International Journal of Scientific Research and Engineering Development-– Volume 8 Issue 5, Sep-Oct 2025

Available at www.ijsred.com

RESEARCH ARTICLE OPEN ACCESS

Assessment of Factors of Institutional Information Systems which Facilitate Adoption of Institutional Repositories: case of four universities in Tanzania

Musa Kasella Amosi*, Henry L Mambo**, Said Ally Mohammed***

*(Department of Regional Development Planning, Institute of Rural Development Planning, Lake Zone Center – Mwanza
E-mail: mamosi@irdp.ac.tz and musa.amosi84@gmail.com)

**(Department of Media Studies and Library Services, Open University of Tanzania
E-mail: hlmarowo@yahoo.com)

***(Department of Media Studies and Library Services, Open University of Tanzania
E-mail: saidallymasomaso@gmail.com)

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Abstract:

The main objective of this study was to assess factors of institutional information systems that facilitate adoption of institutional repositories in four universities namely; Open University of Tanzania, Sokoine University of Agriculture, University of Dodoma and University of Dar es Salaam. Conceptual framework variables of the study were derived from relevant empirical literature, and information systems theories and models. Three specific objectives were set to identify components of institutional information systems which facilitate adoption of institutional repository, determine how components of the institutional information systems affect adoption of institutional repository and evaluate prospects and challenges of institutional information systems in relation to adoption of institutional repository. This qualitative study used triangulation methodology whereby longitudinal approach and four methods of data collection were applied. Direct observation method was used at the research field to observe information systems physical components such as people, infrastructures, ICT hardware and software, procedures of conducting organizational business, databases and applied technologies. Documentary review was done to examine available institutional documents. Semi-structured interview was conducted to key staff informants and questionnaire was supplied to postgraduate students and staff members in all four universities. Finally, thematic analysis was done and the findings indicated that; there are inadequate information systems' components, adoption of institutional repositories still face several challenges and prospects which were indicated by visibility and enhanced trends in improvements in adoption of the institutional repositories and thus, key stakeholders were recommended to get fully involved by playing their parts fully so as to improve the status quo.

Keywords **— Institutional repository adoption, local content accommodation, stakeholders, infrastructures, procedures, ICT hardware, ICT software, ICT technology**

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I: INTRODUCTION

In 2002 Budapest Open Access Initiatives (BOAI) were declared to foster open access scholarly communication by using digital archives platform. One of the main benefactors of this initiative are the higher learning institutions who were struggling with the problem of processing, storage and dissemination of their local content due to immensity of production resulting from their daily routine functions of their institutions which

are mainly trainings, researches, consultancies and innovations. Empirical data shows that inadequacy in the information systems, apparently, results into slowed adoption and implementation of institutional repositories. According to (1) an information system is a socio-technical, organizational system designed to collect, process, store, and disseminate information. Challenges and barriers to repository development are identification and deposit of content, access and use of services and preservation of content and sustainability of service ([2],[3],[4] [5],[6]). Deficiencies in information systems that hinder development and efficiency of open access institutional repositories are inadequate human resource capacity, inadequate ICT infrastructure, inadequate means and techniques of information processing, copyrights, inadequate awareness and time to deposit ([7],[8],[9]).

Local content categories can differ according to the operating policy of an institution. (10) reports that they can be categorized as follows: Serials (Nigerian dailies - newspapers, magazines, journals), textbooks/monographs, government documents, audio – visuals, indigenous knowledge, literature, reference sources, historical documents (archival document, artifacts, ancient antiquities), theses/dissertations, research reports, musicals/home video, photographs, broadcast, retrieval tools (indexes, abstracts, bibliographies, thesaurus, classification schemes).

Institutional repository (IR) stakeholders who are directly connected to institutional repository may include authors, funding agency, researchers, students, faculty, librarians, institutional repository implementation/sustenance teams, university administrators, commercial publishers, conference and workshop organizers, and other entities that are directly and indirectly involved in the contemporary scholarly publishing cycle (11). Other important stakeholders in the repository development are policy and decisions makers such as the councilors, vice councilors, provosts, body of directors, and university management team. Having an open access policy is dramatically important in terms of establishing the will of the faculty and providing a mechanism for addressing unnecessary limits on sharing scholarly articles, but it is not particularly meaningful unless articles are actually collected and made available under the policy (12).

Other enabling factors in the information system are computer hardware and computer software. The computer hardware are the physical components of the computer system such as processing unit and monitor while computer software are programs which perform various tasks according to algorithms and instructions (13). For any institutional repository to be interoperable there must be software that is compatible with Open Access Initiative - Protocol for Metadata Harvesting and Open Access Initiative – Object Reuse standards (OAI-MPH and OAI-ORE) standards, which will provide a seamless search of materials with other repositories. Two most popular programs, which are OAI - compliant are DSpace, Eprint, MyCore, and Fedora (14). The variance in software platform versions implemented in the community is dramatic.

The sample frame institutions in this study included; the Open University of Tanzania, Sokoine University of Agriculture, University of Dodoma and University of Dar es Salaam.

The general purpose of this study was to make assessment of factors of academic institutional information systems which facilitate adoption of institutional repositories in four academic institutions in Tanzania. Specific questions for this study were;

RQ1: Which components of the institutional information systems are used in adoption of an institutional repository?

RQ2: How do components of the institutional information systems affect adoption of an institutional repository?

RQ3: What are prospects and challenges of institutional information systems in relation to adoption of an institutional repository?

A. *Statement of the problem*

The introduction of open access institutional repositories revolutionized management and practice of archival administration in academic institutions. Empirical findings show that there are some differences in the rates of adoption of academic institutional repositories globally. According to the empirical data published by Directory of Open Access Repositories (DOAR) and Registry of Open Access Repositories (ROAR), European countries lead with the number of repositories per each country followed by North and South American countries. In Asian countries Japan and Indonesia have high number of open access repositories. Furthermore, the data indicate that African countries have the lowest number of open access repositories per each (15). (15) used Gross Domestic Product (GDP) data as a global comparative layer to determine general wealth and infrastructure development between countries. However, other factors of institutional information systems such as stakeholders' engagement, institutional frameworks, technologies, information communication technology (ICT) hardware and software and databases are still some of the setbacks to adoption and management of open access institutional repositories in the developing countries, particularly in Africa.

B. *Significance of the study*

Significance of this study is that it will draw more close attention of policy makers, managerial bodies and information practitioners regarding assessment of factors of institutional information systems for adoption and accommodation of local contents in their institutional repositories. They will be able to evaluate element composition of the information systems such as infrastructures, stakeholders' engagement, institutional frameworks, technologies, ICT hardware and software and databases to determine functionality and efficiency of their institutional repositories.

C. *Literature review*

1) Components of the institutional information systems that are used in adoption of institutional repository

The components of information system are; human resources, infrastructures, databases, procedures, computer hardware, computer software and applied communication technology ([16],[17],[18],[19]). Human resources are all the people involved in the information systems who have different tasks in system due to their work positions, job descriptions, knowledge, skills, attitudes and experience. These people are such as information specialists who are mainly librarians, ICT managers and technicians, and records managers (20). Another group of people are the faculty members such as heads of departments, coordinators, deans and lecturers. Empirical data show that the successful establishment of an institutional repository needs careful arrangements and enthusiasm from the entire institutional community such as students and faculty members ([22], [24], [25]).

Other important stakeholders in the repository development are policy and decisions makers such as the councilors, vice councilors, provosts, body of directors, and university management team. Institutional repositories work in such a way that stored archival information can be preserved, processed and retrieved and accessed through aggregators such as Google Scholar and made available to information seekers. Databases are digital stored data which can be processed to produce information. Data and information categories can differ according to the operating policy of an institution (10). Other enabling factors in the information system are computer hardware and computer software. The computer hardware are the physical components of the computer system such as processing unit and monitor while computer software are programs which perform various tasks according to algorithms and instructions ([13].[16] [17],[18], [19]).

2) Influence of components of the institutional information systems on accommodation of local content

i. Institutional stakeholders

Obviously, institutional repository stakeholders go beyond faculty, research staff and students to include university administration, funding agencies, librarians, academic disciplines, commercial publishers, conference and workshop organizers, and other entities that are directly and indirectly involved in the contemporary scholarly publishing cycle ([19],[22],[24],[25]). One of the key roles of library units and librarians in the academic institutions is to devise a plan and an implementation policy for institutional repository by collaborating with information technologists and university & faculty administrators ([27],[28],[29]).

ii. Infrastructures

Technical infrastructure means ICT hardware, software, equipments and physical working space. Inadequate or poor technical infrastructure is one of the factors which affect adoption of IRs. Technical infrastructure means ICT hardware, software, equipments and physical working space. Empirical data indicate prevalence of inadequate technological infrastructure in academic institutions ([30],[3],[4]). Inadequate or poor technical infrastructure is one of the factors which affect adoption of IRs. This factor is described by two information system models which are Model of PC Utilization (MPCU) (Triandis, 1979; (31) are Information Systems Success Model (ISSM) (32) whereby information systems facilitating conditions and systems quality are core constructs in determining the designing and implementation of open access institutional repository

iii. Databases

Presence of various databases in the institutional realm that can store newspapers, magazines, journals), textbooks/monographs, government documents, audio – visuals, indigenous knowledge, literature, reference sources, historical documents (archival document, artefacts, ancient antiquities), theses/dissertations, research reports, musicals/home video, photographs, broadcast, retrieval tools (indexes, abstracts, bibliographies, thesaurus, classification schemes).

iv. Procedures

Guiding principles and policies are important for plan and implementation of open access institutional repositories because the policy should stipulate who, where, what, and how things should be done. Motivations should be put into considerations when designing and implementing IR policies. These practices are well supported by Stakeholders Theory (Freeman, 1984) and Social Exchange Theory (Emmerson, 1976).

v. applied information communication technology

Lack or limited knowledge and technical expertise

(33), states that the default installation of DSpace is based on a compiling method containing many steps to be executed manually. This makes the deployment of DSpace-based application a laborious work, and usually needs some technical skills. These can be enhanced by organizing a series of conferences and capacity building workshops and educate stakeholders and retraining. To (34), the retraining of librarians was necessary for libraries to be able to utilize the potential that the models offer, which end result would be that libraries and librarians can claim a key role in scholarly communication.

3) Prospects and challenges of institutional information systems in relation to adoption of institutional repository

Empirical data show that there is a high rate of adoption of open access institutional repositories worldwide. European countries lead, followed by North and South American countries. Adoptions of institutional repositories in most of the Asian countries are relatively high. High adoptions are aligned with very well and improved institutional

information systems which are attributed to presence of good economies in those countries. Adoptions of institutional repositories in most of the African countries are relatively low exhibited by presence of moderate and or poor as well as unreliable institutional information systems which are attributed to low economies, ([16],[17],[18],[19]). Deployment and adoption of open access institutional repositories are still facing economic, social and psychological barriers, challenges and problems such as; Copyright and intellectual property rights (35). Also, inadequate technological infrastructure, ([36],[3],[4]), and lack of political or will power.

D. Conceptual framework

The choice of variables for research was done by review of existing literature relevant to this study whereby conceptual framework was devised and variables prepared to guide finding answers to the research questions.

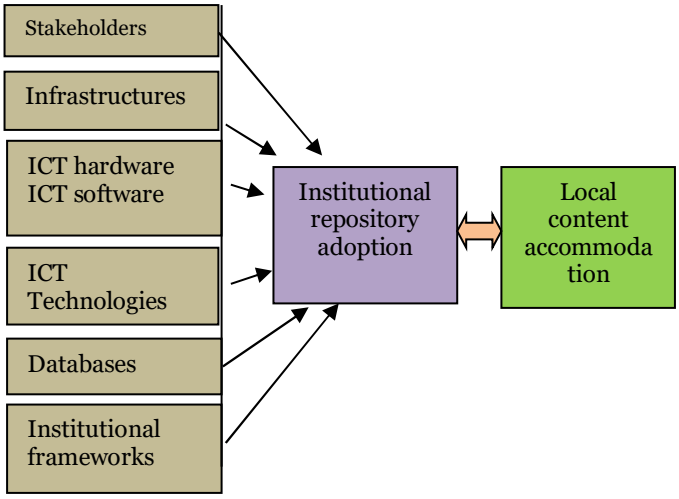

Fig. 1 Conceptual framework

II: METHODOLOGY

A. Study design and approach

This qualitative study employed longitudinal approach to assess institutional information systems in four universities of Tanzania. The major aim was to evaluate components of the academic institutional information systems in relation to adoption of institutional repositories.

It employed four data collection methods which were; direct observation, documentary reviews, questionnaires and semi-structured interviews.

B. Study area, sampling technique and sample size

The sample frame included four academic institutions which were the Open University of Tanzania (OUT), the Sokoine University of Agriculture (SUA), the University of Dodoma (UDOM) and the University of Dar es Salaam (UDSM). During the direct observation method the observation checklist which comprised of five aspects of interest was prepared and eventually used at the research fields. These aspects were concerned with the information systems components. In the documentary review, all documents pertaining to institutional frameworks were searched, reviewed and evaluated. The documents were found in offices, libraries, on the websites and the institutional repositories of particular academic institutions. 24, 19, 11 and 23 documents were found in OUT, SUA, UDOM and UDSM, respectively. In the semi-structured interviews interview guides were prepared for that purpose of collecting relevant data for this study. Altogether, forty staff members, ten per each institution, were selected purposively as key informers and interviewed. Lastly, postgraduate students and both academic and administrative staff members were selected randomly as sample units to answer questionnaires. Hence, two questionnaires were prepared; one for the staff and the other for the postgraduate students. Total number of staff and student respondents involved in the study by questionnaire method was 203.

C. Data analysis techniques

Analysis of the literature here was done in accordance with the order in which the research objectives and subsequent research questions appear. Due to triangulation methodology which was applied in searching field data it was observed that descriptive statistics and thematic analysis were done to mine data.

D. Ethical considerations

Assurance to all participants in the study that any information they would provide would be treated as confidential and would not be used anywhere for any other reason other than the initial reason for which it was sought and given to respondents. Ensuring privacy along the research process was essential to create safe and comfortable environments to participants to share their thoughts, experience and sensitive information. Care was taken to ensure that all works referred to in this study were acknowledged to so as to avoid cases of plagiarism.

III: RESULTS AND DISCUSSION

A. Summary of key findings

1) Which components of the institutional information systems are used in adoption institutional repository?

TABLE 1: Summary profiles of the surveyed institutions

Institution	Library workers	ICT Technical staff	Academic staff	Admin. staff	Number of postgraduate students	Number of faculties colleges Institutes schools	Number of campus
OUT	18	50	31	220	3977	5 facultie	1 main campus in Dar es salaam city, 30 regional centres 70 study centres, Rwanda, Kenya, Ethiopia, Ghana, Namibia, Uganda and Malawi
SUA	38		1427		891 (2022)	6 colleges 2 schools	Main Campus (Edward Moringe) Sohlomon Mahlangu 11km north-west of Morogoro Olmotony campus in Arusha, Mazumbai Forest Reserve – Lushoto, Tunduru campus, Mizengo Pinda campus in Katavi region
UDOM			782	608	25000 (students)	6 colleges, 3 schools and 2 institutes	Main campus at Chimwaga in Dodoma city
UDSM	121	229	1941	1409	5536	7 colleges 7schools 7 institutes 17 centres 12 directorates 2 units	UDSM main campus Mlimani DUCE est. 2005/2006 in Dar es salaam city MUCE est. 2006/2007 in Iringa municipality

Findings have indicated that all of the four institutions surveyed have good established information systems although they still face some challenges of adoption in varying degrees.

i. Infrastructures

Due to increased number of citizens who were prospective for higher learning education the Open University of Tanzania was established in 1994 by Act of Parliament of 1992. SUA was established by Act of Parliament of 1984. In June 2021, the School of Agricultural Economics and Business Studies was elevated to a fully-fledged College of

Economics and Business Studies (CoEBS). Similarly, the School of Engineering and Technology (SoET)1 and School of Education (SoE)2 were formed. University of Dodoma was established in 2007. Area size is 3953.67 hectares 12km east of the city of Dodoma. Its capacity is 40,000 students and the University of Dar es salaam started in 1961 as a college of the University of London. In 1963 it became a constituent of the University of East Africa. In 1970 University of Dar es salaam was officially established after split of the University of East Africa whereby Makerere University and University of Nairobi were also established simultaneously. UDSM established Dar es salaam University College of Education (DUCE) in 2005/2006 and Mkwawa University College of Education (MUCE) was established in 2006/2007.

ii. Stakeholders

The government of Tanzania is the prime role player in establishment, management and survival of higher learning institutions specifically those which are in public domains. The government makes sure that the institutions are established by law passed by the parliament and eventually given charter and accredited to conduct business in a full fledged way. It is the role of the government to provide funds though respective ministries as subsidization budgets for infrastructures, equipments and tools, employment of human resources to meet the visions and missions of respective institutions and other running costs. Other stakeholders are; Personnel in general, Internet Service Providers, Donors, Sponsors, National Council for Technical and Vocational Education Training (NACTVET), Tanzania Commission of Universities (TCU), mother ministries, University Governing Body, Tanzania Commission for Science and Technology (COSTECH), firms and the general public.

These people are further divided into; ICT technicians, librarians, lecturers, students, IR/librarians, specialists, directorate of research officials, directorate of postgraduate officials etc, directing and coordinating organs and others workers, security guards.

iii. ICT Hardware and Software

In all four institutions hardware included; computers, Ethernets, WiFi routers, Network servers, backups, scanners, printers.

In OUT ICT software included; Windows 7, Eprints (version 3.3.5 eps) birthdate 10th October 2012, antivirus, firewalls. It was found that OUT institutional repository, Eprints (version 3.3.5 eps), was established since 10th October 2012.

In SUA it was found that institutional repository, DSpace (version other), was first installed on 20th May 2015.

It was found that institutional repository called DSpace (version other), in University of Dodoma, at the first time was installed on 20th May 2019.

It was found that there are two kinds of institutional repositories in the University of Dar es Salaam. The first one is called UDSM Research Repository, http://repository.udsm.ac.tz:8080/xmlui/ which was born in 2015. And the other is Library Repository, libraryrepository.udsm.ac.tz.

iv. Application of Technologies

- Ethernet, WiFi hotspots, authentication and login, ICTs security firewall.
- 23 wireless (WiFi) hotspot connections were found at OUT Headquarters
- 64 wireless (WiFi) hotspot connections were found around the SUA campuses
- 101 wireless (WiFi) hotspot connections were found around the UDOM campuses
- 134 wireless (WiFi) hotspot connections were found around the UDSM campuses
- WiFi WAN not available at some points
- Windows 7 computers at OUT need updating to latest versions.
- E-Prints v3.3.5 at OUT needs updating to latest version such as v3.4.5

- Very low self-archiving practice
- No multimedia were shared in the IR which showed that expertise is still a challenge to accommodate multimedia
- Automated IR workflow still challenging

v. Processing Guidelines

Findings indicated that processing guidelines, tools and techniques included; Dublin core, Sherpa-RoMEO, copyright check, dissertations, theses, articles, papers, accommodation, automation, policies, guidelines, acquisition process evaluation and reporting.

TABLE 1: Documents in the institutional frameworks which were either missing or not publicly available

OUT	SUA	UDOM	UDSM
Institutional repository policy	Research Policy-and-Agenda-	ICT Master Plan	Library policy
Research regulations and guidelines	SUA Vision document	ICT policy	Institutional repository policy
Anti-plagiarism policy and guidelines	E-learning strategy	ICT security policy	ICT Master Plan
Quality Assurance Good Practices Handbook	Guidance and counseling perspectives policy	Investment policy	ICT security policy
Graduate studies regulations and guidelines	Graduate studies regulations and guidelines	Quality Assurance Good Practices Handbook	Research regulations and guidelines
OUT vision document		E-learning strategy	Investment policy
Guidance and counseling perspectives policy		Research policy and agenda	Quality Assurance Good Practices Handbook
		Guidelines for journals	E-learning strategy
		Research ethics policy	Research ethics policy
			Guidance and counseling perspectives policy

TABLE 3: Delay in formulation or updating of some policies, plans, strategies and guidelines was found

	Name of institution	Average time of updating of institutional publications to new editions/versions
1.	The Open University of Tanzania	More than seven years
2.	The Sokoine University of Agriculture	Five years
3.	The University of Dodoma	More than six years
4.	The University of Dar es Salaam	Six years

- Processes of local contents are done at two points i.e in the UDSM library and the Directorate of Research and Publications
- Institutional Repository http://journals.udsm.ac.tz UDSM Research Repository: http://repository.udsm.ac.tz:8080/xmlui/ and library repository at: https://libraryrepository.udsm.ac.tz

2) Prospects and Challenges of Institutional Information Systems in Relation to Recruitment of Local Content in Institutional Repository

i. Prospects of Adoption of Institutional Information System and Institutional Repository

Most library and ICT officers are juniors and undergraduate. Awareness was found not sufficient amongst the institution community members. The findings showed that community members are varied in the degree of awareness of existence and running of the institutional repository. Highest awareness was found amongst library workers partly due to their expertise in information matters, compelling duties which are assigned to them in the library as well as in the institutional repository and customary regular trainings that they normally obtain in symposia, conferences, seminars and in-house trainings. High awareness of institutional repositories was also observed among lecturers, senior lecturers and professors. This was due to fact that they are compelled to publish regularly in order to increase expertise in their professional fields as well as obtain rank promotions and less awareness and knowledge of institutional repositories are found among non-academic staff and the students. This is mainly due to the fact that they are not directly involved in information publishing in the

institutional repositories and they receive trainings rarely to nil. Trainings concerning institutional repository and information literacy at SUA, UDOM and UDSM were done regularly to students and staff members to enhance their knowledge and skills, but, at OUT were not regularly done instead were done during orientation seasons due to the fact that the mode of studies is open and distance learning.

Although institutional repository is a new venue of information publishing it was found that most scholars were willing to deposit in OA-IR. Other positive impacts and prospects observed were;

- Perceived behavioral control measures were indicated in the documents
- Documents deposited or accommodated in institutional repository were 3633 at OUT, 5799 at SUA, 4151 at UDOM, 15743 at UDSM library repository and 5991 at UDSM research repository.
- Visibility of institutional activities and outputs enhanced
- Increased information and knowledge shared within scholarly community members
- OUT, SUA and UDOM registered on ROAR and OpenDOAR (Sherpa)
- UDSM Research Repository registered on ROAR and OpenDOAR (Sherpa) but UDSM Library Repository not yet registered on ROAR and OpenDOAR (Sherpa)
- It was found that high price of Internet broadband from ISP hinders full utilization of personal computers due to low budget allocated for Internet uses
- High security measures taken to control risks of attacks and sabotages by ICT's users within and outside the information systems were found
- Ethernet, WiFi hotspots, authentication and login, ICTs security firewalls found
- Working place infrastructures included; Seminar rooms, study rooms, offices, libraries, departments, colleges/schools/institutes canteens, ICT rooms, study areas, ICTs maintenance workrooms.
- New biggest library at UDSM which was built by China as an aid was completed and opened since 2018. The new library is equipped with adequate new ICT equipments for UDSM students and staff. The new library supplements the Old Chagula Library
- Most postgraduate students and staff members own both Smartphones and laptop PC
- Scanning of local content for archival in institutional repository in progress
- The metadata were well documented in the repositories
- COSTECH was established in 1986: vision is to be a prime driver of science, technology and innovation for sustainable development in Tanzania. Through collaboration with COSTECH OUT, SUA, UDOM and UDSM were able to obtain technical assistance as well as co-publication of her local content through open access mode
- In 2021-2026, the government in collaboration with the World Bank acquired a financial loan to finance the World Bank Programme/Project worth 425 USD (972 billion Tshillings) known as Higher Education for Economic Transformation (HEET) whereby University of Dar es salaam received 47.5 million USD, Sokoine University of Agriculture received 32 million USD, University of Dodoma received 8 million USD and the Open University of Tanzania received 9.9 million USD

ii. Challenges of Developing Institutional Information System and Adoption of Institutional Repository

In order to measure adoption challenges two models namely the Model of Personal Computer Utilization and Information System Success Model were applied.

According to the findings challenges associated with adoption of main institutional information systems were; inadequate infrastructures, inadequate and uneven distribution community members specifically at OUT, inadequate computer

hardware and software, inadequate use of modern technologies, insufficient procedural guidelines, adoption of library policy in relation with IR policy implementation were found containing some shortcomings. Lack of clear guidelines and mechanisms to track and trap scholarly works to be accommodated into institutional repository as absence and or inadequacy in the contents of institutional directives can result into delayed actions, dormancy, lack of clarity, obscured or disturbed workflow and slowed development. Low PC utilization knowledge and skills are still setbacks, acquisition of local content by the Sokoine National Agricultural Library (SNAL) from sister institutions for the sake of accommodating the contents in the institutional repository was found not efficient due to slow coordination and inadequate fund, UDOM very lately adopted and installed repository software,

Generally, it was found that adoption of the institutional repositories at all four institutions had met challenges which had resulted into this moderate efficiency in terms of development. These challenges are such as low budget, electricity shutout, lack of updated institutional repository and library policies, inadequate ICT tools, inadequate working library staff, low speed of digitization of hard copies of archival materials lack of enough time to deposit, low incentives, plagiarism and copyright issues and inadequate coordination due to lack of clear directives and guidelines regarding institutional repository from other institutional policies.

Control of room temperature seemed difficult due to lack of reliable and sustainable electric supply, lack of enough backup electric supply in case of electric shutout/cutout and lack or inadequate air conditioners. Experts recommend to maintaining reasonable climate control in secured rooms, with temperature ranges between 50 and 80 degrees Fahrenheit, with a humidity range of 20 - 80% (see also the requirements on the installed systems).

In this study it was found that there are some challenges persisting within the information systems caused by inadequacy measures taken to cope with time lapse dynamics which affected the quality of the information system. Eventually, these challenges have been hindering efficiency in execution of daily business of the institution. Time lapse and technological changes have resulted into most personal computer hardware, software, and ICT equipments incur some defects and some of them become obsolete. Some working environments and infrastructures no longer support new versions of technologies. Likewise, the changes in working environments and changes in ICT technologies have necessitated acquisition of new knowledge and skills. Altogether these dynamics have resulted into raised costs of running the information systems. Replacement of outdated and obsolete ICT equipment is and installment new modern ICT equipment and infrastructure are expensive. Retraining of community members to meet the ever changing working environment and technologies are expensive too.

Adoption and implementations of information systems and the institutional repository have become contrary to high expectations due to several reasons such as; wearing and depreciation, high cost of rehabilitations, some computer equipments are not working, failure to control room temperature due to unprecedented electricity shutout and weather conditions fluctuation. Other challenges found were;

- Complexities of running institutional information systems as well as institutional repositories are mentioned in the documents
- Centralized local content accommodation practice
- Library staff workers were inadequate and most of them were undergraduates
- Very low self-archiving practice
- Automated IR workflow still challenging
- Postgraduate students abstracts only are accommodated in the repository at OUT
- Only abstracts of dissertations and thesis shared at UDSM
- Some metadata inconsistency was found

- Library space is becoming not big enough to accommodate the growing number of users especially students at SUA
- Poverty is one of the factors hindering efficient publication in the open access institutional repository

IV: CONCLUSION AND RECOMMENDATIONS

A. Conclusion

Components of the institutional information systems are used in adoption of institutional repository

The study was conducted to assess factors information systems that facilitate adoption of open access institutional repositories of OUT, SUA, UDOM and UDSM. The factors which were put into considerations were; human resources, infrastructures, databases, procedures, computer hardware, computer software and applied information communication technology. Research findings have indicated that the above mentioned factors of the institutional information systems were still inadequate to yield high efficiency in the practice of accommodation of local contents in respective repositories. However, there are some differences in inadequacy amongst themselves. First of all, awareness, knowledge, skills and attitudes amongst stakeholders are still some of the setbacks towards accommodation of local contents. Secondly, other challenges are incomplete institutional frameworks which comprise of policies, plans, guidelines, strategies and procedures related to organizational businesses. Thirdly, ICT hardware and software together with application of information communication technologies are still problematic due to rapid ICT technological changes which affect functionality of the information systems. However, these academic institutions have been coping with the challenges eagerly and diligently regardless the financial and technical deficits which they normally face during open access institutional repositories adoption.

B. Recommendations

This study recommends and suggests continued support of implementation of existing institutional information systems by responsible policy makers, decision makers and managerial bodies by strengthening and enhancing human resources, infrastructures, databases, procedures, ICT hardware, ICT software and applied information communication technological issues so as to meet optimum standards which enable full adoption of institutional repositories.

C. Limitations

There were some limitations which were encountered and consequently affected the research process, these limitations were;

- Failure to conduct focus group discussion to participants in all the four institutions because the participants claimed that their timetables were very occupied
- At the Open University of Tanzania it was impossible to obtain sample units of students as research participants for interview and survey questionnaire because the mode of education and training of OUT is open and distance learning whereby students are scattered all over the countries and in some countries abroad. Instead the survey questionnaire and semi-structured interview methods were applied to academic and administrative staff only. Other methods applied at OUT were direct observation and the documentary reviews.
- The analysis was done manually and automatically by using SPSS
- Only those literature written in English language were reviewed

D. Implications for future research

This study suggests more research to be carried on matters related to analysis and trends in the

utilization of information systems factors in studying institutional repositories phenomena.

ACKNOWLEDGEMENT

Almighty God is the foremost recipient of my gratitude for always being there for grace and strength. I would like to extend my heartfelt appreciations to my family for their invaluable support throughout this endeavour. I also extend my gratitude to every research participant as well as research field assistants during data collection. Friends and relatives deserve appreciation for their being there when I needed them for help.

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