Faculty adoption and usage behaviour of open access scholarly in health sciences Universities

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Abstract
Purpose: The study sought to investigate factors that affect the adoption and use of open access in Tanzanian health sciences universities.
Design/methodology/approach: Based on a cross-sectional questionnaire survey, 415 faculty members were selected through a stratified random sampling from a population of 679 in all eight health sciences universities in Tanzania. The response rate was 71.1%.
Findings: Based on the social exchange theory (SET), and the Unified Theory of Acceptance and Use of Technology (UTAUT), the study developed a model suitable for assessing open access adoption and usage in academic institutions. The study found that facilitating conditions, extrinsic benefits (professional recognition), behavioural intention and individual characteristics (professional rank, technical skills and number of publications) predicted actual usage of open access. Other factors related to contextual factors (attitude, and open access culture), and extrinsic benefits (academic reward, accessibility and preservation) determined behavioural intention to use open access. Fear to violate publisher's copyright policies and effort expectancy however de-motivated faculty to adopt open access, while copyright concerns inhibited faculty's actual usage of open access.
Originality/value: This is a first comprehensive study focusing on the health sciences faculty's open access adoption and usage behaviour in Africa, and Tanzania in particular, and reveals findings that are useful for planning and implementing open access initiatives in other institutions with similar conditions.

Keywords: open access, social exchange theory, technology acceptance model, faculty, Tanzania, Africa

Introduction
Faculty and researchers in higher learning institutions, including health sciences, disseminate their research findings throughout the scholarly community for the purpose of advancing knowledge and understanding in a given subject area through a process called scholarly communication (Casey, 2012). Traditionally, scholarly communication has been distributed through print publications. With the advent of internet technologies, the Open Access (OA) movement has changed how researchers conduct and share research, primarily by increasing

the reach of scholarly communication across the world, including Africa. Open Access provides free access to online research publications through OA journals ("gold OA") that make peer-reviewed articles freely available online, or through self-archiving ("green OA") (Harnad, 2007). OA journals recover their publishing costs in a different way from traditional journals. Usually the costs are covered by research grants or authors' institutions (Harnad, 2007). On the other hand, the green OA road allows authors to self-archive their peer-reviewed articles in an institutional or other kind of repository while publishing in a non-OA journal. The success of open access scholarly communication depends on participation by researchers.

Several studies however, report that the adoption and participation of faculty in OA publishing and self-archiving practices is low across the world (Abrizah, 2012; Creaser et al., 2010; Hulela, 2010; Kim, 2010), especially in Africa and Tanzania (Dulle and Minishi-Majanja, 2011; Lwoga et al., 2006; Southern African Regional Universities Association, 2008). African health researchers publish often in journals not widely accessible for use by their African colleagues or policy makers. Access to health literature is an essential component in strengthening local teaching and research, improving local medical practices, empowering local experts to find solutions to local health issues, and supporting government officials to make informed decisions and formulate sound policies (World Health Organization, 2006). Most of the existing worldwide health literature focuses on solving health problems of the developed countries (World Health Organization, 2006). It is therefore important to determine factors that may influence African health researchers to adopt open access publishing and disseminate literature which may be pivotal for informing health policies and solving health problems in the local context.

In Tanzania, there is a paucity of empirical findings regarding the adoption and usage of open access, especially in the health education sector. Previous studies in Tanzania have investigated similar topics, although most have focused on the attitudes of faculty in a single university (Lwoga et al., 2006), or from six public Tanzanian universities (Dulle and Minishi-Majanja, 2011), or from eight universities in seven countries in the southern African region including one university from Tanzania (Southern African Regional Universities Association, 2008). Therefore, the topic on faculty open access behaviours is inadequately explored, especially in the health sciences universities including public and private health sciences universities in Tanzania. Challenges for adopting and using open access may differ in different universities, and different categories of research communities or disciplines. Based on the social exchange theory (Homans, 1958, 1961), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), the study developed a model to examine faculty's open access adoption and usage behaviour in Tanzanian health science universities.

Literature review and conceptual framework

This study used a combination of the social exchange theory (SET) (Homans, 1958, 1961), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). The social exchange theory was developed to provide an insight of the human social behaviour in the economic arena (Homans, 1958, 1961). SET was further refined by Blau to narrate the association of various actors as "actions contingent on rewarding reactions from others" (Blau, 1964). Generally, SET is rooted on a central premise: that people interact to help each other for profit or by expecting that they will gain something in return (Kankanhalli et al., 2005). This theory can be used to explain the behaviour of scientists contributing to open access. To determine factors affecting contribution to knowledge repositories,

Kankanhalli *et al.* [16] identified that cost and benefit factors derived from SET moderated by contextual factors derived from social capital theory can predict knowledge repository usage by knowledge contributors. The benefit factors motivate knowledge sharing, while cost minimizes knowledge sharing. Cost factors can inhibit the knowledge sharing process to take place, and it can include the loss of power and unique value within organization, and time and effort required to codify and input knowledge into the repository. Benefit factors can be intrinsic (i.e. enhanced knowledge self-efficacy or confidence; and altruism); or extrinsic (i.e. organizational rewards, good reputation or image).

Based on SET, Kim (2010) proposed that cost factors would result in a reluctance to self-archive, whereas benefit factors would motivate self-archiving behaviour. The contextual aspects were conceptualized to encourage faculty to self-archive. Kim proposed the following variables: (1) costs (additional time and effort; copyright concerns, fear of plagiarism); (2) extrinsic benefits (academic reward; professional recognition; accessibility; publicity; trustworthiness); (3) intrinsic benefits (altruism, self-interest) (4) contextual factors (self-archiving culture; influence of external actors) and (5) individual traits (number of publications; professional rank; age, technical skills). Thus, this study adopted all factors as proposed by Kim, including benefits, costs, contextual and individual characteristics.
The social exchange theory provides a framework that can also be used for understanding how scientists interact with open access systems to share their research outputs. However, the model does not specify other factors such as technological infrastructure. Kankanhalli *et al [16]* suggested that SET can be extended to include the technology acceptance model (TAM) [] to better account for the ease of use and usefulness factors on usage of knowledge repositories by knowledge contributors. The present study therefore additionally used UTAUT (Venkatesh et al., 2003) to better explain technological infrastructure factors that can also determine faculty behavioural intention or actual usage of open access. UTAUT was proposed as a theoretical advancement over existing theories used to examine technology acceptance and diffusion related research. The UTAUT investigates the user's behavioural intentions to use an information system and resultant usage behaviour. The four constructs play a significant role as direct determinants of user acceptance and usage behaviour: performance expectancy, effort expectancy, social influence, and facilitating conditions. The effect of independent variables on dependent variables is moderated by following four moderating variables: gender, age, experience, and voluntariness of use (Venkatesh et al., 2003).

The UTAUT model has been successful used to explain the adoption of OA in public universities in Tanzania (Dulle and Minishi-Majanja, 2011). Dulle and Minishi-Majanja (2011) found that attitude, awareness, effort expectancy and performance expectancy were main predictors of researchers' behavioural intentions of OA usage. Similarly, age, awareness, behavioural intention, facilitating conditions and social influence were found to significantly affect researchers' actual usage of open access (Dulle and Minishi-Majanja, 2011). It was thus imperative to assess whether factors from UTAUT (i.e. effort expectancy, attitude, facilitating conditions, social influence) and constructs from SET can explain how health faculty adopt and use open access avenues than UTAUT alone.

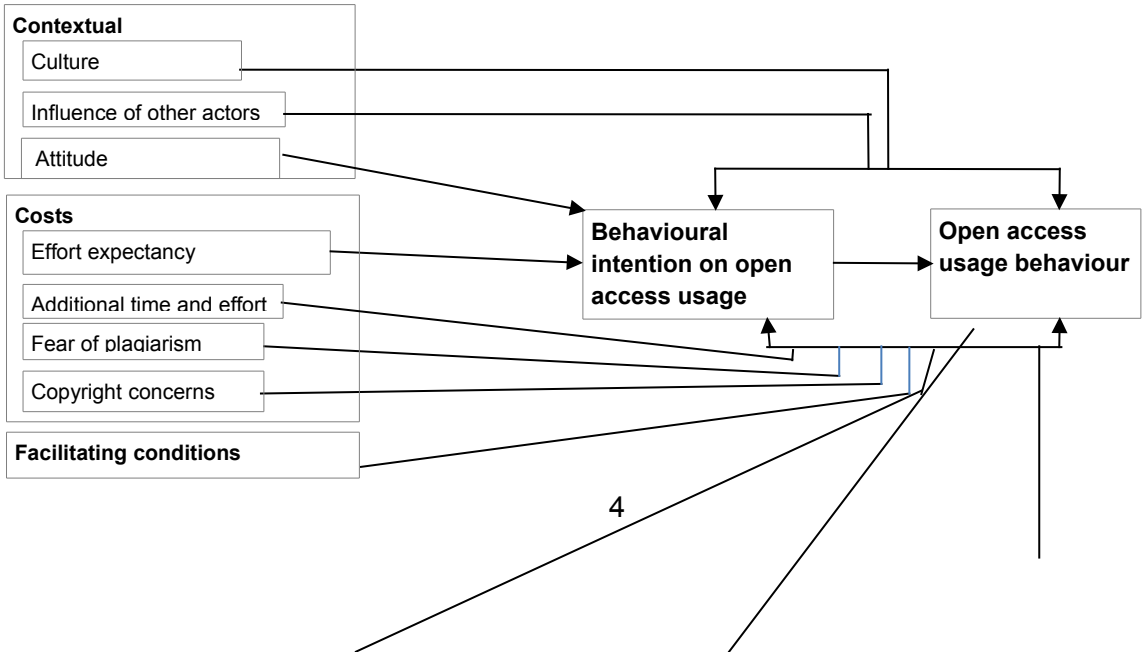
On the whole, factors from social exchange theory (Hall, 2003; Kankanhalli et al., 2005; Kim, 2010) were added to UTAUT, which included intrinsic and extrinsic benefits, cost and contextual factors. The effort expectancy was added into cost factors as shown in the following Figure 1. Further, attitude factor was added into the contextual factors as shown in the research model of this study. The effects of the attitude construct on the behavioural intention and actual use of new technology including open access has been established by other studies

(Dulle and Minishi-Majanja, 2011; Suki et al., 2011). The preservation factor was also added into the extrinsic benefits as suggested in open access behaviour studies (Kim, 2011). The proposed conceptual framework assumes that the dimensions of the model influence adoption of open access, which is conceptualized as "behavioural intention", and eventually actual usage of open access. These six dimensions include the following independent variables: facilitating conditions, costs, intrinsic factors, extrinsic factors, contextual factors, and individual characteristics. Dependent variables include: OA actual usage, and behavioural intention on open access usage.

Cost factors

Literature shows that cost factors can negatively affect faculty's open access usage behaviour, which include copyright concerns, fear of plagiarism, additional time and effort, and effort expectancy. Research shows that fear to violate publisher's copyright policies is one of the factors that inhibit faculty to self-archive. A study of faculty at 17 Carnegie doctorate-granting universities in the U.S. (Kim, 2011) indicated that institutional repository (IR) contributors were significantly more worried about copyright issues than non-IR contributors were. Other studies show that faculty's participation to self-archiving practices may also be inhibited due to secure maintenance of open access materials and the perceived time required and possible technical difficulties in depositing the content in repositories (Abrizah, 2012; Creaser et al., 2010; Davis and Connolly, 2007; Dulle and Minishi-Majanja, 2011; Hulela, 2010; Kim, 2010; Singeh et al., 2012). Thus an extensive promotion of OA benefits is required to create more awareness and influence faculty's decision to participate in open access. In this study, cost factors were conceptualized to affect both their intention and usage behaviour of open access.

The effort expectancy factor refers to the degree to which faculty find it easy or difficult to publish or self-archive their research outputs in publicly accessible websites. The effort expectancy construct is significant only during the initial period of adopting and using the system, and it becomes non-significant over periods of extended and sustained usage (Venkatesh et al., 2003). Prior studies have established that effort expectancy strongly affects behavioural intention to use, rather than actual usage of the system (Dulle and Minishi-Majanja, 2011; Dwivedi et al., 2011; Venkatesh et al., 2003). Therefore, the effort expectancy was conceptualized to affect the researcher's intention to use open access in this study. While some studies on technology acceptance have found negative effects of effort expectancy factor in predicting behavioural intention (Debuse et al., 2008), other studies found that effort expectancy factor had positive effects on behavioural intention to adopt open access (Dulle and Minishi-Majanja, 2011). Indications are that effort expectancy can either inhibit or increase faculty willingness to contribute their research materials into publicly accessible websites.



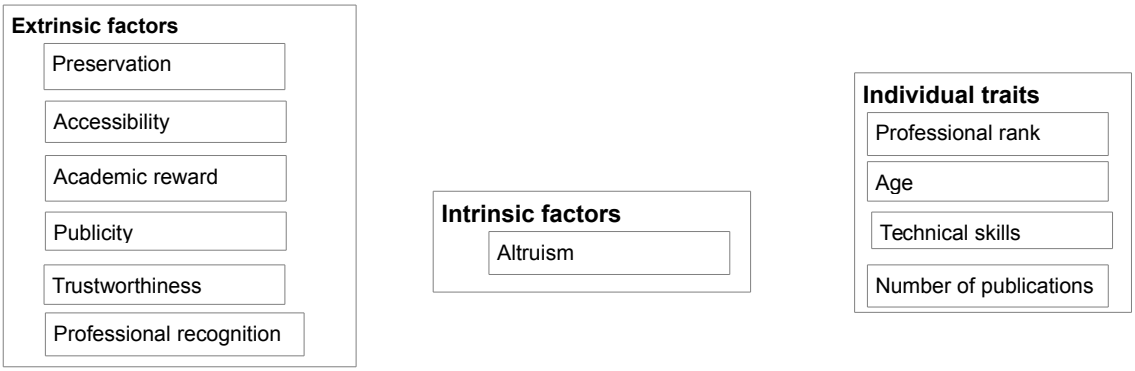


Figure 1: Conceptual model of adoption and use of open access

Extrinsic benefits

Literature shows that open access usage can be influenced by academic reward, accessibility, publicity, professional recognition, trustworthiness and preservation. In this study, these extrinsic factors were conceptualized to affect both their intention and usage behaviour of open access. Academic reward refers to the degree to which existing reward systems of tenure/ promotion (and even grant making) affect the adoption and usage of open access (Kim, 2010). On one hand, a study at the University of California indicated that faculty may be reluctant to contribute their scholarship to open access avenues due to the perception that the current faculty tenure and promotion evaluation process focuses on measures of print-based research productivity (University of California & Greenhouse Associates, 2007). On other hand, other studies in New Zealand (Cullen and Chawner, 2011), USA (Casey, 2012; Kim, 2010) and Norway (Hulela, 2010) have reported differently, where tenure and promotion issues influenced faculty willingness to contribute their outputs to open access avenues. Literature shows that academic reward can either inhibit or influence faculty willingness to contribute their research materials into publicly accessible websites.

Professional recognition is the extent to which the visibility of faculty research work would increase by making their research work available through open access scholarly communication. A study of over 3000 authors across Europe reported that greater visibility, and reputation building was one of the key drivers for self-archiving among the authors surveyed (Creaser et al., 2010). The professional recognition factor also influenced academics to self-archive their research materials in other studies (Cullen and Chawner, 2011; Hulela, 2010). Professional recognition also relates to publicity and accessibility factors. On one hand, publicity refers to the faculty perception that the wider dissemination of their research work through open access would enhance the readership and citation impact of their work. Wider dissemination of research outputs and increased citation rates were among the reasons that motivated authors/scientists self-archive their research materials in other studies (Creaser et al., 2010; Cullen and Chawner, 2011; Deoghuria and Roy, 2007).

On the other hand, the accessibility factor refers to the extent to which faculty believed open access would enhance the availability of the research work. Availability and ease of access of research content can influence faculty to use open access. Prior studies (Abrizah, 2012; Creaser et al., 2010; Cullen and Chawner, 2011; Deoghuria and Roy, 2007; Kim, 2010) have reported that increased accessibility of research work motivated faculty to participate in OA as authors. Indications are that faculty tend to disseminate their research materials through

open access because as such their articles become more easily discoverable and fully accessible.

Trustworthiness narrates the extent to which faculty perceive the quality and credibility of open access research materials. The perception that open access publications are of low quality compared to traditional publications can inhibit scientists to participate in open access scholarly communication. Several scholars (Creaser et al., 2010; Davis and Connolly, 2007; Dulle and Minishi-Majanja, 2011; Hulela, 2010) reported that faculty feared that low quality of some material in the repository would taint their research. Thus, credibility of OA publications plays a great role in influencing faculty's decision to use open access.

Preservation refers to the extent to which faculty believe their open access materials would be permanently available for use, and preserved to perpetuity. Studies show that the most important reason for faculty's contribution to open access repositories is the long-term preservation of materials for the future (Hulela, 2010; Kim, 2011; Sawant, 2012). Thus, the capacity of open access media including IR and OA journals to enhance their digital preservation is important in motivating faculty to publish their research as OA.

Intrinsic factor

The intrinsic factor altruism relates to the extent to which faculty believe that enjoyment in helping others would motivate them to adopt and use open access (Kim, 2011). The altruism factor was a dominant factor that influenced self-archiving behaviour of faculty in various studies (Abrizah, 2009; Hulela, 2010; Kim, 2011). It is clear that faculty self-archive and publish in open access avenues in order to improve the access of other scholars to their materials. The intrinsic factor was conceptualized to affect both their intention and usage behaviour of open access in this study.

Contextual factors

Three contextual factors can affect faculty open access usage behaviour, which include attitude, culture and influence of other actors. In this study, attitude was theorized to affect behavioural intention on open access usage, while culture and influence of other actors were conceptualized to influence both their intention and usage behaviour of open access. On one hand, attitude narrates individual's overall affective reaction to using a system (Venkatesh et al., 2003). Prior research also revealed that researchers' positive attitude influenced their behavioural intention to use open access approaches (Dulle and Minishi-Majanja, 2011), and social media (Suki et al., 2011).

Culture relates to the extent to which faculty believe it is common to make their research work in publicly accessible websites, in both their disciplines and their academic department (Kim, 2011). Various studies have indicated differences between subject disciplines with respect to the level of self-archiving activity and the location of deposit (website, institutional or subject-based repositories) (Creaser et al., 2010; Hulela, 2010; Kim, 2010; Swan and Brown, 2005). However, other studies found no relationship between a disciplinary culture and self-archiving practices (Covey, 2009; Lercher, 2008; Xia, 2008). Xia and Sun found that the presence of a librarian or staff person who managed deposits on behalf of faculty had a positive effect on IR participation. Therefore, the influence of research disciplines on self-archiving culture may differ from one institution to the other.

Influence of other actors refers to the extent to which faculty's decision to adopt and use open access is influenced by individuals (i.e. leading researchers, peers, and co-authors) or

organizations (i.e. universities or research funding agencies). A study of over 3000 authors across Europe found that other actors, such as colleagues, repository managers, co-authors, publisher's and institutional policies influenced author's decisions to self-archive (Creaser et al., 2010). Institutional open access policies have actually been introduced to require researchers to self-archive their final, peer-reviewed drafts in a freely accessible central or institutional repository. Evidence shows an increase of content items for more than half of the repositories after a mandate has been in place (Xia et al., 2012). Other studies have revealed opposite findings where policy mandates did not seem to be a preferable option to influence faculty to deposit their publications into the repository, such as a study of eight universities in New Zealand (Cullen and Chawner, 2011). Other studies also found that other actors such as peers, leading researchers and funding agencies are perceived to have little impact on self-archiving (Dulle and Minishi-Majanja, 2011; Hulela, 2010). Indications are that the influence of other actors, either organizations such as universities/funders or individuals such as co-authors, on usage of open access may differ according to disciplines and institutions. Therefore, it was important to assess the influence of different actors on behavioural intention, and actual usage of open access in Tanzania health sciences universities, which included individuals (colleagues, co-authors, leading researchers) and organizations (surveyed universities, and funding agencies).

Facilitating conditions

Facilitating conditions relate to the extent to which an individual perceives that an organizational and technical infrastructure exists to support the use of a system (Venkatesh et al., 2003). This factor has been found to impact actual usage of technology rather than behavioural intention in technology adoption studies (Venkatesh et al., 2003), and open access adoption research (Dulle and Minishi-Majanja, 2011). According to the meta-analysis of findings reported in 43 published studies, facilitating conditions can have significant impacts on both behavioural intention, and usage of technology (Dwivedi et al., 2011). Therefore, the facilitating conditions factor was conceptualized to affect faculty members' behavioural intention and actual usage behaviour of open access in this study.

Individual traits

Individual traits can enhance both faculty behavioural intention, and consequently actual usage of open access. These factors include professional rank, age, and technical skills. Several scholars report that individual characteristics determine usage of open access usage by faculty, which include professional rank (Kim, 2011; University of California & Greenhouse Associates, 2007), age (Dulle and Minishi-Majanja, 2011), technical skills (Kim, 2011) and number of publications (Swan and Brown, 2005). Indications are that individual traits can be important factors to determine faculty's OA behavioural intention to use, and actual usage of open access.

Methodology

The study was conducted in all eight health sciences universities in Tanzania, which included Muhimbili University of Health and Allied Sciences (MUHAS), International Medical and Technological University (IMTU), St. Francis University College for Health and Allied Sciences – St Augustine University (SFUCHAS), Kilimanjaro Christian Medical University College (KCMUC), Dodoma University, Aga Khan University, Catholic University of Health & Allied Sciences - Bugando (CUHAS), and Kairuki Memorial University. A stratified random sampling procedure was used to select a sample of faculty (researchers and library staff, n=415) from a total population of 679, with a response rate of 71.1%. The total

population and contact information was determined from the institution's prospectus and staff lists requested from the human resource offices in the surveyed universities.

A structured questionnaire was used to collect data, where survey questions were developed based on existing, tested and verified instruments (Dulle and Minishi-Majanja, 2011; Kim, 2011; Singeh et al., 2012; Swan and Brown, 2005). The questionnaire consisted of the following three sections: (i) demographic data including gender, age, professional rank, highest academic qualification, discipline, and technical skills; (ii) level of awareness and utilization of OA scholarly communication; and (iii) factors affecting adoption and use of OA, including 50 likert-scale questions (see Appendix A). The questionnaire was first pre-tested with a small pilot group of 30 academics from the University of Dar es salaam and six librarians from the University of Dar es salaam and Sokoine University of Agriculture. The questionnaire was refined and corrected according to the data that emerged from the pilot study. The researchers personally administered the questionnaires, which were physically distributed to respondents. About 312 questionnaires were collected, but only 295 were found usable. The researcher ensured that relevant research permits were obtained before the commencement of data collection. Approval to conduct this study was sought from and granted by the Muhimbili University of Health and Allied Sciences (MUHAS) Ethical Review Board in Tanzania. An informed consent form was also used to facilitate voluntary participation in the study.

Binary logistic regression analyses were performed to examine the ability of each factor to predict actual usage and behavioural intention to use open access. The first dependent variable assessed whether (1) or not (0) respondents had contributed their research findings in open access avenues. The second dependent variable assessed the adoption of open access by analyzing the intention of respondents to use open access frequently in the future. This variable was measured by using a five point Likert scales ranging from (1) strongly disagree to (5) strongly agree (See Appendix A). Although it would be possible to use a different technique to handle the second dependent variable, for consistent results, the five-point likert scale was thus transformed into binary values to suit the binary regression analysis. Measurements of behavioural intention were reduced from five to two: i.e. responses indicated as agree or strongly agree to contribute their research findings in open access avenues in future were coded as one, while those indicating neutral, disagree or strongly disagree were coded as zero.

Fourteen factors that affect OA usage and intention to use open access were identified from various studies on open access and technology adoption (Dulle and Minishi-Majanja, 2011; Kim, 2011; Venkatesh et al., 2003). About 50 Likert-scale questions were developed and provided in the questionnaire (see appendix A). Each factor comprised a group of two to five scale questions, followed by a five point Likert scales ranging from (1) strongly disagree to (5) strongly agree. Further, the individual characteristics were included as independent variables, including rank, age, technical skills and number of publications per year. The professional rank variable was coded from 1 to 6, and it included the following levels: Tutorial Assistant, Assistant Lecturer, Lecturer, Senior Lecturer, Associate Professor, and Professor. The technical skills variable was measured by using a 1-5 scale, where one indicated no knowledge and five indicated expertise. The number of publications per year was coded from 1 to 3, and included the following levels: 0-1 publications, 2-3 publications, and 4 or more publications. The respondents' technical skills were measured in the following categories: use of word processing programme, spread sheet, information search on the internet, posting research output on the internet, creation of personal web pages, and send and

receive email. Individual percentage scores were summed up and the total score represented the technical skill variable.

The items were also tested for validity using factor analysis with principal components analysis and varimax rotation. Factor analysis enabled the study to determine the items for creating the summated scales. Before proceeding with factor analysis, the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test were conducted to determine whether or not it was appropriate to conduct factor analysis. The KMO values should be greater than 0.5 and Bartlett's test should be significant with a value less than 0.05 (Field, 2006). In this study, the determined KMO measure of sampling adequacy was 0.946. The Bartlett's test of sphericity was found to be significant (Chi-square = 11345.3, df = 1225, p = .000). The results suggested that the data could support factor analysis. The varimax rotation was used to obtain factor loading values and cumulative proportions of variance. Exploratory factor analysis yielded 15 constructs with a total of 50 items as designed in the survey questionnaire. All items achieved a minimal communality of 0.5, loaded onto the factors that represented their constructs and all factor loadings were above the criterion level of 0.32 (Tabachnick and Fidell, 2007). In this study, the average score of the factors was used for further analysis.

The internal consistency of each factor identified in the principal component analysis was further examined through calculation of Cronbach alphas. The criterion level for the definition of a scale was set at an alpha coefficient of 0.70 (Cronbach, 1951). In this study, all factors showed alphas greater than 0.70, which is the accepted level of internal consistency for items in social science research (see Table 1).

Table 1: The reliability of independent variables

Factors/independent variables		**Number of questions**	**Cronbach's alpha**
Cost	Copyright	4	0.825
	Plagiarism	2	0.887
	Additional time	3	0.906
	Effort expectancy	3	0.722
Intrinsic	Altruism	3	0.870
Extrinsic	Academic reward	3	0.820
	Accessibility	2	0.815
	Publicity	3	0.910
	Professional recognition	4	0.878
	Trustworthiness	4	0.887
	Preservation	3	0.831
Contextual	Influence of other actors	5	0.922
	Culture	3	0.878
	Attitude	5	0.904
Facilitating conditions		3	0.833

The quantitative data were also supplemented with analysis of institutions websites and usage data from the institutional repository of one institution that had the OA repository in place. The analysis of institutions websites was done to assess whether faculty members disseminated their research content through their institutions websites. The usage data of the OA repository was collected from July to December 2012, during the data collection process.

Findings

The demographical information, including gender, age, academic qualification, rank, discipline, number of publications per year, and technical skills of study participants, is presented in Table 2. A total of 295 respondents participated in the study, where 64.1% (n=189) were male, and 35.9% (n=106) were female. The average age was 43 years, with most respondents aged between 41 and 50 years (38%; n=112). Slightly less than half of the respondents had master degrees (47.8%; n=141), while 31.5% (n=93) had PhD degrees. Most faculty members were senior lecturers (28.1%; n=83) and lecturers (23.1%; n=68). When asked about how many publications they publish per year, 95.3% (n=281) respondents responded to the question. Among those 281, almost half of the respondents published more than 3 publications per year (47.5%, n=140). Further, the disciplines from which respondents were drawn comprised a reasonable cross-section of health sciences, whereby the largest group came from the medical and nursing sub-fields.

Table 2: Demographic details (N=295)

		Frequencies	Percentages
Gender	Male	189	64.1
	Female	106	35.9
Age	30 years and below	21	7.1
	31-40	101	34.2
	41-50	112	38.0
	51-60	54	18.3
	61 and above	7	2.4
Academic Qualification	PhD	93	31.5
	Masters	141	47.8
	Postgraduate Diploma	18	6.1
	Bachelor/Doctor of Medicine/Dentistry	43	14.6
Professional Rank	Professor	15	5.1
	Associate Professor	26	8.8
	Senior Lecturer	83	28.1
	Lecturer	68	23.1
	Assistant Lecturer	60	20.3
	Tutorial Assistant	43	14.6
Discipline	Medicine	137	46.4
	Nursing	40	13.6
	Biological sciences	36	12.2
	Pharmacy	30	10.2
	Public Health and Allied Sciences	33	11.2
	Allied health sciences	9	3.1
	Dentistry	10	3.4
Number of Publications per year	0-1 publications	98	33.2
	2 to 3 publications	57	19.3
	More than 3 publications	140	47.5

Researchers' dissemination of scholarly content through institutional website analysis

Institutional websites' analysis was conducted to assess the extent to which researchers disseminate their research output through their institutions websites or repositories. Table 3

presents the results based on institutional websites analysis. It was evident that only one institution hosted an online local journal which was available up to abstract level only, while the other university had the institutional repository. All surveyed websites had links up to faculty/centre/directorate/institute levels and none was linked at departmental level. Only two libraries provided links to e-resources such as e- journals and other scholarly databases. Half of institutions websites provided information regarding their research outputs such as a list of publications through their Directorate of Research web pages. Only one institution had a policy on institutional repository, while all universities had policies/rules/regulations on academic staff promotion criteria. These criteria were based upon commendable performance in the areas of Teaching, Leadership and Research and Scholarship.

Usage data from the OA repository from a single institution

The usage data of the institutional repository from MUHAS which had installed the repository were also analyzed. The repository had only 100 research materials (i.e. theses/dissertations, research reports and journal articles) by the time the survey was conducted. Usage data showed that a total of 755 people visited the repository from July to December 2012, with 1,092 total visits and 68.5% new visits (see Figure 2). About 75.92% (n=829) of the visits were made Tanzania. Generally, these data show that the repository was used at a low rate.

Figure 2: Usage data from MUHAS institutional repository

Faculty awareness and utilization of open access scholarly communication

It was deemed necessary to find out the level of awareness and usage of open access, before determining factors affecting the adoption and usage of open access. The study results demonstrated that the majority of respondents (93.5%; n=276) in this study were aware of open access issues. Two thirds (64.4%; n=190) of respondents reported to have used OA outlets to disseminate their research materials. Faculty had disseminated not more than 38.9% (n=74) of their journal articles, and they had disseminated not more than 26.8% (n=51) of their book chapters in the last five years (see Table 3). Thus, only a small proportion of faculty's research materials was made available in open access avenues.

Table 3: Percentage of faculty work produced in the last five years that have been made publicly accessible on the internet (N=190)

	None		1-25%		26-50%		51-75%		76-10%	
	No	%	No	%	No	%	No	%	No	%
Journal articles	57	30.0	25	13.2	34	17.9	50	26.3	24	12.6
Book chapters	77	40.5	22	11.6	40	21.1	34	17.9	17	8.9
Publishers PDF versions of refereed articles	76	40.0	30	15.8	37	19.5	31	16.3	16	8.4
Post-print	96	50.5	28	14.7	31	16.3	20	10.5	15	7.9

Data sets	114	60.0	19	10.0	17	8.9	25	13.2	15	7.9
Un-refereed articles	87	45.8	32	16.8	31	16.3	28	14.7	12	6.3
Books	100	52.6	22	11.6	27	14.2	29	15.3	12	6.3
Pre-print, pre-refereed	100	52.6	20	10.5	36	18.9	23	12.1	11	5.8

Factors affecting adoption and usage of open access

The binary logistic regression was conducted to determine factors affecting actual use and behavioural intention on open access usage. Binary logistic regression generates odds ratios, which indicate the amount of change expected in the likelihood of disseminating research outputs in OA venue when there is one unit change in an independent variable with all of the other variables held constant. A test of the full model was conducted to determine if the overall model was statistically significant. The Omnibus Test of Model coefficients were found significant ($p < 0.001$) for both behavioural intention and actual usage of open access. These results implied the statistical evidence of the model's fitness to the collected data. With respect to the model's predictive ability, the model for behavioural intention to publish as open access was statistically significant (Chi-square 135.555, df = 23, $p < .000$), predicted 90.1% of the responses correctly, and accounted for approximately 60.1 percent of the variance of behavioural intention to use OA (Nagelkerke $R^2 = 0.601$). The model for determining actual usage of open access was also statistically significant (chi square = 107.460, $p < .000$ with df = 22), and it was found to correctly predict 78.2 percent of the observations with Nagelkerke R^2 of 0.440. The adjusted R squares for both actual usage and behavioural intention on open access indicated that the overall model was satisfactory in explaining the variance in intention to use, and actual open access usage by health sciences faculty.

On behavioural intention on open access usage, the results indicated that seven independent variables significantly related to the dependent variable (see Table 4). The results showed that attitude (3.359) had the largest odds ratio, and was thus, the best predictor of the dependent variable. Other significant factors based on the size of odds ratio, which represent the size of their effect on behavioural intention on open access usage, include the following: academic reward (2.698), accessibility (2.615), preservation (2.619), culture (1.932), copyright concerns (0.249) and effort expectancy (0.391). Copyright concerns and effort expectancy factors were negatively associated with the behavioural intention on open access usage, while the remaining factors were positively related.

On the actual use of open access, findings demonstrate that four independent variables were significant determinants of faculty's actual usage of open access (see Table 4). The factor of professional recognition had the largest odds ratio (1.950), and was thus, the best predictor of faculty's actual usage of open access. Other significant factors based on the odds ratio, which represent the size of their effect on usage of open access, include the following: facilitating conditions (1.687), behavioural intention (1.522), and copyright concerns (0.565). Professional recognition, facilitating conditions and behavioural intention were positively associated with the dependent variable, while copyright concerns factor was negatively associated. Three other individual characteristics (professional rank, technical skills and number of publications) were found to be positively associated with the faculty's actual usage of open access.

Table 4: Results of binary logistic regression analysis regarding faculty's behavioural intention and actual usage of open access

Independent variables	Behavioural intention	Actual usage of open

		on open access usage		access	
		P-value	**Odds Ratio**	**P-value**	**Odds Ratio**
Cost	Copyright concerns	**0.002**	**0.249**	**0.045**	**0.565**
	Fear of plagiarism	0.506	0.832	0.178	0.768
	Additional time and effort	0.436	0.787	0.953	1.013
	Effort expectancy	**0.045**	**0.391**	-	-
Intrinsic	Altruism	0.330	0.706	0.874	0.964
Extrinsic	Academic reward	**0.017**	**2.698**	0.083	1.633
	Accessibility	**0.009**	**2.615**	0.303	1.301
	Publicity	0.481	1.278	0.056	0.611
	Professional recognition	0.969	0.985	**0.016**	1.950
	Trustworthiness	0.117	1.933	0.084	1.666
	Preservation	**0.013**	**2.619**	0.683	0.903
Contextual	Culture	**0.031**	**1.932**	0.924	1.023
	Influence of other actors	0.172	0.464	0.233	0.720
	Attitude	**0.011**	**3.359**	-	-
Facilitating conditions		0.068	1.941	**0.033**	**1.687**
Individual Characteristics	Professional rank (ref Tutorial Assistant)	0.540		**0.017**	
	Assistant Lecturer	0.742	0.777	**0.005**	**4.485**
	Lecturers	0.903	1.100	**0.001**	**6.540**
	Senior Lecturers	0.750	0.746	**0.003**	**5.326**
	Associate Professors	0.236	4.209	**0.007**	**8.805**
	Professors	0.298	4.104	**0.036**	**7.106**
	Age	0.254	0.674	0.806	0.945
	Technical skills	0.886	1.039	**0.006**	**1.636**
	Number of publications	0.898	0.963	**0.008**	**1.731**
Behavioural intention to use		-	-	**0.050**	**1.522**

Discussion of study findings

The study findings provide an insight into major factors that enhance and/or inhibit adoption and use of open access in Tanzanian health sciences universities. The study findings indicate that extrinsic benefits and professional recognition in particular, strongly determined faculty's actual use of open access, while a contextual factor, which is attitude factor, was the best predictor of faculty's behavioural intention on open access usage. On the actual use of open access, the odds ratio of professional recognition was 1.950, which indicates that faculty who agreed and strongly agreed with professional recognition as a motivation for open access usage were more likely to contribute their research work in open access outlets than those who responded differently. These study findings are consistent to results of previous studies (Creaser et al., 2010; Cullen and Chawner, 2011; Hulela, 2010). Faculty with a belief that their visibility and citations of the publications would increase are thus more likely to contribute to open access.

Other factors that determined actual usage of open access included facilitating conditions, behavioural intention, and copyright concerns. The findings indicate that faculty who agreed or strongly agreed with the adequacy of facilitating conditions for their open access usage were more likely (odds ratio 1.687) to use open access, which is similar to previous studies in open access (Dulle and Minishi-Majanja, 2011) and technology adoption (Dwivedi et al.,

2011; Venkatesh et al., 2003). It is therefore important for the surveyed institutions to improve the existing ICT infrastructure, including increased bandwidth and power supply, with adequate technical support to enhance use of open access among researchers.

The behavioural intention was found to be positively associated with the actual use of open access. The behavioural intention had an odds ratio of 1.522, which indicates that respondents who perceived behavioural intention as an influential factors to their actual usage of open access were more likely to use open access than those who responded to the contrary. A meta-analysis of 43 technology adoption research studies established that behavioural intention and actual usage of technologies in various studies were stronger correlated than the other relationships (Dwivedi et al., 2011). The same factor of behavioural intention determined the extent to which faculty disseminated their research outputs in various types of open access web venues in other studies (Dulle and Minishi-Majanja, 2011). It is therefore important for librarians and other OA proponents to advocate the benefits of open access to influence faculty decision to use open access.

On the adoption of open access usage, contextual factors (attitude, and culture), and perceived benefits from users perspective, including accessibility, preservation and academic reward predicted behavioural intention on open access usage. In general, the academics' attitude towards open access was found to be positively related to their behavioural intention on open access usage. Regression analysis (odds ratio = 3.359) indicated that faculty with positive attitudes towards open access were more likely to adopt open access which is similar to previous research (Dulle and Minishi-Majanja, 2011; Suki et al., 2011). The findings show that faculty are more likely to adopt open access once they understand its implications and benefits.

The open access culture was also found to be positively associated with the behavioural intention on open access usage. Based on its odds ratio of 1.932, these results indicate that faculty who believed that an open access culture was common in their fields and department, were more likely to adopt open access than those who disagreed or strongly disagreed with such statement. The result of a one way analysis of variance (ANOVA) test indicated that there were no significant differences between the open access culture among the seven disciplines of the surveyed faculty ($F = 1.305$, $p < 0.215$). The findings imply that open access culture was common in all sub-disciplines probably because they all belonged to the major health sciences discipline. However, the results of the ANOVA test indicated that the scores on open access culture were significantly different among the eight surveyed health sciences universities ($F = 13.452$, $p < 0.001$). Overall, the study findings indicate that open access culture was common across all faculty members' disciplines; however there were differences among the surveyed institutions, which give a hope that adoption of open access may be possible in the future.

The academic reward was another factor that was found to be positively associated with the faculty's behavioural intention to use open access (odds ratio= 2.698). These results imply that faculty who perceived that open access publishing and self-archiving do not affect their tenure, promotion and access to research grants were more likely to adopt open access approaches. These study finding corroborate with the results of other studies (Casey, 2012; Cullen and Chawner, 2011; Hulela, 2010; Kim, 2010). The results are, however, contrary to observations made by University of California and Greenhouse Associates (2007) that the tenure and promotion system did not influence faculty to adopt OA. The findings of the present study further imply that OA publishing and self-archiving increased the likelihood

that other researchers would read and cite faculty's research works and this would have a positive impact on their tenure and promotion.

The accessibility factor significantly determined faculty's behavioural intention on open access usage with the odds ratio of 2.615. The findings of this study suggest that faculty are extrinsically motivated to adopt open access due to the increased availability, and readership of their research work. The maximized accessibility and citability of research materials on open access avenues is an important factor in predicting faculty decision's to use open access.

The preservation factor (odds ratio= 2.619) was found to be positively associated with the faculty's behavioural intention on open access usage. The findings imply that faculty who perceived that their research materials would be permanently available and preserved to perpetuity on publicly accessible web sites were more likely to adopt open access. The findings indicate that the permanency of OA literature play a key role in determining faculty's decision's to adopt open access. It is thus important for librarians to establish institutional repositories in the institutions, and enhance their digital preservation capacity. During the survey, only one institution had established an institutional repository (IR), while another institution had an OA journal. The findings also indicate a need for more awareness creation about OA, for faculty to become more familiar about OA issues and benefits, and use it as a dominant medium for their scholarly communication.

In this study, copyright concerns were found to negatively affect faculty's behavioural intention, and actual usage of open access. The study findings showed that copyright concerns were negatively associated with the open access usage behaviour (odds ratio= 0.565) and behavioural intention on open access usage *(*odds ratio = 0.249). The findings imply that faculty who had fewer issues with copyright concerns were more likely to use open access than those who responded differently. The results of this study are similar to other studies which found copyright as a major stumbling block to self-archiving (Abrizah, 2012; Creaser et al., 2010; Davis and Connolly, 2007; Hulela, 2010; Kim, 2010; Singeh et al., 2012). Most faculty members are not aware that a growing number of publishers allow self-archiving of pre or post print articles into repositories. Authors are not familiar with the Sherpa/RoMEO service that provides researchers with information regarding publishers' self-archiving policies and the permissions they grant to authors to disseminate different versions of a published article (Creaser et al., 2010). There is thus a need for more awareness creation about open access issues so that faculty members self-archive their pre or post prints into repositories.

The effort expectancy factor (odds ratio= 0.391) was found to be negatively associated with the faculty's behavioural intention on open access usage. The findings imply that faculty who perceived that it would be difficult for them to use open access system were less likely to adopt OA than those who felt the contrary. These findings are similar to the previous technology acceptance studies regarding the negative effects of effort expectancy factor in determining behavioural intention (Debuse et al., 2008). The study findings are however contrary to the results of other studies in Tanzania which showed that effort expectancy factor had positive relationship with the behavioural intention to adopt open access (Dulle and Minishi-Majanja, 2011). There is thus a need to conduct more training on the use of open access web avenues to enhance faculty capability to use such systems, given that studies show that the negative effects of effort expectancy can be minimized with experience (Venkatesh et al., 2003).

The study findings showed that three individual characteristics (that is, professional rank, technical skills, and number of publications) positively influenced faculty's actual usage of open access. The professional rank variable as a whole was found to be statistically significant (p= 0.017). With odds ratio of 8.805, the results indicate that associate professors have disseminated a greater proportion of their research materials, compared with other lower professional ranks such as lecturers and senior lecturers. The study findings were found to be consistent to results of previous studies (Dulle and Minishi-Majanja, 2011). With the odds ratio of 1.636 and 1.731 respectively, the findings indicate that faculty with proficient skills and a great number of publications are more likely to contribute their research findings in publicly accessible websites, even after controlling all other variables. Technical skills also determined faculty's self-archiving behaviour in USA (Kim, 2011). There is thus a great need to create awareness about the benefits of open access and conduct information skills training programmes so that all faculty members can participate in open access publishing and self-archiving practices.

Implication for theory

This study advances theoretical development in the open access research. Prior studies have examined the adoption and use of open access by scientists through the social exchange theory (Kim, 2010), and UTAUT (Dulle and Minishi-Majanja, 2011). This study conceptualized and developed a model for open access adoption and use among scientists based on social exchange theory (Blau, 1964; Hall, 2003; Homans, 1961; Kankanhalli et al., 2005; Kim, 2010), and UTAUT (Venkatesh et al., 2003), and the validated model (see Figure 3) consists of seven dimensions: facilitating conditions, cost, extrinsic, contextual, individual traits, behavioural intention on open access usage, and actual use of open access.

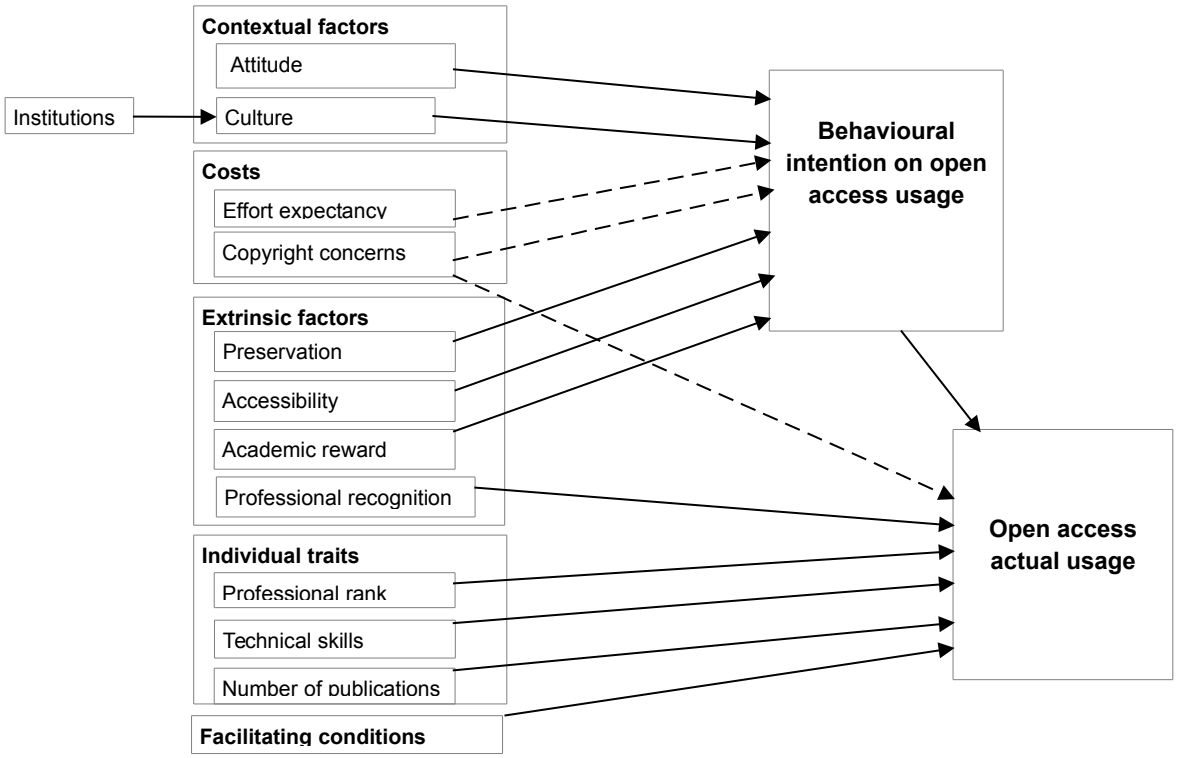


Figure 3: Validated model on open access adoption and usage

The study findings showed that facilitating conditions, extrinsic benefits (professional recognition), behavioural intention on OA usage and individual characteristics (professional

rank, technical skills and number of publications) were found to be positively associated with the usage of open access. Contextual factors (attitude and culture), and extrinsic benefits (academic reward, accessibility and preservation) also had positive association with the behavioural intention on open access usage. Copyright concerns and effort expectancy however had negative relationship with the behavioural intention to use open access, while copyright concerns had negative relationship with the actual usage of open access.

Based on the study findings, the new conceptual model (see Figure 1) was refined, and a validated research model is proposed that can explain in more detail the adoption and usage of open access by health sciences faculty (see Figure 2). The validated model demonstrates that the combination of social exchange theory (SET) and UTAUT can effectively predict adoption and usage of open access. The factors examined provide a strong basis for understanding the open access adoption and usage.

The study further contributes to theory by revealing factors that do not have effects on open access adoption and usage, which include trustworthiness, publicity, altruism, additional time, fear of plagiarism, and influence of other actors. Although these factors were found to significantly influence open access usage behaviour in previous studies, these factors were found to be not significant in the context of the Tanzanian health universities. These findings suggest that future research should examine the effects of these factors on open access adoption and usage. The study has also contributed to the body of knowledge on the open access adoption and usage because little empirical findings exist in the developing world context although much of the literature exists in other developed countries. Thus, the validated open access adoption and usage model can be adapted to test the adoption and usage of open access in other institutions with similar conditions. The results can provide more understanding into how to plan and implement successful open access projects in academic institutions.

Implication for practice

This study has several implications for the successful adoption and usage of open access. These study findings offer suggestions to academic and research institutions management and librarians on how to plan, manage and promote open access usage among scientists. Firstly, institutions especially in Africa and Tanzania in particular should develop institutional repositories and policies to encourage and motivate faculty to use open access. The study findings showed that faculty support the OA initiative and are willing to contribute their research findings. However, the survey results revealed that only one Tanzanian health university had established an institutional repository. Secondly, institutions should improve the ICT infrastructure, ensure adequate technical support and increase internet bandwidth to enable faculty to adopt and use open access in developing countries and Tanzania in particular. The study findings revealed that the facilitating conditions were among the significant factors that influenced faculty to use open access. With adequate technical support and infrastructure, OA initiatives can be successful, especially in institutions with limited resources. Thirdly, the academic and research institutions should review their academic reward policies to recognize new forms of scholarly communication in order to motivate faculty to self-archive their research outputs in institutional repositories. The study findings indicated that faculty perceived that tenure and promotion criteria had no effect on their use of open access. Generally, faculty members were using the open access journal articles for promotion. However, none of the academic reward policies in the surveyed universities formally recognized the open access journal articles in their promotion criteria. This implies that universities need to formally recognize open access publications in the academic reward

policies. Fourthly, the librarians in academic and research institutions should create awareness and conduct information literacy programmes to enable faculty understand OA issues and benefits, and eventually enhance their capacity to self-archive and publish in open access web avenues. These programmes will also enable faculty to understand copyright issues and their right to self-archive in repositories. Lastly, libraries should provide information services that focus on open access issues, such as copyright management in order to assist researchers to understand the legal implications of self-archiving their research outputs.

Conclusions

The study findings indicated that despite the low usage of open access in terms of self-archiving and publishing in OA web avenues, health sciences faculty are positive about adopting and using open access. Tanzanian faculty members who do deposit their research outputs in repositories and publish in OA journals are primarily motivated by perceived extrinsic OA benefits from user perspective (i.e. professional recognition), behavioural intention to use OA and facilitating conditions such as availability of reliable infrastructure and technical assistance. On the adoption of open access, the faculty's attitude toward open access was the best predictor. Other factors that motivated faculty to adopt open access include extrinsic benefits (academic reward, accessibility and preservation), and contextual factor (attitude, and open access culture). The findings further showed that faculty rank, technical skills and number of publications were positively associated with the actual OA usage. The study findings also demonstrated that open access culture was common across all faculty members' disciplines; however there were differences among the surveyed institutions, which may greatly influence adoption of open access in the future. The study findings also specified that faculty were de-motivated to use open access due to the fear of violating publisher's copyright policies, and perceived difficulties in using the system (effort expectancy). Overall, this study reveals findings that are useful for planning and implementing open access initiatives in research and academic institutions in Tanzania and beyond. The study also developed a model that can be adapted to test the adoption and usage of open access in other institutions with similar conditions.

Research limitations/implications

Although previous studies assessed faculty open access behaviour from various disciplines, this study focused on health sciences discipline to ascertain the factors that enhance utilization of OA across the discipline. In general, cross-sectional studies are not ideal to conclude about effects of factors (rather correlations), but the survey questions were designed to include direct questions about what is influencing the respondents OA intention or behaviour. This study is based on self-reports by faculty members and thus further research needs to be done to determine the actual usage of open access among faculty members. Longitudinal and mixed research studies are also required to assess the factors that enhance use of OA outlets, especially self-archiving behaviour among faculty in developing countries.

References

Abrizah, A. (2009), "The cautious faculty: their awareness and attitudes towards institutional repositories", *Malaysian Journal of Library & Information Science*, Vol. 14 No. 2, pp. 17–37.

Abrizah, A. (2012), "Populating institutional repository: faculty's contribution and roles of librarians", *BACA: Jurnal Dokumentasi dan Informasi*, Vol. 31 No. 1, pp. 27–51.

Blau, P. (1964), *Exchange and Power in Social Life*, Wiley Interscience Publication, New York.

Casey, A. (2012), "Does tenure matter? factors influencing faculty contributions to institutional repositories", *Journal of Librarianship and Scholarly Communication*, Vol. 1 No. 1, pp. 1–11.

Covey, D. (2009), "Self-archiving journal articles: a case study of faculty practice and missed opportunity", *Portal: Libraries and the Academy*, Vol. 9 No. 2, pp. 223–251.

Creaser, C., Fry, J., Greenwood, H., Oppenheim, C., Probets, S., Spezi, V. and White, S. (2010), "Authors' awareness and attitudes toward open access repositories", *New Review of Academic Librarianship*, Vol. 16 No. S1, pp. 145–161.

Cronbach, L.J. (1951), "Coefficient alpha and the internal structure of tests", *Psychometrika*, Vol. 16 No. 3, pp. 297–334.

Cullen, R. and Chawner, B. (2011), "Institutional repositories, open access, and scholarly communication: a study of conflicting paradigms", *The Journal of Academic Librarianship*, Elsevier Inc., Vol. 37 No. 6, pp. 460–470.

Davis, P. and Connolly, M. (2007), "Institutional repositories: evaluating the reasons for non-use of Cornell University's installation of DSpace", *D-lib Magazine*, Vol. 13 No. 3/4, available at: http://works.bepress.com/ir_research/8/ (accessed 8 January 2013).

Debuse, J., Lawley, M. and Shibl, R. (2008), "Educators' perceptions of automated feedback systems", *Australasian Journal of Educational Technology*, Vol. 24 No. 4, pp. 374–386.

Deoghuria, S. and Roy, S. (2007), "Open access: what scientists think ? a survey of researcher ' s attitude towards open access", in Prasad, A. and Madalli, D. (Eds.),*ICSD-2007*, pp. 568–577.

Dulle, F. and Minishi-Majanja, M. (2011), "The suitability of the Unified Theory of Acceptance and Use of Technology (UTAUT) model in open access adoption studies", *Information Development*, Vol. 27 No. 1, pp. 32–45.

Dwivedi, Y., Rana, N., Chen, H. and Williams, M. (2011), "A meta-analysis of the Unified Theory of Acceptance and Use of Technology (UTAUT)", *Governance and Sustainability in IS*, pp. 155–170.

Field, A. (2006), "Factor analysis using SPSS", available at: http://www.sussex.ac.uk/users/andyF/factor.pdf.

Hall, H. (2003), "Borrowed theory: applying exchange theories in information science research", *Library & Information Science Research*, Vol. 25 No. 3, pp. 287–306.

Harnad, S. (2007), “Ethics of open access to biomedical research: just a special case of ethics of open access to research”, *Philosophy, Ethics, and Humanities in Medicine*, Vol. 2, p. 31.

Homans, G. (1958), “Social behavior as exchange”, *American Journal of Sociology*, Vol. 63 No. 6, pp. 597–606.

Homans, G. (1961), *Social behavior: its elementary forms*, Taylor & Francis.

Hulela, B. (2010), *Scholars and institutional repositories: perceptions of academic authors towards self -archiving their scholarly works in the Bergen Open Research Archive*, Oslo University College, available at: https://oda.hio.no/jspui/handle/10642/863.

Kankanhalli, A., Tan, B. and Kwok-Kee, W. (2005), “Contributing knowledge to electronic knowledge repositories: An empirical investigation”, *MIS Quarterly*, Vol. 29 No. 1, pp. 113–143.

Kim, J. (2010), “Faculty self-archiving: Motivations and barriers”, *Journal of the American Society for Information Science and Technology*, Vol. 61 No. 9, pp. 1909–1922.

Kim, J. (2011), “Motivations of faculty self-archiving in institutional repositories”, *The Journal of Academic Librarianship*, Elsevier B.V., Vol. 37 No. 3, pp. 246–254.

Lercher, A. (2008), “A survey of attitudes about digital repositories among faculty at Louisiana State University at Baton Rouge”, *The Journal of Academic Librarianship*, Elsevier B.V., Vol. 34 No. 5, pp. 408–415.

Lwoga, E., Forzi, T., Laing, P. and Mjema, E. (2006), “KM in the agricultural field: an ICT-based approach to promote the development and sharing of knowledge among agricultural researchers in Africa”, *In P. Cunningham and M. Cunngham (eds) IST-AFRICA confererence*, available at: http://www.ist-africa.org/conference200.

Sawant, S. (2012), “Indian institutional repositories: a study of user’s perspective”, *Program: Electronic Library and Information Systems*, Vol. 46 No. 1, pp. 92–122.

Singeh, F., Abrizah, A. and Karim, N. (2012), “What inhibits authors to self-archive in open access repositories? a Malaysian case”, *Information Development*, Vol. 29 No. 1, pp. 24–35.

Southern African Regional Universities Association. (2008), “Open access to knowledge in Southern African Universities”, available at: http://www.sarua.org/files/publications/ST.

Suki, N.M., Ramayah, T. and Ly, K.K. (2011), “Empirical investigation on factors influencing the behavioral intention to use facebook”, *Universal Access in the Information Society*, Vol. 11 No. 2, pp. 223–231.

Swan, A. and Brown, S. (2005), “Open access self-archiving: an author study”, available at: http://cogprints.org/4385 (accessed 23 April 2013).

Tabachnick, B. and Fidell, L. (2007), *Using Multivariate Statistics*, Pearson Education Inc, Boston, MA, 4thed.

University of California & Greenhouse Associates. (2007), "Faculty attitudes and behaviors regarding scholarly communication: survey findings from the University of California", available at: http://osc.universityofcalifornia.edu/responses/materials/OSC-survey-summaries-20070828.pdf.

Venkatesh, V., Morris, M., Davis, G. and Davis, F. (2003), "User acceptance of information technology: toward a unified view", *MIS quarterly*, Vol. 27 No. 3, pp. 425–478.

World Health Organization. (2006), "Access to the world's leading journals", available at: http://www.who.int/hinari/Hinari Agora 8pp English leaflet FINAL.PDF.

Xia, J. (2008), "A comparison of subject and institutional repositories in self-archiving practices", *The Journal of Academic Librarianship*, Elsevier B.V., Vol. 34 No. 6, pp. 489–495.

Xia, J., Gilchrist, S., Smith, N., Kingery, J., Radecki, J., Wilhelm, M., Harrison, K., et al. (2012), "A review of open access self-archiving mandate policies", *Libraries and the Academy*, Vol. 12 No. 1, pp. 85–102.

Appendix A: A list of survey items

COST FACTORS **Copyright** 1. I need to ask permission from publishers to post my work on publicly accessible web sites 2. If I post my work on open access sites without permission, I may infringe copyright 3. I need permission from co-authors or collaborators to post my work on open access sites 4. I can post my work on publicly accessible web after publication because publishers do not have exclusive rights over my work
Plagiarism 5. If I post my work on free accessible web sites, readers may plagiarize or not cite my work 6. If I post my work on publicly accessible web sites, the integrity of my work is compromised
Additional time and effort 7. Posting my work on publicly accessible websites takes time away from my research 8. Additional time and effort is required to make my work free accessible on the web 9. It is difficult to learn how to enter the required data (e.g. author etc.) on the web
Effort expectancy 10. The interaction with publicly accessible websites is clear and understandable 11. Learning to publish my work in open access outlets (is) would be easy for me 12. I find it easy to publish in publicly accessible website
INTRINSIC FACTORS **Altruism** 13. Posting my materials on publicly accessible web sites will help other researchers build on my research findings 14. Posting my materials on publicly accessible web sites allows other scholars to access literature that they could not otherwise use 15. I support the principle of open access (free access to research materials for all users)
FACILITATING CONDITIONS 16. I have the necessary resources to publish my work in open access outlets (e.g. IT infrastructure, Internet access) 17. Technical support and guidance is available to use the Internet effectively for searching

information for my research work

18. Technical support and guidance is available to use the Internet for publishing my work in publicly accessible websites

EXTRINSIC FACTORS

Academic reward

19. My institution will accept research work on publicly accessible web sites as an alternative to publication for tenure and promotion
20. Posting my work on publicly accessible web sites will adversely affect my chances of tenure/promotion
21. I will get a better work assignment when I publish my work on publicly accessible web sites/ journal

Accessibility

22. Materials on free accessible web sites are easily accessible through Internet search engines
23. Posting my research work on publicly accessible web sites will increase the chance to communicate my research findings to peers

Publicity

24. Posting my materials on publicly accessible web sites will enlarge the readership of the materials
25. Posting my research work on publicly accessible web sites will increase the potential impact of my work
26. Posting my research work on publicly accessible web sites allows for earlier dissemination of my research findings

Professional recognition

27. Materials on publicly accessible web sites will be cited more frequently
28. Posting my research work on publicly accessible web sites will increase my visibility within the discipline(s) to which I belong
29. Scholars who publish in openly accessible website/journal have more prestige than those who do not
30. Posting my work on publicly accessible web will improve others' recognition of me

Trustworthiness

31. I trust the quality of materials on publicly accessible web sites from authors employed by prestigious institutions
32. I trust the quality of materials on publicly accessible web sites from well-known researchers in my field
33. I trust the quality of peer-reviewed articles on publicly accessible web sites
34. I trust the publicly accessible web sites to publish my work

Preservation

. I like the idea of my work being permanently available and preserved in perpetuity in openly accessible websites

. I would like to maintain multiple versions of my work in openly accessible websites

. Materials on publicly accessible web sites are not preserved in perpetuity

CONTEXTUAL FACTORS

Attitude

38. Access and use of open access materials is a good idea
39. Publishing in open access is a good idea
40. Publishing in open access outlets would make my work more interesting
41. Publishing in open access is easy for me
42. Open access content is beneficial to the scholarly community

Influence of other actors

43. Will publish in open access if leading researchers in my discipline publish in such avenues
44. Will publish in open access if my close colleagues publish in such avenues
45. Will publish in open access if my research funding agency requires me to publish in open access
46. Will publish in open access if my co-authors or collaborators publish in open access
47. Will publish in open access if my institution requires me to publish my work in open access

Culture

48. In my field, it is common for researchers to post their research outputs on open access
49. It is common for faculty and students to share research outputs in my department
50. In my department, it is common for faculty to publish in open access