A Review of Open Access Publication in Tanzania

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Abstract: New forms of scholarship are emerging in the world. These aim at providing freely accessible research materials through scholarly communication. There are two common ways of providing open access to research outputs namely, through the open access journals and through discipline or institutional-based open access repositories, that is: Open Access Institutional Repositories (OAIR) driven by open access publishing. In principle, open access to research outputs maximizes research access and thereby also research impact, making research more productive and effective. Today, institutional repositories are becoming major components of the technical infrastructure of successful research–based institutions. It is a trend now observed in most universities and in particular research-based institutions in developing countries. Recently, there has been a high uptake of institutional repositories by higher learning institutions in Tanzania. Despite this fact however, the study on the status of open access publications in the country have not been undertaken.

This paper provides an overview of characteristics of open access repositories as a global publishing concept. It then applies the same, as a case study, to review open access publications in Tanzania, and summarizes the status of a growing body of evidence on adoption and usage of open access publications in the country. It also assesses the contribution of Tanzanian institutional repositories in the scholarly communication. In the assessment, performance of Tanzanian institutional repositories, as reflected through global visibility and impact of their repositories in the Directory of Open Access Repositories (OpenDOAR), is examined. In addition, the performance of Tanzanian universities in archiving and sharing research findings through institutional repositories, based on the Ranking Web of Repositories (RWR) is examined.

Findings from the examination of the identified open access repositories reveals that, out of the 5 Tanzanian institutional repositories in the study, only 2 are listed in the RWR. These two are ranked at 1060th and 1362nd positions (out of 1983) in the world ranks, as at July 2014. This implies that only 40% of the identified repositories in Tanzania are visible and incorporate good practices in their web publications. It is also revealed that much studies have focused not on open access institutional repositories, but on the factors contributing to adoption of open access scholarly communication in the country. Hence, the relevance of the research reported in this paper.

Keywords: Institutional Repository; Scholarly Communication; Open Access Publishing; Ranking Web of Repositories.

1. Introduction

Scholarly communication is a broader term reflecting various processes through which scholars communicate with one another as they create knowledge and by which they measure its worth with colleagues prior to making a formal article available to the research community [1]. Traditionally, access to scholarly information has been restricted to commercial publishing houses through subscriptions, licenses or other fees [2], [3]. As a response, open access publishing emerged as a solution, aiming at providing "open access" to the outputs of most scholarly research [1, 4, 5].

There are a variety of definitions of "open access," and the concept is still evolving. However, several key documents, which build upon each other, collectively comprise the best current definition of this term. These are the Budapest Open Access Initiative (2002), The Bethesda Statement on Open Access Publishing (2003) and the Berlin Declaration on Open Access to Knowledge in Sciences and Humanities (2003).

The Budapest Open Access Initiative defines open access as:

> "literature that is freely available on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full text 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 barrier other than those inseparable from gaining access to the internet itself [6].

The Bethesda Open Access definition defines open access publication as one that meets the following two conditions:

a) The author(s) and copyright holder(s) grant(s) to all users a free, irrevocable, worldwide, perpetual right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship, as well as the right to make small numbers of printed copies for their personal use.

b) A complete version of the work and all supplemental materials, including a copy of the permission as stated above, in a suitable standard electronic format is deposited immediately upon initial publication in at least one online repository that is supported by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, interoperability, and long-term archiving [7].

The Berlin Declaration on Open Access to Knowledge in Sciences and Humanities further adds that, in order to provide open access to knowledge, institutions should implement a policy to:

a) Require their researchers to deposit a copy of all their published articles in an open access repository.

b) Encourage their researchers to publish their articles in open access journals where a suitable journal exist [8].

The collective definition is referred to as the "BBB definition of open access," and defines open access as "literature that is digital, online and free of charge for everyone with internet connection and free of most copyright and licensing restrictions [9]". Other scholars define open access as digital content that is fully, freely, immediately and permanently available and can be viewed and reused with minimal restrictions [10]. Also open access may mean "free and unrestricted access to scholarly publications via the internet [11], or free availability of electronic scholarly articles at the point of use [12]. There are two strategies to open access: through open access journals or open access repositories.

Today, institutional repositories are becoming major components of the technical infrastructure of successful research –based institutions. This technical infrastructure became a reality as from 2002 when major research universities in the USA (MIT and Cornel University) and the UK (Southampton and Oxford) launched their own repositories using Dspace and Eprints software, respectively. Similar trends are now observable in most universities and in particular research-based institutions in developing countries. This paper presents an overview of open access repositories. Then as a case study, the paper reviews the concept of open access publications in Tanzania and summarizes a growing body of evidence on the status of adoption and usage of open access publications. It also assess the contribution of Tanzanian institutional repositories in the scholarly communication.

The paper is organized into six Sections. Section I covers the introductory part, Section II discusses the characteristics of open access repositories, Section III discusses adoption and usage of open access repositories. Section IV analyses and summarizes the status of open access in Tanzania. Section V covers conclusion and Section VI proposes a future study related to this work.

II.   Characteristics of Open Access Repositories

Generally repositories differ from one another in many aspects. They take many forms and assume different purposes. This makes it difficult to fully describe their characteristics as one entity. Authors in [10] identify repository type, subject coverage, content type, language and size as major features that describe an institutional repository. A number of key characteristics of the repository repositories can be identified from the OpenDOAR data. The OpenDOAR online public records consists of the following:-

- *Organization*:   The title and country of the organization owning the repository.
- *Description*:   Contains information about the repository and the services it provides.
- *OAI-PMH*: Information about the Base URL for the Open Archive Initiative for Metadata Harvesting Protocol.
- *Software*: Information about the software platform used to implement the repository.
- *Size*: The number of items/records in the repository.
- *Subjects*: Contains information about the subjects with broad description of them either as subject specific or multidiscipline.
- *Content*: Describes the content types of the repository as including items like articles, thesis, conferences etc.
- *Languages*: The official language of the repository.
- *Policies*: Defined at various levels, provides information about permissions and rights for metadata and full items, and content on preservation.
- *OpenDOAR ID*: The repository unique entry ID as reflected in the OpenDOAR database.

These key data points are the basis in describing the characteristics of most open access repositories. In addition, OpenDOAR includes information regarding interoperability protocols deployed by repositories and geographical coordinates of systems. For the purpose of this study, five factors have been considered in describing the state of open access repositories in the country. These are *repository size, content types, software platform, category of subjects* and *policies used.*

Apart from the features used to describe their characteristics, Open access repositories are also characterized as containing freely available online scholarly works where authors are not paid for their efforts and there is an extraordinary number of permitted uses [13, 14]. They provide an institution-wide service intended to collect, preserve, and provide access to, among other things, faculty scholarly output in multiple formats and must be actively taking submissions [15, 16]. Open access repositories provide open access by default to their contents. They are discipline or institution-based on their scope and may contain preprints, post-prints or both. They are also economically stable or inexpensive as most of them use open source software. Authors need no permission to deposit materials and normally do not conduct peer review as part of quality control and are interoperable [17].

Unlike journals where users have to separately access the publisher databases to obtain information, open access repositories are interoperable. The Open Access Initiative Protocol for Metadata Harvesting (OAI-PMH), is a key feature designed into many repository services to facilitate interoperability. OAI-PMH is also a standard and recognized protocol that is associated with the repository software. Repositories obeying the protocol can be harvested and the contents can be obtained through multiple search engines and other discovery tools [12].

III. Adoption and Usage of Open Access Repositories in Tanzania.

Limited information is available about open access repositories in Tanzania. Due to low speed of uptake, much of the previous studies have focused on examining factors contributing to adoption of open access publication and awareness creation. Issues of recognition, quality and ownership have been cited as the major factors hindering the adoption. It was discovered that majority of higher learning institutions are aware and are very positive towards open access [18, 19].

Various scholars have also identified the factors emanating from within and from outside individuals. Internal driven factors include behavioral intention, professional recognition and open access culture. These have also been pointed out to enhance adoption of open access publishing. Academic reward, accessibility, preservation and determined behavioral intention to use open access have been cited as externally influencing factors that affect the culture of open access usage. Lack of publishing skills, worry about long term availability of information in repositories and publication charges are among other factors. In comparison with other users, academic staff are more aware about open access and institutional repositories. Students have low levels of awareness and only a few use institutional repository for any purpose [20].

IV. Current Status of Open Access Repositories in Tanzania

In analyzing the current state of Open Access Repositories in Tanzania, data were gathered from repositories registered in the OpenDOAR website, an authoritative directory of open access repositories [21], which is now being used as an important source of data for research on open access developments and can be used to determine whether an institution has or lacks an institutional repository [22]. In identifying their web-performance, data were gathered from institutional repositories listed in the RWR. The web indicators are used to measure the global visibility and impact of the scientific repositories. The data are as of July 2014.

The conducted web analysis reveals that there are 5 open access institutional repositories in Tanzania that are included in OpenDOAR. This implementation rate is only 9.8% of the total number of institutions in Tanzania, which currently stands at 51 higher learning institutions. The results are summarized in Table 1.

Table 1: Status of Institutional Repository Implementation in Tanzania.

Institution	IHI	MUHAS	OUT	SUA	SAUT
Records	2066	1074	288	228	28
Articles	*	*	*	*	*
Theses		*	*		*
References			*		
Conferences		*			
Unpublished		*		*	*
Learning objects					*
Base URL	OAI-PMH	OAI-PMH	OAI-PMH	OAI-PMH	OAI-PMH
Software	Eprints	Dspace	Eprints	Dspace	Dspace
Subjects	Health	Health	Multidiscipline	Earth	Multidiscipline
	Medicine	Medicine		Planetary sciences	
		Library		Ecology	
		Information science		Environment	
Policies	All policies permitted	No information	Not yet analyzed	Policies unknown	Not yet analyzed

Source: OpenDOAR 2014.

KEY: IHI - Ifakara Health Institute, MUHAS - Muhimbili University of Health and Allied Sciences, OUT- Open University of Tanzania, SUA - Sokoine University of Agriculture, SAUT - Saint Augustine University of Tanzania.

a) Number of Records in the Repositories

As shown in Fig.1, a total number of 3684 items are recorded in the open access repositories identified in Tanzania as at July 24, 2014. The highest number of records is observed from Ifakara Health Institute (56%) followed by Muhimbili University of Health and Allied Sciences Repository (29%), Open University of Tanzania (8%), Tanzania Climate Change Information Repository (6%) and lastly Mario Mgulunde Learning Resource Center Repository (1%).
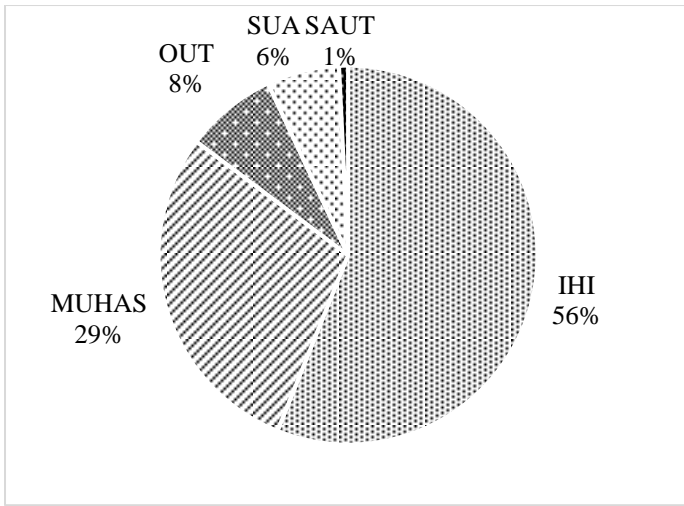
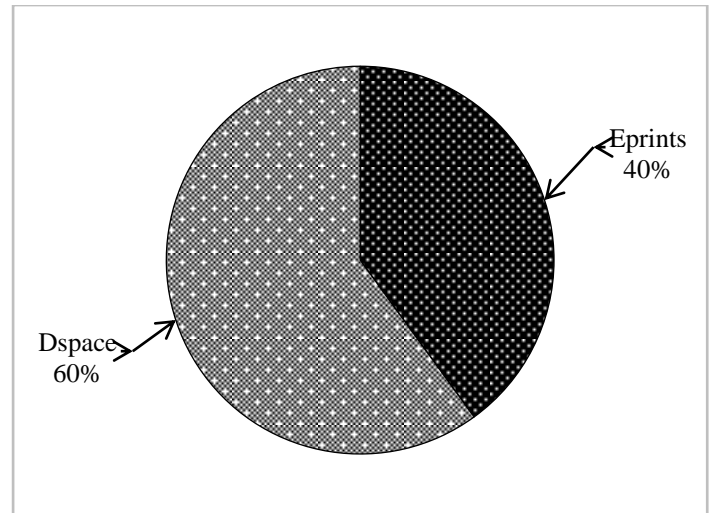**Figure 1**: Number of records in Tanzanian Open Access Repositories.

Figure 3: Proportion of repositories by software platform.

b) *Distribution of Records by Content Types*

Figure 2. Shows the distribution of content types in the repositories. The majority of deposited contents are journal articles 5 (36%). The rest are theses 3 (22%), unpublished 3 (21%), References 1 (7%), and unpublished 3 (21% and learning objects 1 (7%). Based on these figures, majority of researchers are willing to publish their findings in open access repositories.

d) *Distribution of Records by Subjects*

It is evident from Fig.4 that the distribution of subjects in the repositories is multidisciplinary. On the other hand, Ifakara Health Institute and Muhimbili University of Health and Allied Sciences repositories are specialized discipline repositories that are dedicated to Health and Medicine and information sciences.
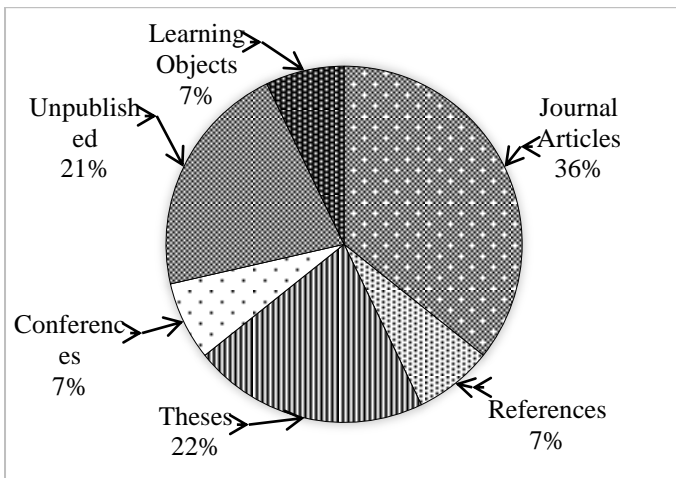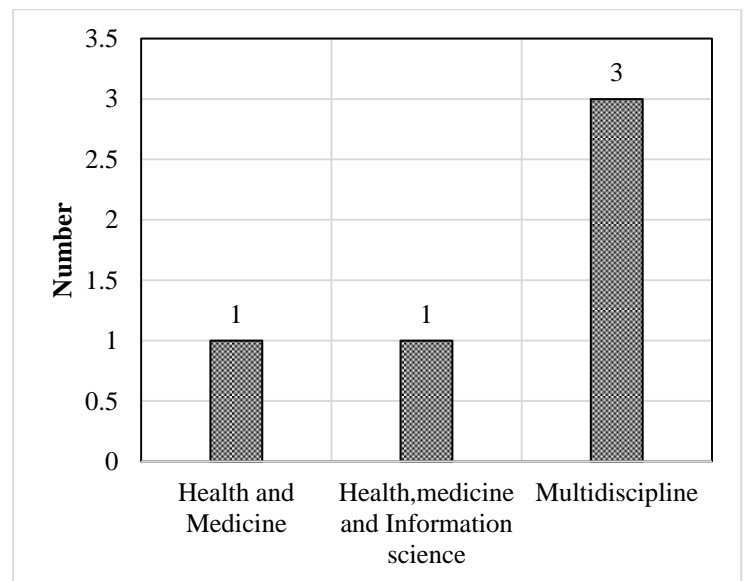

Figure 2: Proportion of records by content types.

Figure 4: Proportion of records by subjects.

c) *Distribution of Tanzanian Repositories by Software Platform*

Figure 3. Shows the distribution of the software platforms used in the implementation of open access repositories in Tanzania. Only two types of open source software have been identified as being used to implement repositories in the country, these are DSpace and Eprints software. Among the implemented repositories, 60% have used DSpace software while 40% have used Eprints software (40%). Globally the two software accounts for more than half of the established repositories.

e) *Policies*

Five main types of policies have been identified by OpenDOAR. These are metadata reuse policies, data reuse policies, content policies, submission policies concerning depositors, quality & copyright, preservation policies. As shown in Fig. 5, majority (80%) of repositories have no policy for all the policy categories. Only one institution (20%), Ifakara Health Institute has all policies well defined for not for profit purposes.
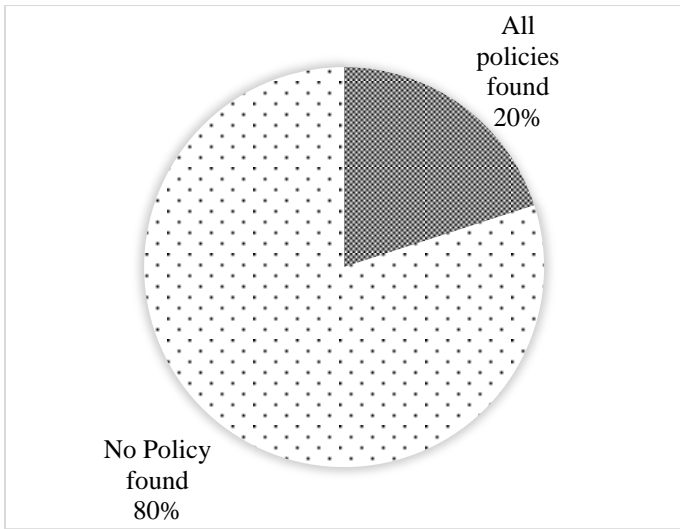
Figure 5: Distribution of the recorded policy issues for Tanzanian Open Access Repositories.

Figure 6: Global distribution of repositories by region.

f) Performance of Tanzanian Repositories in Comparison to African Countries.

Figure 6. Shows the global distribution of repositories with Africa contributing only 4% of the total number which stands at 2701 repositories worldwide. Europe has the largest number of repositories (46%) followed by North America (20%), Asia (18%), South America (9%), Africa (4%), Australia (2%), Caribbean (1%). RWR currently lists 1306 higher learning institutions in Africa but only 102 are implementing open access institutional repositories. The implementation rate stands at 7.8% of all the higher learning institutions in Africa. In Tanzania, 51 universities are listed according to data in RWR but only 5(9.8%) are implementing open access repositories [23].

The performance of Tanzania compared to other African countries in terms of number of repositories established is as depicted in Fig.7. With South Africa taking the lead, Tanzania ranks 7th among 22 African countries in the implementation pace. In terms of the number of records, as shown in Fig.8 Tanzania ranks 9th as compared to all other countries. In total, there are 54 institutional repositories in Africa where Tanzania has 5 (9.26%). Although South Africa has the largest number of repositories (29), it has fewer number of records compared to Egypt with only 7 repositories rich with 313,342 records. Among the success factors of Egyptian repositories are seen to be mandatory deposit policies and the multidiscipline nature of the contents [21].
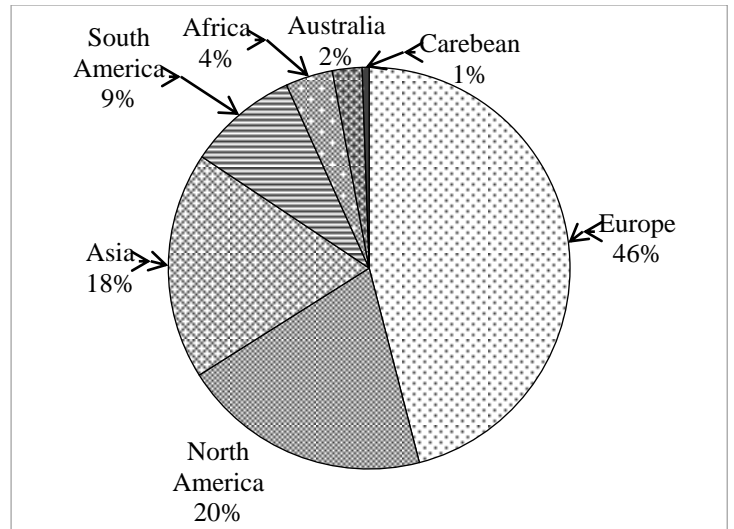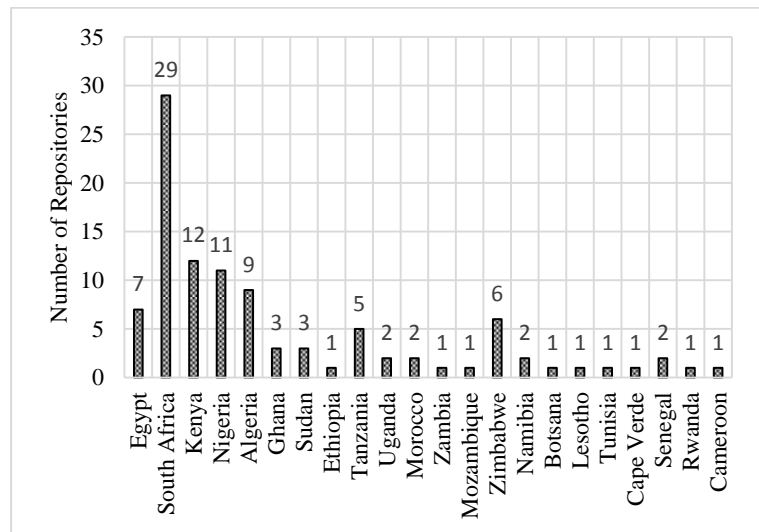

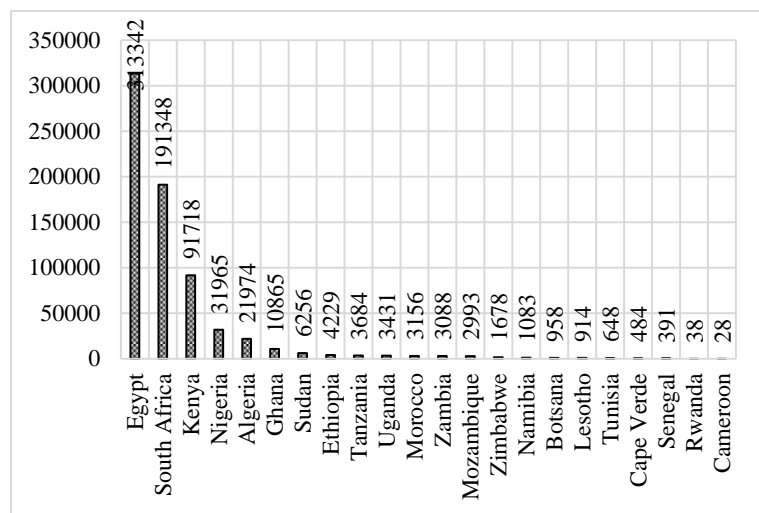**Figure 7:** Number of Repositories in African Countries.

Figure 8: Number of Records in Repositories in African Countries

g) Web Performance of Institutional Repositories in Tanzania

In studying the web performance of Tanzanian institutional repositories in terms of the global visibility and impact, RWR indicators were used. The Ranking Web of Repositories (RWR) sometimes called Webometrics provides a list of mainly research oriented repositories arranged according to a composite index derived from their web presence and the web impact (link visibility) of their contents associated with data obtained from major commercial search engines. The ranking reflects the impact of online scholarship through the process of generation and communication of scientific research findings. RWR uses the following indicators to measure the web performance of repositories:-

a. *Size (S):* refers to the number of web pages extracted from Google.
b. *Visibility (V):* refers to the total number of external links received (backlinks) by the number of referring domains for such links obtained from MajesticSEO and ahrefs databases.
c. *Rich Files (R):* refers to the number of files in formats like Adobe Acrobat (.pdf), MS Word (doc, docx), MS PowerPoint (ppt, pptx) and PostScript (.ps & .eps) extracted from Google.
d. *Scholar (Sc):* refers to the normalized number of papers between 2007 and 2011 as calculated Using Google Scholar database statistics.

As at July 2014, out of the 5 Tanzanian institutional repositories identified, only 2(40%) are listed in the RWR with the Ifakara Institute of Health (eHealth) occupying the 1060th position and Muhimbili University of Health and Allied Sciences(MUHAS) occupying the 1362th position in the overall worldwide performance. In terms of visibility, eHealth ranks 1326th position and MUHAS 1580th position. In terms of impact, Muhimbili University of Health and Allied Sciences is at the 7085th position and has a web presence of 6349 while Ifakara Institute of Health is ranked 18164th position and has a web presence of 19911. The other universities are not listed in the RWR. The results are as summarized in Table 2.

Table2: Web performance of Tanzanian Repositories.

S/N	World Rank	Institution	Size	Visibility	Files Rich	scholar
1	1060	Ifakara Health Institute	804	1326	851	902
2	1362	MUHAS Institutional Repository	1120	1580	1081	1148

Source: Ranking Web of Repositories July 2014.

V.   Conclusion

The objective of this paper was to review the status of open access publications in Tanzania and in particular to examine the status of open access repositories in the country. Data used in the study were gathered from the OpenDOAR and from the Web Ranking of Repositories.

It is evident that open access institutional repositories can contribute to the scholarly community by making research outputs easily accessible with no or little access barriers. In doing so, the visibility of both the authors/researchers and the institution is increased. In general, the findings indicate that the uptake of open access repositories in Tanzania is promising. However, it is important to note that a number of prominent universities are missing in the Ranking Web of Repositories. Most universities in Tanzania are not research-based, and this could be among the factors for little interest in institutional repositories.

Based on the data from OpenDOAR and RWR, few points can be noted:

a) As compared to most African universities, the speed of adoption is relatively higher in Tanzania than other countries.
b) Although the open access movement has not received considerable attention in the country, it is promising that in the near future more universities will have repositories established to increase the impact and visibility of their research outputs.
c) Despite that major universities in Tanzania are performing well in the Rankings Web of Universities, their excellence could excel if this is also reflected in the Ranking Web of Repositories. Therefore, universities in Tanzania should reconsider their web policies and promote substantial increase in terms of volume and quality of research publications and other outputs.
d) Overall, two repositories are said to be successful as compared to others in Tanzania, and as long as the adoption rate is increasing it is important to identify the factors that motivate users in using open access repositories for scholarly communication.

VI.   Future Work

Poor performance among institutional repositories in Tanzania is mainly attributed by fewer number of items recorded in the repositories. As a future study related to this work, it is proposed to study the attitudes and web-usage behavior of potential users of repository systems because the attitudes and web-usage behavior affect the readiness and heavily impact use of open access repositories for scholarly communication. The information revealed from this study can be used as basis for decisions regarding establishment of open access repositories by other higher learning institutions in Tanzania.

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