Factors influencing the adoption of open access scholarly communication in Tanzanian public universities

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ABSTRACT

Open access - a means for free availability of scholarly content via the Internet - is an emerging opportunity for wider and unlimited access to scholarly literature. Scholarly communication, through open access journals and self-arching, are the two main approaches of open access publishing. However, this mode of scholarly communication is not widely utilised in developing countries such as Tanzania. This paper discusses the factors that influence the adoption of open access for scholarly communication in Tanzanian public universities based on a study conducted from 2007 to 2010. A survey questionnaire targeted 544 researchers selected through stratified random sampling from a population of 1088 university researchers at six public universities in Tanzania. In addition, 69 policy makers from the six universities were interviewed. It was evident from the findings that the majority of both the policy makers and researchers were aware of open access. However, most of the researchers accessed free online content more (62%) than they disseminated their scholarly content (20%) through open access. Researchers' Internet usage skills and self-efficacy, social influence, performance expectancy, effort expectancy, and the respondents' general

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perceptions about open access were identified as the positive factors likely to facilitate open access adoption in Tanzanian public universities. The current poor research conditions and researchers' low Internet self-efficacy such as inadequate information search skills were cited as the main hindrances for researchers to use open access outlets to access scholarly content. Additionally, inadequate online publishing skills, and the slow Internet connectivity are the main issues that deterred researchers to disseminate the research findings through open access outlets. The paper recommends that institutional policies on scholarly communication should be revised to incorporate the use of open access publishing. Furthermore, universities should accelerate the establishment of institutional repositories, advocacy campaigns and training directed to researchers, policy makers, readers and information managers of scholarly content, and the improvement of Internet speed at universities through subscription to more bandwidth so as to meet the demand from the scholarly community.

Key words: *Institutional repositories; open access publishing; scholarly communication; Tanzania public universities.*

1.0 Introduction

Scholarly communication, the process through which scholars exchange information with each other is an important process in fostering the growth of science and technology. It is acknowledged that scholars used to communicate informally to distribute their research findings amongst each other until 1665 when the first journal known as "Philosophical Transactions of the Royal of London" was launched (Yiotis, 2005; Swan, 2007). From its onset, the core value of scholarly communication has been sharing of knowledge without price and copyright restrictions. However, the joining and dominance of commercial publishers in journal publication as well as distribution after World War II resulted into limitations to scholarly content access. The interest of commercial publishers has been on reaping prices from journal sales rather than facilitating knowledge sharing for further growth of science and technology. Until recently, over 2.5 million of articles published annually appeared in subscription-based journals making it impossible for researchers with financial limitation to gain access to such information (Yiotis, 2005; Moller, 2006; Bjork, Roos and Lauri, 2009). According to Alemu (2009), the exorbitant journal prices imposed by commercial publishers have forced academic institutions and libraries to reduce journal subscriptions. This resulted into access limitations as scientists may not get most of the literature deemed necessary in their scholarly work. Compared to scholars from well-endowed countries, those from the developing countries are severely affected due to the widespread poverty in the latter nations (Bjork, Roos and Lauri, 2009; Habib, 2009).

The enabling Information and Communication Technologies (ICTs) as well as the frustrating journal prices have prompted the scholarly community to devise an alternative scholarly publishing system whose aim is to achieve a wider distribution of scholarly content without price or other copyright restrictions to end users (Bjork, 2004; Yiotis, 2005; Moller, 2006). The emerging scholarly communication model is known as open access (OA). The Berlin Declaration of Open Access (2003), defines open access as a mode of scholarly communication through which the "author(s) and right holder(s) of scholarly work grant(s) to all users a free, irrevocable, worldwide right of access to, and a license to copy, use, distribute, transmit, and display the work publicly in any digital medium for any responsible purpose, subject to proper attribution of authorship". According to this definition, a complete

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version of the work and all supplemental materials, including a copy of the permission to use should be deposited in at least one online repository using suitable technical standards to enable open access to such works. This form of scholarly communication is achieved through two main channels: Open Access Journals (OAJ) for electronic refereed journals and Self-archiving (Chan and Costa, 2005; Bailey, 2006). Unlike the business publishing model, in open access publishing, the end user is not charged to access scholarly content. Instead, various funding strategies such as direct author fees, institutional membership to sponsor all or part of author fees, funding agency payment of author fees, grants to open access publishers and institutional subsidies are used to cover the costs for publication and distribution of OA content for free access by the end user (Hirwade and Rajyalakshmi, 2006). Contrary to the business mode of scholarly publishing that increases the information access gap between developed and developing countries, open access provides the visibility and accessibility to research output without restrictions. Despite the promising potential for open access to improve scholarly communication, this mode of publishing is not yet wide spread in developing countries when compared to developed countries (Moller, 2006; Wang and Su, 2006; Directory of Open Access Repositories (DOAR), 2010). The limited adoption of open access in developing countries as well as the absence of specific detailed studies addressing the awareness, acceptance and usage of open access scholarly communication in Tanzanian public universities motivated this study. The findings reported in this paper are part of a PhD study titled "An analysis of open access scholarly communication in Tanzanian public universities". The objectives of the main study among others were to: investigate the general awareness and open access usage; find out factors that facilitate researchers' adoption of open access; determine factors that hinder researchers' adoption of open access; determine researchers' perspectives on open access; formulate and validate a research model of technology acceptance regarding the adoption of open access, and suggest strategies to resolve the hindrances to open access uptake. This paper reports results obtained from investigating the following objectives:

- Assess the general awareness and open access usage;

- Find out factors that facilitate researchers' adoption of open access and;

- Recommend strategies to enhance the adoption of open access in the study area.

2. Research methodology

The study adopted the survey method for data gathering. Data was collected at six out of the eight Tanzanian public universities namely: Ardhi University (ARU); Muhimbili University of Health and Allied Sciences (MUHAS); Mzumbe University (MU); Open University of Tanzania (OUT); Sokoine University of Agriculture (SUA); and the University of Dar es Salaam (UDSM). The other two public universities [Dodoma University and Zanzibar State University] did not meet the selection criteria. The criteria for selecting the universities for the study were (a) having existed as higher learning institutions for at least ten years as well as (b) evidence of running postgraduate programmes. The two criteria were used to ensure that the selected institutions had a comparatively well established research infrastructure resulting into the generation of more research output and hence were more likely to benefit from open access initiatives than the newer institutions. Furthermore, public universities were targeted by this study on the understanding that being publicly funded they are obliged to make their research findings available for free to the public (Comba and Vignocchi, 2005).

A self-administered questionnaire was distributed to 544 respondents selected through stratified random sampling from a population of 1088 university researchers ranging from the ranks of lecturers to professors at main campuses of the six public universities. The stratified random sampling ensured obtaining the desired representation from the various subgroups on the basis of gender, rank and research discipline of the respondents. Table 1 presents the distribution of the study population.

Table 1: Distribution of senior researchers at six Tanzanian public universities [N= 1088]

University	Distribution of researchers by rank			Total number of researchers
	Professors	*Senior lecturers*	*Lecturers*	
ARU	6	20	30	56 (**5.1%**)
MUHAS	40	56	71	167 (**15.3%**)
MU	14	32	46	92 (**8.5%**)
OUT	14	20	45	79 (**7.3%**)
SUA	104	68	74	246 (**22.3%**)
UDSM	128	110	210	448 (**41.2%**)
TOTAL	**306 (28.1%)**	**306 (28.1%)**	**476 (43.8%)**	**1088 (100)**

The researchers also conducted interviews with 67 policy makers from the six universities to complement the questionnaire survey. Except, the Vice Chancellors and Deputy Vice Chancellors (administration and finance), all university policy makers from directors/deans or equivalent positions were eligible for the interview. Among the distributed copies of the questionnaire, 405 were returned of which 398 copies were found usable for analysis. From the targeted interviewees, 63 (94%) of them were available and participated in the study. The overall response rate of 73% for researchers and 94% for policy makers is considered adequate for this kind of a study. The standard and acceptable response rate for most surveys is 60% (Malaney, 2002; Evans, Peterson and Demark-Wahnefried, 2004).

After the data collection, editing by means of checking and adjusting for errors, omissions, and legibility was done in order to ensure completeness, consistency and readability before entering into the database for analysis. Content analysis was used to organise data emerging from open-ended questions. The descriptive statistics of the SPSS (v15) package was used for data analysis. The software in question has also been widely applied in technology acceptance and user studies (Al-Zahrani, 2006; Ifinedo, 2006; Louho, Kallioja and Oittinen, 2006).

3. Results and discussion

Descriptive statistics including the profile of the respondents as well their awareness and usage of open access scholarly communication are presented in the first three sections. The major part of this section presents and discusses factors affecting open access adoption. Key conclusions and recommendations of the study are provided at the end of the paper.

3.1 Profile of respondents
Among the 398 researchers who responded to the questionnaire, 310 (77.9%) were males and 88 (22.1%) were females. This compares to 73% males and 27% females from among 63 university policy makers who were interviewed. Table 2 presents data with respect to the distribution of respondents by their rank. It is revealed that close to a half (46.2%) of the

researchers were lecturers, followed by professors (28.9%) and senior lecturers (24.9%). These percentages correspond well with the total population of the senior researchers in these universities, i.e.43.8% lecturers, 28.1% senior lecturers and 28.1% professors as reflected from Table 1.

Table 2: Distribution of the researchers by rank [N=398]

Rank	Institution						Total (%)
	ARU	MUHAS	MU	OUT	SUA	UDSM	
Lecturer	10	20	17	24	30	83	184 (**46.2**)
Senior lecturer	9	23	8	7	25	27	99 (**24.9**)
Professor	2	14	2	3	45	49	115 (**28.9**)
Total (%)	21(**5.3**)	57 (**14.3**)	27 (**6.9**)	34 (**8.5**)	100 (**25.1**)	159 (**39.9**)	398 (**100**)

In terms of the highest academic qualifications attained by the researchers, 299 (75.1%) were holders of PhD degrees while the remaining 99 (24.9%) had Masters degrees. With respect to age, 78 (19.6%) were aged between 31-40 years; 157 (39.4%) between 41-50 years; 145 (36.4%) between 51-60 years; and 18 (4.5%) were above sixty years. The majority of the researchers (53.5%) had Internet usage experience of 6 - 10 years; while 34.9% had more than ten years of experience only 11.6% had 1- 5 years' internet experience. Based on the above profiles, i.e. age, academic qualifications and seniority it is clear that the respondents were highly educated and experienced researchers. This was accentuated by the fact that junior lecturers were excluded from the study as they were considered inappropriate for this kind of investigation due to their limited experience in scholarly publishing. It should also be noted that among the 63 interviewed university policy makers, 4 were deputy vice chancellors (academic); 31 deans of faculties/ schools; and 28 directors of centres/directorates/institutes. Thus, the findings discussed in the forthcoming sections represent authoritative views. This is further evidenced by their level of awareness of open access.

3.2 Awareness of the concept of open access
The majority of both the policy makers (90.5%) and researchers (72.1%) were aware of open access before this survey. This means that for most of them, the open access concept was quite familiar and hence they were in a position to have an opinion about it. Compared to several previous studies done in Tanzania and elsewhere, the findings of this research reveal an improvement in open access awareness over time. For example, studies done prior to 2007 in the Southern Africa region indicated less than 60% of the respondents were aware of open access (De Beer, 2005; Lwoga *et al*, 2006; Moller, 2006;). This compares to recent studies that were conducted in the same region by Fullard (2007) and SARUA (2008), which reported that the awareness of open access among the respondents to be 61% and 71% for the former and the latter studies respectively. However, it should be noted that despite an increased awareness of open access by policy makers, i.e. interviewees, they were more familiar with open access journals as compared to other open access aspects or initiatives. This implies a lack of deeper understanding of open access on part of these respondents and hence the need for more awareness creation so that the concept is well understood.

3.3 Usage of open access scholarly communication
The findings from this study indicate that fewer Tanzanian researchers disseminated their findings through open access channels than those who accessed free online content. Less than 20% of the respondents published in open access outlets as compared to 62% of those who accessed free scholarly content from the Internet. The situation whereby researchers' publish less than they access content in open access outlets is not peculiar to public universities in Tanzania. A notable example is the study done by Gadd, Oppenheim and Probet (2003)

whereby, while 57.8% of 456 respondents were reported to have submitted papers to open access journals in comparison to 88% who acknowledged to having accessed free online content made available by other scholars. A survey by Deoghuria and Roy (2007) also reveal that out of 125 respondents, 80% of them used open access to access literature and 20% used OA for publishing their research output. Similar findings indicate that despite that 66% (n = 481) of the respondents claimed to use open access publication media to access scholarly content at least once in their academic career, only 28% of them had actually published using the same media (Mann *et al*, 2008). The low utilisation of open access outlets by researchers to disseminate their scholarly output is probably attributed to the effort involved in this process in contrast to accessing information using similar means. While it is possible for one to access free materials by chance through a simple search on the Internet, publishing via the same media is more involved as one must have, firstly something to publish, and then additionally, adequate online publishing skills as well as sufficient familiarity with potential websites for publishing.

Despite the fact that many researchers in Tanzania public universities do not utilise open access for publishing, the majority of the respondents (78% of 384) were optimistic about publishing via open access in the future. This implies good prospects for future development of open access in such universities. This is compared to previous studies in which less than 50% of their respondents were reported to be in a position to publish in open access outlets in future (Deoghuria and Roy, 2007; Hess *et al*, 2008). Contrary to the referred two studies in which the respondents were asked about their likelihood of publishing in open access media within a limited time frame, in the current study, the aspect of time frame was excluded. The respondents were just questioned about their future likelihood of disseminating their research findings using open access outlets. This is the possible reason for the majority of the respondents in the current study to indicate their high likelihood to publish in open access outlets in future. It is possible that the respondents who did not expect to publish in open access outlets by other studies did not expect to have anything to publish within the indicated timeframe. The remaining part of this paper discusses important factors likely to affect adoption of open access in the study area.

3.4 Factors affecting the adoption of open access scholarly communication

Various factors have been established as motivating or inhibiting factors with respect to adoption of open access. Attitude, self-efficacy, facilitating conditions, social influence, performance expectancy and effort expectancy are the mostly acknowledged factors considered to play a key role in shaping individuals' acceptance and usage of technology (Venkatesh *et al*, 2003; Schaper and Pervan, 2007; Hess *et al*, 2008; Tibenderana and Ogao, 2009). The referred factors were assessed in the current study to determine their possible effect in the adoption of open access scholarly communication at Tanzanian public universities as reported and discussed in the following subsections.

3.4.1 Attitudes and general views on open access

Attitude is an individual's overall affective reaction to using a system (Venkatesh *et al*, 2003). Respondents' attitudes about open access were evaluated before examining their perceptions about the quality of open access publications. Their general comments with respect to open access in general also provided some insights regarding the acceptance of this mode of scholarly communication. With respect to attitude, among 396 respondents, over three quarters (80%) of the respondents considered open access as beneficial to the scholarly community, accessing and use of open access as a good idea, and that publishing in open

access was a good idea. This implies that the majority of researchers had very positive attitudes towards open access publishing. In addition to the positive attitude, many researchers also positively evaluated open access publications they accessed. Table 3 summarises researchers' assessment on open access publications.

Table 3: Researchers' assessment on open access publications (N = 227)

OA publications' assessment	Number of respondents	Percentage
Publications represent adequate standards of quality and have scientific merit	178	82.4
Publications are original and represent high quality research	116	54
Publications are mediocre or of little scientific merit	33	14.5

It is noted from Table 3 that among 227 respondents who evaluated OA publications, they rated them to have adequate standards of high quality research and scientific merit (82.4%) and that such publications were original with high quality research (54%). On the negative side, 14.5% of the respondents claimed that open access publications were mediocre with little scientific merit. These results mirror the researchers' and policy makers' general comments about open access. Overall, apart from making emphasise to ensure quality control for open access publications, most of the comments were in favour of open access scholarly communication (see Appendix 1). The general support of open access has also been noted in other previous studies (Swan and Brown, 2005; Kim, 2006; Lwoga *et al*, 2006; Fullard, 2007; Hess *et al*, 2008). These results suggest that attitude and the general perceptions of the respondents with respect to open access may not be a major stumbling block for the adoption of this mode of scholarly communication in Tanzanian public universities. However, it is still important for open access proponents to further promote this mode of scholarly publishing in order to ensure positive views for all stakeholders to enhance its adoption.

3.4.3 Effort expectancy

Effort expectancy is the degree of ease associated with the use of the system (Venkatesh *et al*, 2003; Louho, Kallioja and Oittinen, 2006). The researchers' views about their expected difficulties or ease of open access outlets' usage was examined by providing a number of statements to the respondents for rating themselves against their ability to use OA in scholarly communication. Table 4 presents results from this investigation. Noted from Table 4 is that more than half of all respondents believed that they were unlikely to face difficulties in using open access outlets to access or publish scholarly output. Finding it easy to access scholarly content was agreed or strongly agreed to by the majority of the respondents (76.5%) while the least (61.3%) of the respondents agreed or strongly agreed that they understood implications of publishing in open access outlets.

Table 4: Researchers' effort expectancy with respect to open access outlets' usage in scholarly communication (N = 394)

Tasks	Ratings (number & percentage)				
	Strongly agree	**Agree**	**Disagree**	**Strongly disagree**	**Don't know**
I expect interaction with open access publication system to be clear and understandable	71 (**18.2**)	194 (**49.7**)	44 (**11.3**)	5 (**1.3**)	76 (**19.5**)
It is (will be) easy for me to become skilful at publishing my	54 (**13.8**)	212 (**54.2**)	58 (**14.8**)	9 (**2.3**)	58 (**14.8**)

	Strongly agree	Agree	Disagree	Strongly disagree	Don't know
work in open access					
Learning to publish my work in open access outlets is (would be) easy for me	58 (**14.7**)	212 (**53.8**)	65 (**16.5**)	10 (**2.5**)	49 (**12.4**)
I clearly understand the implications of publishing in open access outlets	57 (**14.5**)	184 (**46.8**)	71(**18.1**)	11 (**2.8**)	70 (**17.8**)
It is (will find it) easy to access open access scholarly content from the Internet	89 (**22.4**)	212 (**54.1**)	46 (**11.7**)	8 (**2**)	37 (**9.4**)

The above results are comparable to a similar study that established that among 125 scientists 21% believed that the interaction with OA publication systems as clear and understandable; 18% thought that it was easy for them to become skilful at publishing their work in open access outlets (Deoghuria and Roy, 2007). The findings by the cited study were contrary to the current findings and other similar studies (for example, Kohne, Schoop and Staskiewicz, 2005; Louho, Kallioja and Oittinen, 2006; and Butler and Richardson, 2008) which report high proportion of the respondents to have significantly expressed less effort expectancy towards the usage of new technologies.

Despite over 60% of the respondents in this study belief that they were unlikely to face difficulties in using open access outlets to publish their research findings, to a large extent most would find it easy to use open access outlets in accessing rather than disseminating information through open access. Basing on these results, it is necessary to design more user friendly open access platforms for researchers' ease of publishing research output. This is particularly important taking into account that a transition from print to electronic information environment has resulted into more challenges to researchers in effectively accomplishing their scholarly communication tasks (Eger, 2008).

3.4.5 Facilitating conditions

Facilitating conditions are defined as the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of a system (Venkatesh *et al*, 2003). Five factors relating to infrastructure and technical support [facilitating conditions] as presented in Table 5 were assessed basing on the respondents' perceptions to determine the possible effect of such factors on scholars' usage of open access.

Table 5: Availability of facilitating conditions for open access usage [N=394]

Facilitating condition	Ratings (number & percentage)				
	Strongly agree	Agree	Disagree	Strongly disagree	Don't know
I have the necessary knowledge to publish my work in open access outlets	47 (**11.9**)	120 (**30.5**)	133 (**33.8**)	55 (**14**)	39 (**9.9**)
I have the necessary resources (e.g. Internet access) to publish on open access outlets	**40**(**10.2**)	152 (**38.3**)	114 (**28.9**)	50(**12.7**)	38 (**9.6**)
My institution recognises open access publications for my career development	38 (**9.7**)	120 (**30.5**)	79 (**20.1**)	53 (**13.5**)	103 (**26.2**)
Guidance is available for me to use the Internet for publishing my research output	36 (**9.1**)	132 (**33.4**)	93 (**23.5**)	56 (**14.2**)	78 (**19.7**)
Guidance is available for me to use the Internet effectively for information access.	51 (**12.9**)	167 (**42.4**)	87 (**22.1**)	48 (**12.2**)	**41**(**10.4**)

As noted from Table 5, less than half (50%) of all the respondents strongly agreed or agreed that their institutions provided adequate facilitating conditions for them to publish in open access outlets. Only the availability of guidance for effective usage of the Internet to access information was supported with slightly more than a half (55.3%) of the respondents. The overall results from this study imply that most of the facilitating conditions for researchers to effectively use open access outlets for scholarly communication were inadequate. For example, while only 42.4% of the respondents either agreed or strongly agreed to have the necessary knowledge to publish in open access outlets, 57.7% either disagreed or strongly disagreed or they were not sure of having such knowledge. Slow Internet speed and inadequate skills to access and publish in open access were also cited by the respondents as the main cause for researchers' less effective usage of open access and the Internet in general to enhance scholarly communication. This further supports the above observations with respect to inadequate facilitating conditions to enhance researchers' effectively exploitation of open access opportunities.

Supporting the above observations, a further analysis revealed that none of the universities in the study had adequate bandwidth to meet the actual demand of its user population as a result of high connectivity costs. In the beginning of 2009, it was revealed that the university of Dar es Salaam had the Internet speed of 12.5 mega bits per second (mbps) downlink and 1.5 mbps uplink; Muhimbili University of Health and Allied Sciences, 1.024 mbps downlink and 0.512 uplink; Sokoine University of Agriculture, 2.048 mbps downlink [shared 1:8] and 0.256 uplink; Ardhi University, 1.2 mbps downlink and 0.2 mbps uplink; Mzumbe University, 1.0 mbps downlink and 1.0 mbps uplink; and the Open University of Tanzania, 0.512 mbps downlink/uplink. This implies that researchers from these institutions are compelled to spend a lot of their time trying to access information online due to slow connectivity. The observed situation has remained the same until mid of 2010. Similarly, users' access to documents uploaded in the respective university websites is expected to be difficult due to the low uplink connectivity of these institutions. A similar study by Deoghuria and Roy (2007), also revealed that 45% of scientists claimed to have knowledge of publishing in open access outlets while 10% said they would need specific assistance (to computer or library personnel) in order to publish their works in such outlets. Limited availability of facilitating conditions, both infrastructure as well as technical know how have also been cited as among the reasons for the low uptake of open access in most developing countries (Muthayan, 2003; Hirwade and Rajyalakshmi, 2006; McCulloch, 2006). It is thus necessary to improve the technological and human factors in Tanzanian public universities in order to improve adoption of open access. The improvement of facilitating conditions [e.g. provision of training on online publishing] will also raise researchers' Internet self-efficacy, which is also considered to be on the lower side as noted in the following section.

3.4.6 Internet Self-efficacy

Internet self-efficacy refers to the individuals' ability to use the Internet using their own skills (Hsu, Chiu and Ju, 2004). For individuals' to access or publish scholarly content on the Internet and open access outlets in particular, it is important that they have the necessary skills. This view is also supported by Wang and Su (2006) who asserted that in order to benefit from open access initiatives, readers should improve their information and computer literacy skills. It is equally important for researchers to become Internet literate in order to use the electronic media environment more effectively for accessing and disseminating scholarly content. Respondents in this study rated themselves as having very good or good skills in terms of accessing online information (83.7%) as compared to 65% who claimed to have very

good or good skills with respect to publishing online. These findings resembled those concerned with researchers' Internet self-efficacy in terms of disseminating and accessing information using online sources as presented in Table 6.

Table 6: Researchers' Internet self-efficacy ratings [N=384]

Internet-self-efficacy statement	Ratings (number & percentage)				
	Strongly agree	Agree	Disagree	Strongly disagree	Don't know
I feel confident searching information on the Internet	**170 (44.3)**	170 (**44.3**)	28 (**7.3**)	6 (**1.6**)	10 (**2.6**)
I feel confident publishing research output on the Internet	72 (**18.8**)	176 (**46**)	86 (**22.5**)	22 (**5.7**)	**27(7)**
I feel confident in designing my personal website	34 (**8.9**)	87 (**22.8**)	120 (**31.4**)	77 (**20.2**)	**64 (16.8)**
I feel confident publishing on the Internet even when there is one around to show me how to do it	27 (**7.1**)	111 (**29.1**)	131 (**34.4**)	65 (**17.1**)	47 (**12.3**)

As observed from Table 6, the majority of the respondents strongly agreed or agreed that they felt confident in searching information on the Internet (88.6%) while 64% claimed to have confidence with respect to publishing research output on the Internet. It should also be noted that a large proportion of the respondents (68.4%) disagreed or strongly disagreed or didn't know/or were not sure with regard to their ability to design personal websites. Similarly, 63.8% of the respondents expressed less confidence with respect to publishing on the Internet without assistance. These results support the findings with respect to facilitating conditions whereby many respondents also indicated that they needed support to improve their ability in disseminating scholarly content online.

It should be noted however, that the reported Internet usage skills and self-efficacy are solely based on respondents' own perceptions and that they were not tested or measured by any other means. This means that the reported self-assessment results by researchers may be considered as indicative rather than the actual reflection of their skills and self-efficacy with respect to Internet usage. However, basing on the researchers' actual usage of open access, it can safely be argued that low Internet self-efficacy as reported by many respondents in a way reflects why many of them accessed rather than disseminated scholarly content using open access outlets. Both, the Internet usage skills and self-efficacy have been acknowledged as the key determinants for effective exploitation of information in the digital environment era (Waldman, 2003; White and Gendall, 2005). It is thus necessary for the universities involved in the study to take deliberate measures to improve the Internet usage skills and self-efficacy of their researchers so that they can fully benefit from open access opportunities in improving access to and dissemination of scholarly output.

3.4.4 Performance expectancy
Performance expectancy relates to how individuals believe new technology will help them to better perform their job (Venkatesh, *et al*, 2003; Louho, Kallioja and Oittinen, 2006). In this study, an assessment was made to determine how the researchers believed open access facilitates the accessibility and dissemination of scholarly content. Results from this investigation are presented in Table 7.

Table 7: Researchers' ratings on performance expectations from open access (N = 396)

Expectation	Ratings (number & percentage)				
	Strongly agree	Agree	Disagree	Strongly disagree	Don't know
Open access outlets enables scholars to publish more quickly	109 (**27.7**)	164 (**41.6**)	52 (**13.2**)	6 (**1.5**)	63 (**16**)
Open access outlets increase research impact by researchers' works being highly cited	126 (**32.1**)	157 (**39.9**)	58 (**14.8**)	7 (**1.8**)	45 (**11.5**)
Open access outlets improves accessibility to scholarly literature because it is free	171 (**43.3**)	157 (**39.7**)	29 (**7.3**)	**7 (1.8)**	31 (**7.8**)
Open access enables researchers from developing countries to access literature more easily	179 (**45.2**)	140 (**35.4**)	34 (**8.6**)	8 (**2**)	35 (**8.8**)
Publishing in open access outlets exposes scholarly work to a large potential readership	165 (**41.5**)	160 (**40.5**)	29 (**7.3**)	7 (**1.8**)	34 (**8.6**)

As observed from Table 7, most of the respondents were quite optimistic regarding open access publishing in improving both accessibility as well as dissemination of scholarly output. Over two thirds of the respondents either agreed or strongly agreed that open access publishing was superior to the conventional subscription based scholarly publishing in many aspects. The above findings also support the observation that despite that many researchers having not previously published in open access outlets, the majority of the respondents had expectations of future publishing in open access outlets [see last paragraph of section 3.3]. This implies that the future adoption of open access is highly dependent on the expected benefits of OA in improving accessibility to and dissemination of scholarly content. Several other studies also acknowledge performance expectancy as a motivation for scholars to adopt open access. For example, free access to online content has been reported as the main motivation for many researchers to access open access scholarly materials (Haijjem, Hanard and Gingras, 2005; Schroter, Tite and Smith 2005; Warlick and Voughan, 2006). Similarly, it has been observed that increased research impact (Chan, 2004; Brody, 2006); increased speed of publication or dissemination of research output (Prosser, 2005; Carr *et al*, 2006); and wider dissemination of research output (Swan and Brown, 2005) as among the other factors influencing researchers to consider making their publications openly accessible. The beliefs by the majority of scholars that open access improves scholarly communication as compared to the conventional business based publishing may be used as strong selling point for OA to the scholarly community.

3.4.6 Social influence

Social influence relates to how an individual is affected by his/her peers or other leading researchers and/or his/her organisation in deciding on open access usage (Venkatesh *et al*, 2003; Schaper and Pervan, 2007). In the current study, the researchers were provided with a number of statements about social influence and were asked to indicate the extent to which such factors would influence them to publish in open access outlets. Table 8 presents the results regarding how researchers' use of open access is influenced by social factors.

Table 8: Role of social influence on researchers' future publishing in open access outlets (N = 394)

Factor	Importance ratings (Number and percentage)				
	Very important	Important	Less important	Least important	Don't know
If close colleagues publish in open access outlets	70 (**17.8**)	165 (**41.9**)	102 (**25.9**)	23 (**5.8**)	34 (**8.6**)
If leading researchers in my discipline publish in OA outlets	128 (**32.4**)	158 (**40**)	66 (**16.7**)	12 (**3**)	31 (**7.8**)
If my research finding agency would look favourably on me	125 (**31.7**)	168 (**42.6**)	56 (**14.2**)	9 (**2.3**)	36 (**9.1**)
If my research finding agency require me to publish in open access outlets	121 (**30.4**)	190 (**48.2**)	41 (**10.4**)	10 (**2.5**)	32 (**8.1**)
If my institution would look favourably on me for publishing in open access outlets	137 (**34.8**)	169 (**42.5**)	42 (**10.7**)	6 (**1.5**)	40 (**10.2**)
If my institution requires me to publish in open access outlets	130 (**33.1**)	179 (**45.5**)	42 (**10.7**)	5 (**1.3**)	37 (**9.4**)

It is noted from Table 8 that all social influence factors were considered by more than two thirds of all respondents as important or very important determinants for their publishing in open access outlets. However, researchers' peers and colleagues influence were found less important when compared to other of social influence factors related to organisational or research funding bodies with respect to respondents' usage of open access. These results imply that employers and/or research funding bodies in the study area stand a better chance of accelerating the adoption of open access at respective universities than fellow researchers' influence. Similar findings were reported by other previous studies. A study by Deoghuria and Roy (2007) for example, indicate that out of 125 scientists, 64% and 20% considered their funding agencies' and employers' influence respectively as crucial determinants for their publishing in open access. Peers' influence has also been negated by the majority of the respondents as a motivation for their publishing in open access outlets (Deoghuria and Roy, 2007; Hess *et al*, 2008).

The above observations suggest that it is important to enforce measures that may be employed by the universities and other research funding agencies to boost adoption of open access in the country. The majority of university policy makers who were interviewed in this study also supported most of the measures earmarked for fostering open access development, further supporting this view. Among the 63 respondents, 92.1% of them said they would support or would likely support establishment of a policy requiring their faculty to deposit research output in institutional repositories; 87% would support or likely support the recommendation for researchers to retain copyright for their publications; 85.7% would support or likely support their institutions to sponsor author charges for their employees to publish in open access journals; 82.5% would support or likely support their institutions to sponsor publication of their institutional journals so that they are made openly accessible and lastly; 82.5% would support or likely support the explicit recognition or reward for open access publications published by their employees.

4. Conclusions and recommendations

The findings from this study indicated that researchers and policy makers at Tanzanian public universities are fully aware of the potential of open access publishing. Yet, it also became evident that they are not fully in a position to take advantage of this potential. However, the overwhelming willingness by the majority of researchers to disseminate their scholarly content through open access outlets in the future suggests positive prospects for this mode of scholarly communication in Tanzanian public universities. These findings also provide a strong basis for the introduction of this mode of scholarly publishing at Tanzanian public universities and other research institutions in the country. Attitude, effort expectancy, social influence and performance expectancy were highly ranked as factors that could facilitate the adoption of open access scholarly communication in the study area.

On the other hand, respondents indicated that the current state of Internet self-efficacy and facilitating conditions hinder them in adopting open access. Accordingly, slow Internet connectivity, inadequate skills for information searching and publishing in the digital environment were identified as the main hindrances for researchers to exploit open access opportunities. Basing on the study findings, the following recommendations are considered important in order to enhance the adoption of open access scholarly communication in Tanzanian public universities and other research institutions in the country and elsewhere:

> **Advocacy for open Access**

Open access scholarly communication can flourish only if faculty and university administrators are made aware of its benefits (Chan and Costa, 2005). In view of the fact that some researchers and policy makers in Tanzanian public universities were found to be unaware of open access, it is important to further advocate for this mode of scholarly communication. The need for further advocating of open access in such institutions is further motivated by the low publishing involvement of the researchers in open access outlets as revealed by this study. For a wider impact, the open access advocates campaigns should be done at all levels from institutional to national levels. At the national level, open access advocates should be led by the Tanzania Library and Information Association (TLA). The Consortium of Tanzania University and Research Libraries (COTUL) under development also stand a better chance in advocating for open access among its member institutions.

> **Internet connectivity improvement**

The potential of open access can only be exploited to the fullest in situations of adequate Internet connectivity. However, slow Internet connectivity was evident throughout the study area due to low bandwidth. This implies that researchers from these institutions are compelled to spend a lot of their time trying to access information online due to low downlink connectivity. At the same time, information hosted at their university, even if available online, may not be easily accessed by other scholars from outside due to the existing low uplink connectivity in all the Tanzanian public universities. It is thus highly recommended for the universities involved in this study to improve their Internet speed through subscription to more bandwidth so as to meet the demand from the scholarly community at the respective institutions. The Eastern African Submarine Fibre Optic Cable connection connecting Tanzania to the rest of the World that was launched in June 2009 by President Jakaya Kikwete of the Republic of Tanzania offers a great opportunity for such universities to improve their connectivity (Shame, 2009). Once connected to this gateway, universities will be in position to increase their connectivity at an affordable cost as compared to the current situation whereby such institutions dependent on satellite based communication systems that are deemed quite expensive. At the moments writing this paper, the laying of fibre optic cable in various locations in the country was ongoing so that they are connected to the see cable. The University of Dar es Salaam expects to be connected to the sea fibre optic cable before end of June 2010 to upgrade its connection from 12.5 to 155 mbps. It is hoped that other universities will join the University of Dar es Salaam and the connectivity situation in such institutions is likely to improve greatly by end of this year.

> **Improve researchers' online publishing skills**

Among others, one of the reasons for the low usage of open access outlets by the researchers to disseminate their research findings is associated with the inadequate skills in online publishing by such respondents. This is probably why Harle (2009:15) emphasised " With more sophisticated ICTs now being used in HE [Higher

education], and with developing web technologies relating to information access and publishing becoming more sophisticated, libraries need to continually upgrade the technical skills of existing staff and to enable and encourage them to develop new expertise". It is thus highly recommended for information professionals from both libraries and university computing centres to proactively device attractive training modules for upgrading publishing techniques in the online environment. This will ensure effective exploitation of open access potentials by the researchers with respect to improving dissemination of scholarly content.

> **Formal institutionalisation of open access publishing**

The willingness of researchers from Tanzanian public universities and research institutions elsewhere to publish in open access outlets in future can only be put into practice if appropriate mechanisms to foster the adoption of this mode of scholarly communication are put in place. Most importantly, is to put in place appropriate policies that would encourage researchers to disseminate their findings through open access. Policies that support recognition of open access publications in career development for example, can play a major role to motivate researchers to disseminate their research findings in such outlets. Lack of recognition of OA publications in staff career development have been acknowledged as among the reasons why scholars are reluctant to publish in open access outlets (Sale, 2006; Deoghuria and Roy, 2007; Fullard, 2007; Hess *et al*, 2008; SARUA, 2008).

The other motivation for researchers to disseminate their research findings through open access is to avail such publishing opportunities locally available. For example, among the viable strategies for encouraging researchers' to publish in open access outlets is for universities and other institutions to establish open access publishing outlets within their premises. This can be made possible by turning into open access some of the locally published journals as well as establishing institutional repositories. This would highly improve the dissemination of local content which remains invisible to the rest of the world due to low circulation of local journals and other grey literature in the current conventional publishing system. This is also expected to improve the research impact of the respective universities by making their research output visible worldwide as compared to the current state of affairs.

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Appendix 1: Researchers' and Policy makers' general comments on open access

- OA is good, it should not be limited to universities alone but should be adopted national-wide
- University administrators should be educated on open access benefits and limitations for its adoption at respective institutions.
- University policies should be reviewed to consider open access publications in career development.
- Open access is good for sharing research results as well as increasing researchers' and institutions' recognition internationally.
- Open access increases collaboration of researchers internationally.
- Open access is important but it is new, there is need for more sensitisation and supporting it with university policies.
- Create awareness for positive perceptions on quality and value of open access publications.
- Open access is especially good for countries with limited access and dissemination of research findings.
- There is no reason to hide academic work, so I support open access.
- Open access is good, it will benefit distance learning students
- Good initiative, promote and implement it.
- Open access depends on Internet, so connectivity should be improved for more researchers to benefit.
- Open access is good but perceived low quality for free journals and poor internet connectivity especially in Tanzania remains the main challenges.
- OA is very new to most academicians though it seems to be very good as far as accessibility to information is concerned.
- OA is something new and interesting - it should be promoted; developing countries should accelerate the pace of establishing OA publishing in order to make their publications widely accessible.
- Open access publications increase the visibility and impact of scientific findings from researchers to a wide audience especially in developing countries.
- Scholars in developing countries should be encouraged to publish in open access outlets so that their findings reach more people.
- Open access is good for information sharing but there is need for a good mechanism to ensure quality control to avoid poor quality materials.
- It is unacceptable/difficult making publications free of charge, hence don't support open access.