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Usage of Information and Communication Technology to Support Innovative Library Services in Universities: A Case of the University of Dar es Salaam Wilbert Chagula Library

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Abstract

This study investigated the application of Information and Communication Technologies (ICTs) in supporting innovative services at the University of Dar es Salaam (UDSM) Wilbert Chagula Library. It focused on ICT facilities available in the UDSM Library, ascertained usage of ICT facilities in offering innovative Library services, and factors influencing usage of ICT'S in the Library to provide innovative library services. The study employed a mixed methods in whi1ch a questionnaire, interview and observation guides were used to collect data from a sample of 50 respondents that included seven Heads of Sections, ten academic, thirty administrative and, two ICT staff, and the Director of Library Services. In general, the study's findings revealed that a majority of respondents are moderately skilled in the usage of ICTs which they obtained through on the job training, in-house classroom training organized by the UDSM Library, attend local and international seminars/workshops, international seminars/workshops and through professional training. The findings further revealed that, ICTs is used to offer innovative library services at UDSM Library. These services include: virtual desk services, provision of electronic resources and databases chat with a librarian, literature searches, QR code access, ask a librarian, and establishing institutional repositories.

Introduction

ICT systems are now widely accepted and used in almost all areas of human endeavour. Rapid developments ICTs are viewed as a means and an end for development. These have provided a solid foundation for revolutionary changes in academic libraries and information centres' information handling capabilities (Bhangu, 2013). As pointed out by Krubu & Osawaru (2011), computing, communication, and mass storage technologies are some of the continuously developing areas that are reshaping how academic libraries access, retrieve, store, manipulate, and disseminate information. Even though innovation is not limited to science and technology but any process of making changes to something established by introducing something new. ICTs are the main driving force behind innovation in academic libraries (Sahin, 2006). Innovation involve looking for opportunities to apply new and evolving ideas, methods, designs, technologies and willingness to take risks, experiment, and make mistakes (Pellen & Miller, 2014). The last half of the 20th century saw researchers and practitioners warning

academic libraries of the likelihood of being left behind if they did not adapt to changes taking place (Jantz, 2012). In response to this, most academic libraries started to undertake innovative initiatives despite the various challenges they faced in trying to do so (Islam, Agarwal, & Ikeda, 2015: Yeh & Ramirez, (2016). Since then, innovation is no longer an option but a necessity for libraries (Jantz, 2012). Unfortunately, academic librarians are rarely equipped to be innovative despite the obvious need for that in service provision in their work places (Vaughan, 2013). Academic librarians have limited skills due to few ICT facilities at their disposal a result of inadequate budgetary allocations (Dhanavandan and Tamizhchelvan (2014) and Brundy (2015). Hence, innovative means are inevitable in improving library operations including services provision that meet users' needs. In view of this, academic libraries must aggressively and effectively utilize ICT to improve efficiency and effectiveness and in service provision to users (Janakiraman, Ormsby & Subramanian, 2015). Therefore, this study sought to investigate application of ICT in enhancing innovation in academic library's services provision.

Literature Review

The abbreviation "ICT" has been used by researchers since the 1980s to refer to the field of Computer and Information Science, and a huge and rapidly growing knowledge base developed by practitioners and researchers (Moursund, 2005). Alakpodia (2010) argue that, ICTs have transformed the world in all aspects of life including library services. According to Eseohe, Simeon, and Ehikioya (2014), the use of ICT in libraries simply entails using ICTs to carry out functions activities and services offered that previously relied on human manual labour. Through the application of ICTs, academic libraries can now o provide access to unlimited learning resources, information, and knowledge 24/7 hitherto inaccessible before because of distance (Elisha, 2006).

ICTs have greatly changed academic library working environments (Steyn & Johanson, 2011) and the emergence of automation software and its application has seen a great shift in library operations and functions from being traditionally heavily reliant on human labour to handling of core activities technologically, this is a prime example of what ICT can do (Kumar, 2017). The extent of automation varies between libraries. Whereas some have automated all housekeeping operations (Wema, 2000) while others use ICTs to develop new computerized information services (Omosor, 2014). Overall, ICTs provide timely access to quality information to users', at 'any time', from 'anywhere', and in the 'right way' (Fischer, 2012; Kumar, 2017).

Evidently, with the help of ICTs, academic libraries can utilize advanced scientific methods, and know-how on a large scale to come up with innovative practices that cater for all users' needs including researchers hence accomplishing their objectives and at the same time contributing to the quality of higher education (Moursund, 2005). In all, innovation is an important concept in today's libraries, especially in light of the ongoing transition from acquiring serials in print to subscribing to electronic journal databases, thus moving toward virtual library environments (Raitt, 2005 & Khan, 2016).

In order for libraries to remain relevant to their customers, they must follow the fundamental rule of business, that is, to supply what is demanded by their market in best way possible (Kodama, 2013). For that to be possible, ICADL (2010) argues that library staff skills need to allow them to shift their services from book-centric to user-centric. In other words, as the library continues to redefine its role in the digital environment, it needs to leverage its strengths and innovate to create responsive and convenient services (Sahin, 2006).

Since ICTs have a great role in almost all academic libraries' operations as pointed out by Dhanavandan and Tamizhchelvan (2014), these libraries have no choice but to change their services and modernize their operations to match the new technologies. Studies carried out by Krubu & Osawaru (2011) and Ghuloum (2012) revealed that ICTs provide opportunities for providing value-added information services and access to a wide variety of digital-based information resources. However, the studies also revealed that for libraries to utilize innovation opportunities brought by ICTs, staff members need to be equipped with ICT skills needed to handle information, manage and organize libraries in a digital environment. In support of this, Khan (2016) and Dhanavandan and Tamizhechelvan (2014) state that for libraries to effectively meet users' needs, there is a need of improving ICT skills among library professionals.

Apart from the constant need for skill improvement, as a result of various changes surrounding ICTs and their usage, there are a number of factors that affect the usage of these tools tin innovative services Dhanavandan, and Tamizhchelvan (2014) point out that ICTs have brought out issues of massive digitization and storage demands, unlimited access versus copyright laws, digital knowledge mining, electronic reference services demands such as search co-ordination, and management of archives.

According to the study by Haliso (2011) pointed factors that on the factors affecting Information and Communication Technologies (ICTs) use by academic librarians in Southwestern Nigeria are as follows; poor and inadequate telecommunication facilities; poor level of computer literacy skills militated against effective use of information and communication technology in Nigeria. The study fu advised that, professional librarians in Nigeria must acquire necessary skills that will enable them to be competent in an ICT environmentFurther that that irregular power supply; librarians attitude towards usage of ICT andinadequate funding among others stood are militating factors agaist ICT availability and use in Nigerian academic libraries.

The other factor is information explosion. As information increases ICT demand also increases for handling those information. Khan (2016) affirmed that, due to information explosion it is very difficult to handle large quantities of information with traditional library tools like manual catalogue, bibliographies, etc. In today's library environment, t the right way is not possible without ICT application. ICT has become a necessity and need.

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Methodology

This study was conducted at the University of Dar es Salaam (UDSM) Library in Dar es Salaam, Tanzania. The Library's pioneer role in the application of ICTs to aid information access and retrieval (which it started in the 1990s) in the country made it the right place for this study. This study applied a survey research design to collect qualitative and quantitative data from 50 library staff inclusive of administrative and academic staff, directors, heads of sections, and ICT staff. Specifically, the study's sample was made of 7 head of sections, 10 academic staff, 30 administrative staff, 2 ICT staff, and the Director of Library Services. From the administrative and academic staff, a self-administered questionnaire consisting of mainly close-ended questions was administered to collect data. All the 40 questionnaires distributed were completed and returned resulting in a 100% response rate. The study used the 7 heads of sections, 2 ICT staff and the Director of Library Services as interviewees because they were considered information rich hence likely to provide in-depth information on the issues under study. The study also applied the observation method to find out about types, quantities, and operational status of ICT facilities available in the Library.

Findings

Table 1: Demographic Characteristics of Respondents

Understanding the designation of respondents was important in this study as such data provides information on respondents' responsibilities in the library. This is because designation is basically related to the duties and responsibilities assigned to a person on daily basis. Such tasks may also influence one's usage of available ICT facilities. The composition of respondents of this study is shown Table1below:

Table 1: Demographic Details of Respondents

Designation n=40	Gender				Total	
	Female		Male			
	F	%	F	%	F	%
Library Officers II,	5	12.5	5	12.5	**10**	**25**
Library Officers I,	2	5	2	5	**4**	**10**
Library Assistants II	1	2.5	3	7.5	**4**	**10**
Assistant Librarians	2	5	2	5	**4**	**10**
Library Assistants I	1	2.5	2	5	**3**	**7.5**
Senior Library Assistants	1	2.5	2	5	**3**	**7.5**
Principal Library Officer	0	0	1	2.5	**1**	**2.5**
Tutorial assistants	1	2.5	2	5	**3**	**7.5**
Assistant lecturers	0	0	2	5	**3**	**7.5**
Lectures	1	2.5	1	2.5	**2**	**5**
Senior lectures	1	2.5	1	2.5	**1**	**2.5**
Professors	1	2.5	1	2.5	**2**	**5**

Source: Field data 2018

Table 1 shows that twenty four (60 percent) respondents are male and 16 (40 percent) are female. In terms of designations, the table shows that Library Officers II made up 25% of the total sample while , Library Officers I, Library Assistants II, and Assistant Librarians had a 10% representation each, followed by Library Assistants I and Senior Library Assistants with a 7.5% representation each while the least represented 2.5% ware Principal Library Officers. On the part of academic staff respondents, it was found that Tutorial Assistants, Assistant Lecturers, Lectures, Senior Lecturers, and Professors consisted 7.5%, 7.5%, 5%, 2.5%, and 5% respectively of the sample.

Available ICT Facilities and their Status

ICT staff members were asked to provide details on ICT facilities available in the Library. This required them to provide the types of facilities, their quantities, and operational status. The responses are summarised in Table 2 below;

Table 2: ICT Facilities Available in UDSM Library

Item,	Quantity	Status
Computers	485	Functioning
Telephones	4	Not Functioning
Fax Machines	1	Not Functioning
Scanners	7	Functioning
Printers	24	Functioning
Photocopiers	4	Functioning
Digitizer table	32	In Good Condition
Blue light DVD player	1	Functioning
Blue light CD player	1	Functioning
Electronic white board	1	Functioning
Projectors	4	In Good Condition
Televisions	4	In Good Condition

Source: Field data 2018

Table 2 shows that the Library has a wide range of ICT facilities in varying quantities and conditions which were acquired through government and donor support. The findings indicate that, since establishment of the new library services there have been a lot of changes and introduction of new ICT facilities which were not previously available. According to the respondents, these equipment are enabling library staff to perform their day to day duties with much ease as articulated by an IT technician as follows:

> *"The presence of ICT facilities has simplified library duties. Classification, cataloguing and acquisition of library items are now easy because of the integration of ICT in library operations. In case of library users, they can easily*

identify whether a certain library item is available or if it is on loan by using the OPAC. Not only that, ICTs have also simplified tasks related to students registration as nowadays they can register online and access their special reserve cards within two days compared to previous days when the same process took up to a month".

Despite the role played by ICT facilities as aforementioned, the researcher observed that a number of available ICT facilities in the Library are inadequate hence posing a challenge towards their optimal usage. A study conducted by Kumar (2017) revealed that inadequacy of ICT infrastructure is a major cause of users' dissatisfaction with services these days. This shortage forces staff members to dedicate the few available resources to performing tasks deemed central to the library's wellbeing hence leaving less or no room for innovation. In addition to that, the constant engagement of these facilities means there are limited opportunities for learning new skills. This further impacts on innovative ideas development since for ICT to be properly harnessed, users need to possess appropriate computer skills (Alakpodia, 2010).

Usage of ICTs in Offering Innovative Services at UDSM

The study also required respondents to indicate how ICTs are used to offer innovative services in the library. According to responses obtained, the library offers a number of services with the help of ICTs. The findings are presented in Table 3.

Table 3: Usage of ICT in offering innovative services at UDSM

Innovative services n=50	**Administrative Staff n=30**		**Academic Staff n=10**		**Total n=40**	
	F	%	F	%	F	%
Virtual desk services	29	96.7	0	0	29	72.5
E-resources and databases	20	66.6	8	80	28	70
Chat with a librarian	26	86.7	0	0	26	65
QR code access to resources	15	50	5	50	20	50
Literature searches	14	46.7	7	70	21	52.5
Ask a librarian	11	36.7	0	0	11	27.5
Institutional repository	4	13.3	5	50	9	22.5

Source: Field data 2018

These findings show that virtual desk services are the most performed by the respondents (72.5%), followed by provision of electronic resources and databases (as confirmed by 70% of respondents), and chat with a librarian mentioned by 65% of respondents. Other tasks mentioned by considerable percentages were literature searches (52.5%), QR code access to resources (50%), ask a librarian (27.5%), and institutional repository (22.5%).

When asked the same question, interviewees mentioned the same services and provided more details on their execution and benefits. Regarding the registration of students for services, ICTs were credited with the reduction of paper work and time used to do. On the other hand, the facilities were hailed for easing students' lives by allowing them to learn if an item they needed was on loan or available following which they can place an order. One interview shared the following on both these roles of ICTs;

> *"On the University of Dar es Salaam Library website there is virtual desk where students can register for library services to request for new or a replacement of special reserve cards. This desk is based on a Goggle platform so; students have to sign in using their email addresses. Library staff members from each section have access to records created by the students hence their ability to process the requests made. Through this virtual desk, clients can look at items' availability for loan".*

During interviews, ICT facilities were also hailed for allowing both students and staff to have access to numerous electronic resources available at University. The access to these resources, some of which are subscribed to assists researchers, academic staff, and students to obtain more of relevant and current information. Also pointing out some of the prominent databases offered by the library, one interviewee stressed the importance of the role played by ICTs in enhancing access to e-resources as follows:

> *"Our users can now read online or download subscribed electronic resources. Now people do not always have to be physically in the library to get the information we offer. Through our AGM COTUL subscription, the current one running between 2018 and 2019, our clients can access databases such as EBSCO HOST, EMERALD, SPRINGER and CAMBRIDGE and RESEARCH 4 LIFE databases such as HINARI, AGORA, ARDI, OARE, and GOAL. All these can be accessed only by bona fide UDSM Library users by using their username and password".*

Through the communication facilities that come with ICTs, the library has been able to come up with better ways to enhance communication between clients and librarians. The presence of ICT facilities in the reference section has reduced the number of library users who visit to ask questions at the reference desk. The section has created platforms known as Chat with a Librarian and Ask a Librarian which are used to get requests from clients and respond to them. One respondent said the following on this aspect:

> *"Chat with a librarian is a very powerful communication tool that has ensured efficiency and effectiveness in offering services in this library. Users normally chat and ask what they want 24/7 without limitations and receive feedback*

> *instantly or after an agreeable amount of time. This is a total contrast to how things used to be in days gone by when users were expected to visit the library in order to ask questions. This has reduced reference librarians' workload".*

Another interesting comment on Ask a librarian came from a respondent who went further to describe its make and how it is used then he commented:

> *"We have four platforms under Ask a librarian namely feedback forum, Facebook account, online reference, and information literacy. Users often use these platforms to ask questions related to the services offered by UDSM Library. These are directly answered by the reference librarian or directed to any subject specialist to answer on behalf of reference librarian. The communication is either instant or with a slight delayed reply. For both of them the primary aim is to satisfy users".*

The responses from interviews also revealed that ICT facilities give a wide range of opportunities to staff and their ability to communicate and share information, knowledge, and other resources within and outside their offices. That way, these facilities make working conditions more conducive. For example during interviews one respondent said:

> *"Staff and students from different colleges always send to us titles of electronic journals and electronic books they need. We use different literature searching strategies to find requested documents. Afterwards, the documents are sent to the people who requested them. This is a very easy version of our tasks. We can now think of how else to provide our services because there is usually time for that".*

These results were also revealed that through ICTs the library started having access to resources through Quick Response Code (QR code). This has been a response to the growing number of clients with handheld communication devices such as smartphones which have the ability to view various e-resources. This method has been established to free clients of the requirement of knowing the URLs of databases and other platforms where resources are kept. Elaborating on this, a respondent from the reference services section said:

> *"We now help our clients to have direct access to our resources without worrying much about getting there. We have moved from providing people with leaflets with URLs to letting them just scan the codes we leave on notice boards around the University. During orientation and other training we offer, library users are taught how to install and use QR code readers on their smartphones. The results have been very impressive, majority of those introduced to this mechanism have expressed their joy. In the other words of one respondent the service has brought library resources to our fingertips".*

The results have also show that through ICTs a new way of offering information to users has been introduced by the library, and that is institutional repository. The library has been collecting, preserving, and providing access to intellectual digital output collections of the University. During an interview session one respondent elaborated on the role of ICTs in this respect as follows:

> *"At this point we are striving to get all our scholarly works converted to digital. Some of them are already in that format and available through the Institution repository. These are basically there to make researchers' lives easier by offering them access to scholarly works in an easy way. The researchers can access and choose any citation as they are ready-made in the database. Recently, we have also embarked on creating subject-specific databases the aim is put together resources that support current national development goals such as those on research and industrialization".*

Level of ICT Skills Possessed by Staff Members in the Library

With a clear understanding that ICT would not make any innovative impact without staff members with skills to put them to use (Elly, 2002), the study sought to measure Library's staff ICT skills. To do so, respondents were requested to state if they possess computer skills and in response all (100%) respondents said "yes". The respondents were also asked to indicate their level of ICT skills in order to get a clear picture of skills Library's staff possess. Table 4 presents ICT skill levels possessed by respondents.

Table 4: Respondents' Level of ICT Skills

Skills Level	**Administrative Staff N=30**		**Academic Staff N=10**		**Total N=40**	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Basic	5	16.7	3	30	8	20
Intermediate	22	73.3	7	70	29	72.5
Very low	2	6.7	-	-	2	5.0
I don't know	1	3.3	-	-	1	2.5
Total	**30**	**100**	**10**	**100**	**40**	**100**

Source: Field data 2018

The findings in Table 4 shows that majority (72.5 %) of library staff possess basic ICT skills, 20% possess intermediate skills while 5% felt their skills are very or inadequate, and 2.5% did not know. Looking at specific categories of respondents, the findings show variations in skill levels. With regards to this, Table 4 shows that a higher percentage of academic staff have basic adequate skills compared to administrative staff. Academic staff have adequate skills possibly due to their teaching responsibilities which demand the use of these tools constantly. The other reasons might be their reliance institutional repository resources, their frequent literature searches, and usage of electronic resources and databases, all of which demand more advanced ICT skills than those needed by

administrative staff to carry out tasks related to manning systems such as the Ask a librarian, chat with a librarian, and virtual desk reference services.

This imbalance in ICT skills was confirmed through the researcher's observations where some administrative staff members were unwilling or failed to participate in activities that required the use of ICTs because they did not possess requisite skills to enable them to do so. These results are an indication that opportunities for innovation in this Library are to some extent limited. This is so because the application of ICTs in library operations is essential in creating opportunities for creating and implementing innovative processes, abut without necessary skills it is not possible.

How Library Staff Members Obtained their ICT Skills

Respondents were asked to indicate how they obtained their ICT skills. The responses are summarized in table 5 below:

Table 5: How Library Staff Members Obtained their ICT Skills

ICT Training n=40	**Administrative Staff N=30**		**Academic Staff N=10**		**Total N=40**	
	F	%	F	%	F	%
On job training	26	86.7	6	60	32	80
In-house classroom training organized by UDSM Library	18	60	5	50	23	57.5
Local seminars/workshops	13	43.3	5	50	18	45
Seminar/workshops abroad (International)	7	23.3	1	10	8	20
Professional training	5	16.7	2	20	7	17.5

Source: Field data 2018

These findings reveal that 80% of the respondents obtained their ICT skills through on the job training, 57.5% through in-house classroom training while 45% did so through local workshops/seminars. The results also show that only 17.5% got the skills through professional training.

Clearly, the results show that there are variations in how respondents acquired ICT skills with on-job training being the most prominent method. In their study, Ajeemsha and Madhusudhan (2014) argue that one advantage of on job training is that it is mostly practical than other formal training methods. They further commended the training for helping semi-professionals to familiarize themselves more with their new working environments.

However, those who attended international workshops or seminars and professional training had more exposure and interaction compared to those who did not. During an interview session one respondent elaborated on the role of international workshops or seminars and professional training as follows;

> "*Staff members who have attended such training seem to have advanced skill levels in science and technology hence this helps them to increase their own levels of innovation capabilities and creativity".*

Generally, with the current changes of ICT facilities in offering library services to users at UDSM, most library members were equiped with on the job training. Despite those changes in facilities and on job training, most of library staff still possess intermediate ICT skills in offering library services to users. As a result, all these constrain their ability to effectively use available ICT facilities to support innovative library services at UDSM.

Factors Influencing the Innovatinve Usage of ICT in Libraries

Having ICTs and skilled staf in place does not neccessarily guarrantee innovations, it is importat for this study to look at factors that prote use and application of ICTin library innovations. To do so, respondents were asked to mention factors influencing usage of these tools for innovation. The findings obtained are summarised in Table 6:

Table 6: Factors influencing usage of ICT in libraries

Factors influencing usage of ICT in libraries	**F**	**%**
Cuts down costs	34	85
Simplifies library works	29	72.5
Able to access anywhere and at any time	25	62.5

Source: Field data 2018

Table 6 shows that 85% of the respondents said what influences them to use ICTs is the need to cut down operational costs, 72.5% ability to simplify work, and 62.5% said facilities' accessibilty.

These findings imply that ICTs usage in this library has been propelled by various factors mentione earlier particulary to to cut down operational costs. According to a study by the Association of Research Libraries in 2014, the average percentage of total university expenditures declined from just under 3.7 percent in 1982 to 1.8 percent in 2011 (Brundy, 2015). It is well known that academic libraries are experiencing reduction exacerbated by dwindling in operating and materials budgets every year resulting in economic pressure of inability to allocate budgets for new challenges (Dhanavandan and Tamizhchelvan, 2014). In such a resource-scarce environment, academic library leaders must be innovative to ensure their libraries continue to run smoothly (Vaughan, 2013)

and this can be done partly by subscribing to electronic journal data bases which are less expensive compared to print resources (Khan, 2016).

With regards to work simplification, Khan (2016) argues that ICT has changed how acquisition, technical, resources processing, periodical subscription, and circulation activities are carried out. Khan continues to say these days; library readers can get their desired information and services in shortest time with less man power involvement. Talking about ICTs' simplification of tasks, one respondent shared the following:

> *"The use of social media such as feedback forum, facebook, hangout and other ICT applications such as ask a librarian, QR code, online reference and information literacy services, a librarian's work has considerably been simplified. For example, users used to request for services at the library reference desk. Now these services are integrated in ICT based applications hence reducing library staff's workloads and making services provisions easier"*

Conclusion and Recommendations

Findings of this study revealed that UDSM library utilizes available ICTs to come up with better ways of meeting users' needs. However, the revelation that library staff's ICT skill levels are not up to the desirable levels indicates that these tools are not optimally utilised. More alarming is the fact that administrative library staff who are the ones involved in sevice provision have far less skills. In other words, the people who directly deal with users and are supposed to continuously come up with more innovative ways of serving users can not fully exploit the power of ICT. This simply means that despite the promising developments at the library, more needs to be done in terms training support staff who have great potential in bringing about innovative services.

Essentially, the University of Dar es Salaam Library should develop long and short-term, and in-house training programmes for its staff members to enable them to effectively use and apply ICT in library services provision. This must be done regularly because information technologies change rapidly. On a broader perspective, the Library should formulate and implement an ICT strategy which in addition to being used to guide the improvement of ICT infrastructure, it should lay out short and long term skill development programs.

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