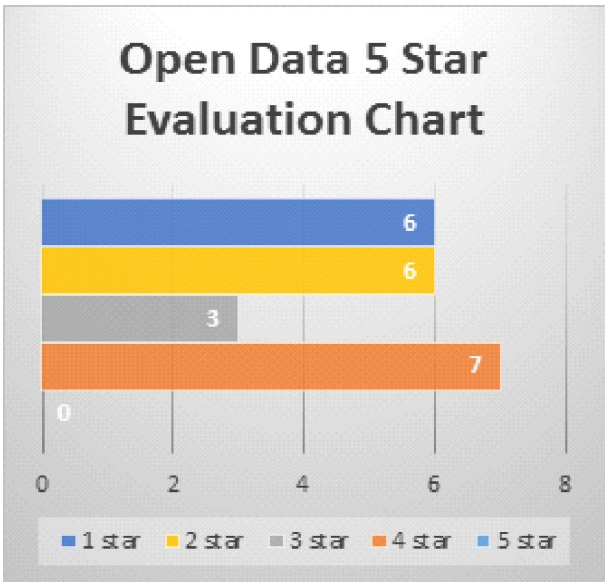

Figure 1: 5-Star Evaluation of the Data Portals

None of the data portals under investigation was able to attain a 5-star rating as a result of the inability to link the data provided on their portal to other related data to provide context (Open linked Data). This could be as a result of the concept of open linked data just beginning to be topical within the open data paradigm. However, seven open data portals managed to score a rating of 4 stars. This list includes two of Nigeria's platforms: Edo State Open Data and Visual Data Nigeria. The Ghana Open Data Portal, Morocco's Open Data Portal, Senegal Ouvert Data Portal, Kenya Open Data Portal and Burkina Faso Open Data initiative portal also scoring a 4-star rating. It was also discovered that three of these seven data portals (Visual Data Nigeria, Ghana Open Data Portal and Morocco Open Data Portal) used the latest version of Dkan in implementing their open data portals which went a long way in helping them achieve the 4-star rating. Edo State Open Data Portal was implemented using the Ckan technology; though complex, this also had a significant impact on its achieving the 4-star rating. However, Burkina Faso Open Data Portal was implemented using python and JavaScript technology.

Data Format

Datasets can be represented in a variety of formats such as Excel, DOCX, PPTX, CSV, JSON, RDFs, Pdf, and more. However, the standard formats for open data are non-proprietary formats such as CSV, JSON and RDFs. These formats enable the users to further reuse the datasets without having to purchase software to process them. These formats in all make the process of reuse a painless one and have the tendency to promote the use of such data sets. Formats such as the RDF promote the concept of open linked data, which is the apex of the 5-star rating and its use is entirely absent in this survey. This is another pointer to the inability of the portals assessed to attain the 5-star rating. The use of non-proprietary data formats such as JSON and CSV which is machine-readable and do not need proprietary software to process turned out to be low. Fourteen of the twenty-two data portals which account for more than half the total number of data portals did not adhere to the use of non-proprietary and machine-readable data formats at all. The result of this being that the flow of the available data to a wider pool of audience who would love to reuse them could be limited which boils down to the issue of accessibility. Users could have to purchase programs or software that would be needed to process the data in proprietary format such as excel, pdf or word before it can be reused by them.

Major Datasets

Datasets within a data portal span a variety of categories such as education, finance, agriculture, transportation, population, health, weather and others. The categories of datasets on a portal could serve as a pointer to its versatility and ability to draw users to it. Similarly, availability of data from different spheres of life could really indicate the extent to which a government is opening up to the public. It is to this extent that this survey takes a critical look at the major data sets available on the data portals for this survey. Datasets on education, administration and finance were found to be most prevalent among the data portals. Education and administrative datasets were more prominent on nine (9) of the data portals.

Finance datasets were also prevalent in seven data portals. Five of the twenty-two data portals focused solely on one dataset. They are BudgIT from Nigeria (Finance), OpenUCT from South Africa (Education), Centre for Higher Education Transformation from South Africa (Education), Egypt's Government Services Portal from Egypt (administration), and Ebola data jam from Sierra Leone (Health/Ebola). It is also interesting to note that all four data portals from Nigeria had financial datasets on their portals, which shows that open data initiatives in the country are demanding the right to information on government financial data. This may go a long way in tackling corruption in the country.

The diversity, though not comprehensive, in categories of datasets within the data portals across Africa shows that open data can be useful in various aspects of life and not just limited to a particular aspect. Areas such as agriculture, science and technology, and weather could definitely be improved upon.

Open Data Licensing

For datasets/data published on the data portal to be reusable by users, it has to be published under an open data license. The most recognised and commonly used data licenses are: Creative Common (CC) Licenses, CC zero (CC0), Open Data Commons and the Open Government License. It is on this premise that this survey assesses the selected data portals based on the open data licences under which the data is published. The use of open data licenses by the data portals turned out to be low, as fourteen of the twenty-two data portals published datasets without the use of open data licenses.

Open data commons open database license (ODbL) was used in publishing datasets by four (4) data portals. Open data commons was used in publishing datasets by two data portals, and Creative Commons Attribution was used by one data portal in publishing its datasets. The use of open data licenses should be highly encouraged, as this has the propensity to increase data reuse. This could come in the form of other users being able to republish the content or data on their own website and derive new content or information from them.

Functionality

Users should be able to perform a variety of functions while accessing the data portals. Data portal

functionality refers to specific tasks users can perform on the datasets available while using the data portal. This survey assesses the selected data portals based on accessibility, downloadable datasets, exportable datasets, dataset analysis, dataset visualisation and search function. These functions are explained as follows:

i. Accessibility: Access to the datasets within the data portal by users without any form of restriction.

ii. Download: Datasets should contain download links to enable user download datasets from the data portal.

iii. Export: Datasets available for download should also be exportable into several other formats to enhance reusability.

iv. Analysis: Elements of datasets within the data portal should be broken down into simpler parts to enhance user understanding.

v. Visualisation: There should be a graphical view or representation of what a particular dataset represents.

vi. Search: Datasets should be accessible using the search form instead of having to navigate through the pages of the data portal.

The result of the survey shows that all the data portals are accessible. Seven of the data portals- Morocco open data portal, Senegal ouvert, Burkina Faso initiative, Visual Data Nigeria, National Bureau of Statistics Nigeria, Open Data Edo State and the Kenya open data portals provided all the required functionality. It is worthy to note that Egypt's and Tanzanian data portals might even fall short of the definition of open data portals in the real sense of it, as these portals only give access to view data sets available on them but such cannot be downloaded or exported, which violates the definition of open data as provided by the Open Data Handbook.

Conclusion

Opening up data in the African continent is witnessing an upsurge. Within a four-year period (2011-2015), 22 data portals have sprung up from 17 countries. The present uptake is still very low (about a third) having in mind that there are 54 countries on the continent. Significant efforts will be required from national governments in ensuring the development and sustenance of national initiatives towards open data. Such efforts can also be complemented by other units such as state/regional governments including local governments, cities, independent bodies and universities. In future implementations however, there is a need to pay more attention to the right data formats which have a significant bearing on how re-users are able to key into the enormous data being made available for their various personal use. Employing the right approach is tantamount to achieving the desired success. Therefore, it is expedient that technologies that are capable of fast tracking the deployment of these platforms are adopted.

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A Survey of Sustainable Curation in Research Repositories of Higher Education Institutions in Southern Africa

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Abstract

The status and the prestige of higher education institutions depend on the quality, visibility and accessibility of their research. Globally, research indicates that valuable research output originates from both public and private higher education institutions, but the results of scholarship are often not archived and curated sustainably. Poor scholarship curation and lack of research visibility deter higher education institutions from taking their rightful place in higher education and higher education research communities. This article reports on investigations into digital scholarship curation trends in a purposefully selected target group of private and public higher education institutions in Southern Africa. Empirical research was triangulated with webometric analysis to derive solutions and best practices to ensure sustainable scholarship curation in institutional repositories. In all, 16 institutions were selected for the study. All the selected 16 institutions were subjected to webometric analysis but only 10 of the institutions completed the questionnaire. The study reveals a number of gaps affecting the effectiveness of institutional repositories in higher education institutions in Southern Africa. These gaps include true understanding of the nature and the importance of interoperability in open access. Also, collaboration within the higher education institutions, as well as external networks, is lacking. There is lack of awareness and knowledge regarding scholarship curation, and the value that web visibility holds for the entire institutions. The study recommends that institutions should include both social and technical aspects of scholarship curation.

Keywords: Digital Scholarship Curation, Sustainability, Open Access Institutional Repositories

Introduction

Higher education institutions are knowledge-intensive environments. Research and scholarship created in these institutions are institutional knowledge capital and must be managed as assets to give the institutions a competitive edge in research and academic stature. Knowledge capital is expected to be managed in a way that will ensure return on investment. Digital scholarship such as dissertations, theses, proceedings and publications form part of the knowledge capital created in higher education institutions. The curation of digital scholarship refers to the management, archiving and preservation of digital data over the lifecycle of the data (Yakel, 2007).

The digital curation of scholarship is expected to add value to existing knowledge and assist in creating new knowledge. Sustainability of digital collections and services, such as institutional repositories, is defined by Rieger (2011) as the ability to secure access to all resources needed to protect, maintain, develop and increase the value of a product's content and the service it has for the user there of. Anbu (2007) adds to this definition by stating

that sustainability should include long-term preservation and curation of content and services in the institutional repository context of the definition. Sustainability is thus seen as surpassing mere successful implementation and content management of an institutional repository. Sustainability in institutional repositories and digital scholarship curation requires a socio-technical approach, where decision-makers need to realise its value and align technical and financial operations in support of scholarship curation (Rieger, 2011). Institutional repositories are expected to expand and develop to satisfy the environmental (academic) and socio-cultural (research cultural) needs of the higher education institution. The sustainability of institutional repositories poses challenges in institutions where the value of knowledge capital is not realised. Knowledge capital in the form of scholarship is expected to be purposefully and strategically supported by policies, processes and strategies on a high level of management. In some Southern African higher education institutions, especially private higher education institutions, sharing data in open access is slow.

There are 35 institutional repositories in Southern Africa registered on OpenDOAR (Open DOAR 2016). Public higher education institutions have most of the registered institutional repositories in Southern Africa. The main problem that is addressed in this article is why the management of digital scholarship appears to be underdeveloped, in terms of lack of visibility, ranking and open access to research in South Africa. The article will explore how the application of information management and knowledge management principles should be applied in the sustainable curation of digital scholarship, which in turn will reverse the current state of affairs of low ranking educational institutions and poor access to scholarship.

African higher education institutions need to develop their own e-strategies to provide the framework needed to establish digital repositories. Thus, creating a mandate for African digital scholarship. Without the virtual research environment in an institution, the digital data curation cannot take place.

Digital Scholarship

Most higher education institutions in the developed world have fully incorporated and adapted to e-learning and digital scholarship. Lack of access to information and technology has a profound negative effect on the African digital scholarship. Mutula (2009) warns that Southern African higher education institutions that neglect to deploy e-learning and e-research in their institutions do it at their own peril. Collaborative research cannot take place without digital scholarship curation.

Digitised institutional repositories databases developed rapidly during the past ten years in most higher education institutions in the developed world (Smith, Barton and Branschofsky, 2003). Institutional repositories projects cannot develop in isolation and should support the aims and objectives of the educational institution as a whole. Digital scholarship is a networked, scholarly or academic environment extensively integrated with digital and information technologies in teaching and research (Mutula, 2010).

The whole of Africa still has only 5% of the global total of institutional repositories (OpenDOAR, 2015; OpenDOAR, 2016). The first developments towards electronic submission, storage and dissemination of theses and dissertations in Southern Africa date back to the early 1990s (Lor, 2005), followed by the establishment of the South African Research Information Services (SARIS) project which aimed at providing a framework for e-research services to all South African researchers (Van Deventer and Pienaar, 2008). Mutula (2008) laments the fact that African higher education institutions perform poorly in global web rankings because researchers publish in low impact journals with no internet links, and states that 80% of African higher education institutions suffer from no or poor internet connection.

Institutional Repositories and Open Access

Developments to promote access to research in the open access environment resulted in the creation of a number of treaties and agreements such as the Bethesda Open Access Statement (BOAI) in 2001 and the Berlin Declaration of 2003. The value of open access was communicated and encouraged and soon became the norm in institutional repositories. Awareness of the importance of open access research grew and gradually more institutions worldwide, and in Southern Africa, joined open access initiatives and movements by signing treaties and advocating open access. Recently, the value of

open access was communicated and encouraged and soon became the norm in institutional repositories.

Cullen and Chawner (2010) reported that institutional repositories were created with great initial enthusiasm, but it soon became just another task to be done. Generally, the focus in institutional repositories was on improving dissemination of digital scholarship and wider impact of research (Ball, 2010). Ball (2010) mentioned that institutional repositories were not initially tasked with preservation responsibilities, but as the content of repositories evolved to include more aspects of scholarship than just being a temporary storage until papers or research were officially published in mainstream publishing, this function became increasingly important. Digital curation and preservation need to be planned and managed with great care.

Information and Knowledge Management in Digital Scholarship Curation

Chaffey and Wood (2005) stressed that information and knowledge are increasingly valued as 'capital' in both business and higher education institutions. Rowley (2000) maintained that institutional knowledge must be embedded in knowledge management. Rowley (2000) gave these descriptions for the total knowledge existing in higher education institutions and not just scholarship. Scholarship and digital scholarship repositories are, however, seen as important subsets of the sum of all knowledge assets in higher education institutions.

The challenge of achieving sustainability lies not only in the institutional repository project itself and how information and data are managed, but also how the project relates to the bigger higher education institution's objectives. Sustainability of institutional repositories is dependent on how knowledge is seen, valued and managed on all higher education institution operational and decision-making levels. Effective sharing of knowledge created at higher education institutions remains a challenge. Higher education institutions are knowledge-intensive organisations and their relevance and success depend on how knowledge is created, managed and communicated. There are higher education institutions, such as a growing number of Australian (Blackman and Kennedy 2009) and Japanese higher education institutions (Tian, Nakamori and Wierzbick 2009), that do value knowledge as a strategic asset with capital value, and valuable lessons can be learnt by studying trends.

Mutula (2007) posited that knowledge management transformed into new products and innovations. It is evident that this process must be managed on a continuum in order to produce consistent and constant innovation. Sustainability of institutional repositories is dependent on how knowledge is seen, valued and managed in higher education institutions operational and decision-making levels. Blackman and Kennedy (2009) stated that traditionally higher education institutions and their governance structures, such as councils, were hesitant to plan strategically. They stated that there is often lack of knowledge management strategies. The research of Tian, Nakamori and Wierzbick (2009) into Japanese institutional repositories confirms the views of Kennedy and Blackman. They stated that effective sharing of knowledge created at higher education institutions remains a challenge. The role that institutional repositories should play in the management and curation of knowledge capital still needs to be formalised in policy and strategy by higher education institutions' decision-makers and governance processes. Jelavic (2011) posited that not only was knowledge management in institutions critical for success, but also that it should focus on the interrelatedness of the human element with the technical.

Research Methodology

The mixed methods research methodology of this study targets 16 purposely selected Southern African institutional repositories (IRs) as focus areas to observe their scholarship web presence and trends in scholarship curation. According to Best (2012), mixed methods research stems from pragmatism and is seen to strengthen the study by interrelating qualitative and quantitative methodologies (Best, 2012). Data analysis in mixed methods research allows for quantitative analysis of descriptive and inferential statistics.

Ranking Web of Universities was used to identify higher education institutions ranking below the top 500 global ranking universities and not included in the African top ten institutional repositories on Ranking Web of Repositories. The target group

included 16 public and private higher education institutions in Southern Africa, offering postgraduate programmes and creating scholarly communication in the form of research (see Table 1). For the sake of confidentiality, the respondents in the public sector is referred to as A1-8, and in the private sector as B1-8 (Appendix 1). To further ensure anonymity rankings are supplied in intervals of 10 in Table 1 below.

Table 1. World and Sub-Saharan ranking of HEIs in the target group (Ranking Web Universities, May 2016

HEI	Type	Ranking Universities	World Ranking falling between Intervals of 500	Sub-Saharan Africa ranking falling between Intervals of 10
A1.	Public	Yes	3500-4000	50-60
A2.	Public	Yes	3000-3500	40-50
A3.	Public	Yes	500-1000	10-20
A4.	Public	Yes	3000-3500	40-50
A5.	Public	Yes	2500-3000	20-30
A6.	Public	Yes	6500-7000	70-80
A7.	Public	Yes	4000-4500	60-70
A8.	Public	Yes	7000-7500	90-100
B1.	Private	Yes	4500-5000	60-70
B2.	Private	Yes	9500-10 000	120-130
B3.	Private	Yes	15000-15500	200-210
B4.	Private	Yes	7500-8000	90-100
B5.	Private	Yes	12500-13000	170-180
B6	Private	Yes	21500-22000	250-260
B7	Private	Yes	15500-16000	280-290
B8	Private	Yes	16500-1700	390-400

Catell and Fernberger, as cited in Jacobs (2010), researched the systematic use of bibliometrics and laid the foundation for further research. The mixed method used in this study included webometric analysis of the target's group web visibility and performance. Webometrics is a subset of bibliometrics. Bibliometrics is a scientific tool to measure research output (Jacobs, 2010). Jacobs reported that Eugene Garfield's Science Citation Index made analysis of research possible. There are three types of bibliometrics, namely descriptive, relational and evaluative bibliometrics. For the purpose of this study, evaluative bibliometrics is important, as it is a tool to assess the impact of scholarly work, as well as the quality of digital scholarly contributions to open access collections.

OpenDOAR and Web Ranking of Repositories are authoritative examples and sources of reliable institutional repository statistics and performance monitoring worldwide. Webometrics analysis and institutional repository content analysis were used to gain deeper insight into the data collected from survey questionnaires. Analysing this data against webometric rankings gave insight into the inherent sustainability or lack thereof in the target group. For this study, quantitative data was collected from completed empirical survey questionnaires. Kim and Kuljis (2010) refer to content analysis as a useful qualitative methodology to examine web-based content, provided it is sampled and coded correctly.

Sixteen copies of the questionnaire designed for this study were sent out and 10, were received back. The feedback ratio on completed questionnaire was 62.5. The credibility of the research was measured by the Cronbach Alpha Coefficient and the scale employed was 0% to 100%, with a higher percentage indicating a higher credibility rating. An overall coefficient of 74.25% was calculated for the results obtained, and this is considered to be in the range of scores regarded as reliable.

Findings

The findings of this study were derived from webometric analysis and a survey based on the questionnaire distributed to the 16 institutions which was returned by 10 institutions.

Data Analysis of Ranking Web of Repositories

Fifty-two Sub-Saharan institutional repositories were registered on Ranking Web of Repositories. Nine of the top ten repositories are situated in South Africa. The top ten are all from public universities. The top ten institutional repositories were explicitly excluded from this study, as the assumption based on their ranking and OpenDOAR profiles is that they are well funded, planned and managed. The ranking of top institutional repositories correlates with the ranking of top universities. Nineteen institutional repositories on Ranking Web of Repositories are registered in South Africa, two in Namibia, one in Botswana and four in Zimbabwe. The higher education institutions selected for this study were all ranked on the Ranking Web of Universities site, but the question was whether they were ranked and correlated as the top 10 higher education institutional repositories. Figure 1 presents a comparison of ranking positions of respondents. Five of the sixteen institutional repositories chosen for this study were ranked on Ranking Web of Repositories. Only one private higher education in this target group institution's repository was ranked. In all, six repositories in the target group were ranked, comprising 37.5% of the target population. Of all the institutional repositories in the target group, 62.5% were not ranked on Ranking Web of Repositories, indication poor web visibility to research.

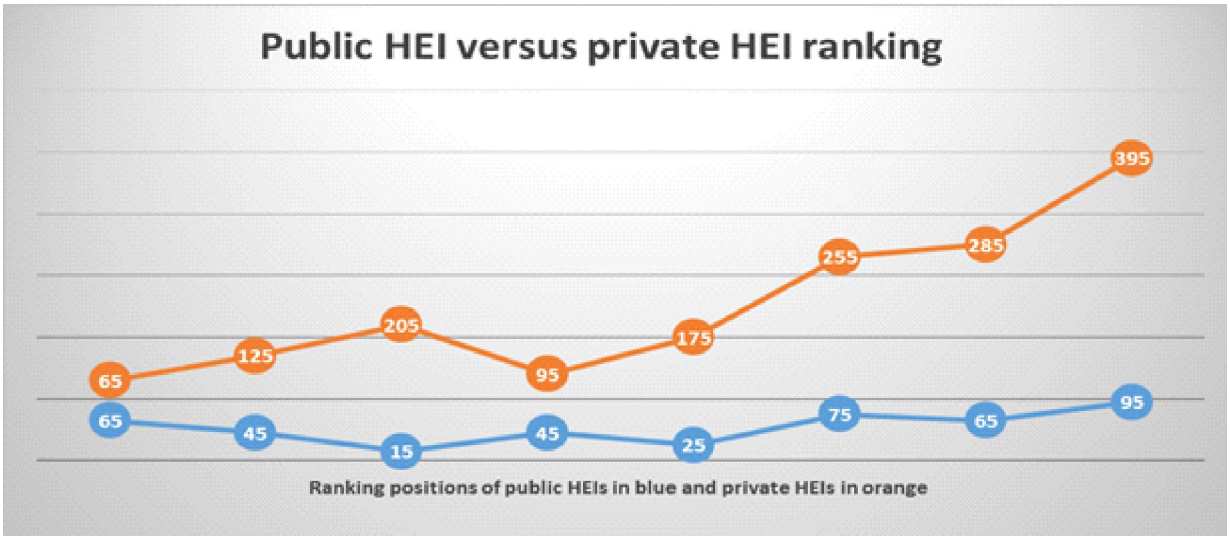

Figure 1. Public versus Private HEIs on Ranking Web of Universities (2016)

Open DOAR Content Analysis

Seven of the sixteen institutional repositories in this study were registered on OpenDOAR. Only one private higher education institution in this study was registered on OpenDOAR. Although respondents indicated their participation and appreciation of scholarship in open access, content analysis on OpenDOAR reveals that only three of all the higher education institutions supplied metadata standards information. The absence of reputable academic harvesters has a seriously negative impact on web visibility and is one of the reasons for low ranking and low impact. Findings indicate that respondents in this study were not OAI-compliant. The OAI Protocol for Metadata Harvesting (OAI-PMH) is a machine-to-machine interface provided by most repository software platforms (OpenDOAR 2016). They all indicated and supplied the metadata standards and re-use policies (OpenDOAR 2016). OpenDOAR offers clear guidance on how these policies can be added and also explains the benefits they had for increased web visibility.

Data Analysis Based on Questionnaire

Nature of Scholarship Production and Curation

All of the ten respondents indicated that both postgraduate students and academic staff members produced scholarship and communicated this scholarship through academic research platforms and publications. All the public higher education participants had digital repositories for showcasing their scholarship.

Strategies for Sustainable Curation of Scholarship and Research Output

Only five of the higher education institutions had a research strategy, IT strategy and an open access strategy. Nine indicated that they did not have a knowledge management strategy in place. This corresponds with the study by Blackman and Kennedy (2009), stating that higher education institutions are generally slow to take up knowledge management strategies, despite the potential benefits. Chakravarty and Wasan (2015) warned that where the institutional repositories performance was too low, policies and strategies should be reviewed to increase the volume and quality, making information management strategies a critical component of sustainable developments of institutional repositories (Chakravarty and Wasan, 2015. The results of this study indicate that Southern African higher education institutions are not yet on par with global trends.

Institutional Governance and Scholarship

Having strategies in place does not ensure best practice. Policy and procedure documents should be aligned with all higher education institutions' strategies. The nature of policies affecting scholarship and research output and communication shows that only five of the respondents, stated that institutional repository policies were in place. Only two had an open access policy in place. According to the answers, no one institution had a research information management strategy policy in place, indicating that the institutional repositories in the target group were not staying abreast of innovations.

Scholarship Curation, Policy and Procedure

Four of the respondents indicated that their library committee was the only governance body making decisions on institutional repository policies. Tian, Nakamori and Wierzbicky found in their 2009 study at a Japanese university that the biggest stumbling block in establishing knowledge management for the enhancement of research knowledge creation lies in the lack of higher education institution governance recognition, as well as their understanding and support in scholarship curation (Tian, Nakamori and Wierzbicky, 2009).

Value, Trust and Quality of Scholarship Curation

Seven of the respondents indicated that they were informed about all research related to digital projects in their respective higher education institutions. Eight of respondents were of the opinion that digital curation in institutional repositories should be a centralised function in the higher education institutions. Six of the respondents reported that their higher education institutions supported and funded research production. Four were of the opinion that research was secondary to teaching and learning at

the higher education institution. This corresponds with a study done in 2014 in Malaysian private universities by Thuraisingam et al. (2014), where they found that the research culture was not well established, and research and knowledge creation were indeed secondary to teaching and learning.

Institutional Repository Relevance in Higher Education Institutions

Eight of the respondents answered in the affirmative and indicated that their management and governance structures were informed about scholarship collections. On the question whether budgeting and separate funding for institutional repositories were in place, six of the respondents indicated that there were no separate budgets.

Constant development and innovation are requirements for success and development. Respondents indicated that new developments such as RIMS (Research Information Management System) and digital scholarship collections were jointly planned and managed. Only two indicated that these innovations were happening. Rieger (2011) stressed the importance of constant innovation and alignment with institutional developments as a critical factor in the sustainability of institutional repositories. Six of the respondents stated that their institutional repositories were well known in their institutions and research community. Eight of the respondents indicated that their scholarship collections were visible on their websites. However, content analysis on OpenDOAR indicates that even though scholarship is available on the websites, web visibility is compromised where open access harvesting and interoperability standards are not adhered to and implemented (OpenDOAR, 2016).

To a question on whether regular calls for participation and contribution of research output for submission to the repositories were made, four of the respondents answered that proactive efforts were made to populate their institutional repositories. This leaves six of the respondents open to random and inconsistent contributions by researchers' and students' scholarship to be curated in an organised and controlled way. Five of the repositories had a long-term preservation plan in place, but four had no preservation plans in place. After successful implementation, successful performance monitoring of institutional repositories growth and usage is cardinal for successful management of institutional repositories. Two of the respondents indicated that they were aware that their IR was ranked on Ranking Web of Repositories. Three respondents indicated that they were not ranked, and another three were not sure. Five of the respondents indicated that there had been clear development of their institutional repository. Four respondents indicated that there were no plans for maintenance and development. Despite low rankings, limited web visibility and lack of innovation, eight of the respondents felt that institutional repository managers were suitably skilled. Six of the respondents were using an open source software package to run their institutional repositories. Seven of the respondents indicated that their software had been upgraded during the past three years.

Conclusion

The main aim of this article, and the study, was to evaluate trends in digital scholarship curation in a purposefully selected target group. Participants in this target group were chosen for their existing web visibility and level of scholarship creation. Despite the fact that higher education institutions are knowledge-intensive institutions, where new knowledge is constantly created, researchers agree that knowledge management in higher education institutions in the form of knowledge management strategies, policies or even knowledge management awareness and conceptualisation is, surprisingly, rudimentary in most higher education institutions.

The empirical study reveals a number of gaps affecting the effectiveness of institutional repositories in higher education institutions in Southern Africa. Gaps were identified in terms of a true understanding of the nature and the importance of interoperability in open access. Collaboration within the higher education institution, as well as external networks, is lacking. Although respondents were of the opinion that institutional repository staff were well qualified, and that their higher education institutions were supportive and knowledgeable about open access, triangulation with webometric analysis indicated the presence of factors that had a negative impact on sustainability of the institutional repository. When triangulating the findings of the questionnaire survey results with recent statistics obtained from the reputable web directory, OpenDOAR, all indications are that the institutional repositories may be at peril,

as serious sustainability threats surfaced.

This research explored how information management and knowledge management principles could improve the archiving, preservation and curation of digital scholarship, ultimately to enhance access to valuable research produced in Southern African higher education institutions. The research revealed that there is still insufficient understanding and support of scholarship curation at governance level. The study revealed serious gaps in the understanding of open access and application of open access protocols and standards.

There is lack of awareness and knowledge regarding scholarship curation, and the value that web visibility holds for the entire institutions.

Recommendations

The importance of research visibility is not realised by many higher education institutions. The sustainable management of scholarship in digital open access repositories must be prioritised. Higher education institutions' rankings, as well as repository rankings, need to be reported to decision-makers and their performance monitored. Knowledge management for sustainability needs to begin at a statutory decision-making level, where the institutional repository is formally recognised and incorporated into higher education institution's governance processes. Based on the research, it is clear that a suitable definition for a sustainability domain must include both social and technical aspects of scholarship curation.

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Appendix 1:Respondents of the Questionnaire

Name	Country	Type	Name	Repository on Open Doar	World Ranking Repositories	Ranking Universities	University Rank Position May 16	Questionnaire received back
A1. Nkhosi/ Mr. Anbu	Swaziland	Public	SWALA	No	No			Yes
A2. David Thomas	SA	Public	DUT	Yes	Yes	Yes		Yes
A3. M Snyders	SA	Public	UWC	Yes	Yes	Yes		Yes
A4. Z Magi	SA	Public	MUT	No	No	Yes		Yes
A.5 M Moshoeshoe	Lesotho	Public	University of Lesotho	Yes	No	Yes	3999	Yes
B1. Kelemwork AgafariKassahun	Botswana	Private	Botho	Yes	Yes	Yes	3128	Yes
B2. Dr Blom	SA	Private	Da Vinci Institute	No	No	Yes	899	
B3. Prof Louw	SA	Private	Monash	No	No	Yes	15131	Yes
B4. Dr Van Rensburg	SA	Private	SA Theological Seminar	No	No	Yes	7857	Yes
							22592	
							14067	
							7713	
							12321	

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Technology Acceptance: Examining the Intentions of Ghanaian Teachers to Use Computer for Teaching

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Abstract

Technology is seen as a key enabler of modern education. The Government of Ghana recognises information and communication technology (ICT) as an engine of national growth, and it is investing ICT into teaching and learning. However, most teachers still feel reluctant to use computer for teaching. Therefore, the purpose of this study is to examine the factors that influence teachers to use computer for teaching purposes. The research model developed in this study was based on the Technology Acceptance Model. Questionnaire was used to collect data from one hundred and five teachers in the New Juaben Municipality, Eastern region of the Republic of Ghana. Partial Least Square (PLS) was used as the statistical technique to analyse the data. The study found that perceived barrier, attitude, perceived ease of use, perceived usefulness and relevance to job had a positive significant effect on teachers' intentions to use computer. The effect of self-efficacy was not supported.

Keywords: Perceived Usefulness, PEOU, Self-Efficacy, Attitude, Perceived Barrier, Technology Acceptance

Introduction

Technology, specifically computer, is identified as an enabler, facilitator and a promoter of quality teaching. Computer is seen to provide accessibility, connectivity, mobility and storage of information to its users. Previously, teaching was performed by using blackboard and chalk but the computer has opened new opportunities for teachers to use projectors to display synopses of their materials, keep records, conduct research, and even communicate with their students. Providing computers and its peripherals to all teachers and students is seen as a long term goal by the central government of Ghana. The Millennium Challenge Goal of Ghana considers the introduction of the computer into teaching and learning as a critical platform for sustainable educational development. In 2013, the government instituted ICT Accelerated Development programme to harness accessibility to information for educational development, training, providing modern techniques of teaching and to encourage knowledge sharing within the educational sector for national development (Government of Ghana, 2013).

The recent report by GES (2002) revealed that the Ghana educational curriculum emphasises the integration of technology into teaching and learning. The government working under The Better Ghana Agenda ICT Project has made it a priority to distribute laptops and to train every teacher in the schools on how to use computer. These initiatives serve as a source of motivation for teachers to use computer at work. The benefits of using computers, coupled with the government interventions, necessitate the exploration of critical determinants

of the usage of computers in Ghana for teaching and learning purposes. This study therefore investigates the intention of teachers to use computers for teaching. The significance of this study lies in the fact that although lot of research has been conducted to investigate the adoption and the use of ICT in education, the findings of existing studies reveal that there has been limited studies on this domain, particularly in the African context. In addition, many researchers (Harindranath et al., 2008; Levy, 2006; Boakye and Banini, 2008; Hussain and Safdar, 2008) acknowledge the need for further studies to be conducted in this domain.

Review of ICT Adoption and Teaching in Ghana

The government of Ghana, since independence has been striving to improve the quality of education. About 30 percent of the annual budget goes to investments in secondary and tertiary education. To leverage ICT in education, the government has started providing computer laboratories and laptops to teachers as one of its aims in realising the Millennium Development Goal Challenge in education. According to Edumadze and Owusu (2013), the introduction of ICT and its incorporation into the Ghanaian educational system are aimed at improving the teaching and learning processes. Many researchers have made an effort to examine the way teachers in Ghana use computer for teaching. Agyemang (2012) found that Ghanaian teachers acknowledge the benefit associated with the use of technology or computer for teaching. In another study, Amenyedzi et al. (2011) investigated how teachers and students use computer for teaching and learning respectively. The study involved teachers and students from senior secondary schools in the Tema Metropolis, Ghana. They found that about 30 per cent of the teachers mainly used computer and Internet for research. However, they found no indication that teachers were using ICT to communicate with their students.

In a related study, Boakye and Banini (2008) examined teachers' readiness to use ICT at secondary schools in Benin, Cameroon, Ghana and Mali with the objective of determining whether teachers were involved in the process of integrating ICT into education in these countries. Teachers were asked about their skills with regard to ICT and use of ICT in their pedagogical practices. From the teachers studied, 71% had never used the computer in class; while 10% used it for classroom activities. About 44% had never used the computer in preparing lesson notes, while 49% did. A third of those who used it in preparing lessons did so "always" and the rest "occasionally". The use includes using the computer for searching content on the Internet, typing out lesson notes, and designing teaching and learning materials. About 60% of the teachers considered themselves as having knowledge of web browsing, with 71% of them using email. Most of the teachers (78%) learnt on their own how to use computers. Despite the fact that some teachers did not use ICT at all, they agreed generally that the computer had changed the way students learn.

On the skills of teachers to integrate and adopt technology in teaching, Boakye and Banini (2008) noted that training geared towards pedagogical integration of ICT in Ghana is minimal. The Ministry of Education MOE (2009) reported that teaching methods used by teachers in Ghana have marginally reflected technology integration because the teachers lack pedagogical skills of technology integration. The e-readiness of teachers for pedagogical integration of technology in schools in Ghana is currently less than 10% (MOE 2009). Buabeng-Andoh (2012) who recently explored teachers' skills, perceptions, and practices about ICT in secondary schools institutions in Ghana found that about 68% of the 231 teachers used some ICT peripheral in teaching. Even though a study by Apeantin (2010) provided inkling that prospective mathematics teachers have background knowledge of some software for teaching mathematics, identified that most teachers lack knowledge about the ways to integrate ICT in lessons delivery (Agyei and Voogt, 2011). They further noted that there was lack of training opportunities for these teachers to acquire knowledge on how to integrate ICT into their teaching lessons. Based on these issues and, particularly, the low level of ICT usage among Ghanaian teachers, this study attempts to investigate the factors that could influence Ghanaian teachers' intention to use computer based on the theoretical foundation of the Technology Acceptance Model.

Theoretical Framework

The Technology Acceptance Model (TAM) is attributed to Davis doctoral thesis where he examined the acceptance of computer technology by comparing TAM and Theory of Reasoned Action (TRA) (Ajzen, 1991; Ajzen and Fishbein, 1980). TAM has been vastly used across various technological settings and has been found as a significant model to predict technology use, in particular, computer usage (Taylor and Todd, 1995; Venkatesh and Davis, 2000). Empirical studies have confirmed that TAM explains about 40% variance in predicting the intention to use computer (Teo, 2009). The Technology Acceptance Model postulates that individuals' attitude of a behaviour influence individuals' behavioural intention to use a specific technology. TAM focuses on only two variables, namely perceived usefulness (PU) and perceived ease of use (PEOU) (Davis, 1989). According to this model, the dual factors of perceived usefulness and ease of use have an effect on the attitude of individuals towards the use of technology, while attitude and perceived usefulness of the technology affects individual's intention to use the technology.

TAM has been deployed in many studies to predict individuals' behavioural intention of using technologies such as office automation tools, software development tools, and business application tools (Legris, Ingham and Collerette 2002), on Internet banking (Md Nor, Sutanonpaiboon and Mastor, 2010), on computer usage (Teo, 2009; Teo, Lee and Chai, 2008; Pierce and Ball, 2009), and Internet shopping (Liao and Cheung, 2001). Figure 1 shows the technology acceptance model.

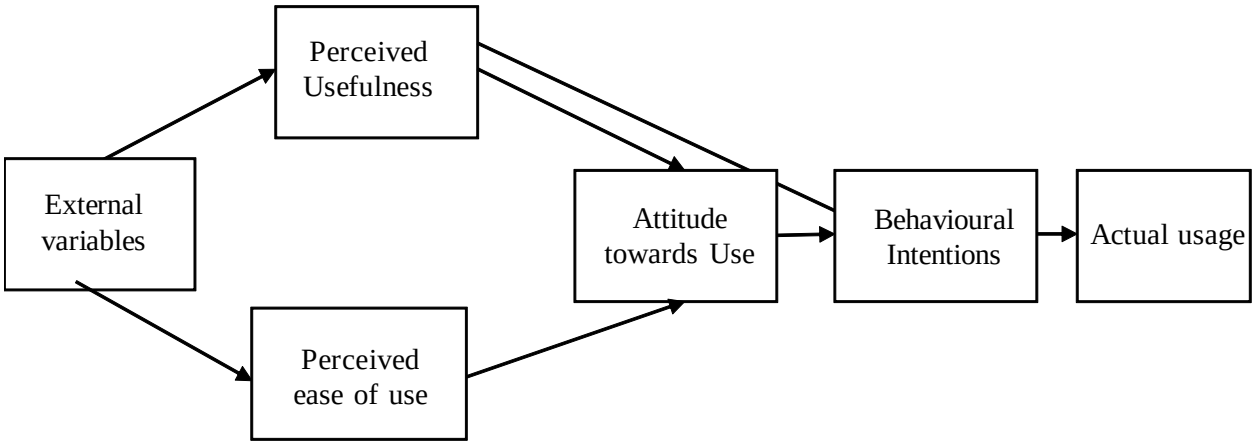

Figure 1: Technology Acceptance Model (Source: Davis 1989)

Research Framework

The central tenet of technology acceptance model centres on individuals' acceptance and use of a technology. The model suggests that when individuals are presented with a new technology, two factors influence their decision on whether to use it or not. These factors are perceived usefulness which is the degree to which the individuals believe that using that technology would enhance their job performance and perceived ease of use which is the degree to which the individuals believe that using that technology would be free from effort (Davis, 1989).

Based on the review of literature, many researchers have utilised the model in their studies since its emergence in 1989. The model has been subjected to constant expansion; notably the TAM 2 model (Venkatesh and Davis, 2000; Venkatesh, 1999) and the Unified Theory of Acceptance and Use of Technology or UTAUT (Venkatesh, Morris, Davis and Davis, 2003). The TAM 3 model has also been proposed in the context of e-commerce with an inclusion of the effects of trust and perceived risk on

system use (Venkatesh and Bala, 2008) and most recently UTAUT 2 model (Venkatesh et al, 2003). While the contributions of these scholars have advanced the original model, important variables that could influence individuals' behavioural intentions may still be missing. For example, in behavioural research domain, variables such as self-efficacy have been found to influence individuals' behavioural intentions (Bock, Zmud, Kim and Lee, 2005; Kankanhalli, Tan and Wei, 2005; Wasko and Faraj, 2005). In this study, three variables, namely self-efficacy, perceived barrier and relevance to job constructs which have been found to significantly influence behavioural intentions in other related research domain, were incorporated into the original TAM model (refer to Figure 2) to examine the context of teachers' intention to use computers in Ghana.

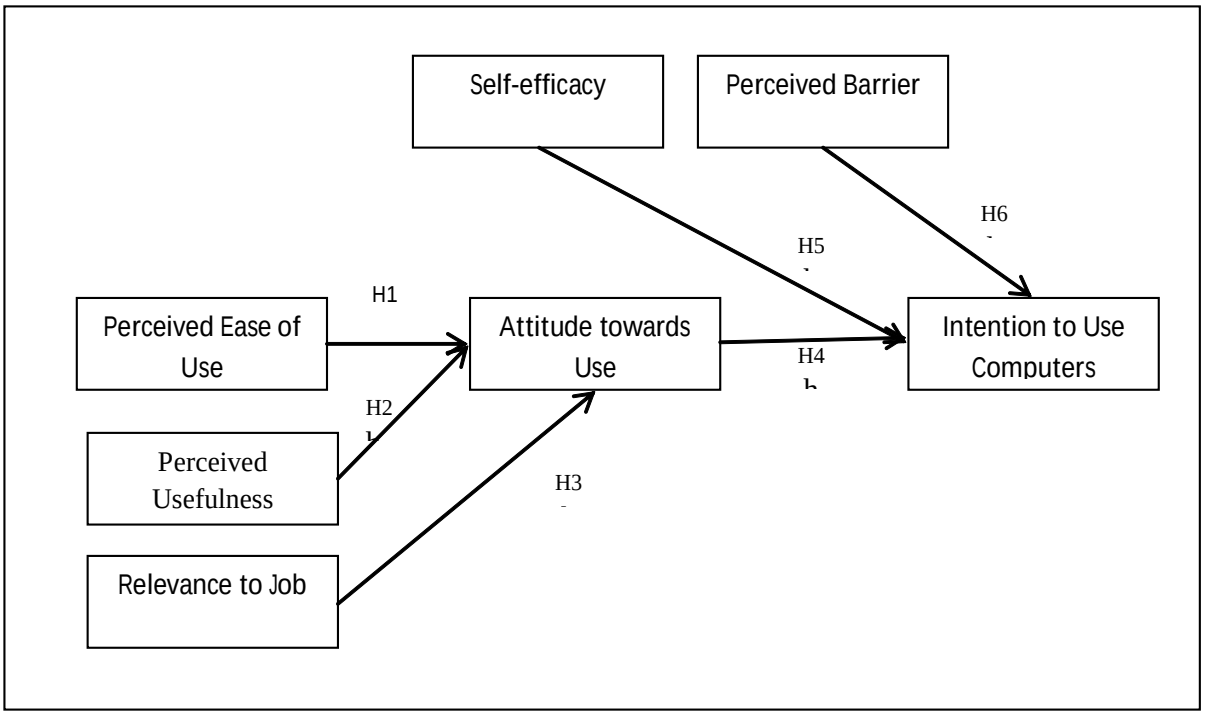

Figure 2: Research Model

Hypothesis Development

H_{o1}: *Perceived ease of use has a positive significant influence of teachers' attitude to use computer.*

According to Davis (1989), perceived ease of use can be defined as "the degree to which a person believes that using a particular system would be free of physical and mental effort". That is, the technology is free from difficulty and requires less effort to operate. For instance, the teacher may be influenced to use computer for teaching when he/she perceives the use of computer to be easy. However, in a situation where computer is perceived to be too difficult to use, teachers may resist using it for teaching. Therefore, a teacher may formulate a positive attitude to use computer when he/she perceives computer to be easy to use. Several studies have confirmed that perceived ease of use has an effect on individuals' attitude towards usage and behavioural intention (Šumak, Hericko, Pusnik, and Polancic, 2011; Teo, 2011; Wong and Teo, 2009). A research conducted by Wong and Teo (2009) concludes that perceived ease of use has a positive significant influence on individuals' attitude to use computer. Thus, the first hypothesis is stated as:

H_{o2}: *Perceived usefulness has a positive significant influence on teachers' attitude to use computer.*

With regard to perceived usefulness Davis et al. (1989), it is the degree to which a person believes that using a particular technology would enhance job performance. If a user believes that using a specific technology can enhance his or her job performance, then that application would be considered as useful. The individual would tend to use a system considering the positive effect that a particular system would have on his or her job performance. Davis (1989) argued that a person who perceives a certain technology to be useful could also consider the difficulty attached to using it. Users would change their minds only when the gain of using the system supersedes the difficulty of using it. Perceived usefulness can be considered as a type of external motivation as the benefit expected of using the system would propel the person to use or continue using the system (Davis, Bagozzi, and Warshaw, 1992). Teo et al. (2008) found perceived usefulness to have a significant influence on attitude towards computer use among pre-service teachers in Singapore. In another study, Teo (2009) concludes that perceived usefulness has an effect on the behavioural attitude which influence, the intention of teachers to use computer. Thus, the third hypothesis is stated as:

H_{o3}: *Job Relevance has a positive significant influence on teachers' attitude to use computer.*

This study has also incorporated the variable job relevance into TAM. Venkatesh and Davis (1996) defined job relevance as "an individual's perception regarding the degree to which the target system is applicable to his or her job". An individual who holds the belief that a particular system is applicable to his or her work may form a positive attitude towards the system. The relevance of the system towards the individual's work may motivate him or her to use the system. Essentially, it is based on the users' perception of the relevance of the system towards his or her job demand and the applicability of the system or technology (Ducey, 2013). A person may perceive technology to be relevant when he or she perceives that the system is used to perform most of the functions at work. Venkatesh and Davis (1996) posit that job relevance has a direct influence on individual's attitude to use a technology.

H_{o4}: *Attitude has a positive significant relationship with teachers' intentions to use computer.*

Ajzen and Fishbein (2005) defined attitude as the manner in which an individual responds to something or an object. It can also be defined as a person's positive or negative feelings toward taking certain actions (Ajzen, 1991). One's attitude towards an object could be positive or negative, as people may see things from different perspective. Sustainable use of any technology in the school would depend on the attitude of teachers towards that technology. If the teachers have negative attitude towards the computer, they are likely not to use it for teaching and learning. According to Yildrim (2000), it is difficult to see teachers with negative attitudes toward computers encouraging their students to use computers. Therefore, one can infer that the degree to which teachers would use computer for teaching and learning would depend on the attitude of teachers toward it (Liaw and Huang, 2003). A study conducted by Teo and Lee (2010) concluded that attitude of pre-service teachers has a positive significant influence on their intentions to use computer. In an earlier study, Teo (2009) had found attitude to have a positive significant effect on teachers' intentions to use computer. Therefore, this study argues that, individual teacher's favourable attitude would have a positive significant effect on his/her intention to use computer. Thus, the next hypothesis is stated as:

H_{o5}: *Self-efficacy has a positive significant influence on teachers' intentions to use computer.*

Self-efficacy, on the other hand, is peoples' judgment of their ability to undertake an action (Bandura, 1997). This is not about the skills one has but understanding of what one can do with the skills. This means that self-efficacy is the likelihood of a person's appraising himself/herself on whether an action will be executed successfully or not. Bandura (1997) postulates that individual's self-efficacy determination may influence the willingness of a person to perform certain

activities, such as the effort that may be applied on the activity and how long the behaviour would be performed. Clearly, the individual's willingness to accept technology may have a direct relevance to self-efficacy. In their study, Endres, Chowdhury and Alam (2007) argue that employees appraise their strength and their surroundings before they take action. Therefore, this study argues that teachers with a higher self-efficacy on computer usage may willingly accept the use of computer for teaching than those with low self-efficacy. Thus, the last hypothesis is proposed as follows:

H_6: *Perceived barrier has a negative significant influence on teachers' intentions to use computer.*

Perceived barrier variable can be defined as the degree to which a person may believe that something would hinder the use of a technology. In this study, perceived barrier is defined as the degree to which a person evaluates resources, accessibility, time, training, and technical problems to hinder the use of a technology. Individuals may want to use a particular technology or system but their intentions could be undermined when they perceive a certain barrier on the way. These barriers have been acknowledged in prior research (Flores, 2002; Earle, 2002; and Brinkerhoff, 2006). According to Jones (2004), teachers find it difficult to use computer for teaching due to lack of resource and accessibility, lack of time, inadequate training towards the use of the system, technical problems, and age of the teachers. In another study, Ertmer (1999) found lack of computers, lack of quality software, lack of time, technical problems, inadequate funds, resistance to change, poor administrative support, lack of computer skill, poor fit with curriculum, scheduling time and inconsistencies, and inadequate training affect individuals' intention to use computer for teaching and learning. In Ghana, a study conducted by Agyei and Voogt (2011) suggested that lack of knowledge about ways to integrate ICT in lesson and lack of training opportunities for ICT integration knowledge acquisition are some of the barriers hindering teachers from using computers in the classroom. In this study, we argue that perceived barrier may influence the intentions of teachers to use computer.

Methodology

A questionnaire was used as the instrument to collect the data. The questionnaire consists of part A and part B. Part A solicits the demographic characteristics of the respondents, which includes: age, gender, tenure, level of education and status. Part B consists of 35 Likert scale items that measure the study's variables. Five items were used to measure perceived usefulness, self-efficacy, perceived barrier and the dependent variable, such as intentions to use computer. Four items were used to measure perceived ease of use, while three items were used to measure job relevance.

In this study, intentions to use computer was operationalised as the perception or intentions of teachers to use computer at work. Perceived usefulness was operationalised as the degree to which a person believes that using a particular technology would enhance his or her job performance. Perceived ease of use was operationalised as the degree to which a person may believe that using a system would be less difficult. Attitude was operationalised as a person's positive and negative feeling towards using computer. Perceived barrier was operationalised as the extent to which a person believes that something may hinder his/her effort in using computer. Job relevance was operationalised as the extent to which a person believes using computer is relevant to his/her job. Self-efficacy is operationalised as the level of confidence of a person to use computer at work. The items used in measuring the constructs were adapted and modified from Davis et al. (1989), Taylor and Todd (1995), and Campeau and Higgins (1995). One hundred and eighty (180) copies of the questionnaire designed for this study were distributed to teachers from twenty (20) seniors' high schools from New Juabeng Municipality, Koforidua, Ghana from June 2015 to July 2015. One hundred and five (105) copies were collected and thus achieving at 58.3 percent response rate. The data was collected during an annual West African Examination Council (WAEC) script marking exercise at the Zone C of the Koforidua centre, Ghana.

Findings

Respondents' demographic profile (refer to Table 1) indicates that about 51 percent were male. The

majority of the respondents were aged between 20 and 29 years. The educational background of the respondents as depicted in Table 1 consisted of 2.9 percent with diploma, 79.1 per cent with a bachelor's degree, 16 per cent with Master's degree, and 2.9 per cent with PhD. In relation to the length of service, about 23.8 per cent had served 1-2 years; 36.2 per cent 2-3 years; 20 per cent 4-6 years; and 20 per cent 7 years and above.

Table 1: Demographic Profiles (N=105)

Demography	Category	Frequency	Percentage
Gender	*Male*	*54*	*51.4*
	Female	46	48.6
Age	20-29	59	58.2
	30-39	28	26.7
	40-49	10	9.5
	50-59	08	6.7
Education	Diploma	04	3.8
	Bachelors	82	78.1
	Master's	16	15.2
	PhD	3	2.9
Tenure	0-1 year	25	23.8
	2-3 years	38	36.2
	4-6 years	21	20.0
	> 7years	21	20.0

Measurement Model

In this study, structural equation modelling (SEM) approach using Smart PLS statistical software (Ringle et al., 2005) was employed to test the hypotheses. Before the final analysis was conducted, the data collected were subjected to convergent and discriminant validity analysis. Factor loadings, composite reliability and average variance extracted were examined to assess the convergence validity. The convergent validity was performed to evaluate the degree of relatedness of the items measuring the same concept (see Table 2). The loadings for all items (except two items, i.e., SE12 and IUC1) exceeded the recommended value of 0.6 (Chin, Gopal and Salisbury, 1997). Although items SE12 and IUC1 were below 0.6, they were maintained in the analysis because their average variance extract (AVE) was satisfactory (Hair, Black, Babin and Anderson, 2010). Composite reliability values, which showed the degree to which the items indicated the latent construct, exceeded the recommended value of 0.7 (Hair et al., 2010). The average variance extracted is in the range of 0.507 and 0.684, which is also exceeded the recommended value of 0.5 (Hair et al., 2010).

Next, the discriminant validity was conducted to confirm that the constructs are not correlated. Discriminant validity is a measure to determine that a construct does not reflect another construct within the same framework, and it is determined through the calculation of the square root of AVE (Fornell and Larcke, 1981). The square root of AVE results indicated low correlations among the constructs (see Table 3). Thus, the overall measurement model demonstrated adequate convergent and discriminant validity.

Table 2: Factor Loadings and Reliability

Construct	Items	Loading	CR	AVE
Intention to Use Computer	IUC1	0.480	0.837	0.573
	IUC2	0.874		
	IUC3	0.808		
	IUC4	0.802		
Attitude	PA16	0.679	0.853	0.594
	PA17	0.748		
	PA18	0.804		
	PA19	0.843		
Perceived Barrier	PB20	0.946	0.841	0.643
	PB21	0.685		
	PB22	0.751		
Perceived Ease of Use	PEU16	0.865	0.896	0.684
	PEU17	0.867		
	PEU18	0.861		
	PEU19	0.703		
Perceived Usefulness	PU6	0.808	0.886	0.609
	PU7	0.815		
	PU8	0.774		
	PU9	0.816		
	PU10	0.681		
Relevance to Job	RJ16	0.840	0.887	0.663
	RJ17	0.867		
	RJ18	0.773		
	RJ19	0.773		
Self-Efficacy	SE11	0.849	0.798	0.507
	SE12	0.504		
	SE14	0.816		
	SE15	0.623		

Note: CR = Composite reliability, AVE = Average Variance Extracted

Table 3: Inter-construct Correlation

Construct	1	2	3	4	5	6	7
Intention to Use Computer	**0.757**						
Attitude	0.517	**0.771**					
Perceived Barrier	-0.176	0.045	**0.802**				
Perceived Ease of Use	0.536	0.531	-0.032	**0.827**			
Perceived Usefulness	0.390	0.487	0.148	0.351	**0.780**		
Job Relevance	0.489	0.534	0.183	0.555	0.612	**0.814**	
Self-Efficacy	0.258	0.353	0.262	0.472	0.227	0.385	**0.712**

Note: Diagonal elements are the square root of the AVE score.

Structural Model

The structural model, which includes the estimates of the path coefficients and the R^2 value, determines the predictive power of the model (Sang, Lee and Lee, 2010). The R^2 path coefficients indicate how well the data support the hypothesised model (Chin, 1998; Sang *et al*., 2010). Table 4 and Fig. 3 show the results of the structural model from the PLS output. Perceived ease of use ($\beta = 0.335$, $p < 0.05$), perceived usefulness ($\beta = 0.250$, $p < 0.05$), and relevance to job ($= 0.195$, $p < 0.05$) were significant and positively related to attitude, thus supporting H1, H2 and H3 of this study. Furthermore, both attitude ($\beta = 0.474$, $p < 0.05$) and perceived barrier ($\beta = -0.237$, $p < 0.05$) were significantly related to intention to use computer, explaining 32.6 % of the variance therefore supporting H4 and H6. However, self-efficacy was not a significant predictor of intention to use computer, thus H5 was not supported.

Table 4: Summary of the Structural Model

Hypotheses	Path coefficient	Path Error	Standard	t-value	Results
H1	Perceived Ease of Use -> Attitude	0.335	0.1111	3.014	Supported
H2	Perceived Usefulness -> Attitude	0.250	0.0993	2.521	Supported
H3	Relevance to Job -> Attitude	0.195	0.1138	1.709	Supported
H4	Attitude -> Intention	0.474	0.0875	5.418	Supported
H5	Self-Efficacy -> Intentions	0.153	0.1522	1.005	Not Supported
H6	Perceived Barrier -> Intention	-0.237	0.1123	2.110	Supported

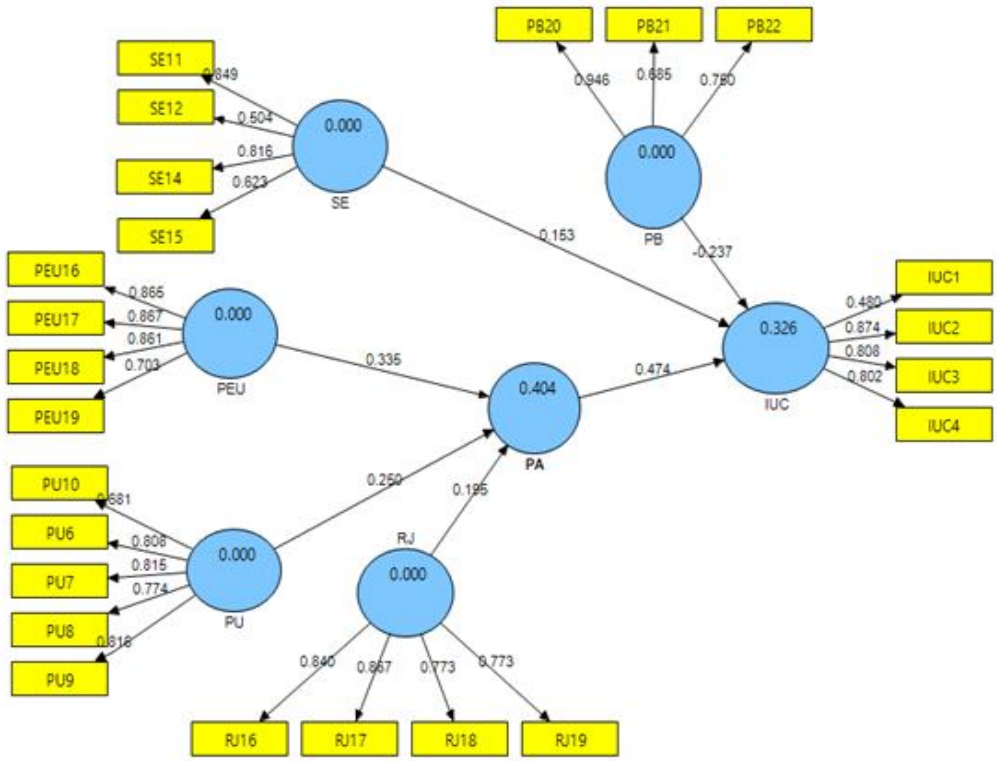

Figure 3: The Structural Model

Note: IUC=Intentions to use computer; PA= Attitude; PB=Perceived barrier; PEU= Perceived ease of use; PU= Perceived usefulness; RJ= Relevance to job; SE=Self-efficacy

Discussion and Implications

This study investigates the extent to which perceived usefulness, perceived ease of use and relevance to job have an influence on teachers' attitude to use computer for teaching. In addition, the study further examines the effect of attitude, self-efficacy and perceived barrier on teachers' intention to use computer for teaching. The study found relevance to job, perceived usefulness, and perceived ease of use to had a positive significant influence on teachers' attitude to use computer. The study also found that perceived barrier and relevance to job had a positive significant influence on teachers' intention to use computer. These results are congruent to prior studies (see Teo, 2009; Teo and Lee, 2010; Davis *et al.*, 1989; Venkatesh and Davis, 1996).

Interestingly, the result shows that self-efficacy was not significant in influencing teachers' intention to use computer for teaching. This result is contrary to the work of many researchers who had found positive significant relationship between the variables (Anderson and Maninger, 2007; Teo, 2009; Zhao, 2009, Sang *et al.*, 2010). Self-efficacy, not having significant relationship with behavioural intention could be attributed to the fact that, the respondents who are senior high school teachers from Ghana even though, may have their own personal computers at home they may execute their teaching tasks such as note taking, assignments, students attendants, marking, and results collating manually. Therefore, they could not vividly determine their confident level of how they could use computer to do their job. This result could also be attributed to the fact that most schools had no computers for the teachers to use and even if they had, teachers were usually not trained on computer proficiency. This is evidential in a study conducted by Agyeman (2012) to examine "the intentions of Ghanaian teachers to use the computer in teaching mathematics" which concluded that most teachers in Ghana did not use computer in the classrooms.

The findings of the study show that perceived ease of use had an influence on teachers' attitude to use computer for teaching and learning. This implies that teachers' attitude to use computer would be influenced if they found the use of computer to be easy. Therefore, it is suggested that administrators, governments and stakeholders should implement the necessary training programmes to enhance teachers' proficiency in computer use. Also, the study found perceived usefulness to have influence on teachers' attitude to use the computer. This implies that teachers' attitude to use the computer would be influenced when they perceive computer to be useful for their job. Hence, we further suggest that governments and managers should provide teachers with computers for practical and modern teaching. In addition, the study found perceived barriers to have a negative influence on teachers' intention to use the computer. This implies that certain obstacles such as lack of laboratory, faulty computer with no maintenance, lack of technical knowhow could prevent teachers from using computers for teaching. Therefore, we suggest that educational policymakers and other stakeholders should make sure all perceived obstacles are solved to motivate teachers in using computer for teaching.

In the effort to motivate and implement computer usage for teaching in Ghana, specifically the senior secondary schools, there is a need for more intriguing interventions than just mere supply of computers to the schools. It was evident in this study that teachers' attitude has an influence on their behavioural intentions to use computers at school. They are used to chalk and blackboard for teaching since their training colleges era. Therefore, the act of transforming from what they have been taught in manual to digital is not an easy task for them - hence the resistance to the use of computers for teaching. This means that the implementation of ICT into teaching in Ghana should start with attitudinal change and mental preparedness since the teachers are stuck with their old ways of teaching methods. In this situation, teachers should be trained on the use of computer for teaching, particularly those in senior secondary schools. To further achieve this target, the teaching environment should be supported with computers for the teachers to have no excuse in using the computers for teaching.

Conclusion

The study has achieved its main objectives of examining the effects of attitude, perceived barrier and self-efficacy on intention of teachers to use computer. In addition, the study investigated the effect of perceived ease of use, perceived usefulness and relevance to job on attitude of teachers to use computer for teaching . The results indicated that attitude was positively and significantly related to teachers' intention to use computer. Perceived barrier was also found to have a negative significant influence on teachers' intention to use computer. Moreover, the study found perceived usefulness, perceived ease of use and relevance to job to have positive significant influence on teachers' intentions to use computer for classroom teaching. However, the result of the study shows that self-efficacy did not significantly influence teachers' intention to use the computer for teaching. Based on the findings, implications for practice and theory, limitation, and future research were presented.

Limitation and Future Research

Similar to other studies, this study is not without limitations. The major limitation is the generalisation of the findings due to the small sample size. Although the sample frame used for this study may be unique but the total number of respondents from which data was collected and utilised for this study was limited. Hence, the results may not provide the general representative of the Ghanaian teachers. Future studies may consider collecting data from a larger sample size of teachers in other geographical areas especially in the capital city.

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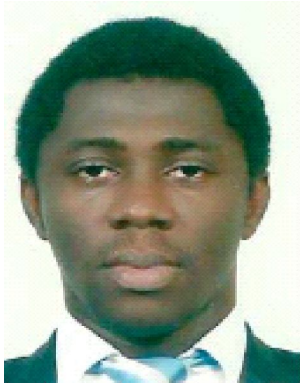

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Library and Information Science Education and Training and Employability Skills in Zimbabwe

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Abstract

The study addresses the question why library and information science education and training programmes are purportedly reproached for not producing industry ready graduates. The population of the study included five deans/ heads of departments (Deans/HODs), forty-seven LIS faculty and 17 LIS practitioners. A census was done for the Deans/HODs and LIS faculty. Seventeen LIS employers were purposively selected. The Deans/HODs and LIS employers were interviewed, and LIS faculty were given a survey questionnaire to complete. The findings suggest that it is not the goal of LIS education and training to produce industry ready graduates but to inculcate a general professional foundation applicable in diverse information environments. The alleged reproach that LIS graduates are inadequately prepared for their roles was attributed to inadequacies in the requisite resources (funding, policy and regulatory frameworks, equipment, human capital, and ICT infrastructure) needed to develop the required skills in graduates. The study recommended that LIS education and training programmes build mutual linkages with practitioners and devise mechanisms and strategies to understand, envision, inform and respond to the changes taking place in the wider community and the LIS field.

Keywords: LIS education, LIS training, Library science, LIS employability skills, Zimbabwe.

Introduction

The principles, nature, structure, mission, practice and services of the library and information science (LIS) field have been fundamentally transformed because of the impact of information and communication technology (Mckendrick, 2012). Campbell (2006), Whalen and Costello (2002) assert that the ubiquitous nature of information, and communication technology environment have compelled LIS professionals to extend their presence to reach cyberspace through:

- collaborating and linking local libraries at the regional, national and global levels;
- placing full content of institutional scholarly resources online for public access;
- publishing information about the library and archival resources;
- creating vibrant and interactive library websites that link the library holdings and its users;
- placing finding aids online;
- creating online Information Literacy Skills (ILS) tutorials; and
- offering reference services via emails, text messaging and mobile interfaces.

LIS professionals have become "system designers, knowledge managers, web designers and

administrators, educators, problem solvers, navigators and publishers" (Huckle and Watson, 2007 and Campbell, 2006); technology officers, project managers, data administrators, data curators, data modellers, data architects, web librarians, digital librarians, cyber librarians, information scientists, and knowledge analysts (Ugwuanyi and Ezema 2010).

The changing roles and the work environments in the information industry signify that LIS professional practice has evolved from a narrow 'Bibli' or book centred focus to 'information transfer and ICTs have become enablers' of professional tasks. This has brought major structural changes that have transformed long standing set of practices, definitions, technologies, standards, tasks, principles, skills sets and core competencies required in the LIS community of practice. The changes have brought serious concerns about disciplinary core knowledge in LIS curricula (Lewis, 2010) and created a major misalignment on supply and demand.

Background to the Study

LIS education and training programmes in Zimbabwe are offered in five public Higher Education Institutions (HEIs). These include three polytechnics (Harare, Bulawayo and Joshua Mqabuko Nkomo) and two universities: namely National University of Science and Technology (NUST) and Zimbabwe Open University (ZOU). Polytechnics offer three levels of qualifications (Hikwa, 2010), namely: the National Certificate (NC) in Library and Information Science (a one-year long programme that prepares candidates for basic assistance in library and information practice), the National Diploma (ND) in Library and Information Science (a three-year long programme that prepares candidates for paraprofessional engagement in library and information practice), and the Higher National Diploma (HND) in Library and Information Science (a year-long programme) that prepares candidates for all kinds of semi-professional work in library and information practice.

NUST offers three levels of qualifications that include (Hikwa, 2010) a Bachelor of Science Honours Degree in Library and Information Science (a four-year long programme that prepares candidates for professional work), postgraduate diploma (an 18-month programme that prepares graduates who wish to join the LIS profession, having acquired a first honours degree in other disciplines), a Master of Science degree in Library Science (a two-year programme that prepares candidates for managerial work or teaching), and a doctor of philosophy degree in LIS (a three to five year programme that prepares LIS administrators, academics and researchers). Zimbabwe Open University (ZOU) offers one level of qualifications that is a Bachelor of Science Honours Degree in Library and Information Science (a four-year long programme that prepares candidates for professional work) and currently it is preparing to launch a Master of Science degree in Library Science.

Munyoro (2014) in her study on LIS education and training programmes in Zimbabwe found that institutions offering LIS have integrated ICTs related competences and generic skills in their curricula in response to perceived environmental needs. However, LIS practitioners consider the curricula to have too many gaps in knowledge and employability skills which need to be addressed through continuous curricula reforms (Chikonzo, 2013). Furthermore, Chikonzo (2013) findings show that the LIS curricula were mostly theoretical in nature with limited application in the contemporary LIS work environments. This finding was substantiated by Munyoro (2014) who found that the LIS curricula were dated and limited in application to the work environment. Munyoro concluded that the inadequacies in funding, ICT infrastructure and connectivity, teaching and learning resources, skills, regulatory and policy framework, as well as lack of support from leadership and lack of deep rooted curricula changes have misaligned LIS education and training to the work environments (Munyoro, 2014).

Statement of the Problem

Findings from a series of empirical studies have shown that LIS graduates are often reproached for being inadequately prepared for their jobs. In Australia, a study by Anderson (2007) shows that LIS graduates were not 'work ready'. In America, Moran and Marchionini (2012) study confirmed the claim that LIS education and training programmes have been reproached for failing to meet the immediate needs and requirements of the current LIS work environments. Kavulya (2007) in Kenya also

reaffirmed the frequently noted concerns among employers that LIS graduates were not well suited or prepared for the job market. Munyoro (2014) findings in Zimbabwe corroborated the assertions in literature that LIS graduates were inadequately trained for the contemporary work environments.

The purported reproach that LIS graduates were inadequately prepared for their roles, though a global concern that is also highly debated in scholarly discourse, has remained under-researched topic. This study therefore sought to address the following research questions:

1. What competencies are encapsulated in LIS curricula in Zimbabwe?
2. What LIS skills are needed by the information industry in Zimbabwe?
3. What human and physical resources are available for delivering LIS curricula in Zimbabwe?

Literature Review

The American Library Association (ALA) commissioned Kellogg-ALISE Information Profession and Education Reform Project (KALIPER) to examine the state of library and information science education in America (KALIPER Report, 2000). The KALIPER study found that LIS education had transformed, in response to the demands of the information society and technological developments (KALIPER Report, 2000). Six major trends in LIS education were identified:

(1) LIS professional education was focusing on broad-based information environments and information problems;

(2) Diverse multi-disciplinary perspectives have been incorporated in the curricula;

(3) Educational programmes have become predominantly user-centred;

(4) Heavy investments in ICT infrastructure and infusion of ICT in LIS curricula were observable;

(5) Specialised components have been integrated within the LIS curriculum; and

(6) LIS students were provided with flexible options of study and ICT related degrees at undergraduate, master and doctoral levels have been introduced (Durrance, 2004).

Tam, Harvey and Mills (2007) in Asia conducted a Delphi study in Hong Kong and China analysing the core competencies and generic personal qualities of LIS curricula in the region. The study found that curriculum content of LIS programmes in Hong Kong and China was focused in the following areas: "Information service skills, research and analytical skills, communication skills, collection development skills, management skills, subject knowledge and information services organisation skills as well as employability skills and personal qualities. Employability skills were listed as willingness to learn and continue to learn, flexibility, creativity, innovative, change, awareness of wider professional issues, ability to conceptualize, people oriented, collaborative partnership, ability to learn from others and teamwork" (Tam and Mills, 2006).

In Africa, a study by Shiholo (1999) revealed a high rating for competency in information technology and management. The study found that LIS programmes focus on knowledge of automation activities, networking, databases, online searching, and systems development, computer technology, indigenous knowledge systems, introductory courses in Information and Communication Technologies (ICTs), management of information and knowledge management. The diversity and transdisciplinary nature of the competencies encapsulated in LIS curricula globally shows that LIS educational programmes have adopted a general model of education. Hazeri, Martin and Sarrafzadeh (2009) praised this educational approach, stating that the education of LIS professional has transcended traditional boundaries to include wider professional horizons. This suggests that LIS education programmes have discarded the discipline-specific model of education and adopted a more liberal and general education model.

SCANS Report for America (2000) asserts that the advanced technological advancements in the LIS environment require a behaviour and orientation towards work that goes beyond step-by-step task performance to include:

(1) interpersonal skills: ability to participate as a team member, train others, service clients, exercise leadership, negotiate and work with diversity; (2) information skills: ability to acquire, evaluate and add value to information; (3) technology skills: select technology, apply technology to tasks, maintain and trouble shoot equipment; (4) systems skills: understand systems, improve or design systems, monitor and correct performance; (5) resources skills: identify, organise, plan and allocate resources; (6) personal attributes: self-esteem, sociability, self-management, integrity, honest; (7) thinking skills: thinking creatively, making decisions, solving problems, visualizsng, knowing how to learn and reason (8) basic skills: reading, writing, performing arithmetic and mathematical operations, listening and communication.

The employability skills and attributes listed in the SCANS Report for America (2000) suggest that job-specific technical skills in a given field are no longer sufficient for work environments. Most of the skills valued in contemporary work environments are outside the boundaries of "what a university education all-too-often provides" (Barber, Donnelly and Rizvi 2013:12). This prompted Kennan, Willard and Wilson (2006) to declare that the LIS employment landscape has become highly variable and heterogeneous, resulting in a vague set of skills which employers seem to value. Bhasin (2012) noted that the most important resource for any industry is its human resource, and the most essential attributes of the workforce are its competencies. He suggests that the effectiveness and viability of LIS education and training programmes is dependent on the competencies of its faculty.

Besides skills, effective curricula delivery needs to be supported by adequate and sustainable human, physical and technological resources (Van der Linde and Braak, 2011). Ely (1993) confirms this, asserting that education systems that are not adequately supported by resources such as hardware, software, money, and highly competent human resources cannot take off let alone be successful. This was also substantiated in Singh and Wijetunge (2006) study which found that most higher education institutions (HEIs) in developing nations are resource starved.

McLeod (2012) asserted that a well-developed information infrastructure is a major foundation base for the development of ICT related competencies and skills. Minishi-Majanja (2004) in her study found that LIS schools in Sub-Saharan Africa need to invest heavily in ICT infrastructure to facilitate the transfer of ICT competencies and skills in graduates. Aswalap (2005) suggests that a country needs to be e-ready to effectively develop ICTs competencies and skills in its citizenry in terms of ICT infrastructure, policies and regulatory frameworks, and human capital base. Chakraborty and Sarkhel (2009) assert that most HEIs lack strong educational infrastructure that can facilitate the development of highly skilled human capital base.

Methodology

The study was informed by the post positivist paradigm combining qualitative and quantitative methodologies. The qualitative methodology was dominant over the quantitative. The study also used a survey design within a case study (Creswell, 2009). The holistic units of analysis were institutions offering LIS education and training that included: NUST, ZOU, Harare, Bulawayo and Joshua Nqabuko Nkomo Polytechnics. The population of study comprised key stakeholder groups in LIS education and training including LIS academic faculty, Deans/ HODs, and LIS employers (major libraries). These groups were targeted due to their expertise, authority, experience, responsibilities and interest in the problem under study (Pickard, 2007). According to the NUST website, the LIS department had fifteen faculty while the ZOU website stated that the LIS department had ten faculty (NUST, 2012 and ZOU, 2012). The prospectuses of Harare, Bulawayo and Joshua Nqabuko Nkomo polytechnic colleges stated that the staff establishment of the LIS department at Harare Polytechnic was ten; Bulawayo, eight; and Joshua Nqabuko Nkomo, four (Harare 2007; Bulawayo 2013 and Joshua Nqabuko Nkomo, 2009). The total population of LIS academics at the time of study was forty- seven. There were five Deans/HODs heading the LIS departments.

The list of LIS employers in Zimbabwe was provided by the Zimbabwe Library Association (ZimLA). LIS major employers comprised twelve university libraries, two special libraries (United States

Information Services (USIS) and the British Council Library), one national library (represented by the National Archives of Zimbabwe), two public libraries (Harare City Libraries and Bulawayo City Libraries). The total number of libraries selected as major employers of LIS professionals was seventeen. The population of the study is summarized in Table 1.

Table 1: Population of the Study

Institutions	Deans and HODs	Faculty	LIS Employers
National University of Science and Technology	1	15	
Zimbabwe Open University	1	10	
Harare Polytechnic College	1	10	
Bulawayo Polytechnic College	1	08	
Joshua Nqabuko Nkomo Polytechnic College	1	04	
Major LIS employers (ZimLA)			17
Total	5	47	17

Seventeen LIS employers were purposively selected because the number of major LIS employers in Zimbabwe cannot be easily determined. Babbie (2005) and Burns and Grove (2005) recommend that in large scale surveys where the elements are not easily determined the use of the purposive sampling technique is considered appropriate. A census was done of LIS faculty (47) and Deans/HODs (5). Israel (2009) recommended this approach, noting that it is advisable to conduct a census for a small population as it eliminates sampling error, achieves desirable levels of precision and provides data on all the individuals in the population. The relative sample population of respondents is summarised in Table 2.

Table 2: Relative Sample of Respondents

Targeted respondents	Total Population	Sample Population	Sampling Method used
Deans/HODs	5	5	Census population
LIS Academic Faculty	47	47	Census population
Major LIS Employers	17	17	Purposive

A total of 22 respondents (five Deans/HODs and seventeen LIS employers) were interviewed, and 47 LIS faculty were surveyed using questionnaires. In-depth face-to-face interviews were used. Open-ended questions were utilised to enable the respondents to respond in their own words (Whittemore and Grey, 2006). A survey questionnaire enabled the researcher to collect anonymous and confidential data cheaply from a large and geographically dispersed population and also enabled the researcher to gather responses in a standardised manner (Pickard, 2007). Data was collected for a period of five months (April to August 2014). SPSS 20 and NVivo 10 were used to compute and analyse the data.

Findings and Discussion

On the question, “What competencies are encapsulated in the LIS curricula?” the findings revealed nine broad competencies: foundational or core, technological, business/managerial, communication and community services, "work place competencies and interpersonal skills, legal framework for practice, practicum, research, and specialized competencies.

The findings validate Boll's (1972) assertion that LIS professional knowledge is continuously enlarging making it practically impossible to devise a curriculum. The continuous changes in LIS curricula prompted Raju (2005) to query “whether it is practical for LIS departments to teach all that has to be taught”. Stilwell (2004) argues that "no single department is likely to have the capacity to span the full spectrum of programmes required". This suggests that LIS education and training programmes lack the capacity to meet perceived environmental demands, and this might be attributed to the widely held view that LIS graduates are inadequately prepared for their roles.

The findings corroborate Raju's (2005) assertions that new skills are required in LIS work environments as new technologies are released in the market. The findings also confirm Minishi-Majanja's (2009) claim that "there continues to grow a diversity of fields that are considered as core competencies, which when pitched against the need for market-ready graduates, make the task of preparing a curriculum difficult".

The findings further revealed that there was no standardised approach to ICT integration in LIS curricula in terms curricula content, breadth and depth of ICT modules, available ICT resources and faculty ICT competencies. This finding can be attributed to lack of a formal and established ICT policy and regulatory framework that fosters the integration of ICTs in education and training in Zimbabwe. Isaacs (2007) noted that policy and regulatory frameworks on ICT use in education provide specification and guidelines, as well as standards and frameworks for ICT integration in the curricula.

The findings also revealed that the employability skills in the LIS curricula are not homogeneous across LIS schools in Zimbabwe. Furthermore, the competencies integrated in the LIS curricula were dissimilar to those demanded in work environments. Archer and Davison (2008) in their study found that "there is a contrast between what some universities are promoting and what is required by industry". The findings suggest lack of a common conceptual framework that can be used by both HEIs and industry to define and assess employability skills in Zimbabwe.

The findings revealed disparities in the employability competencies integrated in LIS curricula in Zimbabwe. The findings were corroborated by Knight (2011) in Australia when she states that:

> … although there has been a publicly expressed consensus for the need to embed employability skills within HE, the methods of ensuring that students gain these skills through their discipline-based degrees are neither clear nor easy.

The findings suggest lack of a national educational policy and regulatory framework on the development of employability skills in Zimbabwe. This finding signifies the need to foster a collective response to the development of employability skills in HEIs in Zimbabwe.

Competencies Needed in LIS Work Environment in Zimbabwe

LIS employers were asked to answer the question: What skills are required of LIS professionals in the contemporary workplace? The findings revealed that a combination of knowledge and applied skills were perceived to be critical for LIS graduates. The views of LIS employers are indicated by their varying perspectives, needs and preferences. The majority (11 out of 17) of LIS employers emphasised ICTs and their applications. A senior university librarian noted:

> We need graduates with knowledge of ICTs and their applications. Competencies in virtual research environments, open access, programming, software development, social media, ability to use and apply information technology in library

> operations, ability to compare, evaluate, select technologies and software, ability to translate print based services to electronic services, web designing and administration, networking and consortia management as well as trouble shooting and system diagnosis.

A significant number (9 out of 17) of LIS employers emphasised employability skills. An experienced university librarian highlighted:

> ...We need LIS professional able to communicate and train or teach, able to work as a team, negotiate, work with diversity, willing to continuously change, able to work under pressure, and someone who is honest and sociable.

Similarly, 5 out of 17 respondents cited project management as a required competency. This view was highlighted by another librarian who noted,

> We are running most of our functions and activities such as library automation, web design and administration, and digitisation as projects. We need LIS professionals with project management skills, able to design business plans, evaluate projects, source funding, negotiate, advocate, and manage funds and human resources. These professionals should also be motivators, team players, time conscious and committed to the profession and continuous learning.

A library director in a specialised public library identified another set of competencies. These are training, copy cataloguing, knowledge management, Resource Description and Access (RDA), licensing and quality control, noting:

> ... We require LIS graduates with competencies in training/teaching, Information Literacy Skills (ILS), knowledge management (to manage institutional repositories), knowledge of Resource Description and Access (RDA), copy cataloguing skills, quality control competencies, licensing and negotiation skills with database vendors and publishers.

The findings suggest that LIS work environments are demanding graduates with a profile of knowledge, skills and attitudes that include, but go beyond, the disciplinary expertise or technical knowledge that traditionally formed the core of most LIS curricula. A similar study by Barber, Donnelly and Rizvi (2013) also found that the skills and competencies required in contemporary work environments in America were outside the boundaries of "what a university education all-too-often provides".

A study by Kennan, Willard and Wilson (2006) found that the LIS employment landscape has become highly variable and heterogeneous, resulting in a vague set of skills which employers are demanding. This finding highlights the question posed by Raju (2005) "whether it will continue to be practical or desirable for a single institution to provide education and training for all types of work settings?" NIACE (1998), in similar vein observes that particular aptitudes, values and personal attributes valued in contemporary work environments are highly contextual and must be learned on the job.

The differences in the competencies encapsulated in the LIS curricula and those required in the labour market suggest power dynamics between LIS faculty and LIS employers. This signifies struggle for control of LIS education and training products and educational processes between educators and industry. This view is also shared by Becher and Torowler (2001) when they assert that conflicts concerning industry and HEIs symbolize power dynamics in terms of who defines what counts as useful core competences and whose discourse achieve dominance". Longhurst (2007) asserts that employers are dissatisfied with the existing practice whereby academics devise degree schemes and offer these to the market with little or token input from industry.

Resources Needed for Curriculum Delivery in LIS Education and Training

LIS education and training faculty were asked to establish the resources integral to delivering LIS

curricula. The findings point to human expertise, infrastructure, equipment, funding, up to date curricula, policies and regulatory frameworks, quality cohort of students and information resources as essential for delivering LIS curricula. The findings are presented in Figure 1.

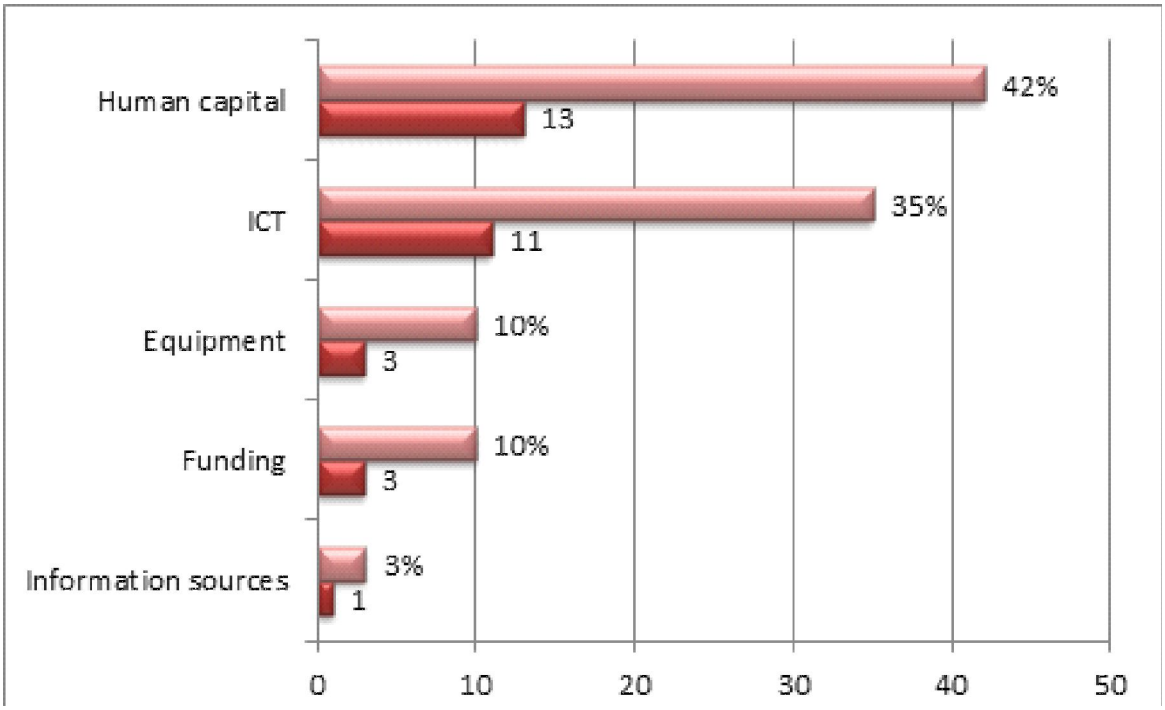

Figure 1: Resources for delivering LIS curricula (N=31)

Results in figure 1 show that 13 (42%) of respondents specified human capital; 11 (35%) noted infrastructure; 3 (10%) itemised equipment; 3 (10%) listed funding; and 1 (3%) identified both print and digital information resources as integral for delivering LIS curricula. A senior lecturer commented on the question of human expertise stating that, "… skills, the right skills are integral for delivering LIS education curricula". One lecturer remarked on the scarcity of highly qualified LIS faculty noting that:

> …there is need for highly qualified LIS faculty competent in ICT, research and inter-disciplinary knowledge … but we are experiencing shortages of highly qualified LIS staff due to brain drain.

The Southern African Regional Universities Association (SARUA, 2010) study reported that universities in Zimbabwe were understaffed as a result of brain drain. The study further pointed out that HEIs in the country were unable to attract highly qualified and experienced faculty because of poor working conditions, lack of robust research and low remuneration. Many highly qualified and experienced academics were forced to leave the country for greener pastures. Bhasin (2012) points out that the effectiveness and the utility of LIS education programmes largely depend on the expertise of the teaching staff and their availability.

Nearly 35% of the respondents identified ICT infrastructure as a key component in delivering LIS curriculum. However, these respondents presented diverse views on what constitute infrastructure. One lecturer identified telecommunication as an essential infrastructure. She stated that:

> …telecommunication systems are essential for delivering LIS curriculum, however, these are not widely spread as there are areas in Zimbabwe where access to telecommunication is impossible and the postal system is very poor. This makes the delivery of distance education very difficult.

Internet connectivity was noted as a vital ICT infrastructure needed for delivering LIS curriculum. A junior lecturer raised the need of sustainable internet connectivity, stating:

> … Internet connectivity is crucial in the contemporary digital environment for the delivery of LIS curriculum however, connectivity is very poor here due to limited bandwidth and at times we experience down turns and electricity outages.

Another academic further identified computer laboratories as a necessary fundamental ICT infrastructure needed for the delivery of LIS curriculum and remarked that:

> …well equipped computer laboratories are critical for the delivery of LIS curricula. However, our computer laboratories are few and not well equipped. For example in our Bulawayo region the computer student ratio is 1:90.

Brown (2008) and Rosenberg (2007) emphasised that successful implementation of technological innovations requires supportive infrastructure. Rosenberg (2007) further contends that the state and the level of a country's e-readiness in terms of infrastructural and capacity development are important determinants of the adoption and use of ICT in its educational system. The World Economic Forum (2013) found Zimbabwe as having low levels of e-readiness.

Adams (2003) claims that the problem of underdeveloped ICT infrastructure is a major problem in most African countries. He attributed the problem to underfunding, lack of commitment and political will, and lack of perceived need to develop ICT infrastructure. Adams (2003) states that most HEIs have been experiencing major budget deficits and cannot afford to invest in the requisite physical and ICT infrastructure. Adams (2003) attributes the poor ICT infrastructure in HEIs in Africa to the exorbitant initial costs required to put ICT infrastructure in place. Hall and Khan (2002) observed that without the requisite ICT infrastructure, inculcating ICTs competencies in HE graduates becomes a mammoth task.

About 10% of LIS faculty noted equipment as an important resource for delivering LIS curricula. A senior lecturer stated:

> …We need equipment such as overhead projectors, printers, microphone, television, videos, Power Point projectors, laptops and other peripherals to help us effectively deliver LIS curricula.

Another lecturer indicated the need for relevant software, suggesting that:

> …relevant software … we are struggling to purchase or buy licenses and we end up relying on Free and Open Sources Software's (FOSS) like CDSIS which no longer speaks to the current situation. We want relevant and applicable software's in teaching.

Rosenberg (2000) found that there was a general lack of teaching and learning equipment in HEIs in Africa. The SARUA (2010) in a similar study confirmed that HEIs lacked access to basic educational resource essential for teaching and learning.

Ten percent (10%) of LIS faculty suggested funding as an essential resource for delivering LIS curricula. The different faculty perspectives on funding were summarized by a lecturer, who stated:

> … Funding is of paramount importance for delivering LIS curriculum. We need funds to procure essential equipment and rehabilitate dilapidated infrastructure and complete ongoing building projects, reengineer the curricula, retrain or retool our faculty, and fund research. Without funds it becomes a challenge to balance educational strategies with economic realities…

Minishi-Majanja (2004) reported that the rapid pace and transient nature of the changes in the wide society, and the LIS field require sustained funding. SARUA (2010) confirmed that financial resources in HEIs are insufficient to sustain teaching, learning, research, infrastructural investments, human capital

development and for effective operations. HEIs in Zimbabwe have been experiencing declining government funding and have resorted to alternative means of funding for survival. Many of them have resorted to donor communities for support (Isaacs, 2007). However, due to prevailing political conditions and imposed sanctions in the country, most donors have withdrawn funding in protest at the human rights abuse by the current government (SARUA, 2010).

About 3% of the participants indicated that information resources were important. A lecturer stated that:

> … We have libraries …due to budget cuts, we can no longer afford to stock current materials and subscribe to certain journals, although our library is a member of the Zimbabwe University Libraries Consortium (ZULC) which subscribes to several databases such as EBSCO host, Emerald, JSTOR… We also have access to e-journals through Programme for the Enhancement of Research Information (PERI).

Rosenberg (2007) noted that there was a general lack of teaching and learning materials in Africa. SARUA (2010) reported that teaching and learning capacity in HEIs is further eroded by inadequate library resources, lack of full access to digital resources and lack of robust institutional repositories. The report further stated that currently the student and information resource ratio at Midlands State University in Zimbabwe is 20:1 as opposed to a desired ratio of 3:1.

An up-to- date and relevant curriculum was cited as an important resource for delivering LIS curricula. A dean noted that "A relevant and up-to-date curriculum is indispensable". The dean's response implies that LIS curricula are not up-to-date and this was attributed to lack of adequate funding for curricula review. Lawal (2000) advocated for continuous reviews of LIS curricula to reflect and align with the changes, challenges, needs, employment market, contemporary professional thoughts, manpower forecast and the trends of research interests of the profession. Virkus (2012) points out that LIS education and training programmes need vibrant and up-to-date curricula. Use of dated curricula might be the reason why LIS graduates are considered to be inadequately prepared and not work ready.

Conclusion

The broad spectrum of competencies and skills encapsulated in the LIS curricula suggests that LIS education and training programmes have discarded the discipline-specific model of education and adopted a more liberal and general education model adaptable in diverse information environments. The findings pointed to the need to view LIS education and training not only for producing industry ready graduates but also for providing a broad professional base applicable in diverse information environments.

Furthermore, the diversity of the competencies encapsulated in LIS curricula suggests that LIS education programmes are not synchronised, and there are no common standards guiding the educational sectors, and there are no quality control measures in place. This suggests that a professional accreditation body for the LIS profession needs to be urgently developed by the Zimbabwe Library Association, to assure accountability, quality control, compliance, and standardization of LIS education programmes. Similar schemes have yielded observable results in countries such as the United States of America and the United Kingdom

The diversity and transdisciplinary nature of the competencies required in LIS work environments suggest that LIS work environments have expanded beyond the library. This diversity makes it very difficult for LIS education and training programmes to devise and provide a one-size-fit all educational programmes. This study recommends that LIS education and training programmes continue: (1) offering generalised professional education programmes applicable in diverse information environment; or (2) introduce specialised professional tracks in the curricula; or (3) expand curricula contents, as well as the credit hours.

The findings revealed that LIS graduates lacked the required competencies needed in the work. LIS education and training in Zimbabwe should build collaborative teaching linkages with practitioners to help rectify the problem of resource inadequacies. This strategy is used in the contemporary digital information environment at the Sukhothai Thammathirat Open University (STOU) in Thailand.

Collaborative teaching initiatives, as practised at STOU, have helped in bridging the mismatch between LIS education and training programmes and practice.

It is recommended that LIS professionals, practitioners, professional associations and policy makers devise mechanisms and strategies to understand, envision, analyse, and develop adaptive strategies to the changes in the field. Similar strategies have been developed in the United Kingdom.

The study suggests that it is not the goal of LIS education and training to produce industry ready graduates but to inculcate a general professional foundation applicable in diverse information environment. The alleged reproach that LIS graduates are inadequately prepared for their roles was attributed to inadequacies in the requisite resources (funding, policy and regulatory frameworks, equipment, human capital, and ICT infrastructure) needed to develop the required skills in graduates. The study recommended that LIS education and training programmes devise mechanisms and strategies to understand, envision, inform and respond to the changes taking place in the wider community and the LIS field. Further, the study recommended that LIS education and training programme nurture mutual collaborative synergies with practitioners to help rectify the problem of resource inadequacies.

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Challenges of Twenty-First Century Academic Libraries in Africa

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Abstract

Twenty-first century academic libraries worldwide have fundamentally transformed in the past two decades. Most traditional library services have been transformed to e-library services. Some of the notable major developments in the academic libraries include online scholarly communication, mobile technologies, social mediation application, digital curation and preservation. To fit into this new information landscape, academic librarians have assumed new roles. The purpose of this paper is to highlight the recent trends in academic libraries, changing roles and skills of academic librarians and discuss the challenges faced by librarians in academic libraries in Africa. The paper also offers recommendations to overcome some of the challenges. This paper is based on desktop review of relevant literature and the authors' views. The findings reveal the major challenges in academic libraries in Africa as: chronic financial constraints and inadequate basic infrastructure, insufficient ICT infrastructure, poor library and information science curricula, slow acceptance of open access resources, resistance to change, and difficulty in the importation of books and journals. It is hoped that the findings of this study would help policy makers, administrators and other key stakeholders to develop effective strategies to address them. In addition, the findings are significant to academic libraries and librarians that are planning to transform to modern academic libraries.

Keywords: Twenty-First Century Academic Library, Paradigm Shift, Recent Trends, Challenges in African Libraries, Africa.

Introduction

Academic libraries are established to "support the mission of their parent institutions to generate knowledge and people equipped with knowledge in order to serve the society and advance the well-being of mankind" (Raja, Ahmad and Sinha, 2009). Primarily because of the information and communication technology (ICT) revolution and changing education systems, academic libraries have to continuously evolve as academic institutions change. However, the situation in academic libraries in Africa is different, as most of these libraries are not able to evolve at the same pace as their counterparts in developed countries. University libraries in many African countries are facing a difficult time, mainly resulting from rapid erosion of funding for books and journal subscriptions, staffing difficulties and a loss of the recognition as centres of academic scholarship (Echezona and Ugwuanyi, 2010; Hoskins and Stilwell, 2011; Willemse, 2002; Rosenberg, 1998).

The purpose of this paper is to examine the recent trends and issues in academic libraries and identify the major challenges academic libraries are facing in Africa. The paper is organised into the following sections: recent trends in academic libraries, new roles of academic librarians, new skills and

competencies for academic librarians, challenges in academic libraries in Africa, conclusion and recommendations.

Recent Trends in Academic Libraries WorldWide

Literature review reveals the major recent trends in 21st century academic libraries as: integration of ICTs, increased focus on research data management, curation and preservation, scholarly communication, use of mobile technologies, patron-driven e-book acquisition, game libraries, virtual shelf-browsing, use of social media applications, new kinds of engagement with faculty and students, learning commons. They are discussed in subsequent sections of this paper.

Integration of Information and Communication Technologies (ICTs): Technology continues to drive much of the futuristic thinking within academic libraries (ACRL, 2012). The New Media Consortium (NMC) Horizon Report (2012) identified the following recent trends driving educational technology: ubiquitous learning (for example, people's expectation to be able to work, learn, and study from anywhere and anytime); adoption of cloud-based technologies; students' collaborative projects relying on wikis, Google Docs, Skype, and Dropbox; education paradigms shifting towards online and hybrid learning and emphasis on student-centered learning (Johnson, Adams and Cummins, 2012). The 2014 New Media Consortium (NMC) Horizon Report grouped trends accelerating technology adoption in academic and research libraries into three categories, namely:

(1) **Fast Trends:** Driving technology adoption in academic and research libraries over the next one to two years (increasing focus on research data management for publications; and prioritization of mobile content and delivery);

(2) **Mid-Range Trends:** Driving technology adoption in academic and research libraries within three to five years (evolving nature of the scholarly record, increasing accessibility of research content); and

(3) **Long-Range Trends:** Driving technology adoption in academic and research libraries in five or more years (continual progress in technology, standards, and infrastructure; and rise of new forms of multidisciplinary research).

Libraries are increasingly sharing digital resources through online public access catalogues, federated searching, scholarly web portals, and web-scale discovery systems in order to provide greater access to the available electronic resources. Examples of such services include online public access catalogues (OPACs), online databases, e-books and digital libraries, institutional repositories, subject portals, online and virtual reference services, electronic interlibrary lending, access to open access information sources, Frequently Asked Questions (FAQ) databases, security systems, electronic circulation systems, media marketing, and learning commons.

Increased Focus on Research Data Management, Curation and Preservation: Research data are critical to the scientific and economic development of any society. Owing to increased focus on research data management, there is growing availability of research reports through online library databases, which is making it easier for students, faculty, and researchers to access and build upon existing ideas and work. Archiving the observations that lead to new ideas has become a critical part of disseminating research reports in form of audio, video, and other media and visualizations (Johnson et al, 2014). Better data management can lead to better research because it saves time in the long run, helps fulfil grant requirement; enables adherence to open data policies; enhances appropriate data privacy while minimising the risk of data loss; ensures long-term preservation and availability of scholarly contributions, and allows facile use and re-use of research data (Ludwig and Wagner, 2015). Hence, many academic libraries today offer curation and preservation services. For instance, at Johns Hopkins University, the library's digital curators create the intellectual data model that enables digital objects to be organized and programmed (CLIR, 2008).

Scholarly Communication: Scholarly Communication is the process of conducting research and sharing the results from creation, to dissemination,

to preservation of knowledge, for teaching, research, and scholarship (Purdue University Libraries, 2015). New scholarly communication and publishing models are developing at an ever-faster pace, requiring libraries to be actively involved or be left behind (ACRL, 2012), thus presenting significant challenges for academic libraries. Since information seekers are able to access any type of information using worldwide web applications, modern librarians also advocate for sustainable models of scholarly communication.

Use of Mobile Technologies and Prioritisation of Mobile Content and Delivery: Mobile devices are changing the way information is delivered and accessed (ACRL, 2012). Integrated mobile platforms are being used to search library catalogues, contact librarians, access information and maintain patron account information, place holds on e-books, and directly download and read library e-books (Thomas, 2012; Johnson, Adams and Cummins, 2012).

Patron Driven e-book Acquisition: Patron-driven acquisition (PDA), also known as demand-driven acquisition, allows patrons to select and purchase e-books for the library collection without staff mediation (Walters, 2013). PDA of e-book licensing aims to avoid spending on thousands of books that are not used in the library, and offers opportunity to have a much larger collection of books at lower cost (Kolowich, 2011; Esposito, 2011).

Game Libraries: Games in education system are gaining increased importance. As a result, some academic libraries have already included games in their collections. For example, University of California Santa Cruz has an impressive collection of video games available for check-out along with consoles and games within the library (Salter, 2015).

Virtual Shelf-Browsing: Virtual Shelf browser is an interactive tool that allows users to browse shelves and items online such as physical stacks (Kenney, 2012; Giardini, 2015). At Columbia University library, Virtual Shelf Browser allows researchers to browse the catalogue as if all of the items, including titles that are at offsite or online, were arranged by call number on a single shelf. Library catalogue records can be browsed by choosing "Show" or "Full Screen" (Witte, 2015).

Application of Social Media: Social media are playing a significant role in academic libraries through various forums, and are enabling provision of library services such as current awareness, networking, community interaction and engagement, education, library promotion, outreach, and knowledge creation (Jain, 2013). For example, the most popular social media platform, Facebook, is increasingly being used for marketing libraries and information centres in several ways. If time is limited, Facebook can be populated via other platforms such as Twitter feedback, the library calendar and a library Blog. OPAC search can be embedded on the Facebook page for ease of library users (Potter, 2013).

New Kinds of Engagement with Faculty and Students: Digital scholarship provides new opportunities for collaboration between faculty and librarians. Libraries have faculty-like expertise that is valuable in many areas of scholarship, curricular, co-curricular, and social experiences (ACRL, 2010). For example, some American academic libraries are using instructional games to promote information literacy competencies among students.

Learning Commons: As higher education approach has changed from a teaching paradigm to a learning paradigm, there is an emphasis on student learning outcomes. In response to the users' changing needs, academic libraries have come up with new types of digital learning spaces, popularly known as learning commons, to make learning dynamic and learner-centered (Forrest, 2012).

New Roles of Academic Librarians

To fit into the above new trends, academic librarians are undertaking new roles. Based on the literature (Belzile, 2010; Heidorn, 2011; Kenny, 2012; Anyangwe, 2012; Giarlo, 2013; Charney, 2014; Cox, Verbaan and Sen, 2015), the new roles can be summarised as follows:

- Knowledge managers and knowledge workers;
- Instructional partners in learning spaces;
- System librarians;
- Content producers and disseminators;

- Curriculum developers;
- Technology savvy/experts by training in both using and training in new technology and implementing a variety of digital web-based projects, initiatives and infrastructures;
- Research supporters by offering advice on funding sources, conducting literature reviews, carry-out bibliometrics and impact measurement, bibliographic software training, advocacy for open access and/or institutional repository, advice on copyright issues and advice on archiving of research records, etc.;
- Supporting studies, not just storing books;
- Effective marketers;
- Knowledge gatekeepers as subject experts;
- Networkers and knowledge brokers;
- Data managers and data curators in eScience (taxonomies, metadata, Dublin Core and others);
- Good researchers both for personal and professional development;
- Web designers;
- Blended librarians; and
- Faculty liaison to provide support and training to academic staff for teaching, research and learning activities and facilitate communication between the library and the faculties to fulfil their academic requirements.

New Skills and Competencies

According to Belzile (2010) and Jain (2013), to accomplish the new roles, academic libraries are continuously striving to equip themselves with the following main skills and competencies:

- Latest ICT skills;
- Digital data management and curation skills;
- Effective communication skills;
- Multi-media marketing skills;
- General management and leadership skills;
- Creativity and long term vision;
- Analytical and lateral thinking abilities;
- Cultural diversity and adaptability skills;
- Multimedia collection development skills;
- Change management skills;
- Information/digital literacy skills;
- Effective communication and interpersonal skills;
- System building and database developing skills;
- Blended librarianship skills;
- Partnerships and networking skills;
- Ability to prove library relevance to institutional administrators; and,
- Intercultural competencies.

Challenges in Academic libraries in Africa

As already discussed, mainly due to advancement in ICTs, academic libraries world-wide are continually remodelling their services completely. However, owing to numerous challenges, most academic libraries in Africa still lag behind in coping with new information environments, and are, therefore, not keeping pace with the developed world. The major challenges are discussed below:

Financial Constraints: Most African academic libraries are confronted with chronic financial problems, which is the key to all other resources including information resources, technological resources, human resources and material resources, staff training and continuous professional development (Willemse, 2002; Christian, 2008; Canada, 2009; Otando, 2010; Adetoro, 2010; Hoskins and Stilwell, 2011; Ubogu and Okiy, 2011). High inflation rates further worsen the financial problems. Hence, often librarians are not adequately trained to keep abreast with the latest trends in modern academic libraries. Also, there is difficulty in the importation of books and journals from abroad due to inadequate funding. According to Abubakar (2011), difficulty in the importation of books and journals from abroad is one of the setbacks in academic libraries in Africa hindering the accessibly of information to library users.

ICT Related Challenges: ICT has confronted academic libraries in Africa with numerous challenges as discussed below:

- *Inadequate Infrastructure:* Academic libraries in Africa have poor infrastructure such

as poor Internet connectivity (Emojorho, Ivwighregweta and Onoriode, 2012; ITU and UNESCO, 2015; Internet World Stats, 2015), poor electricity supply (Adetoro, 2010; Palumbo, 2014), erratic Internet services, lack of hardware and software and non-availability of the ICTs (Abubakar, 2011), and high cost of Internet connectivity (Echezona and Ugwuanyi, 2010).

- *Poor Internet usage:* Out of the 54 African countries, only ten countries have an access rate that is higher than the worldwide Internet usage rate of 45.0% (Madagascar, 74.7%; Mali, 72.1%; Malawi, 70.5%; Morocco, 61.3%; Seychelles, 54.8%; Egypt, 53.0%; South Africa, 51.5%; Mayotte (FR), 49.5%, Kenya, 47.3%; and Tunisia, 46.2%). There are great disparities between rural and urban areas, with the former experiencing very low Internet penetration (Rheingold, 2000; Fuchs, 2005; Fuchs, 2008; Echezona and Ugwuanyi, 2010; Nkanu and Okon, 2010; Van Dijk, 2006).
- *Low ICT literacy levels:* ICT literacy among academic librarians in most libraries is still at the peripheral level (Umeji, Ejedafiru and Oghenetega, 2013; Abubakar, 2011; Ugwuanyi, 2009; Emmanuel and Sife, 2008). Lack of ICT skills makes it difficult for library professionals to be innovative and creative and to ensure sustainable management and maintenance of ICT services in libraries.

Inadequate Library and Information Science Curricula in African Library Schools: The improvement of the LIS curriculum remains a challenge (Adeya, 2001; Odini, 1999; Aina and Moahi, 1999; Thapisa, 1999; Kigongo-Bukenya, 2003; Minishi- Majanja, 2004; Ocholla, 2003; Moahi, 2006; Manda, 2006; Ngulube, 2006; Kamba, 2011).

Challenges of Open Access: Owing to numerous impediments such as inadequate funding, inadequate advocacy and associated misconceptions, lack of Open Access policies, intellectual property, copyright issues and a lack of adoption of Free and open-source software (FOSS), slow uptake of Open Access content recruitment problems, lack of incentives, unawareness of Open Access benefits and complexity of new scholarly communication models (Ramcharan and Dawe, 2006; Christian, 2008, Otando, 2010; Gbaje, 2010; Obuh, 2013). Only 132 institutional repositories are available in Africa (OpenDOAR, 2015).

Resistance to Change: Some academic librarians in Africa still resist changing to e-world (Wawire and Messah, 2010; Lwoga and Questier, 2014; Lwoga, 2014). Consequently, only few university libraries in Africa have embraced the use and application of Web 2.0.

Conclusion

It is apparent from the ongoing debate that information environment is changing continually. Therefore, academic libraries and librarians are re-inventing themselves to fit into new teaching, learning and research environment to support the core business of their parent institutions. However, most academic libraries in Africa are not keeping pace with the ever changing developments. The major challenges are: chronic financial constraints, inadequate ICT infrastructure and skills, slow uptake of Open Access, challenges of new scholarly communication models, resistance to change, and poor local publishing industry resulting into lack of local content and heavy dependency on foreign content.

Recommendation

To overcome some of the challenges, the authors propose the following recommendations to improve library services in academic libraries in Africa):

- Governments should formulate national information policies to import books and other information materials at subsidised price to make information accessible.
- Governments should also formulate ICT policies to make ICT tools and technologies more affordable to citizens.
- Parent institutions should make it their priority to provide adequate resources to academic libraries including finance, ICTs infrastructure and adequate staff training to equip librarians with desired skills and competencies to serve 21st century library users.

- Bandwidth management should be incorporated into the institutional objectives of African universities.
- Formulation of a clear vision, strategy and policies on ownership of research output, Institutional Repository contents, quality standards, intellectual property/copyright issues and other matters related to publishing open access research.
- Continuous training for library staff including use of web 2.0/Social Media applications.
- Promotion of library cooperation and innovative services
- Devising comprehensive promotion policy to publicise and market the benefits of Open Access to the faculty, students and all other stakeholders.
- Provision of local content through institutional repositories by digitising local contents.

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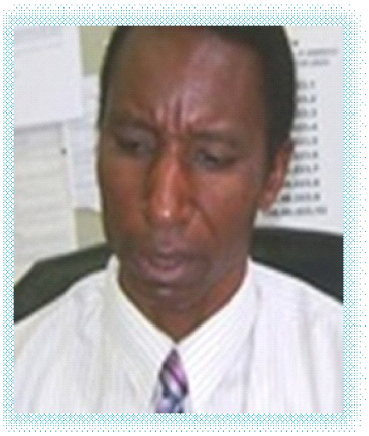

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Abstract

The aim of this study was to assess customer care services provided by the Records Management Unit of the Ministry of Labour and Home Affairs headquarters in Gaborone, Botswana. This was an exploratory study which used a case study design. The study was guided by customer relationship management theory which emphasises that organisations can achieve quality customer service through customer, product, channel and infrastructure strategies. The broader aim of the study was to assess the customer services as it relates to the current records management services provided by the Records Management Unit (RMU) within the Ministry of Labour and Home Affairs (MLHA). The population of the study consisted of 52 respondents - 5 records officers and 47 action officers from the Ministry of Labour and Home Affairs Headquarters in Gaborone. Quantitative data was collected through questionnaire while qualitative data was collected through non-participant observation, document analysis and interviews. The major finding of the study indicates that there is some level of quality in the services provided by the RMU at the MLHA but a lot can still be done for the services to be of high quality level. The study recommends that the RMU of MLHA formulates a well-defined customer care programme supported by service standards, customer charter and professionally trained officers in order to enhance quality customer service.

Keywords: Customer Care, Records Management Units, Records Management, Botswana

Introduction

According to The Chartered Institute of Marketing (2009) customer service, is "what your business delivers to achieve customer satisfaction". This shows that customer service is concerned with the provision of quality service so that the customers are contented, become loyal, and keep coming. It is the provision of quality services to an extent of going beyond the customer's expectations or what the customer asked for. Smith (2003) argues that "effective customer service is establishing what the customer wants, prioritising it, and delivering as much of it as possible". The customers should be satisfied to the extent that they market and recommend an organisation's services to other people. Edvardsson (1998) argued that "satisfied customers spread the good news quickly, something which is satisfying for the employees and most likely for the owners". Principles of service quality include: open communication, consultation and responsiveness, equity and consistency of treatment, effective use of resources, involvement of people, and innovation and improvement (Archives New Zealand, 2006).

According to Sridhar (2001), quality in service is a customer-oriented phenomenon because it is defined, judged and deduced by a customer based on his/her experience, expertise, service process, environment, and more. This shows that the customer is the one who eventually defines service quality regardless of an organisation's internal quality specifications. Customer satisfaction is what a customer expects and how he perceives that service received lived up to those expectations. In order for the staff to be able to provide quality customer service, they should be professionals with appropriate qualifications, necessary skills and experiences to enable them execute their duties. The customer is very critical to the practice of records management because all the processes associated with records management revolve around the customer. As such, it is important that the staff of the RMU relate well with customers in a pleasant, friendly and efficient manner because their business is to satisfy the customers.

Any given organisation has both internal and external customers. Internal customers work for organisations and they require and bank on services of their co-workers to be in a position to serve the general public (external customers). Jun and Cai (2010) argued that internal customers are equally important as external customers, and that successful internal customer service may result in more internal exchanges between various organisational members and departments, lower waste and costs, and improved external customer service quality. For purpose of this study, internal customers are public servants who act as action officers in different departments within the MLHA (Ministry of Labour and Home Affairs).

Botswana Public Records Management Units

Records Management Units in Botswana public service are given professional advisory services and guidance on the care, custody and control of records by Botswana National Archives and Records Services (BNARS). As part of its mandate, BNARS has statutory responsibility for ensuring that public records are created, maintained, used and disposed of in an organised way, following international best practice that promotes efficient handling of information. The Organisation and Methods Unit (1992) observed that registry operations in the public sector in Botswana were the subject of bitter complaints by action officers for their inefficiency and ineffectiveness. The 1985 Organisation and Methods Review of the MLHA on records services revealed that public records management services in Botswana were poor. Specifically, the review revealed that:

- The manual system in registry operation was lacking in development and as such subject to error;
- There were delays in mail circulation leading to misfiling of correspondence, loss of files, casual opening and closure of files, and keeping of files for too long by Action Officers;
- There was inadequate office equipment for registry work and records management operations in general;
- Records were haphasardly housed;
- Space allocated to registry work was inadequate; and as a result, movement of registry staff, mail, materials and equipment adversely affected the effective functioning of a modern public registry;
- There was lack of a programme for the proper upkeep, maintenance and preservation of current and semi-current records in government records. Most files were in a state of neglect, torn and worn out;
- Indiscipline and poor supervision of the registries were common which resulted in registry problems such as misfiling, delays in mail circulation;
- Records services were manned by personnel of a very low calibre in terms of academic and professional qualifications, training and experience; and
- There was lack of appreciation, understanding and cooperation on the part of action officers.

As a result of these concerns, the mandate of BNARS which was previously restricted to the management of archives was extended to include the management of current and semi-current records throughout public RMUs. This study, therefore sought to assess the customer service quality of the RMU

(Records Management Unit) of the Ministry of Labour and Home Affairs (MLHA) Headquarters in Botswana with a view to determining whether the RMU complies with the standards and guidelines provided by (BNARS) for provision of records management services).

Statement of the Problem

Records management is a vital tool for good governance, transparency, accountability, protection of citizen's rights and entitlements, improved service delivery, the rule of law, management of state resources, anti corruption measures, foreign relations and international obligations (International Records Management Trust, 1999). In order for these roles to be achieved, there should be effective management of records. Good records and information management play significant role in combating corruption. Okello-Obura (2012) asserted that records and information provide verifiable evidence that can lead investigators to the root cause of fraud. Ngoepe (2008) argued that good service delivery begins with good record keeping. The International Records Management Trust (2002) affirmed that "records support all business functions and are critical to the assessment of policies and programmes and to the analysis of individual and organisational performance. IRMT further pointed out that "without reliable records, government cannot administer justice and cannot manage the state's resources, its revenue or its civil services. It cannot deliver services such as education and health care to its people. Without accurate records and effective systems to manage these records, governments cannot be held accountable for their decisions and actions, and the rights and obligations of citizens and corporate bodies cannot be upheld." Records help to demonstrate accountability, transparency and corporate governance and are the source of information for the citizens in the context of open government.

Records management units, traditionally known as registries, provide records and information services to action officers who are their internal customers. Action officers have the right to consult records in order to offer services to the general public, which underpins the importance of service quality by the RMUs. As such, action officers are "supposed" to come first. Despite this, the 1985 Organisation and Methods Review of the MLHA on records services in Botswana observed that operations of RMUs were always a subject of bitter complaints by action officers for the inefficiency and ineffectiveness of RMUs throughout the public service.

Mnjama (2010) argued that, for a long time, archivists and records managers have paid little attention to providing service quality to their customers. In addition, Sibanda's study (2005) concluded that moving towards delivering service quality is a challenge facing public archival institutions in Zimbabwe. Despite the 1985 Organisation and Methods Review, no study was done to find out the status of customer service in public RMUs in Botswana. Botswana government is committed to providing efficient service delivery and productivity in the public sector which are partly dependent on quality customer service that is given to the action officers by the RMUs. This was also emphasised by Smith (2003) who stated that the archive domain as a whole has echoed central and local government's commitment to delivering high quality services.

This study, therefore, sought to determine whether the problems that were identified by the 1985 Organisation and Methods Review regarding the services provided by public registries in Botswana still exist. The study sought to find out the extent to which the RMU at MLHA comply with the records management procedures manual provided by BNARS (Botswana National Archives and Records Services) to guide public RMUs, as it was recommended by the review. The records management procedures manual which was developed in 2009 was meant to enhance the management of records in the public service, promoting efficiency and effectiveness in public service delivery, which is a concern for the government (Botswana National Archives and Records Services, 2009).

Aims and Objectives

The broader aim of the study was to assess the customer services as they relate to the current records management services provided by the RMU within the MLHA. The study sought to come up with recommendations on measures to improve customer

services with regard to records management services provided by the RMU at the ministry. Specifically the study sought to:

1. Examine the customer product, channel, and infrastructure strategies of the RMU at the MLHA.
2. Establish the level of compliance by the RMU with the records management procedures manual provided by BNARS.
3. Identify the challenges of Records Management Unit in providing good customer service and those faced by their customers in trying to access the records services.
4. Make recommendations on measures to improve customer services as related to records management services provided by the RMU at the ministry and measures to address the challenges.

Methodology

This study was carried out at the RMU of the MLHA in Gaborone, Botswana over a period of four months between December 2012 and March 2013. This was a qualitative study that made use of a case study strategy. The target population consisted of fifty-two officers of the MLHA comprising five records officers and forty-seven action officers. A questionnaire which was the principal instrument of data collection was hand delivered to all the 52 participants. Out of the 47 copies of the questionnaire distributed to the action officers, only 31 copies were completed and returned, giving a response rate 61%. The five copies of the questionnaire given to the records officers were all completed and returned, giving a response rate of 100% for this group of respondents. Records officers were given copies of the questionnaire by the researchers in the RMU while the action officers were given the questionnaire in their respective offices by the researchers with assistance of two records officers. The researchers made use of semi-structured interviews after administration of the questionnaire as a follow up to clarify issues raised through the questionnaire. The officers interviewed were the Records Manager and the Chief Records Officer. There was no need to interview the action officers since their responses to the questionnaire were very clear and basically the same. The researchers made use of an interview guide and captured responses by taking down notes. Non-participant observation was used to collect data on interactions of service providers and their customers, physical appearance, competence in provision of service and compliance with Records Management Procedures Manual. An observation checklist was used for observation.

Findings and Discussion

The results of the study are presented according to the objectives of the study.

Strategies of Customer Relationship Management (CRM)

According to customer relationship management theory the customer, product, channel and infrastructure strategies could help a researcher to have a holistic view of customer service of an organisation. These different strategies are helpful in determining the status of customer service of an organisation. Based on this theory, the first objective of this study sought to examine the customer product, channel, and infrastructure strategies of the Records Management Unit of the MLHA Headquarters in Botswana. Respondents were asked to indicate how often they used the services of the Records Management Unit. The findings indicated that all the 31respondents in the category of action officers indicated that they used the services of the Records Management Unit on a daily basis showing the need for service providers to know their customers' needs and strive to satisfy them.

The respondents were required to indicate whether their customer service standards were documented or not. The findings revealed that all five records officers indicated that their customer service standards were documented. A follow-up interview revealed that their RMU did not have its own specific customer service standard. They used generic customer service standards meant for the entire Ministry which did not necessarily address service standards requirement of the RMU. The document analysis revealed some of the values of the Ministry relating to provision of service to include:

(i) Service excellence (our responsibility, commitment and relationship with our clients

is respective, open, collaborative and beyond expectation).

(ii) Integrity, honesty, modesty and botho (mutual respect, responsibility and accountability)

Sensitisation Workshops

Respondents were asked to indicate whether the RMU conducts sensitisation/training sessions on records management issues or not. The findings revealed that all the five records officers and 22 (79%) action officers indicated that sometimes their RMU did conduct sensitisation/training sessions on records management issues. Four action officers indicated that these sessions were done frequently; and two did not know how the sensitisation was carried out. A follow-up interview with records officers revealed that since 2009, no records management workshop had been held by the RMU. Mnjama (2010) argues that information users and consumers of public services should expect full and accurate information about the services they are entitled to receive. The findings reveal that the customers were not provided with sufficient/enough information since the sensitisation workshops were not held regularly and in a consistent manner.

Furthermore, the findings revealed that all the records officers indicated that the RMU did not even orientate action officers on arrival to the Ministry on records management procedures, expectations and service standards; 20 (71%) of action officers indicated that orientation was never carried out; while four indicated that it was done; another four did not know whether it was ever carried out or not. A follow-up interview with the Records Manager revealed that sometime there was an induction of new members of staff by all heads of departments including the Records Management Unit but the RMU never carried out orientation programme for newly appointed action officers.

Marketing of Services and Feedback

It is advisable that service providers should carry out marketing activities for their services. Based on this understanding, the study sought to determine if the RMU at MLHA ever marketed its services. The findings revealed that there was no form of marketing of records management services that was taking place at the MLHA

In addition, respondents were asked to indicate how often their RMU sought customer assessment of their customer service. The findings revealed that out of 28 action officers, 15; (54%) indicated that their RMU never sought assessment of customer service; while seven indicated that the RMU sometimes sought customer assessment of their service; and six indicated that RMU frequently assessed customer service. The respondents who indicated that they did assess customer service identified the following as channels used by their RMU to get feedback from customers: feedback forms, listening to complaints, surveys and meetings. All the five records officers, indicated that assessment of customer service was sometimes conducted, and only surveys and listening to complaints were the channels to obtain feedback from the customers.

A follow-up interview with the Records Managers revealed that even though the RMU administered the customer satisfaction forms, it was not all of the records officers who took cognisance of the importance of customer assessment. They viewed the completing forms to give feedback as waste of time. The results generally revealed that there was very little customer service assessment going on at the RMU of the MLHA and the RMU did not therefore benefit from feedback of customers which is vital for improving customer service. Feedback from customers can help service providers to monitor and detect changes in customer needs so that necessary adjustments could be made.

Customer Segmentation

The customer strategy calls for segmentation of customers. For this reason, respondents were asked to indicate whether their RMU segmented customers or not in providing service. The findings showed that all the five records officers indicated that they did not segment their internal customers. A follow-up interview revealed that the RMU did not see any need to segment customers because they considered their informational needs were the same.

Dealing with Customer Complaints

The study sought to establish whether the RMU had procedures for dealing with customers' complaints. The findings showed that two of the five records

officers indicated that their RMU did not have any procedures for dealing with complaints; three indicated that they had them. Out of 28 action officers, 22 (79%) indicated that they did not have forums for airing their complaints while six indicated that they had forums of airing their complaints which included heads of units meetings, and discussion with RMU supervisor, and their supervisors.

A follow-up interview with the Records Manager revealed that the RMU lacked procedures for handling customers' complaints. They listened to the complaints and sometimes they notified the senior management to advise on appropriate action. Though the RMU at MLHA did not have a clearly defined system for handling complaints of customers, 25 (89%) of action officers (customers) indicated that they were satisfied with how customer complaints were handled.

Product Strategy and Organised Information

Respondents were asked to indicate if the RMU was conveniently located and easy to reach by all action officers in the Ministry. The findings revealed that all 28 (100%) action officers indicated that the Records Management Unit was conveniently located, and it was easy to reach it in person and through the use of a telephone.

When asked if organised information was always available, 16 (64%) of the action officers indicated that it was always available; seven indicated that sometimes it was available; and four indicated that they did not know whether it was always available or not. Personal observation and inspection of files indicated that the RMU of MLHA put a lot of effort in availing organised information. The records officers (100%) indicated that they processed and passed mail to action officers the very same day it had been received unless the file was misplaced. This was corroborated by observation throughout the data collection period, that there was no backlog on processing of mail.

Promptness and Criteria for Provision of Service

Concerning whether their records services were timely, 18 (64%) of the action officers indicated that the services provided by the RMU was timely while 10 (36%) indicated that the services were not timely. Those who indicated that the service was not timely argued that the delays were mainly caused by shortage of staff in the RMU. The researchers also observed that on a number of occasions the requests for files overwhelmed the records officers leading to delays in retrieving of those files. Personal observation also revealed that due to inadequate staffing at the RMU, sometimes, customers did not get immediate service because the records officers could be out of the RMU doing other duties related to records management such as file census and tracking down misplaced files.

When records management personnel were asked how they decided how to provide services to customers, a records officer indicated that it was done in response to customers' demands; while two indicated that this was done based on the records management manual and the other two indicated that this was done based on management thinking and on the records management procedures manual. This shows that the service providers did not base their services on the demands of their customers. A follow-up interview with the Records Manager revealed that some of the demands of the customers did not benefit or improve the RMU service, in anyway and they could make the RMU to go against the standards that guide them.

Consultation with Customers

When respondents were asked whether the RMU consulted and involved customers in the process of records service improvement, 10 of the action officers indicated that customers were consulted and 18 (64%) indicated that customers were never consulted nor involved in initiatives aimed at improving records management services in the ministry. The action officers indicated that they were consulted through meetings and briefings on records service improvements being undertaken.

Those respondents, who indicated that they were consulted, stated that they were consulted on classification of records relating to specific departments, and filing of certain documents. It was further argued that the RMU sought customers' opinions on things they want to implement by circulating a request for information for users to have an input. A follow-up question which sought to find out whether action officers' ideas and suggestions

were appreciated revealed the following: 13 (46%) of the action officers indicated that sometimes the RMU staff listened to customers and acknowledged their comments; 14 (50%) indicated that they listened to customers always; and one was not sure.

Information Needs

Respondents were asked to indicate whether the services provided by their RMU matched the customer needs or not. The findings revealed that 24 (86%) action officers indicated that the records services provided by the RMU matched their customer needs while only four indicated that the service did not match their needs. When asked whether their customer needs were met, 26 (93%) respondents indicated that their customer needs were met and only two of the respondents indicated that their customer needs were not met. The two who said that their needs were not met indicated that their complaints were never attended to, and there was no response to issues they had raised with the RMU. In addition, 19 (70%) respondents indicated that their service providers fully understood informational needs of customers while eight indicated that their records officers understood informational needs just averagely.

Channels of Communication

Respondents were asked to indicate the channels of communication used by the RMU staff to communicate with customers. The findings indicated that all the records officers and 28 (100%) action officers indicated that the main channels of communication used by their RMU staff to interact with customers were 'face to face' and telephone. Some action officers 11(39%) further identified staff memos as one of the channels of communication being sometimes used.

Most of the customers 26 (93%) were satisfied that their RMU used channels that gave them easy access to records services. The above findings were supported by observations made by the researchers who witnessed that most customers made requests over the telephone and the records officers acted promptly to those requests and kept customers updated with progress relating to their requests.

When asked to state their preferred channels of communication, customers identified telephone, face to face, Internet and emails as their preferred means of communication with the RMU. Based on this, respondents were asked whether their preferred channels of communication were used, 22 (79%) indicated that their preferred means were used (telephone and face to face) while six indicated that their preferred means such as the Internet and e-mails were not used.

Infrastructure Strategy

The human resource variable of infrastructure strategy emphasises that the service providers should be trained professionals with necessary skills and must be highly motivated to diligently serve the customers. Based on this, the study sought to determine the educational background of the records officers and whether they had the appropriate professional skills. Three (60%) respondents possessed university degrees; one had a diploma; and one had Certificate of Secondary School. It also shows that only two had been trained in records management and one had been trained in customer service. This shows that the majority of the records officers at the MLHA had not been trained in records management and customer service. They acquired the necessary skills through apprenticeship (learning on the job) and developed their skills through experience as shown by the number of years they have been serving as records officers. It has been established that (60%) of records officers had more than 6 years, work experience and two had been records officers for less than 5 years. Therefore, it can be concluded that most of records officers were experienced enough to provide some level of quality service.

Concerning if respondents were satisfied with staffing, all the records officers indicated that the RMU was not adequately staffed to serve the customers. The interview with the Chief Records Manager revealed that there were only three records officers and a Records Manager. Two records officers were responsible for managing the confidential RMU and the Records Manager assisted the other records officer to man the open Records Management Unit. The confidential RMU personnel managed 2500 files while the open RMU personnel managed 600 files. These records officers served about 47 internal customers.

Even though most of the records officers had not been trained for the job, most of their customers 17(63%) strongly believed that they were competent, and 24 (86%) indicated that their records officers made few mistakes in their work. Personal observation also revealed that the service providers seemed to be competent and confident in providing service.

Action officers were also asked to indicate how they found their RMU staff in providing customer service. The results show that 22 (81%) of action officers were convinced that their service providers behaved in a professional manner. When asked whether records officers took pride in their job or not, the results showed that three of the five records officers indicated that they did take pride in their job. Action officers 22 (81%) respondents indicated that they thought their records officers took pride in their job while five thought they did not.

Assessment of Facilities

Tangibles in the form of physical facilities, equipment, personnel and communication materials have been identified in literature as one of the key service dimensions (Edvardsson 1998, Camgoz-Akdag and Zindelin, 2010, Parasuramann, Zeithaml, and Berry, 1988). Service facilities, documentation and personnel should be presentable at all times because facilities and equipment which are not neat may give the customers impression that services will be conducted in the similar manner. The findings indicated that the service providers were well groomed, and the RMU was clean with a good layout. The furniture used looked new and modern. The files were in good condition, and the storage facilities were properly organised with no files on the floor, tables or on top of cabinets. Their workroom was also spacious enough to allow easy movement, even though it housed the storage facility.

Respondents were asked to indicate the form of technology which their RMU staff used for records management. The findings revealed that all the five records officers and 16 (57%) of action officers indicated that their RMU had access to computers, printers, Internet and e-mail. A significant number of the action officers 12 (43%) indicated that there was no technology used for provision of records services. Personal observation and interviews revealed that all the records management processes and services at the RMU of the Ministry of Labour and Home Affairs were carried out manually despite the availability of modern technology in the form of computers, Internet scanners and printers. The technology which was currently used in the RMU was in the form of photocopying and binding machine.

Compliance with BNARS Records Management Procedures Manual

One of the objectives of the study sought was to find out the level of compliance by the RMU with the standards and guidelines provided by Botswana National Archives and Records Services. All the five records officers identified the records management procedures manual as one of the documents that guided them in their daily activities in serving their customers. Three (60%) respondents indicated that they always followed the set standards, while two indicated that they followed them sometimes. When asked if they found BNARS Procedures Manual useful, all the five records officers indicated that they found the standards very useful.

Records Management Policy

Respondents were asked to indicate if their RMU had an approved Records Management Policy or not. The findings show that though two of the records officers indicated that they had an approved records management policy, interviews and personal observation revealed that they did not have it. The interview further highlighted that they were still working on development of a records management policy. These results suggest that during the period of study, there was no policy or regulation for the records management activities.

Mail Management

Records officers were asked to indicate how long they took to process mail on arrival. The findings revealed that all the records officers indicated that they took a day to process mail and pass it to action officers. The researchers observed that on receiving mail, the records officers processed it the very same day they received it. From the interview, it was obvious that the RMU had agreed that on receiving mail it had to be processed and passed to action officers that very same day but delays did occur in

cases of files which were misplaced or locked in action officers' offices. All incoming mails were recorded in an incoming mail register as recommended by the records management manual. It was also observed that the RMU made use of a mail circulation box allowing mail to be circulated among action officers as recommended by the manual.

The interview with records officers highlighted that they had agreed to circulate mail on daily basis for only two hours and restrict it to the most senior officer in a unit/department so that they know what is happening in the Ministry. In practice, it was observed that the circulation of mail went well beyond two hours delaying passing of mail to action officers. In addition, personal observation revealed that the RMU also processed outgoing mail, and the tools they mainly used were outgoing mail register and hand delivery register/messenger's despatch book. They indicated the following information in the messenger despatch book: date of despatch, subject of the letter, reference number of the letter and where the letter is sent, name and signature of the receiving officer, and the date of receipt.

Quality of Service

Records officers were asked to rate the records management service they provided to the customers using the following descriptors: very good, good, neutral, poor, and very poor. The results showed that all the records officers indicated that the service was good. In responding to the same question, 18 (64%) action officers indicated that the customer service was good; seven indicated that the service was very good; and three did not indicate their position. The way they all responded showed that the RMU of the Ministry of Labour and Home Affairs provided satisfactory level of quality customer service which could still be improved upon.

Challenges of Providing Customer Service by Records Officers

This study also sought to establish the challenges faced by records officers in providing customer service. Records officers identified the following issues as the main challenges they experienced in trying to provide service to their customers:

- Lack of adequate storage space;
- Lack of cooperation from action officers;
- Lack of training for the records officers;
- Unreliable transport which results in mail and newspapers not delivered or collected;
- Documents/information sometimes misfiled making it difficult to retrieve it;
- No feedback on issues that action officers raise related to records management in their Ministry;
- Unwillingness by some records officers to take advice from action officers;
- Files are sometimes misplaced and never recovered;
- Files not available because other action officers have locked them in their offices;
- Delays in getting service from the RMU because the RMU is sometimes left unattended; and
- No storage for electronic records and audio visual material.

Conclusion and Recommendations

This study assessed customer care services provided by the Records Management Unit of the Ministry of Labour and Home Affairs headquarters in Gaborone, Botswana. The major finding of the study indicates that there is some level of quality in the services provided by the RMU at the MLHA but a lot can still be done for the services to be of high quality level.

The study recommends that the Records Management Unit should immediately consider implementing a number of changes. The Chief Records Manager and the MLHA Records Management Committee should develop a specific customer service standard. This would help customers to know what level and quality of service to expect. The study further recommends that the RMU should develop a records management policy which must be based on international best practice on records management. It is further recommended that the Ministry take practical measures to train service providers in customer service, conflict handling and records management. The training has to be an ongoing process so that they are able to put

up with changes in the records management and customer service trends.

Additional research is needed to specifically address the following aspects which relate to customer care and records management in the public sector: the impact of internal customer service on the service delivery given to the general public and the level of motivation among records officers and its impact on the service they provide.

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Agricultural Information Dissemination in Rural Areas of Developing Countries: A Proposed Model for Tanzania

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Abstract

This article is based on the findings of a study on access and use of poultry management information in rural Tanzania. It highlights the connection between the information system, rural farmers and information providers; and how those linkages can impact information access, usage and farmers' satisfaction. The study findings suggest that rural information dissemination in Tanzania is planned without consulting the rural farmers, resulting in limited access and underutilisation of information. Based on the study findings and drawing on the information systems success model and quadratic usage framework, a model for agricultural information dissemination in the context of rural Tanzania is proposed. The proposed model addresses the need to understand the target community before embarking on information dissemination. It places more emphasis on understanding farmers' community, rather than focusing on the information per se.

Keywords: Agriculture, Information Dissemination, Information Models, Developing Countries

Introduction

Agriculture has been described as the engine for economic growth and improved livelihoods in Africa (Diao, Hazell, Resnick and Thurlow, 2007; World Bank, 2006). More than 50 per cent of the population in Africa lives in rural areas or depends on rural activities for their livelihoods (Ballantyne, 2005). Agricultural production depends largely on the availability of and access to relevant information (Olajide, 2011). Effective dissemination of agricultural information plays a key role in supporting rural agricultural activities as it may improve farmers' knowledge and increase their agricultural productivity. Information helps to provide opportunities for rural farmers to improve their farming activities, while helping to improve their livelihoods (Ballantyne, 2005; Lwoga, Ngulube and Stilwell, 2012). Studies have revealed that an increased flow of information to farmers has a positive effect on agricultural development (Fawole, 2008; Lwoga, Stilwell, and Ngulube, 2011; Manda, 2002; Mchombu, 2001; 2003). Thus, improved systems for dissemination of agricultural information to the rural areas can improve farmers' access to information, which may assist them in making informed decisions about their farming activities. Farmers' decisions are greatly influenced by the amount of information that is available to them (Ali and Kumar, 2011; Siyao, 2012). Farmers, who are well informed, make wise decisions, which in turn, are responsible for improving agricultural productivity (Rutatora and Mattee, 2001). Thus, timely dissemination of appropriate information to farmers is a critical input for improving agricultural production (World Bank, 1994).

Information services in rural areas of developing countries have been provided through various channels such as radio, print, video, television, films, pictures, drama, dance, folklore, group discussions,

meetings, exhibitions and practical demonstrations (Mtega, 2012; Munyua, 2000). However, rural farming communities vary, thus require information services based on models that are context specific. Meyer (2005) asserts that information in digital or written format may be inaccessible to rural people due to their unfamiliarity with the source. In this case, they may prefer to access the information that is delivered through face-to-face communication because they are used to their oral tradition (Msoffe and Ngulube, 2016). Thus, a proper understanding of the farmers' situation in the rural community should be a prerequisite for information provision in rural areas. Information dissemination services should involve assessment of the target community before information provision takes place. Knowledge about the target communities assists the information providers to formulate the best approach for agricultural information delivery to such communities. The aim of this article is to propose a model which could be used for dissemination of agricultural information in the rural areas of developing countries with a focus on Tanzania. The proposed model is based on the study findings and theoretical framework that guided the study on access and use of poultry management information in selected rural areas of Tanzania. The study findings are presented along with the proposed model.

Statement of the Problem

Access to information is essential in agricultural production. Improved flow of information within the agricultural sector is an important element for agricultural production, and economic growth. Effective dissemination of agricultural information would lead to better and more efficient agricultural activities, which would in turn lead to increased agricultural production. However, most African countries have not managed to provide adequate supply of information to farmers in the rural areas (Aina, 2004). In Tanzania, information provision in the rural areas is mostly not determined by the farmers' needs (Lwoga, Stilwell and Ngulube, 2011). The information provided is inadequate, and accessibility of information is not reliable (Mtega, 2012). The study findings indicate that farmers are inadequately accessing and using the information disseminated to the rural areas. The findings from previous studies suggest that there is inadequate flow of information to the rural farmers. Effective information dissemination depends on the methods used and the framework that guides the process of information transfer.

Therefore, there is a need for developing a model dedicated to managing the information flow between information providers and farmers' communities in the rural areas. A number of models have been developed explaining human information behaviour (Wilson, 1999). However, the models have not focused specifically on agricultural information dissemination in rural areas of developing countries. The rural areas of the developing countries deserve special attention because of the low level of development (Kiplang'at and Ocholla, 2005). The proposed model fills the gap by focusing on agricultural information dissemination in the rural areas of the developing world, and putting emphasis on understanding of the farmers' community. The model may form the basis for improving the current information dissemination services in Tanzania and other developing countries with similar rural settings. The following research questions guided the study:

(i) What are the farmers' information seeking patterns?

(ii) Which are the sources of information preferred by farmers?

(iii) Which are the information sources preferred by the information providers?

(iv) Which information sources are effective in delivering information to farmers?

(v) Are farmers satisfied with information dissemination services?

(vi) What are the barriers for accessing information?

Conceptual Framework

The Information Systems Success Model (ISSM) (DeLone and McLean, 1992; 2003) and the Quadratic Usage Framework (QUF) (Mardis, Hoffman and Marshall, 2008) were used as the conceptual framework for the study. The ISSM represents the construct of information dissemination success. The QUF explains the factors that underlie the acceptance and use of information systems. The

two models provide valuable factors in relation to access and use of information. They were chosen due to their strength in validity and reliability through continuous validation in many studies.

The concepts of ISSM and QUF can be adapted in order to build a framework that can guide the dissemination of information in local communities. The framework provides a basis for understanding various aspects which contribute to effective information dissemination in the local context. The framework combines the ideas from the ISSM, QUF and the study findings, in order to develop a model that focuses on farmers in a rural setting. The proposed model builds on the existing body of knowledge on information dissemination, information needs and seeking behaviours and information usage in rural settings.

ISSM consists of six interrelated categories of success measurements (Figure 1) (DeLone and McLean, 1992; 2003). Each category defines a set of success measures related to a broad information systems concept. ISSM has three quality dimensions: information quality, systems quality, and service quality. These quality dimensions further impact on user satisfaction, intention to use and the use of the system. These use-related factors affect each other and have an impact on the net benefits. The realised and perceived net benefits then again impact on the use and user satisfaction of the system. The model therefore shows how the quality of a system has an impact on the use of the system and the perceived benefits, and that the use affects further use of the system through user satisfaction.

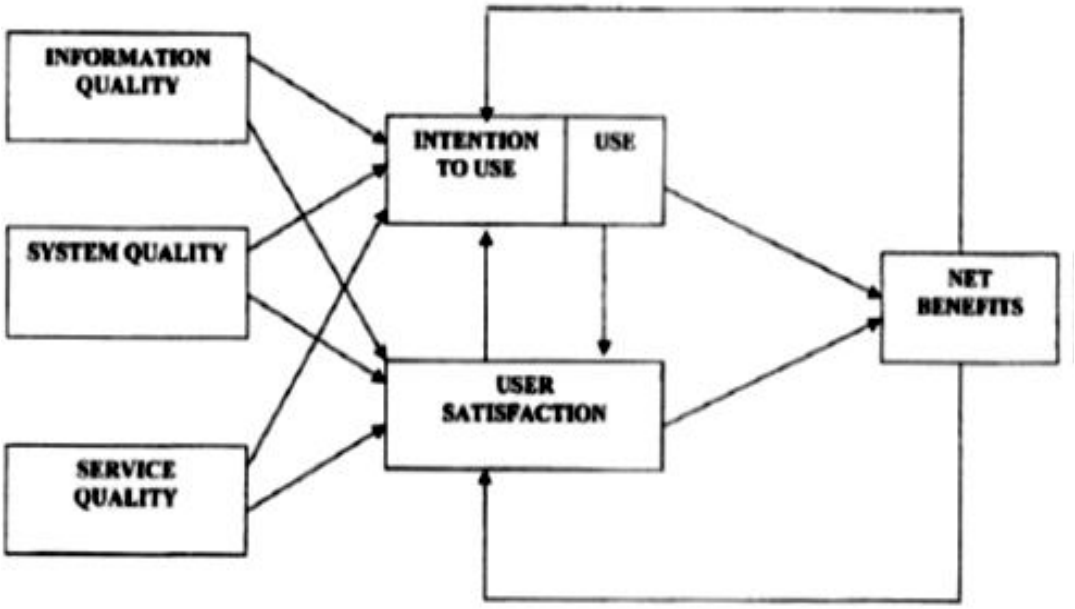

Figure 1: Updated DeLone and McLean Information Systems Success Model (Source: DeLone and McLean, 2003)

According to DeLone and McLean (2003), system quality includes accessibility, ease of use, ease of learning, intuitiveness, system reliability, system flexibility, sophistication, and response times. Information quality comprises accuracy, relevance, precision, reliability, completeness, usefulness, currency and preferred format. Service quality is the support users receive from the service provider. System use is measured as the amount, frequency, nature, extent, and purpose of the use. User satisfaction refers to how the user feels about the whole experience with the system. Net benefits cover how much the information system adds to the success of the individual, group, organisation, industry, or nation (DeLone and McLean, 1992; 2003; Petter, DeLone and McLean, 2008).

In operationalising DeLone and McLean's model of Information Systems Success, the six dimensions of the model are defined as follows. System quality refers to the desired characteristics of the system of information dissemination: usability, availability, reliability, adaptability, and response time. Information quality refers to the content offered, which should be complete, relevant, easy to understand, and current. Service quality is the support that the information provider offers to the farmers. Usage refers to any type of interaction that farmers have with the information providers. User satisfaction measures the farmers' opinions on the information dissemination system. Net benefits are the impacts of the information dissemination system on farmers and/or farming activity.

On the other hand, QUF seeks to explain the dynamics of usage, incorporating personal characteristics and environmental factors. The model (Figure 2) is explained as follows: (i) technology, which refers to factors based on access to or functionality of the artefact itself; (ii) competence, which consists of factors that affect the individual's skills, education, knowledge and experience, and which determine whether or not they know how to use the technology; (iii) culture-related values, which include historic practices, organisational settings, institutional policies, as well as cultural norms and values; and (iv) personal values, which include preferences, beliefs, traditions and trust, and are linked to the individual user's motivation and choices (Mardis, Hoffman and Marshall, 2008).

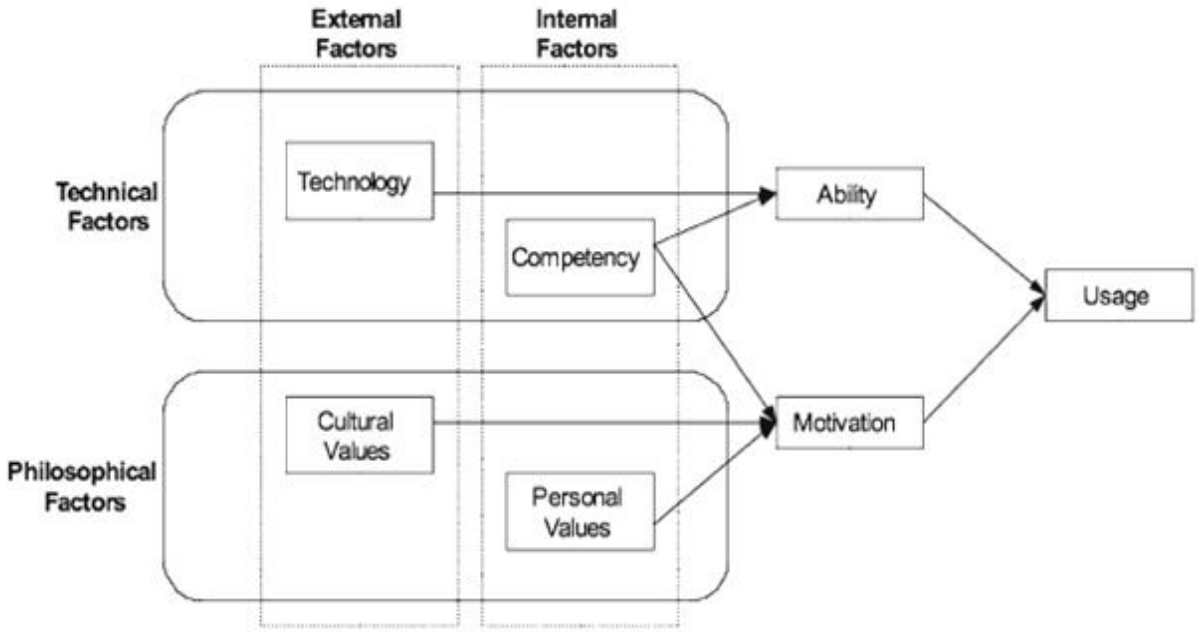

Figure 2: Quadratic Usage Framework (QUF) (Source: Mardis, Hoffman, and Marshall, 2008)

In this context, technology would be equivalent to agricultural information, and competence would involve skills to access the information. The information will be accessed and used if the culture-related values (cultural values of farmers) are put in place. Personal values involve making sure that farmers trust that accessing agricultural information will benefit them by improving their agricultural production. Once the farmers have the ability to access agricultural information, and they are motivated, then they will be able to use the information for improvement of farming activities. This means that once the farmers are competent with regard to information access, and have positive attitude and culture, then they will have the ability and motivation to use the information that is accessed.

The two models (the DeLone and Mclean Model of Information Systems Success and Quadratic Usage Framework) are related at the point of information usage. The former creates an information system which is user-friendly, thereby promoting information access and use. The latter looks at other factors (such as skills to access information) which may affect the user in the process of access and use of information. Therefore, a combination of both models leads to improved access and use of agricultural information, which will in turn improve agricultural production.

Methodology

This study was conducted in three rural districts between 2013 and 2014. They included Iringa rural, Morogoro rural and Mvomero. The study sites were selected for the reason that poultry health and management programmes have been extensively implemented in the areas. Three districts were purposively selected to include rural districts involved in the poultry management programmes. One ward was selected from each of the districts to include wards with higher poultry production; and from each ward, one village with well-established poultry production was selected.

The study population included smallholder farmers involved in poultry production, extension officers, poultry researchers, and village leaders. The respondents were categorised into two groups: poultry farmers and information providers (extension officers, researchers, and village leaders). Districts, wards and villages were selected using purposive sampling technique. Poultry farmers were selected using simple random sampling technique. The purposive sampling technique was used to select information providers. This study used multiple approaches to collect data in order to enhance the reliability and validity of the findings (Romm and Ngulube, 2015). A questionnaire was used to collect data from 360 poultry farmers. Focus group discussions were used to gather information from a purposively selected sample of 160 poultry farmers. Sixteen focus group discussions with ten participants per session were held in the nine selected villages. The selection of group participants considered the gender, age, economic and cultural characteristics of the participants. There were ten farmers in each focus group discussion. Interviews were conducted with twenty-two information providers in selected rural communities. They included nine village executive officers, six researchers, three extension officers, three district agricultural officers, and one ward executive officer. These were the people deemed to be suitable for providing the information required in the study.

The sampling frame for this study was a list of names of all farmers who were practising poultry farming in the selected villages. The researchers obtained the name lists of poultry farmers from the offices of the village executive officers (farmers' up-to-date list for the year 2013). The total number of poultry farmers in the three selected districts was 2,401. A table for determining sample size from a given population, as provided by Krejcie and Morgan (1970), was used to estimate the sample size required to be representative of 2,401 poultry farmers. The sample size that was representative of 2,401 farmers was found to be 331. This figure was rounded to 360 for convenience during sampling.

All the 360 farmers returned the questionnaire. Direct administration of questionnaire helped the study to achieve high response rates. The majority of the respondents had primary education; a few had secondary education; and only four respondents had post-secondary education. Forty three respondents (11.9%) were illiterate. The researchers read the questions to the respondents in order to obtain their responses, and the researchers then recorded the answers.

Findings of the Study

This section presents the findings of the study.

Characteristics of the Respondents

The majority of the poultry farmers (See Table 1) were between the ages of 18 and 57 years. Younger and older people were not actively involved in poultry farming. More men than women participated in the study. Most of the poultry farmers were literate, in the sense that they were able to read and write. Few farmers were illiterate; more men were literate than women. The majority of the poultry farmers were involved with mixed farming, practising both crop farming and livestock keeping. Few farmers practised livestock keeping and small business. All of the farming activities in the surveyed communities were carried out at subsistence level.

Table 1: Characteristics of Poultry Farmers (N=360)

		Frequency (n)	Percentage (%)
Gender	Men	189	52.5
	Women	171	47.5
Age	Below 18 years	2	0.6
	18 - 37	173	48
	38 - 57	130	36.1
	Above 57 years	-	-
Educational levels	Post-secondary education	4	1.1
	Secondary education	22	6.1
	Primary education	287	79.7
	Informal education	4	1.1
Occupation	Livestock keeping and crop farming	341	94.7
	Livestock keeping and small business	13	3.6
	Livestock keeping and skilled work	6	1.7

The majority of the information providers were between the ages of 35 and 55 years (See Table 2). Most of the respondents were village executive officers; few were researchers and district agricultural officers. There were more men than women information providers, and most of them had secondary education. The mean age of the respondents was 42 years.

Table 2: Characteristics of the Information Providers (N=22)

		Frequency (N)	Percentage (%)
Gender	Men	15	68.2
	Women	7	31.8
Age	35 - 55 years	18	81.8
	Above 55 years	4	18.2
Educational levels	Degree	6	27.3
	Secondary education	6	27.3
	Tertiary certificate	4	18.2
	Diploma	3	13.6
	Primary education	3	13.6
Work / Job	Village executive officers	9	40.9
	Researchers	6	27.3
	District agricultural officers	3	13.6
	Extension officers	3	13.6
	Ward executive officer	1	4.5

Information Seeking Patterns of Farmers

Farmers sought poultry management information mostly from families, friends, neighbours, extension officers, researchers and radio (See Table 3). Print sources of information (books, leaflets, posters and newspapers) were sparingly used, whereas modern information sources (cell phones, the Internet, and television) were least used. There were variations in terms of the information sources according to educational level. Farmers with primary education and beyond utilised printed sources, while farmers with limited education (informal education and illiterate) relied on interpersonal sources.

Table 3: Sources Used to Access Poultry Management Information by Educational Levels (N=360)

Information source	Illiterate		Informal education		Primary education		Secondary education		Post-secondary education		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Family/ friends/ neighbours	33	9.6	3	0.9	232	67.8	17	5	3	0.9	288	84.2
Extension officers	12	3.5	2	0.6	135	39.5	12	3.5	1	0.3	162	47.4
Researchers	3	0.9	1	0.3	48	14	1	0.3	-	-	53	15.5
Radio	1	0.3	-	-	23	6.7	1	0.3	1	0.3	26	7.6
Leaflets	-	-	-	-	10	2.9	-	-	-	-	10	2.9
Newspapers	-	-	-	-	8	2.3	1	0.3	1	0.3	10	2.9
Books	-	-	-	-	8	2.3	-	-	1	0.3	9	2.6
Poster	-	-	-	-	3	0.9	1	0.3	-	-	4	1.2
Songs	-	-	1	0.3	2	0.6	-	-	-	-	3	0.9
Veterinary drug seller	1	0.3	-	-	1	0.3	1	0.3	-	-	3	0.9
Films	-	-	1	0.3	1	0.3	-	-	-	-	2	0.6
NGOs/ CBOs	1	0.3	-	-	1	0.3	-	-	-	-	2	0.6
Cell phone	-	-	-	-	1	0.3	-	-	-	-	1	0.3
Drama	-	-	-	-	1	0.3	-	-	-	-	1	0.3
Internet	-	-	-	-	1	0.3	-	-	-	-	1	0.3
Television	-	-	-	-	1	0.3	-	-	-	-	1	0.3
Total responses	40	11.7	3	0.9	275	80.4	20	5.8	4	1.2	342	100

Note: NGOs: Non-Governmental Organisations; CBOs: Community Based Organisations. *(Multiple responses were possible.)*

Information Sources Preferred by Poultry Farmers

Most of the poultry farmers preferred interpersonal and informal sources of information (See Table 4). Extension officers, family, friends and neighbours were the most preferred sources of information. Radio and researchers were cited as second and third choices respectively. Internet, television, drama and films were not preferred. There was a very low preference for the modern ICTs as sources of poultry management information. Cell phones were least preferred, while the Internet and television were not preferred. There were variations in terms of the preference for print sources of information. Farmers indicated a greater preference for books, leaflets and posters, but a low preference for newspapers.

Table 4: Information Sources Preferred by Poultry Farmers (N=360)

Information source	Rank								
		Not preferred		Least preferred		Preferred		Most preferred	
	N	No	%	No	%	No	%	No	%
Radio	359	23	6.4	71	19.7	94	26.1	171	47.5
Poster	359	61	17.0	92	25.6	112	31.2	93	25.9
Cell phone	359	83	23.1	96	26.7	85	23.6	95	26.4
Leaflets	358	62	17.3	72	20.1	103	28.7	121	33.7
Television	353	200	56.5	80	22.6	43	12.1	30	8.5
Newspapers	359	124	34.4	126	35.0	72	20.0	37	10.3
Researchers	358	28	7.8	106	29.5	88	24.5	136	37.9
Internet	358	309	86.1	29	8.1	10	2.8	10	2.8
Films	356	189	52.8	108	30.2	31	30.2	29	8.1
Songs	356	129	36.1	140	39.2	62	17.4	25	7.0
Drama	357	132	36.9	130	36.3	60	16.8	35	9.8
Books	353	47	13.3	86	24.3	94	26.6	126	35.6
Family/ friends/ neighbours	355	8	2.2	44	12.4	62	17.4	241	67.7
Extension officers	356	16	4.5	22	6.2	62	17.4	256	71.7
NGOs/ CBOs	350	32	9.1	119	33.9	114	32.5	85	24.2

(Multiple responses were possible and preferences varied from one farmer to another.)

Sources Preferred by Information Providers to Disseminate Information

The information providers had different choices of information sources that they preferred to use for disseminating poultry management information. The most preferred sources were posters, leaflets, and meetings. The Internet, newspapers, songs and NGOs/CBOs were not preferred by any of the information providers. The findings detailing their preferences are presented in Table 5.

Table 5: Information Sources Preferred by Information Providers (N=22)

Source	Frequency (N)	Percentage (%)
Radio	7	31.8
Poster	21	95.5
Cell phone	2	9.1
Leaflets	18	81.8
Television	1	4.5
Films	2	9.1
Drama	4	18.2
Books	5	22.7
Family/friends/neighbours	6	27.3
Meetings	16	72.7

(Multiple responses were possible.)

The information providers pointed out the reasons for their preference of information sources. Surprisingly, none of their reasons were related to farmers' preferences. The reasons (Table 6), in descending order of importance, were: availability of the source, affordability, convenience of using the source, skills in using the source, and reliability of the source.

Table 6: Information Providers' Reasons for Information Source Preference (N=22)

Reasons	Frequency (N)	Percentage (%)
Availability of the source	18	81.8
Affordability of the source	15	68.2
Convenience of using the source	15	68.2
Skills in using the source	10	45.5
Reliability of the source	4	18.2

(Multiple responses were possible.)

The findings revealed further that all the information providers had never inquired about farmers' information source preferences. The majority of the respondents mentioned inadequate resources and difficult working conditions as their main reasons (Table 7). Other reasons were: a lack of knowledge about different information sources, and a lack of funds to support various dissemination channels.

Table 7: Reasons for not Inquiring about Farmers' Information Source Preferences (N=22)

Reasons	Frequency (N)	Percentage (%)
Inadequate resources	16	72.7
Difficult working conditions	13	59.1
Lack of knowledge about different information sources	9	40.9
Lack of funds to support various dissemination channels	7	31.8

(Multiple responses were possible.)

Effectiveness of Information Sources

The extension officers were considered to be the most effective information source, followed by family, friends, neighbours, radio and leaflets (See Table 8).

Table 8: Effectiveness of Sources for Poultry Management Information (N=360)

Information source		Rank							
		Not effective		Least effective		Effective		Very effective	
	N	No	%	No	%	No	%	No	%
Radio	357	7	2.0	78	21.8	98	27.5	174	48.7
Poster	355	28	7.9	92	25.9	119	33.5	116	32.7
Cell phone	355	38	10.7	108	30.4	94	26.5	115	32.4
Leaflets	357	28	7.8	71	19.9	95	26.6	163	45.7
Television	358	164	45.8	92	25.7	55	15.4	47	13.1
Newspapers	356	63	17.7	148	41.6	84	23.6	61	17.1
Researchers	356	26	7.3	110	30.9	106	29.8	114	32.0
Internet	350	261	74.6	51	14.6	17	4.9	21	6.0
Films	358	159	44.4	133	37.2	47	13.1	19	5.3
Songs	359	91	25.3	150	41.8	82	22.8	36	10.0
Drama	357	120	33.6	131	36.7	73	20.4	33	9.2
Books	355	26	7.3	81	22.8	131	36.9	117	33.0
Family/friends/ neighbours	355	7	2.0	43	12.1	67	18.9	238	67.0
Extension officers	357	5	1.4	25	7.0	59	16.5	268	75.1
NGOs/CBOs	353	17	4.8	135	38.2	117	33.1	84	23.8

(Multiple responses were possible.)

The extension officers, meetings, researchers, family, friends and neighbours were considered to be the most effective sources of information. Convenience, availability and reliability of an information source were the most important determinants of the effectiveness of information sources.

Farmers Satisfaction with Information Dissemination Services

Most of the farmers (60%) were not satisfied with the information dissemination services. Inadequate information services from extension officers, lack of reliable sources of information, lack of awareness of the availability of information, and unavailability of the extension officers were cited as the main reasons for dissatisfaction (See Table 9).

Table 9: Reasons for Farmers' Dissatisfaction: Data From Survey Questionnaire (N=216)

Reasons	Frequency (N)	Percentage (%)
Inadequate information services from extension officers	87	40.3
Lack of reliable sources of information	54	25
Lack of awareness of the availability of information	34	15.7
Unavailability of the extension officers	20	9.3
Availability of only a few sources of information	11	5.1
Unreliable information services	10	4.6

(Multiple responses were possible.)

On the other hand, majority of the information providers admitted that information dissemination services did not satisfy farmers' needs. Poor infrastructure, poor facilities, limited transport services, lack of funds, insufficient number of extension officers, and a difficult geographical infrastructure were pointed out the main constraints to effective dissemination of poultry management information in the surveyed communities (See Table 10).

Table 10: Reasons for Farmers' Dissatisfaction: Data from Interviews (N=22)

Reasons	Frequency (N)	Percentage (%)
Poor infrastructure	13	59.0
Poor facilities	12	54.5
Limited transport services	12	54.5
Lack of funds	10	45.5
Insufficient number of extension officers	8	36.4
Difficult geographical infrastructure	7	31.8

(Multiple responses were possible.)

Barriers to Information Access

Unavailability of extension officers, lack of awareness, unavailability of information, lack of electricity, lack of funds, and poor infrastructure were the major barriers that hindered farmers from accessing poultry management information. Other factors were limited literacy levels, long distances, a lack of cooperation among farmers, limited transport services, unreliable information sources, and poor economic status. The findings from the survey questionnaire and interviews are presented in Tables 11 and 12.

Table 11: Barriers to Information Access by Farmers (N=216)

Barrier	Frequency (N)	Percentage (%)
Unavailability of extension workers	173	87.4
Unavailability of information	167	84.3
Lack of awareness on the availability of information	106	53.5
Lack of funds to buy printed information materials	97	49.0
Lack of electric power	74	37.4
Poor infrastructure	71	35.9
Limited literacy levels	47	23.7

(Multiple responses were possible)

Table 12: Barriers to Information Access: Data from Interviews (N=22)

Barrier	Frequency (N)	Percentage (%)
Few choices of information sources	6	27.3
Lack of electricity	14	63.6
Lack of cooperation among farmers	9	40.9
Lack of reading culture	14	63.6
Limited literacy level	14	63.6
Poor economic status	15	68.2
Poor infrastructure	17	77.3
Lack of self-motivation	5	22.7
Limited number of extension officers	22	100

The Proposed Model

The proposed model (Figure 3) has six interrelated components for effective information dissemination: farmers in the rural community, information providers, the information system, farmers' satisfaction, information usage, and benefits. Each component requires important elements for successful information dissemination. The key elements to be considered are farmers' information needs; appropriate information sources; farmers' competence; cultural and personal values; farmers' characteristics; and information seeking patterns.

In order for the information providers to accomplish their work effectively, several factors need to be taken into consideration. These include adequate resources, an enabling environment, support from the government, and proper understanding of the target community. The information system should be designed with the target rural community in mind.

The elements to be taken into account in designing the information system include: information quality, system quality, and service quality. The three elements of the information system may result in information usage and farmers' satisfaction. After using the information and being satisfied with the benefits, farmers may consult the information system again, in order to access more information to improve their farming activities. This will only happen if the information disseminated is relevant to farmers' needs, and if its usage thus improves their farming activities and results in noticeable benefits.

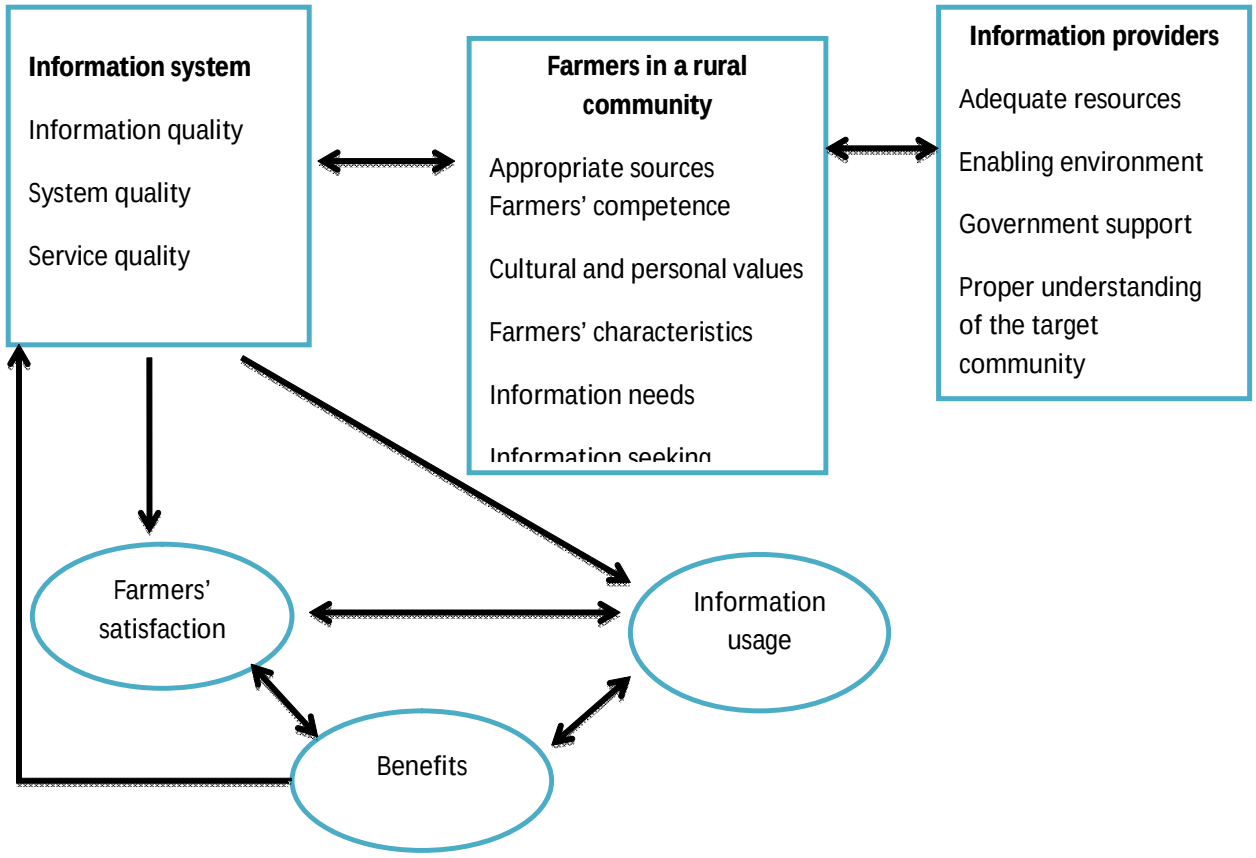

Figure 3: A proposed model for dissemination of agricultural information in Tanzania

Explanation for Components of the Proposed Model

There are six components that guide the proposed model, namely: information system, farmers in the rural communities, information providers, farmers' satisfaction, information usage, and benefits. The proposed model presents the important elements that the information system depends on for effective information dissemination. These are information quality, system quality, and service quality. Understanding the farmers in the rural communities is a prerequisite for successful information services. Various issues need to be taken into consideration in order to gain adequate knowledge about the target community. These include farmers' information needs, appropriate sources, preferred sources, cultural and personal values, farmers' characteristics, and farmers' competence. Information providers are the ones responsible for planning and disseminating information to the rural communities. In order to perform their duties effectively, they need adequate facilities, adequate resources, enabling environment, government support, and a proper understanding of the target community. The positive outcomes of the three components are farmers' satisfaction, information usage, and benefits to the farmers. The six components of the proposed model are explained in detail in the following sections.

Information System

The success of an information system in the rural communities is dependent on three variables, that is, information quality, system quality, and service quality (Msoffe, 2015). Information provision should consider these variables during the planning and dissemination of information in the rural areas. Information quality refers to the information content. The content should be relevant, context specific, easy to understand, and up to date. The study findings revealed that farmers were not motivated to access information that was

general, since it was not relevant for their local circumstances. Similarly, they failed to use the information that was delivered in formats they could not comprehend. Thus, the information providers should ensure that they understand farmers' needs and characteristics as well as their local environment so that they are in a position to deliver relevant content to the farmers.

System quality is concerned with the general organisation of the information dissemination: availability, usability, adaptability, reliability, and response time. The study findings showed that availability, convenience and reliability of an information source were the key factors for farmers in accessing information. Thus, it is important for information providers to ensure that the channels used for disseminating information are continuously available, convenient and reliable. Service quality is the support that the information providers offer to the farmers. This may be in form of awareness creation, follow-ups, assistance to use information, and being receptive and responsive to farmers. The study findings indicated that farmers were unable to use information because of lack of support from the information providers. It is thus imperative to ensure that information providers offer support to farmers so that they can be able to access and use information.

Farmers in the Rural Community

Farmers in the rural communities interact with the information system in an effort to satisfy their information needs (Msoffe, 2015). The information system that is designed with a proper understanding of the target community will be in a position to offer appropriate information to satisfy farmers' needs. It is thus proposed that assessment and understanding of the rural community could be based on, but not limited to the following: information needs, information seeking patterns, farmers' characteristics, preferred information sources, appropriate sources, cultural and personal values, and farmers' competence. Information providers should therefore make it a priority to have adequate knowledge about the target community as a prerequisite for planning and dissemination of information to the rural communities. The study findings showed that information needs of farmers were location specific. Also, farmers accessed information that had significance in their farming activities. This implied that farmers tend to value information that has a local focus and positive impacts in their farming activities. Thus, it is imperative to understand the information needs and seeking patterns of the target community in order to design an information service that is context specific and relevant to the farmers.

The study findings established that farmers had preferences for information sources, and also had choices for sources they considered effective. The study findings indicated that rural farmers preferred interpersonal sources. However, it was recommended that the use of multiple sources of information would provide a wider opportunity for all categories of farmers to access information. In order to understand the sources of information that are suitable for the target community, the information providers have to assess farmers' preferences and their choices for effective sources of information. This knowledge will assist in using information sources that are preferred by the rural community. In this regard, the proposed model is likely to assist in providing appropriate information packages to the farmers.

It is also prudent to assess and understand the cultural and personal values of farmers in the target community. The study findings revealed that cultural and personal values had effects on the way farmers were seeking information and sharing information among them. For this reason, it is important to understand the culture of the community in order to find ways of nurturing the positive cultural norms for the improvement of information access. For instance, the oral culture could be encouraged by organising discussion groups, storytelling, and narratives.

The farmers' demographic and socio-economic characteristics have influence on their information seeking patterns, as well as their ability to comprehend and use information. The findings showed that educational level of farmers had influence on the way farmers accessed and used information. It was also found that economic status of farmers influenced their information seeking patterns and information use. This model suggests a need to understand the demographic and socio-economic characteristics of farmers before disseminating information to the rural communities.

With such knowledge, the information providers will be able to design information packages that are relevant to a particular group of farmers. This fact will enable information services offered to the rural communities to reach farmers of different status.

Information Providers

The information providers are responsible for delivering agricultural information to the farmers in the rural areas. They can only perform their work successfully if the requirements for accomplishing their responsibilities are in place. The basic requirements for planning and dissemination of information to the rural communities are: adequate resources, enabling environment, government/ institutional support, and proper understanding of the target community (Msoffe, 2015). In order to plan and deliver information to farmers, various resources are required to enable the information providers to assess the target community, design the information resources and disseminate the information. The study findings established that information providers were unable to identify and prioritise farmers' information needs mainly because of lack of resources to facilitate the undertakings. The proposed model addresses the issue of providing adequate resources to enable smooth planning and dissemination of information to the rural communities. These may include physical and financial resources such as reliable transport, reliable communication facilities, funds, and other resources vital for information dissemination.

Enabling environment refers to appropriate policies, favourable working environment, basic infrastructure, as well as necessary social services. If all these aspects are taken into consideration, the information providers will have a comfortable working environment which may enable them to work efficiently. Such an environment is conducive for proper planning and dissemination of information. Likewise, proper understanding of the target community can assist the information providers in planning and disseminating appropriate information to the local communities. This involves assessment of the target community in terms of farmers' characteristics, information needs, preferred information sources, information seeking patterns, and appropriate sources. Similarly, government support is very important for the information providers to perform their responsibilities. The findings indicated that one of the obstacles that information providers faced was lack of support from the government. This model can assist the government in implementing information services to ensure that the information providers are given full support. In view of this, the proposed model is likely to facilitate the effective dissemination of agricultural information in the rural areas.

Farmers' Satisfaction and Information Use

The information system has impact on farmers' satisfaction with the information, as well as information usage. A well-designed information system has a positive impact on farmers' satisfaction, that is, the information needs of farmers will be satisfied. Satisfaction of farmers has impact on information usage, for the reason that farmers who are satisfied with the information are likely to use it. Similarly, use of relevant information brings satisfaction (Msoffe, 2015). Therefore, farmers' satisfaction and information usage have impact on each other and have impact on the benefits. In order to arrive at farmers' satisfaction and information usage, there should be a proper planning for information dissemination which starts with assessment of the target rural community. After the assessment, the information providers have to use the knowledge gained to plan for information dissemination taking into account all the attributes of the target community. A well-designed information system with focus on farmers provides relevant information to the farmers. Finally, farmers receive appropriate information which may result in farmers' satisfaction and information usage.

The Benefits

The benefits are the results of using relevant information. Farmers who use relevant information by applying the recommended farming practices should benefit by improvements in the various aspects of agricultural production. For instance, farmers who use information on poultry disease control get the benefits of healthy poultry. Likewise, those who use information on poultry production gain by increasing the number of poultry. The benefits can only be realised if the information used was appropriate (Msoffe, 2015). It is therefore important for

information providers to ensure that they disseminate information that satisfies farmers' needs and is appropriate to their farming practices. After realising the benefits of using information, farmers may further consult the information system to access more information for use. Thus, the benefits impact further information usage, which may result in improvement of farming activities in the rural areas. It is therefore hoped that the proposed model will be useful in effective planning and dissemination of agricultural information in the rural communities.

Discussion

The model proposes that information dissemination initiatives focus on the target community or intended beneficiaries. The focus should be on the community of beneficiaries, rather than on the information alone. Thus, the information providers should make it a priority to understand the target community before embarking on information dissemination activities. This may entail assessing their information needs, how they seek information, information sources that they prefer, and other factors which may contribute to information access and usage. The study findings showed that it is important to understand the target community in advance, in order to have successful information services. Adequate understanding of the local community provides guidance on the information source to use, and the formats and type of information to disseminate, depending on farmers' requirements (Das, 2012; Mtega, Dulle and Benard, 2013). This may necessitate the repackaging of information messages in order to reach the intended group. It is therefore important for responsible institutions to understand the culture, traditions and local situations before planning for information dissemination in the rural areas.

The study findings revealed that farmers in rural areas have limited education and lack various basic services. Thus, they may not be able to use print media, electronic resources and other formal sources of information. The level of education of an individual determines his or her knowledge and capability, and may influence the individual's ability to access and use information (Chen, Liu and Yang, 2011). Opara (2010) asserts that information may be accessible physically, but may possibly be inaccessible intellectually. The educational level of farmers has a great influence on the way in which farmers access and use information (Waller, Hoy, Henderson, Stinner and Welty, 1998). According to Sheba (1997), exposure to education gives an individual the ability to control information input, and store and retrieve information for future use. The proposed model is designed to accommodate the demographic and socio-economic factors that may influence the process of information seeking. For instance, the illiteracy or limited education of the rural farmers has a significant influence on farmers' information seeking habits, as revealed by the study findings. In the review of information seeking models, Aina (2004) noted that these models did not take the education of users into account. The failure to take these factors into account during information dissemination may affect farmers' information access, which means that information will not reach the target beneficiaries. The need to have a model that addresses the educational background of farmers is thus important for effective dissemination of information in semi-literate rural communities.

Furthermore, a decision regarding which information sources to consult depends on demographic and socioeconomic factors. The study findings showed that farmers preferred to access information through face-to-face communication. They preferred consulting family, friends, neighbours and information providers. In such a situation, individual and collective interactions within the local community would be the appropriate means to reach the majority of the target beneficiaries. However, the use of other media to complement the messages communicated orally would increase the reach to other members of the community, who may not be interested in face-to-face communication. Availability of other sources of information, apart from the oral sources, will also serve as a validation mechanism for orally delivered information. Thus, the proposed model suggests that the focus should not only bet on interpersonal sources, but also on other sources that are deemed to be appropriate by the target community. For instance, radio was found to be among the most appropriate sources for the rural community, and it could therefore serve as a supplementary source to oral communication.

In order for the information to be used, the content should be relevant to the farmers' needs and the formats should be easy to understand. The study

findings established that farmers tended to use information that had a direct impact on their farming activities, and preferred to use fellow farmers as sources, because of the convenience of engaging in two-way communication which is easier to understand than reading or watching. The proposed model suggests that the information disseminated to the rural areas should comprise local content and be context-specific. Farmers in the local communities may be motivated to use information that has a local content and fits within their prevailing circumstances. The usage of such types of information can easily result in the satisfaction of farmers' needs, which is the ultimate goal of disseminating information to the rural communities. Since farmers are likely to use information that has immediate benefits, the outcome of information usage may result in further usage because of the realised benefits. Thus, if relevant information is disseminated to the rural communities, farmers will be motivated to use the information because of the benefits that they achieve after information usage.

Conclusion

The proposed model is unique in its emphasis on farmers as the central focus of information dissemination in the rural areas. This model considers all aspects of effective information delivery to the semi-literate communities of developing countries. The proposed model creates an opportunity for all agencies responsible for information provision in the rural areas to develop and design guidelines for information dissemination. It also provides an initial framework for understanding farmers in the rural communities of the developing world. This model may be useful in planning for information dissemination services in the rural areas or during the assessment of the existing information services in rural areas. Furthermore, the model contributes to the understanding of information dissemination in rural settings of the developing world.

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Does Open Access Prevent Plagiarism in Higher Education?

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Abstract

Plagiarism is a dilemma in higher education. However, it is no longer obscure and has grown easier to expose. This is possible due to the web-based e-publication environment where access to and the scrutiny and use of information content is escalating. The authors use their experential knowledge, observation, content analysis, and extant literature to argue that Open Access increases the detection of plagiarism and discourages it in higher education if the stakeholders' roles are known and fulfilled. This presentation is divided into five parts: 1) Conceptualising and contextualising plagiarism; 2) An overview of the Open Access concept; 3) Does Open Access avert plagiarism? 4) The role of stakeholders; and 5) A case study of the University of Zululand (UNIZULU).

Keywords: Plagiarism, Plagiarism Stakeholders, Open Access, Higher Education, University of Zululand, South Africa

Introduction

The advantages of ease of access to and use of web-based information resources in the scholarly environment can be levelled by its disadvantages; in particular, the ease with which these same tools can be used to plagiarise, e.g. 'copy and paste' tool. However, while this scholarly challenge could be concealed in the 'print only' publishing environment for centuries, largely without noticing, the detection of plagiarism is becoming easier in the e-publishing environment. Yet even in the electronic publishing environment, such detection can be time-consuming and costly if e-records are not placed in an Open Access (OA) environment where they rapidly appear in the public domain upon publication. In this paper, it was argued that although plagiarism is still a dilemma in higher education, it is no longer obscure and has grown easier to expose, largely due to the web-based e-publication environment where access to and the scrutiny and use of information content are escalating. Experiential knowledge is often used by authors, researchers, assessors and information users and observations, content analysis and extant literature to argue that Open Access increases the detection of plagiarism and discourages it in higher education. This can only occur if the stakeholders' (e.g. librarians, faculty/teaching staff, higher education management, and students) roles are known and fulfilled. This presentation is divided into five parts: 1) Conceptualising and contextualising plagiarism; 2) An overview of the Open Access concept; 3) Does Open Access avert plagiarism? 4) The role of stakeholders; and 5) A case study of the University of Zululand (UNIZULU).

Conceptualising and Contextualising Plagiarism

Plagiarism is widely understood to be the unethical use of other people's publications, by claiming the content or parts thereof as one's own, without paying tribute to or recognising the sources from which the information was obtained, either at all or properly. However, the definition extends beyond publications; it describes unethical behaviour that involves "the act of taking another person's writing, conversation, song, or even idea, and passing it off as your own. This includes information from web pages, books, songs, television shows, email messages, interviews, articles,

artworks or any other medium" . Based on several definitions of plagiarism by Roger Clarke (2006) and others (Lukashenko, Anohina and Grundpenkis, 2007; Purdy, 2005; Singh and Ramenyi, 2016), plagiarism is associated with stealing, purloin, appropriating, imitating, copying, cheating, fraud, kidnapping, abducting, deriving, re-using, paraphrasing, manipulating, alluding, etc. Clarke's (2006) analysis of the definitions and their usage group them into the following categories:

(1) *Publication:* the presentation of another person's material, work, or idea. A precondition for plagiarism is that the new work is made available to others; personal notes are not an issue;

(2) *Content:* the presentation of another person's material, work, or idea. A precondition for plagiarism is that some part of the new work is derived from someone else's prior or contemporaneous work;

(3) *Appropriation:* the presentation of another person's material, work, or idea as one's own. A precondition for plagiarism is that the claim of originality of contribution is either explicit or implied by the manner of presentation; or the presentation may be such that the reader is reasonably likely to infer the work to be an original contribution; and

(4) *Lack of credit given:* the presentation of another person's material, work, or idea as his or her own, without appropriate attribution. A precondition for plagiarism is that the reader is not made aware of the identity of the originator, nor of the location of the original contribution.

But even here, we must be conscious of the complexities of plagiarism (Clarke, 2006; Purdy, 2005; Singh and Ramenyi, 2016), which can be 'competitive plagiarism' or 'institutionalised plagiarism' (Purdy, 2005:286-287) or 'ghostwriting' (Singh and Ramenyi, 2016) that are not always well understood. Clarke's (2006:97-103) representation of arguments against plagiarism, based on ethical, instrumentalist, legal, copyright and counter arguments, focuses on practicality to authors and readers, the role of imitation in learning and innovation, and alternative cultural interpretations of plagiarism; provides solid arguments for a better understanding of the complexities of plagiarism which cannot be ignored. Plagiarism in higher education largely occurs unknowingly due to negligence, carelessness, ignorance, arrogance, and apathy among members of the academic community. There is a lack of knowledge of how to use information resources or other people's information for teaching, learning and research, correctly or properly. Plagiarism is forbidden in higher education (see also Singh and Armenia, 2016) for at least the following three reasons:

> Firstly, this phenomenon is in contradiction to the process of learning which demands from a learner to take certain intellectual and physical efforts in order to acquire knowledge and skills necessary for the further social and professional activity.
>
> Secondly, plagiarism reduces the value of a qualification conferred by the educational institution. Thirdly, it demotivates other students to work independently and to put efforts to learning in case of impunity of plagiarism.
>
> (Lukashenko, Anohina and Grundspenkis, 2007).

The absence or invisibility of a plagiarism policy can be a major drawback in the fight against plagiarism in universities. In May 2013, a content analysis was conducted for this paper-based on the policies posted on the Internet by 23 South African universities, and concluded that the majority of the universities had a plagiarism policy. Institutional responsibility for the policies varied, but all the universities underlined that plagiarism was the responsibility of all the stakeholders. All the policies targeted students and teaching staff, and nearly all the policies included infringement penalties, detection software, marketing and publicity, declaration of compliance, and guidelines, including library guides. However, only a few policies articulated the library's role clearly.

An Overview of the Open Access (OA) concept

The Budapest Open Access Initiative's (BOAI, 2002) definition of OA was used as "free availability on the public Internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the Internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited" (BOAI, 2002; IFLA 2003). Open Access initiatives have rapidly evolved in recent years, as outlined in the "Timeline of the Open Access Movement", initiated by Peter Suber and taken over in 2009 by the Open Access Directory, which captures and shows the enormous growth of the OA movement from past to present. There is significant contribution to the timeline by libraries, universities, journal publishers, and professional organisations and societies. The most comprehensive report on OA content on the web is by the Directory of Open Access Repositories (DOAR) and the Open Access Directory (OAD). The figure and the table below provide some relevant insights. For example, out of 2993 repositories reported by DOAR worldwide in 2016, Africa repositories accounted for less than 4.4%. For example, Europe, accounted for 44.2%; Asia, 20%; North America, 19.1%; and South America 8.9%.

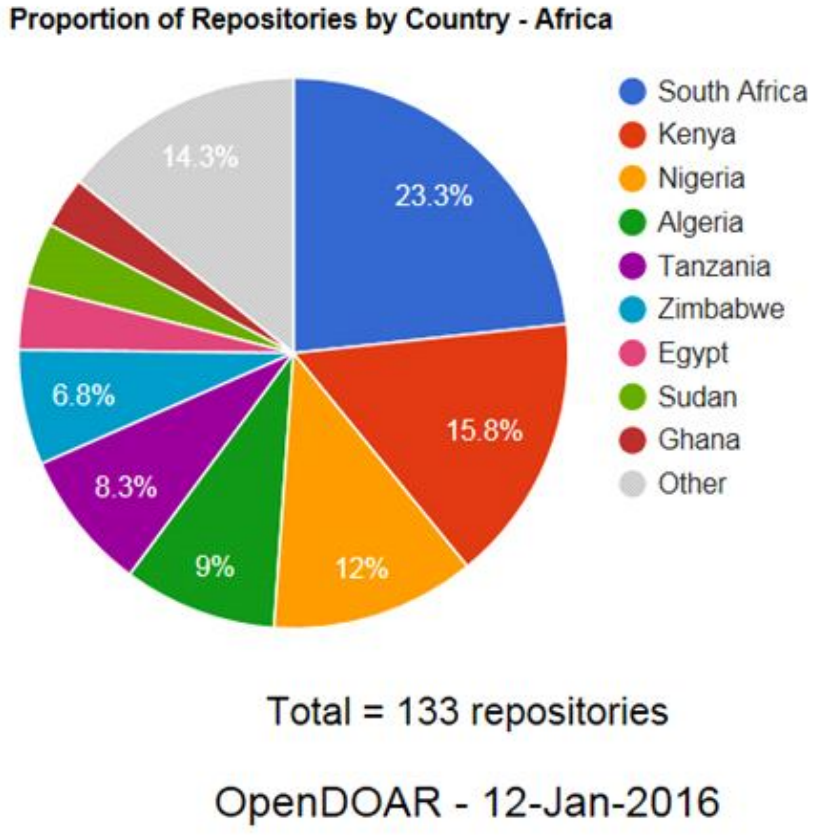

Figure 1: Proportion of Open Access Directories by Country in Africa

Table 1: Open Access Directories in South Africa

Repository name	Country	Recs.	Num. Pubs	Confs	Theses	Unpub	Other	URL Base	Software
African Higher Education Research Online	South Africa	929	+	+	+	+	+	OAI	[Unknown]
CSIR Research Space	South Africa	7125		+			+		DSpace
CUT Institutional Repository	South Africa	246			+				DSpace
Digital Innovation South Africa	South Africa		+	+	+	+	+		[Unknown]
Digital Knowledge at Cape Peninsula University of Technology	South Africa	2413			+	+		OAI	DSpace
DUT IR	South Africa	1254			+				DSpace
KovsieScholar	South Africa	372			+			OAI	DSpace
North-West University Institutional Repository	South Africa	14032			+			OAI	DSpace
OpenSALDRU	South Africa	658		+		+		OAI	DSpace
OpenUCT	South Africa	10602			+			OAI	DSpace
ResearchSpace@UKZN	South Africa	10996			+		+	OAI	DSpace
Rhodes eResearch Repository	South Africa	4096		+	+			OAI	EPrints
Scientific Electronic Library Online - South Africa	South Africa	1074							SciELO
SEALS Digital Commons	South Africa	12955			+		+	OAI	ContentPro
South Africa Data Archive	South Africa	171					+	OAI	DSpace
Stellenbosch University SUN Scholar Repository	South Africa	56423		+	+		+	OAI	DSpace
SUNDigital Collections	South Africa	4327	+				+	OAI	DSpace
TUT Digital Open Repository	South Africa	1233			+			OAI	ContentPro
UCT Computer Science Research Document Archive	South Africa	720	+	+	+	+		OAI	EPrints
UJDigispace	South Africa	12855			+			OAI	DSpace
Unisa Institutional Repository	South Africa	14880			+	+	+	OAI	DSpace
University of Fort Hare Institutional Repository	South Africa	446			+				DSpace
University of Limpopo	South Africa	938			+				DSpace
University of Pretoria Electronic Theses and Dissertations	South Africa	8774			+			OAI	ETD-db
University of the Free State ETD	South Africa	1280			+				ETD-db
University of the Western Cape Research Repository	South Africa	1319		+		+		OAI	DSpace
University of Zululand Repository	South Africa	1227			+				DSpace
UPSpace at the University of Pretoria	South Africa	37654		+	+		+	OAI	DSpace
UWC Theses and Dissertations	South Africa	3124			+			OAI	DSpace
VUT DigiResearch	South Africa	81			+				DSpace
Wits Institutional Repository on DSPACE	South Africa	12016			+	+		OAI	DSpace

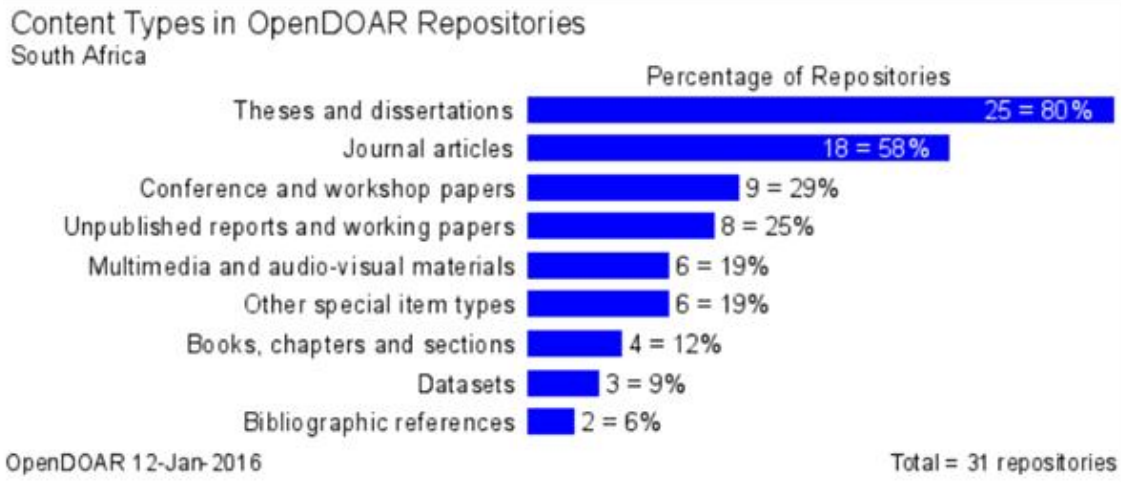

Figure 2: Content Types in Open DOAR Repositories in South Africa

Search engines such as Google, Yahoo and others provide the largest repository of OA content that is accessible to most people in the world, free of charge, on the Internet. Plagiarised information in such content can easily be detected. But, as Brandt et al. (2010) rightly observe, "OA documents are typically hidden from traditional web crawlers in so called OA repositories", meaning that access is restricted. McCown et al. (2006) noted that "21% of the resource identifiers were not indexed by any of the search engines" such as Google and MTN. Brandt et al. (2010) further indicate that "The usage of existing OA repositories is beneficial for any plagiarism detection process."

Does Open Access Avert Plagiarism?

This question can be answered with both a 'yes' and a 'no'. The escalating presence of e-resources on the web, while enjoyed by knowledge and information communities worldwide, is also condemned for enabling plagiarism to occur more easily, mainly because full records or parts of records can be rapidly transferred from one document to another. In higher education institutions, students can easily copy and paste entire papers or parts of documents that do not belong to them into their essays without proper attribution of authorship, leading to plagiarism. There is also an increase of 'online paper writing services' or 'ghostwriting' (Singh and Ramenyi, 2016) where students buy readymade papers, thesis and dissertations and present them for assessment as their original work (Janssens and Tummers, 2015). However, while it is difficult and laborious to detect such plagiarism in print-only information environments where most documents are not exposed to public scrutiny (as happens with e-resources).It could be argued that Open Access increases chances of detecting and averting plagiarism. Open Access e-resources, such as those retrieved from search engines, are available and accessible to the public worldwide; therefore, any person can read them and detect plagiarism. Authors take more precautions when publishing research output or posting their publications in an Open Access platform. It is also increasingly easy to detect plagiarism by using document resemblance detecting software programs (Chew and Blackey, 2010) such as Turnitin, Docoloc, EduTie, Eve2, CopyCatch, Glatt, Moss, JPlag, wordCHECK, etc., when full text records are available in an Open Access environment such as those represented in DOAR's burgeoning Institutional Repositories (IRs). Among the various text resemblance detecting software programs, Turnitin seems to be the most popular with the highest rating (Janssens and Tummers, 2015; Ison, 2014).

Arguments that link Open Access to plagiarism can be divided into three categories. The first category suggests that OA make it easier for plagiarism to occur (e.g. Abrizah, 2009; Brandt et al.,2010). Brandt et al. (2010) report that: "In nearly all recent examples of copyright violations in scientific, academic and scholarly areas, the original

source of the plagiarised passages can be found on the Internet." However, detecting such cases has also become easier to do precisely because of the Internet.

The second category argues that OA averts or prevents plagiarism, or makes the detection of plagiarism much easier. Such studies (Brandt et al., 2010) recognise that: "Freely available documents, however, bear the risk that they may easily be used by third persons without paying attention to the copyright of the original authors…. Nevertheless, the unrestricted accessibility of OA publications is their main advantage, especially with regard to copyright protection. Owing to their free availability, OA documents are also well-suited for automatic plagiarism search services." Increasingly, studies related to plagiarism detection software tools, development and usage (Brandt et al., 2010; Purdy, 2005; Lukashenko, Anohina and Grundspenkis, 2007; Chew and Blackey, 2010) show that internet-based resources, such as OA based-resources, make the detection of plagiarism much easier. Purdy (2005:276) explains that: "Plagiarism detection services that rely on the Internet allow instructors to search for this visual proof, to test their students' papers to determine if they include language copied directly from other sources." But he is also concerned about the legality of remote server-based Plagiarism Detection Software (PDS), such as Turnitin and EduTie, which keeps records of submitted documents in their servers without author consent, and the infallibility and reliability (Lukashenko, Anohina and Grundspenkis, 2007) of the PDS tools. Singh and Armenia (2016) suggest that more emphasis should be accorded to prevention than to the text resemblance checkers.

The burgeoning number of institutional repositories of theses and dissertations in Open Access spaces can deter plagiarism, as both authors and affiliate institutions take more precautions to avoid embarrassment. In the past, theses and dissertations were not easily accessible to the public unless one visited libraries or repositories where they were kept or stored 'gathering dust'. If a researcher from one part of the world or another country, region or institution, copied parts of a thesis/dissertation outside their area of jurisdiction, detection of plagiarism would be difficult. This would require persons who are familiar with the publications, such as theses/dissertations, and who can access and scrutinise the publications, to establish their originality. It is also reasonable to argue that only a few people who read documents pay close attention to their details, as often occurs when authors read for publication or for research, when examiners examine theses and dissertations, or reviewers review publications, or when students read for examinations to secure good grades. Open Access to e-theses and e-dissertations in IRs makes detection of plagiarism much easier, as more people would read them and are likely to sound the alarm if the/their work has been plagiarised. A recent study by Icon (2015) referring to the influence of the Internet on plagiarism among doctoral dissertations produced quite convincing results to support this argument. In the study, David Icon collected:

> Empirical data to investigate the potential influence the prevalence of the Internet has had on significant higher education artefacts by comparing dissertations written prior to widespread use of the Internet with those written in a period in ubiquitous Internet …. [Based on]. Doctor of Philosophy (PhD) dissertations written in English and published by accredited universities in the U.S. and Canada. A sample of 384 dissertations were analysed by Turnitin plagiarism detection software. The mean similarity indices for pre-Internet and post-Internet eras were 14.5 and 12.3, respectively. A Mann Whitney U test (Mdn = 13, U = 30,098.5, $p < 0.001$) indicated that the differences between groups were significant, however opposite that has been purported within the exigent literature. When comparing the counts of dissertations for each time era considering those with plagiarism versus those that had little/no evidence thereof, there was no statistically significant difference (?2 [1, N = 368] = 2.61, p = 0.11). The findings of this study suggest that the Internet may not be significantly impacting the prevalence of plagiarism in advanced levels of higher education.

Interestingly, the results from this study have not significantly departed from his earlier study where he concluded that:

> Although dissertations from online institutions were slightly more likely to involve plagiarism, the traditional schools had more extreme cases of plagiarism. Thus, the notion that online education is more prone to plagiarism is not well supported. However, across both institution types, more than half of all dissertations contained some level of plagiarism. (Ison, 2014)

The third argument belongs to those who feel that OA both increases and thwarts plagiarism. This is the compromising argument: "If plagiarism is easier to commit because of the Internet, it is also easier to catch because of the Internet" (Purdy, 2005).

The Role of Stakeholders

Stakeholders are the individuals or the organisations involved with or affected by an activity or an occurance. In this case, stakeholders include libraries, HEIs' administration, students, and staff, in particular academic/teaching/research staff. Librarians understand "that detection is not the main objective in a campaign against plagiarism. Rather, universities should concentrate on educating students as to what constitutes plagiarism and how to avoid it" (Burke, 2005). This view is supported by Wiebe (2006) who acknowledges that:

> It is more in-tune with the overall vocation of librarianship to educate students and advocate awareness of why plagiarism is wrong and how they can avoid it. ……Ignorance and lack of education are enemies of academic integrity - both of which can be greatly diminished with the help of proactive librarians and other faculty working together towards a common goal.

Most South African academic libraries are taking the lead in educating the academic community about the learning/research process by providing different services, including user education/ information literacy courses; workshops on e-resources, referencing, plagiarism, PDS such as Turnitin, etc.; online library guides and tutorials; and library displays, referencing and reference management software (e.g. Endnote, Refworks, etc.).

According to Schopfel (2013), "Part of the grey literature, electronic theses and dissertations (ETDs) represent a growing segment of open, available content in institutional repositories (IR) where they contribute to the impact and ranking of their institution." It is noted that most of the IRs listed in DOAR contain ETDs. Libraries have a major role to play in enabling Open Access (Mutula, 2011) and averting plagiarism. Mutula (2011) suggests that libraries should: provide access and support; digitise print collections and develop collections for Open Access; provide enabling infrastructure; offer digital and Open Access literacy; develop institutional repositories; network with stakeholders; provide copyright and intellectual property literacy; and provide leadership for OA. While libraries can initiate and provide leadership for OA and plagiarism, full cooperation and collaboration with relevant stakeholders is vital if they are to succeed.

The major roles of higher education institutions, according to Suber (2007), include: installing an OAI-compliant EPrint Archive; encouraging staff to deposit their scholarly work, both pre-print and post-print, in departmental or institutional repositories; training digital librarians who may assist as 'proxies' in self-archiving; and developing self-archiving, copyright/plagiarism and Open Access policies (Suber, 2007). For example, at Walter Sisulu University in South Africa, a draft Senate Plagiarism Policy under'Joint responsibilities of Supervisors, Co-supervisors and postgraduate students' states that:

> Postgraduate students and their respective supervisors need to take note that the electronic versions of the final research outputs will be posted on the intra and internet, facilitating access by a wide audience, and any proved challenge or allegation of plagiarism or unprofessional referencing will pose a challenge on their qualifications, including withdrawal of the qualification in cases where such qualification is already awarded, and

> simultenously cause disrepute to the supervisor, co-supervisor, department, school, faculty and postgraduate studies in particular and WSU in general.
>
> Authors publish to be read, and are important for Open Access and averting plagiarism. They should sound the alarm whenever they detect plagiarism of their work, or in the works of others. They should also conform to copyright conventions, launch and support OA and plagiarism initiatives and publications, and deposit publications in Open Access spaces.

Lecturers/Faculties/Academics interact with publications on a regular basis in their capacity as educators/instructors, authors, and assessors/ examiners/moderators of students and colleagues' academic and research output. They can detect, prevent, condemn and discourage plagiarism.

Students are vital as well. They need to develop critical thinking and their own/original views about what they learn. They also need to learn how to avoid plagiarism by participating in plagiarism workshops, which are available to them at their respective universities/colleges, and comply with institutional plagiarism policies.

A Case Study of the University of Zululand (UNIZULU)

University of Zululand (UNIZULU) is rural based, was started in 1960 and is one of the 25 public universities in South Africa. It is a comprehensive university that is expected to offer university education in a variety of disciplines, offer flexible exit points, balance teaching and research, combine vocational and traditional university education. The University offers undergraduate certificate, diploma, bachelor as well as postgraduate honours, master and doctorate degree qualifications in four faculties: Arts (humanities and social sciences); Commerce, Administration and Law; Education; Science and Agriculture. The student population in 2016 is 17,693, including 1183 postgraduate students. There are 48 academic departments at the university and 800 staff members, including 367 academic staff. UNIZULU is ranked among the top 100 of the 1450 African universities by most of the widely known five international university ranking agencies. The University mode of teaching is contact. The research portfolio at the University is held by the Deputy Vice Chancellor Research and Innovation who is also the Chair of University Research Committee (overseeing research at the University), Research Ethics Committee and Higher Degrees Committee whose functions are captured at the University research website. The university library hosts its institutional repository.

The University of Zululand has two major research policies that deal with plagiarism. (i)Ethics Policy - Policy and Procedures on Research Ethics and (ii) Policy and Procedures on Managing and Preventing Acts of Plagiarism--This policy recognises that:

> Plagiarism constitutes a breach of academic integrity and compromises and undermines the values and processes by which knowledge is created, shared and evaluated. Such breach not only casts suspicion upon the integrity of the individuals involved, but also damages the reputation of the academic community. The University of Zululand ("the University", "UNIZULU", "the Institution") therefore has a responsibility to uphold academic integrity and to promote trust in scholarly work undertaken at the Institution and to prevent plagiarism within the Institution (section 1).

The necessity of the policy is highlighted as follows:

- To get a shared and clear understanding of the nature of plagiarism .
- To emphasise the need to educate the University community about plagiarism and its impact on them and the Institution.
- To provide for monitoring, detection and prevention mechanisms and processes.
- To establish uniform procedures for dealing with instances of plagiarism that comply with the principles of natural justice.

- To contribute to academic integrity within the Institution.
- To improve the quality of research at UNIZULU .
- To augment the attributes of the University's graduates.
- To enhance the University's academic reputation (2012).

The plagiarism policy is linked to other associate policies such as Research Ethics Policy, Higher Degree Policy, Student Disciplinary Code, and Staff Disciplinary Code.

The university library conducts regular plagiarism awareness and prevention workshops to staff and students. At the end of the workshops, perceptions of participants regarding plagiarism are obtained.

Methodology

The University of Zululand library provides several workshops to staff and students that include plagiarism. A case study was conducted during UNIZULU research awareness month through open- ended questionnaire distributed to participants after the plagiarism workshops in September 2015. One hundred and eighty six copies of the questionnaire were distributed. The participants were mixed (academics -12; postgraduate students -14; and undergraduate students, 160). Ninety copies of the questionnaire were returned. They were required to answer the following questions: 1) Are you aware of the UNIZULU plagiarism policy? 2) If you know that a plagiarism/text resemblance checker (e.g. Turnitin) will be used on your work will you still plagiarize? 3) Do you think that you are still likely to plagiarise when you know that your work will appear in the public domain (e.g. on the web/ internet or IR) in Open Access (OA) for everyone to access (full text) and use? 4) Do you think OA can prevent plagiarism? and 5) What would you like to know about plagiarism?

Findings

The findings are highlighted include awareness of plagiarism, knowledge of plagiarism, prevention of plagiarism, etc.

Awareness of UNIZULU Plagiarism Policy

This paper has acknowledged the necessity of plagiarism policy in a university. Out of the 90 respondents to the question posed, 58 indicated that they were aware and 29 were not, while three did not respond. Some of the their responses were as follows: Learned about it during the presentation; It is fair and encourages students not to plagiarise; Now it's worthy to know it has serious consequences which can damage your reputation as a researcher; Teaches us to acknowledge the authors; and stop plagiarism. From the variety of responses there seems to be a general awareness of the UNIZULU plagiarism policy from this sample.

Awareness that a plagiarism/text resemblance checker (e.g. Turnitin) will be used on your work

When respondents were asked if they would still plagiarise despite awareness of plagiarism/text resemblance checker, most of the respondents indicated that they would not plagiarise if they were aware that a text resemblance checker would be used on their work, 32 indicated 'No' with comments, while 54 without comments, and four did not respond. This may suggest text resemblance checker could reduce plagiarism. This confirms views in related studies reported elsewhere in this paper (e.g. Purdy, 2005; Ison, 2015). Some of the responses were: No, why should I not unless I am in sane but everything was thoroughly explained; No, it may ruin my career; No, it's prohibited when conducting research; No, I am aware of the Turnitin system, it is clear that the work submitted will not be considered.

Knowledge of plagiarism

The concept of plagiarism is not widely understood as reflected in this study. The respondents identified areas of training need on plagiarism as: the penalties that a researcher may be given after plagiarism is detected; Unintentional plagiarism like how do you plagiarise from the previous studies; and how to avoid plagiarism; How to use Turnitin and learn different

referencing styles;

Knowledge that work will appear in public domain

Respondents were asked if they would still plagiarise despite the fact that their work would appear in the public domain (e.g. on the web/internet or IR) in open access (OA) for everyone to access (full text) and use, the respondents overwhelmingly agreed that they would not plagiarise if they knew that their publication would appear on an online Open Access space with 51 indicating saying 'No' without comments, 32 with comments, and seven did not respond. More than three respondents in each case cited bringing shame to themselves, the supervisor and the institution; getting caught and prosecution as the reasons why they would not plagiarise. Some of the responses are: No, it is important to acknowledge the work of others; No, because it will be seen in public and it will be easier to spot plagiarism; No, because that can destroy my entire academic attributions; It is not easy to plagiarise since the authors of written information or articles will be aware of you plagiarising; No, because still I will get caught; No, you can be prosecuted; No, never; It will give me, my supervisor and university a bad name.

Prevention of plagiarism through OA

The main question in this study referred to whether Open Access could prevent plagiarism. The respondents agreed that OA could prevent plagiarism. For example 62 agreed, 11 disagreed, 7 stated maybe, 10 did not respond. Some of the responses were: It will be easier to access information and also get new ideas so that they can develop their own; It exposes those who plagiarise; One may reduce or do not plagiarise at all due to the fact that the open access is able to expose all work submitted with plagiarism; Everyone will be aware to whom the work belongs; Because no researcher will try to steal someone's information without any acknowledgement; Because people will access your work and see that you have stolen other people's work. While most acknowledged that open access prevents plagiarism by most respondents, at least four respondents noted that training on correct ways of using information was essential.

Conclusions

At the beginning of this paper, it was argued that OA can avert, prevent or reduce plagiarism and validated this with some examples (e.g. Brandt et al., 2010; Purdy, 2007). It was acknowledged that many more studies and observation in our work spaces would support this, as demonstrated in the UNIZULU case study. Studies supporting this view or argument from PDS developers and providers admit that detecting plagiarism would be considerably easier and more effective when records are accessible in full text on the Internet in OA space. There are also strong arguments in favour of what could be called 'prevention is better than cure'(Singh and Ramenyi (2016). Also recognised as the compromising argument - alluded to earlier - succinctly summarised by Purdy (2006) that: "If plagiarism is easier to commit because of the Internet, it is also easier to catch because of the Internet." First, Higher Education Institutions (HEIs) need to develop comprehensive plagiarism and OA (IRs, etc.) policies that embrace the rights and responsibilities of all the stakeholders.

Secondly, OA documents hidden from traditional search engine crawlers on the Internet and only accessible through institutions' intranet cyberspace, sometimes with additional password restrictions, do not qualify as OA documents in the way that OA is defined. This concern is increasingly contradictory and confusing the spirit of OA as reflected by Prost and Schöpfel (2014) in their article "Degrees of Openness: Access Restrictions in Institucional Repositories" where they were concerned regarding "whether this lack of openness is temporary due to the transition from traditional scientific communication to open access infrastructures and services, or here to stay, as a basic feature of the new and complex cohabitation of institutional repositories and commercial publishing". Such restricted access limits the detection of plagiarism.

Thirdly, Internet-based OA documents (such as ETDs, including retrospectively digitised print theses, online conference proceedings, etc.) provide growing opportunities for plagiarism awareness, detection, and prevention if documents are accessible

in full text format. Stakeholders should work together and focus more on awareness, education and training to prevent plagiarism, as it is the view that most plagiarism in HEIs occurs because of ignorance and apathy, largely among students.

Lastly, plagiarism detection software tools are highly useful and helpful in OA document environments. They play a major role in the detection of plagiarism if used wisely. However, the wisdom of using them is curtailed if full text records are only scrutinised by one or a few individuals, and not made available to the greater public.

The case study affirmed that plagiarism policy is essential in a university. Plagiarism could be significantly reduced if students are aware that text resemblance checker (e.g. Turnitin) would be used to verify their work. There was an overwhelming admission by the respondents that they would not plagiarise if they knew that their work would appear on an online open access space/platform and that open access could prevent plagiarism. The study identified training needs on plagiarism and emphasised the importance of awareness of all aspects of plagiarism to support its prevention. The conclusion is similar to Singh and Ramenyi's (2016) suggestion in that "it is also important for the issue of plagiarism and ghost writing to be discussed more openly and regularly within universities". This study has provided background knowledge of plagiarism and open access and university environment in Africa that can support future debates, research, education /training and policy on OA and plagiarism.

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