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Factors affecting the implementation of Web 2.0 applications in Omani academic libraries

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Abstract

Purpose – The purpose of this paper is to investigate the different factors that affect using Web 2.0 applications in Omani academic libraries (OALs).

Design/methodology/approach – In all, 29 interviews with directors and library staff of five OALs were conducted for the purpose of collecting data for the current research.

Findings – The results indicated that there are nine internal factors and four external factors that affect using Web 2.0 applications in OALs. Internal factors include the low motivation of directors and library staff regarding using of Web 2.0 applications, lack of training and constant changes in the management structure. Meanwhile, the external factors are related to lack of policy and regulations and weakness and low speed of the internet.

Practical implications – Most academic libraries in Oman have not yet adopted Web 2.0 applications to enhance their services. Therefore, this study intends to open insight into the state of Web 2.0 adoption in academic libraries and will help library managers to understand factors facing the use of Web 2.0 applications in their libraries, and this could signal a basis for policy shift in the internet infrastructure especially in the institutions of the higher education.

Originality/value – This research is the first study in the field of Web 2.0 applications in OALs that investigates the factors affecting the use of Web 2.0 applications in academic libraries in general and in OALs specifically.

Keywords Academic libraries, Oman, Web 2.0 applications

Paper type Research paper

Introduction

Web 2.0 applications is a technology shifting the Web into a participatory platform, wherein people not only use content but also interact with and produce information. Web 2.0 includes new technologies, such as tagging, blogs, wikis and mashups, which serve to break down the barriers between users and data providers by creating new and useful links (Darwish and Lakhtaria, 2011). Web 2.0 applications play a significant role in the education, business, healthcare and library sectors. As the emergence of these



applications, they have been widely used for the purposes of communication, sharing information and ideas and promoting services (Cova and White, 2010; Juzwish, 2009; Redecker, 2009; Wirtz *et al.*, 2010).

By utilizing Web 2.0 applications, students in the education sector have the opportunity to communicate and share information through the web (Uzunboylu *et al.*, 2011). It is widely recognized that Web 2.0 applications have considerable impact on student performance, reducing feelings of isolation, increasing abilities for self-learning, obtaining and giving feedback and organizing social activities (Gayle, 2008; Redecker, 2009; Shihab, 2009; Watson, 2011).

Academic libraries, as part of the higher education system, utilize Web 2.0 applications to support the provision of quality educational services. Web 2.0 applications in academic libraries contribute to improving the level of learning and research, establishing a new study environment, increasing the level of motivation among the students and presenting new windows for self-study (Chua and Goh, 2010; Darwish and Lakhtaria, 2011).

In addition, Mahmood and Richardson (2011) found that really simple syndication (RSS) was the most popular Web 2.0 tool in academic libraries for publishing news, sharing items published on library blogs, providing information literacy instruction and announcing information on new acquisitions, podcasts, vodcasts, databases and e-journals. Furthermore, in the opinion of Harinarayana and Raju (2010, p. 76), "blogs are the best informal communication channel to extract latent feedback information from users to enhance the quality of library services".

Accordingly, using Web 2.0 applications in academic libraries led to the appearance of a new concept known as Library 2.0 (Kim and Abbas, 2010). According to Mahmood and Richardson (2011), Michael Casey introduced the term Library 2.0 as being an application of the Web 2.0 concept in libraries and developing a new philosophy of library services. Similarly, Partridge *et al.* (2010, p. 315) defined Library 2.0 as "a change in the interaction between users and libraries in a new culture of participation catalysed by social web technologies".

Consequently, investigating factors that affect using Web 2.0 applications in academic libraries will assist in understanding any problems that may arise, as well as concrete and abstract issues behind using Web 2.0 applications. This study attempts to contribute to the area of study of Web 2.0 applications in academic libraries by providing evidence related to the internal and external factors that affect the adoption of Web 2.0 applications in five case libraries in Oman: Nizwa University Library (NUL), Middle East College Library (MECL), Ibri Applied Science College (IASC), Sohar Applied Science College (SASC) and Muscat Higher Technical College Library (MHTCL). Although for reasons of differences in organizational culture, the results of this study cannot be generalized; the outcomes of the study could be applied in other academic libraries, as they may be shaped by similar constraints.

Research objectives and questions

This research aims to investigate external and internal factors affecting the adoption of Web 2.0 applications by librarians in Omani academic libraries (OALs). This research attempts to answer the following questions:

- Q1. What are the external factors that affect the use of Web 2.0 applications in OALs?
- Q2. What are the internal factors that affect the use of Web 2.0 applications in OALs?

Background information

This research involves the following five OALs as participating libraries:

- (1) *MECL*: It was established in 2003 to provide information services to the community of the college. MECL's collection consists of around 35,000 books and subscriptions to seven electronic databases.
- (2) *NUL*: It was founded in 2004 to provide information services to the university community. The library offers an online public access catalog through an online integrated system that also enables users to request and loan books electronically.
- (3) and (4) *IASC and SASC*: The libraries provide the usual information services, such as circulation, reference services, classification and cataloguing. They subscribe to one electronic database (EBSCO). These two libraries have implemented the Symphony integrated library system that is hosted by the Ministry of Higher Education. As a result, occasionally they have had difficulty in providing electronic services because of the closed system.
- (5) *MHTCL*: It offers its services to about 17,500 users. It provides the usual information services, such as circulation, reference services, classification and cataloguing. It does not subscribe to any electronic databases.

Research problem

In conducting this study, the researchers surveyed 15 websites selected from among those of the 40 universities and colleges in Oman to investigate the use of Web 2.0 applications in their libraries. Furthermore, the researchers conducted interviews with librarians working at the Sultan Qaboos University (SQU) main library, Learning Resources Center (LRC) academic libraries of Rustaq Applied Science College and the MHTC, as well as communicated by phone with librarians in the SASC, the IASC, the Al-Mussanna Technical College and the Ibra Technical College. The aim of these interviews was to survey the use of Web 2.0 applications in all 15 libraries. The results revealed that 2 out of the 15 libraries used Facebook and only one library used Twitter. Only the main library at SQU provided links from its website to Facebook, Ask a Librarian and Twitter. Moreover, the SQU main library has now launched Instagram and the YouTube channel applications on its beta website. This includes a short introductory film about the library, photos of library events, photos about library visits, session photos with a simple explanation and the provision of photos of book titles with call numbers. It is important to mention that all the colleges of technology have links to Facebook and Twitter on their websites and three out of seven are linked to Google+ and YouTube. However, their libraries have not benefited from these applications. The most feasible reason behind this, from the library staff's viewpoints, is a lack of awareness of the potential for use of Web 2.0 applications in academic libraries. Table I presents an overview of the status of the use of Web 2.0 applications in the 15 surveyed universities and colleges.

Therefore, OALs need to make greater effort to meet the current and future information needs of their users. To take advantage of Web 2.0 applications and social network technology to promote information services in OALs, the current research will examine the challenges that these libraries may face in applying Web 2.0 applications as a means of enhancing their information services.

University or College	OAL	Application	Year added	Implementation of Web 2.0 applications
SQU	Main library	Ask a librarian	1999	335
		Facebook	2011	
		Twitter	2013	
		Instagram	April 2014	
		YouTube	September 2014	
Rustaq Applied Science College	LRC	–	–	Table I. Use of Web 2.0 applications in OALs
Salaleh Applied Science College	LRC	–	–	
Sur Applied Science College	LRC	–	–	
Sohar Applied Science College	LRC	Facebook since three months	2014	
Ibri Applied Science College	LRC	Facebook and Blogs (use them unofficially)	–	
Muscat Higher Technical College	ETC	–	–	
Al Mussanna Technical College	ETC	–	–	
Ibra Technical College	ETC	–	–	
Nizwa Technical College	ETC	–	–	
Middle East College	Library	–	–	
Nizwa University	Library	–	–	
Caledonian College of Engineering	Library	–	–	
University of Buraimi	Library	–	–	
University of Sohar	Library	–	–	

Literature review

A number of research studies have discussed Web 2.0 applications (Collis and Moonen, 2008; Davis, 2009; Isaac, 2008; Mahmood and Richardson, 2011; O'Reilly, 2005). The phrase Web 2.0 was first used in 2004, to refer to what is perceived as a second generation of web-based services, emphasizing online collaboration and sharing. O'Reilly (2005) described Web 2.0 in terms of seven set principles:

[...] platform; harnessing collective intelligence; data is the next Intel inside; end of the software release cycle; lightweight programming models; software above the level of a single device; rich user experiences.

He further described Web 2.0 as “a platform, a rich and user friendly, interactive interface, emphasis on community and interaction, trusting users as co-developers, harnessing collective intelligence” (O'Reilly, 2005, p. 18). Meanwhile, both Isaac (2008) and Collis and Moonen (2008) considered Web 2.0 as a tool for assisting people to share and cooperate effectively in knowledge acquisition.

Mahmood and Richardson (2011) listed several reasons to explain why users prefer web tools and services for seeking information, namely, web applications and services features have significant ease of use, ease of access and speed. Moreover, some web search engines have started to adopt search features to deal with less trustworthy information available on the web, such as Google Scholar. Second, web search engines have begun to provide integrated search environments that have influenced user research behaviour. Third, Web 2.0 design notions focus on users as the central point and all services are built around them:

Such user-centric design goes all the way from tailored toolbars to a “mashup” of services, that is, to “a web site or application that seamlessly combines content from more than one source into an integrated experience” (Mahmood and Richardson, 2011, p. 309).

Finally, users consider web application tools as an online meeting place to exchange formal and informal knowledge; they thereby gain satisfaction from sharing information with others.

Other researchers have pointed out the importance of adopting Web 2.0 applications in both public and academic libraries. Academic libraries implement Web 2.0 applications for sharing news, marketing library services, providing information of literacy instruction, offering reference services, providing information about print and digital resources and soliciting feedback from users (Clements, 2009; Dickson and Holley, 2010; Mahmood and Richardson, 2011; Nguyen, 2008; Tripathi and Kumar, 2010; Xu *et al.*, 2009).

Several surveys have been conducted to explore the types of Web 2.0 applications used in academic libraries. Nguyen (2008), for instance, found that Australian libraries used only four Web 2.0 applications: RSS (63.2 per cent) had the highest adoption frequency, followed by blogs (36.2 per cent), podcasts (21.3 per cent) and instant messaging (IM) (10.6 per cent). These libraries used RSS to announce new books and e-journals, blogs were used for book reviews and podcasts were used for “advice on library skills, guidance with resources, and library orientation tours”. In this context, Xu *et al.* (2009) found that less than half (34) of the 81 academic libraries in New York state used Web 2.0 applications. Of these applications, the most popular was IM (34 per cent), followed by blogs (20 per cent), RSS (14 per cent), tagging (6 per cent) and wikis (6 per cent), whereas podcast (2 per cent) was the least used web application in these academic libraries.

Chu and Du (2012) conducted a study to investigate the use of social networking tools in academic libraries and to highlight the understanding of the library staff of social networking’s usefulness, as well as the challenges facing the use of these tools in academic libraries. Their research found that Facebook and Twitter (with nearly 63 per cent) were the most widely used social networking sites in academic libraries, as compared to IM (44.4 per cent); blogs (25.9 per cent); wikis (18.5 per cent), Flickr (14.8 per cent); YouTube (11.1 per cent); SlideShare (7.4 per cent); and LinkedIn, Issuu and Delicious (3.7 per cent).

In contrast, few researchers have focused on challenges and obstacles that may face libraries in implementing Web 2.0 technologies to advance their services. Isfandyari-Moghaddam and Hosseini-Shoar (2014, p. 7) found that using Web 2.0 applications requires a number of skills, including:

[...] experience in use of Web 2.0 tools; effective technology skills; lack of fatigue when working with Web 2.0 tools; a library science or related degree; personal interest in learning and using new technologies; and feeling of safety.

In addition, factors that may affect adoption of Web 2.0 applications in academic libraries include librarians’ skills in the English language, the required familiarity with IT to apply Web 2.0 in libraries and staff’s personal interest in learning and using new technologies (Isfandyari-Moghaddam and Hosseini-Shoar, 2014).

In Pakistan, Arif and Mahmood (2012) identified four main major factors that hinder the use of Web 2.0 applications in libraries, namely, lack of awareness regarding Web

2.0 applications among librarians, lack of computer literacy and limited availability of computer and Internet facilities. Hence, training programs were suggested for library professionals to introduce Web 2.0 applications in Pakistani libraries. Similarly, [Al-Daihani \(2009\)](#) considered lack of training, excessive workload, lack of time and lack of technical support as the main factors inhibiting the use of Web 2.0 applications in Kuwaiti and Wisconsin libraries. In addition, librarians had a low level of awareness regarding the use of Web 2.0 applications. In a similar study, but a different context, [Sawant \(2012\)](#) found that there were four main problems in teaching Web 2.0 applications to Library and Information Science (LIS) students in India: lack of training programs for instructors, lack of infrastructure, lack of maintenance of computers and security issues.

In Oman, very limited research has been conducted in the area of Web 2.0 applications. [Al-Hafeedh \(2013\)](#), for example, studied the use of Facebook by students at SQU. The research found that 76 per cent of fourth-year bachelor's degree students at SQU had their own Facebook account. However, the overall average use of Facebook by these students to meet their academic needs in terms of information was low. Although many researchers have argued the benefits of using Web 2.0 applications in academic libraries ([Alton and Dion, 2010](#); [Chu, 2009](#); [DeSarkar, 2012](#); [Mahmood and Richardson, 2011](#)), it is claimed that little research has been done on the response to factors and obstacles that affect using these technologies in academic libraries. Consequently, based on the literature that argues for the significance of Web 2.0 applications in academic library services provision, a need emerges for studies to identify factors hindering academic libraries in Oman from adopting these applications to enhance provision of their services.

Methodology

The qualitative method has been used to collect data for the current study. Face-to-face conversations consisting of 29 interviews were conducted to identify the participants' views toward the use of Web 2.0 applications in their academic libraries.

Semi-structured interviews were used to investigate factors affecting the use of Web 2.0 applications in five OALs. This tool is a flexible means of asking in-depth questions and clearing up any misunderstandings. Analyses of these interviews have been used to develop a rich picture to describe the problematic situation and identify the factors affecting the use of Web 2.0 applications in OALs. The interviews included the following basic questions (additional details are available in [Appendix](#)):

- Q1. Do you apply any of the Web 2.0 applications in your library?
- Q2. Do you employ or ask for assistance from (IT) professionals to help develop the applications?
- Q3. What is your view toward Internet services within the college and in Oman in general?
- Q4. What is your opinion about the new generation of Web 2.0 interactive applications in terms of electronic reference services?
- Q5. Do you face any financial limitations in implementing Web 2.0 applications? Is there a definite budget allocated for these applications in the library?

Q6. Are the library staff members capable and well trained to implement Web 2.0 applications?

Q7. What challenges is the library facing while applying Web 2.0 applications?

Five public and private institution libraries were asked the above questions, and these were selected as being the largest libraries in the country, except for the SQU library. Selection was, however, also based on the following criteria:

- MECL as representing private colleges in Oman and having the most participation in e-databases;
- NUL as being the oldest private university in Oman providing services to graduate and undergraduate students and the community in general;
- IASC and SASC representing libraries of the Ministry of Higher Education; and
- MHTC as being the largest library within the Ministry of Manpower and the only one providing services to above diploma level in different specializations.

The SQU main library was excluded from the study, despite being the biggest library in the country, because of its exceptional difference from other academic libraries in Oman.

The director, the assistant director and the staff of five public and private institution libraries were selected as survey participants, as they were the most closely related to the objectives of the study. Moreover, the selection of the participants in the study was based on their involvement in library management or in offering information services to users. The participants shared their views regarding the research questions. To achieve a rich picture of the factors affecting the use of Web 2.0 applications in academic libraries, a member of staff from the educational technologies (ETs) department was also involved, as these staff members support and control the libraries' electronic systems. An audio recorder was used to record the conversations avoid losing data. To ensure the privacy and confidentiality of the data, a written commitment letter confirming the anonymity goals of the organization and participants was issued before the interviews. This increased the confidence of the participants, as well as the reliability and validity of the data. [Table II](#) presents data on the role of the participants and number of interviews from each library.

The thematic analysis method was used to develop themes based on the different viewpoints of the participants. This analysis included six steps: initial codes, searching for themes, reviewing themes, defining themes, naming themes and producing the report ([Braun and Clarke, 2006](#)). A mind map was created ([Figure 1](#)) to facilitate these phases, as well as to facilitate presentation of the information in the findings and discussion section. The mind map clearly demonstrates the interconnection between different themes, a benefit of using thematic analysis in this research. Factors were classified as internal and external depending on the nature of administrative relationships inside the library or within the mother organization. A factor is considered as internal when it is under the control of the library managers and if not, it is considered as external.

Findings and discussion

External factors

The first research question aimed to discover external factors affecting OALs in the implementation of Web 2.0 applications in OALs. The participants identified the following four main external factors:

Library	Role of participants	No. of interviews
Library 1 (L1)	Director (D, $N = 1$) User services staff (U, $N = 3$) Educational technologies staff (ET, $N = 1$)	5
Library 2 (L2)	Assistant Director (AD, $N = 1$) User services staff (U, $N = 2$) IT staff (IT, $N = 1$)	4
Library 3(L3)	Assistant Dean (AsD, $N = 1$) Head of LRC (HLRC, $N = 1$) Assistant Head of LRC (AHLRC, $N = 1$) User services staff (U, $N = 4$) IT staff (IT, $N = 1$)	8
Library 4 (L4)	Dean (Dn, $N = 1$) Assistant Dean (AsD, $N = 1$) Head of LRC (HLRC, $N = 1$) Assistant Head of LRC (AHLRC, $N = 1$) Head of Library Division (HLD, $N = 1$) User services staff (U, $N = 2$) IT staff (IT, $N = 1$)	8
Library 5 (L5)	Head of Library Division (HLD, $N = 1$) User services staff (U, $N = 3$)	4
Total		29

Table II.
Number and role of
respondents at the
participating
libraries

- (1) a lack of policy and regulations;
- (2) the low speed of the Internet in Oman;
- (3) technical issues related to data conversion and storage; and
- (4) the shortage of electronic Arabic content.

Participants thought that the Ministry of Higher Education (MHE) should assist OALs in formulating policy and regulations on the use of Web 2.0 applications in Omani libraries (HLRC, L3). This is perhaps because the MHE has responsibility for supervising and mentoring higher education institutes in Oman. It is the responsible authority for supervising quality assurance in most universities and colleges in Oman, with the exception of SQU. In addition, policy and regulations are described as elements of strategic planning for embedding Web 2.0 applications in OALs. The head of the L5 division commented that:

Formulating guidelines and regulations on the use of Facebook, Twitter and so on; it would result in improvements in implementing Web 2.0 applications for several reasons. One reason is that such guidelines could protect both librarians and users regarding what is published through these applications. It will, at least, orient users to the information that enhance their academic culture so that will help librarians to manage these applications. Moreover, these guidelines and regulations will encourage the decision-makers to pay more attention to use of Web 2.0 in OALs.

This point of view could be attributed to the feeling that the participants believe that a centralized system, as reflected by MHE, could help in enhancing the adoption of Web 2.0 applications by the libraries.

The second factor is related to technical issues. Interestingly, the speed of networks is a vital factor that can affect the use of Web 2.0 applications in the library when it is

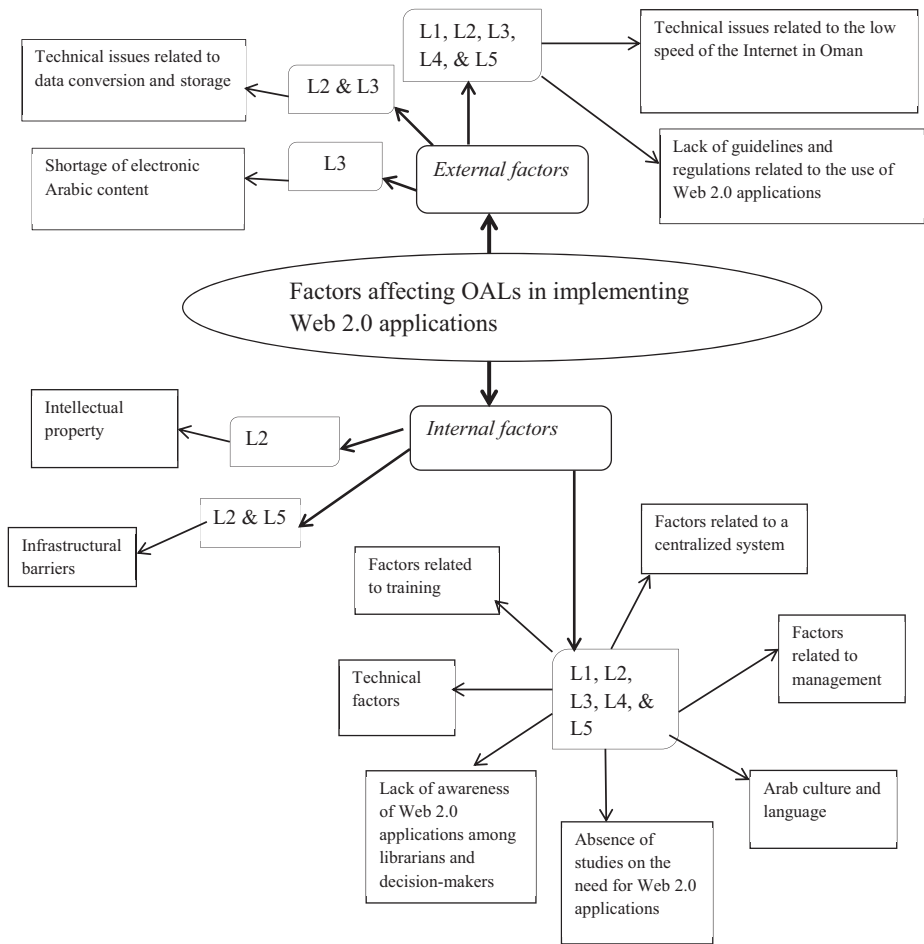


Figure 1.
Overview of the
research findings

Notes: MHE: Ministry of Higher Education; OALs: Omani Academic Libraries

slow, especially during registration time at the start of each semester. The director of Library 1 highlighted that “Internet [access] with high speed is very important to the use of Web 2.0”. This result agrees with the findings of *Muneja et al. (2012)*. They found that unreliable power and lack of Internet access were significant challenges facing librarians in Tanzania. Similarly, *Tandi Lwoga (2012)* recommended improving Internet bandwidth to ensure reliability and speed so users can access it easily.

In addition, an IT staff member from Library 2 commented that “honestly, the network speed is slow in the university”. One possible reason could be that L1 is privately funded and using the Internet at high speed is costly. However, other libraries lack the necessary technical infrastructure and they would need to fix this problem before attempting a network speed increase which might overwhelm the system.

Furthermore, factors related to technical issues of data conversion and storage were also mentioned. An IT staff member in L2 agreed with the following comment by the assistant head of the LRC in L3: “we are concerned about the issue of continuity and development of these programs, data conversion, and saving issues; it can be shut down at any moment”; this result is similar to those of [Naqvi \(2012\)](#). He revealed that loss of data, security and legal issues are particular risks in terms of using Web 2.0 applications in the library. This finding also concurs with the argument that [Merčun and Žumer \(2011, p. 14\)](#) put forth, “The provider may shut down the service without enabling libraries or library users to retrieve their data”.

Finally, it is necessary to address factors related to the shortage of electronic Arabic content. On this point, certain questions were asked to explore the relationship between the use of Web 2.0 applications and availability of electronic Arabic content. The findings show that digital databases have the capacity to implement Web 2.0 applications, such as RSS, so libraries can benefit from subscribing to such databases. Moreover, embedding Web 2.0 applications in digital databases encourages users to use the library website. However, users who are studying in colleges that teach in Arabic language are prevented from benefiting from digital database features because of the lack of Arabic digital content.

Internal factors

The second research question sought to explore internal factors affecting the use of Web 2.0 applications in OALs. The findings revealed the following factors:

Centralized system. All libraries involved in this study have centralized systems. For example, the registration department of L1 stores users’ data. User services staff of L1 said that “all students and faculty members’ details are held by the Department of Registration”. What is more, in L3 and L4 “Library data are kept in the data center in the Ministry of Higher Education” (HLD, L4).

Furthermore, management authorities have shown unresponsive attitudes towards these library issues. As evidence, the head of the library division in L5 stated that she is unable to send e-mails directly to library users in matters related to library activities and services: “we organized a training workshop for academic staff in the college but nobody attended it, just because the assistant dean forgot to pass the e-mail to them”.

In addition, these libraries have a central budget. As the assistant director of L2 commented, “we do not have a separate budget for the library; we have to request money from top management”. Because of the centralized system, these libraries lack basic infrastructure requirements, for instance, there is no server to host data about users and Web 2.0 applications. As a result, this could hinder the employment of Web 2.0 applications in OALs. [Sawant \(2012\)](#) found that a lack of infrastructure was one of the main problems in teaching LIS students in India about Web 2.0 applications.

Factors related to management. There are certain factors that need to be considered before implementing Web 2.0 applications in OALs. First, there are factors related to organizational behaviour and bureaucracy in management that are because of a lack of awareness among top decision makers of the library’s importance within the organization. As a result, significant decisions coming from top management cause

hindrance to the development of the library. Almost all participants in L1, L2, L3 and L5 agreed with the head of the library division in L4 that:

Administrators are unaware regarding the importance of the library to the college so they do not care about improving the library services. Besides, administrators do not look at our suggestions.

Similarly, the head of the library division in L5 mentioned that “Our problem is decision-making comes from top management without regard for our proposals for developing the library”. In addition, he stated, “The Head of the Educational Technology Center is not willing to delegate any powers when he is not in college and this causes problems in our job roles”.

Second, turnover of library managers and college deans are considered as a barrier in implementing Web 2.0 applications in OALs. Management in L2 is described as “being unstable in the sense that three managers had run the library within the last ten years” (AD, L2). Similarly, the head of the library division in L5 highlighted that:

Changes in the dean at our college have affected our library development negatively because each dean has a different view regarding the importance of the role that the library plays in the college. Three deans have run the college within the last four years.

As each manager has had different views regarding the utilization of social networks in their libraries, the situation has been affected negatively. This is because there is no policy in L2 and L5 regarding the adoption of Web 2.0 applications in the provision of their services. As a result, implementing Web 2.0 applications depends on the manager’s understanding of the use of Web 2.0 applications in academic libraries and their beliefs regarding the relationship between library development and the achievement of college goals. Moreover, qualifications, experience and the participation of the library director in writing research and information dissemination play an essential role in implementing Web 2.0 applications in academic libraries.

Third, turnover of and a lack of library staff is one of the challenges facing OALs. All participants in L2 indicated that work pressure hindered them from developing their services. This is because L2 is a private library and library staff members prefer to work in the government sector. Consequently, it is common for the staff of private libraries to transfer to posts in the public sector that offer better salaries and lower work pressure. The assistant director from Library 2 pointed out that “the library often loses its workers. We need more employees before implementing Web 2.0 applications in our library”. He suggested requesting more employees for the library, some of whom should be specialists in IT and network security, as Web 2.0 applications require employees who can track and update content in a technical manner. Correspondingly, librarians in L3, L4 and L5 mentioned that “We need an increase in employees in our library before implanting [embedding] Web 2.0 applications”. This result is consistent with the findings of [Garoufallou and Charitopoulou \(2012\)](#). They stated that Web 2.0 applications need to be constantly updated and reviewed, and this occupies most of the time of students and professionals.

Finally, there is a “lack of teamwork” (HLRC, L4). Improving teamwork in the organization could increase the libraries’ capacity to provide better services for beneficiaries and saving the librarians’ time and effort. The assistant director from L2 commented, “We have a problem in working as a team”. This could be exacerbated by

the frequent change of managers in the libraries, which has led to the absence of a culture of teamwork in these libraries, from the top down.

Technical factors. There are five main issues related to technical factors. First, there are no specialist information systems employees among the library staff. Therefore, if the library faces a technical problem, they have to communicate with the Department of Information Systems to fix it and the problem takes a long time to address, as it has to go through official channels. The director of L1 commented, "We cannot design a Facebook page for our library without consulting technical experts". Additionally, as a user services staff member from L1 mentioned, "Another problem is related to the library infrastructure. That is, the library does not have a special server to host Web 2.0 applications".

Second, conflict between librarians and IT departments could hinder the adoption of Web 2.0 applications in OALs. For example, the assistant director of L2 emphasized:

[...] before implementing Web 2.0 applications in our library we need to address the misunderstandings between librarians and technicians and the issue of lack of technical support from the parent company.

Moreover, the Technology Education Department (TED) in the mother organization of L1 is officially responsible for implementing Web 2.0 applications in all departments. The L1 employee commented that:

[...] social media have a major influence on teaching [...] by using Facebook, a teacher can become closer to students and create a class environment which looks like a family environment. But it is actually the responsibility of the TED and not the library.

It was also suggested that video tutorials could be used to explain library services to students. This finding may be attributed to the lack of awareness about implementing various Web 2.0 applications in teaching, learning and libraries. In this respect, the study by [Garoufallou and Charitopoulou \(2012, p. 202\)](#) revealed that students in information science believed that computer science professionals are more qualified to teach Web 2.0 applications than information professionals, and some of them stated that "cooperation between librarians and computer scientists is necessary for teaching library users the use of Web 2.0 applications".

Third, a lack of organization and library infrastructure was considered a crucial factor inhibiting the implementation of Web 2.0 technologies in OALs. The assistant dean of Library 4 reported: "Infrastructure hinders raising the speed of the Internet in the college; we need to make adjustments in college to fit with company Internet needs". This result agrees with the finding by [Tandi Lwoga \(2012\)](#) that poor technological infrastructure was the major challenge that inhibited public universities in Tanzania from applying e-learning and Web 2.0.

The fourth issue relating to technical factors involves digital library use and search strategies. In general, most participants in the five libraries mentioned that students do not distinguish between electronic databases and Internet resources, and they need to become more literate regarding Web 2.0 applications. The director of Library 1 commented, "I think people in Oman are not aware of the term Web 2.0 or its applications, although they widely use Facebook and Twitter". It appears that increasing awareness about Web 2.0 technologies among users could encourage librarians to learn more about these applications.

In addition, weakness in users' search strategies might be a factor impeding libraries from adopting Web 2.0 applications in the provision of their services, as library staff from L4 and L5 agreed with the director of L1's insistence that "users don't have the required skills in searching for information". The most logical reason behind this is the lack of training programs in using electronic resources. Therefore, without training, these users do not have the necessary skills in searching terms that would facilitate their searches for information. In this context, some Web 2.0 applications depend on search terms such as tagging and RSS.

Finally, the multiplicity of systems and programs available from various companies may even hinder the selection of appropriate applications for implementation in libraries. This point causes librarians to hesitate to implement Web 2.0 applications because they worry that new technologies consume a lot of time and effort while not satisfying their users' needs. As [Naqvi \(2012\)](#) underscored, the availability of so many different Web 2.0 applications can have a negative impact on librarians and users. Also, as [Merčun and Žumer \(2011\)](#) explained, the possible reasons for this might be because of lack of consideration of the actual requirements, the context of the application and the required goals when creating Web 2.0 applications. Moreover, although some features are simple and inexpensive, all Web 2.0 applications require system librarians to use a certain amount of expertise to develop and modify the system according to their needs. This implies that librarians should invest their time from the start and throughout the application's use because:

The true 2.0 feature should develop and improve in real-time as long as it exists [...] without constant content updates, maintenance, librarian involvement, and participation, many services will lose their intended purpose and the community that forms around them ([Merčun and Žumer, 2011, p. 15](#)).

This statement makes it clear that without maintenance and updating of the content by librarians, such services will not be able to perform their intended functions and many features that form a platform around them will eventually be lost.

Lack of awareness of Web 2.0 applications among librarians and decision makers. In general, librarians and deans in L1, L2, L3, L4 and L5 use social networks (Facebook and Twitter) for social communication. Some of them do not know of Web 2.0 applications as a term. Therefore, the researchers gave them examples to clarify the meaning of Web 2.0 applications. In addition, the librarians expressed their unfamiliarity with a number of Web 2.0 applications, such as vodcast, podcast, Flickr, RSS, social bookmarking and Instagram, by stating, "I don't know these applications". This result corroborates the findings of a survey conducted by [Al-Daihani \(2009\)](#). He pointed out that librarians in Kuwait had a low level of familiarity with social bookmarking, social networking, image sharing and collaborative authoring. Similarly, librarians in Pakistan considered their lack of awareness about Web 2.0 applications as a major factor hindering them from utilizing Web 2.0 technologies in Pakistani libraries ([Arif and Mahmood, 2012](#)). In contrast, in Nigeria, [Baro et al. \(2013\)](#) found that librarians were very familiar with social networking, IM, media sharing, blogs, wikis, RSS feeds and social bookmarking.

Factors related to training. The director of L1 said, "I have not attended any workshops on Web 2.0 applications" and generally this was true of the other librarians in this study. It is considered that lack of training could obstruct the use of Web 2.0 applications in academic libraries, whereas provision of training could give librarians

proper guidelines for implementing Web 2.0 applications. This result supports findings by Al-Daihani (2009) and Arif and Mahmood (2012). Al-Daihani (2009) found that the lack of training for librarians in Kuwait is the most significant factor hindering the use of Web 2.0 applications in the country's libraries. Arif and Mahmood (2012) revealed that a lack of training programs obstructed implementation of Web 2.0 applications in Pakistani libraries.

However, the dean of the college of L4 argued that the management of the college has tried to provide training for librarians but staff refused to attend sessions because of the place of training being far away from their work location. The dean commented that "we have tried to provide training in Sohar city but the specialists are available only in the capital". One possible reason for librarians refusing to attend training is that all librarians in L4 are female and are unwilling to leave their families to study new information studies concepts. This result could be a reflection of individual attitudes towards the importance of studying and their capacity to study, as Aharony (2009) revealed.

It was suggested that librarians can learn from "experience, learning from websites, through books and workshops" (D, L1), a view that is supported by Baro *et al.* (2013). They found that self-practice, peer education, and workshop attendance were the strategies used by librarians to learn Web 2.0 applications. Furthermore, librarians in Iran suggested that training courses and workshops about Web 2.0 applications could help them with the adoption of Web 2.0 technologies in their libraries (Isfandyari-Moghaddam and Hosseini-Shoar, 2014). However, Rehman and Shafique (2011, p. 9) argued that "self-learning is sometimes as harmful as self-medication". This is because self-learning entails working through wrong concepts to acquire the right one, which takes a long time. Consequently, formal training from experts is deemed essential.

Although one of the L2 workers had attended a workshop on "how to benefit from social networks (Facebook and Twitter) in getting news" (IT, L2), it appears that library staff need appropriate training regarding implementing Web 2.0 applications. Effectively, it can be considered as a service facilitator in academic libraries.

Arab culture and language. L2 is also facing the challenge of non-attendance of Arab faculty members at training workshops on the use of digital resources. User services staff from L2 highlighted that "Arab academic staff don't attend even the orientation in using digital resources available in the library". It seems that this factor could reduce the librarians' motivation to use Web 2.0 applications. According to Aharony (2009), there is a relationship between the motivation of learning facilitators and personality characteristics in the implementation of Web 2.0 applications by Israeli LIS students.

The English language appears to be critical to the adoption of Web 2.0 applications from the viewpoints of academic staff, students and even the library staff, and the finding of this research supports results produced by Isfandyari-Moghaddam and Hosseini-Shoar (2014). They found that librarians' skill in English language was the main factor affecting the use of Web 2.0 applications in Iranian libraries.

Intellectual property factor. A member of user services staff from L1 said that "As an institution of higher education, we will face the problem of intellectual property rights while applying Web 2.0". This supports the view of Makori (2012) that intellectual property rights are potential challenges inhibiting the use of Web 2.0 applications in academic libraries in Africa. Germain (2008) indicated that librarians can build their

own wikis; however, they must consider ownership issues, such as copyright. This finding also corroborates the finding of [Merčun and Žumer \(2011\)](#) that privacy, data protection, security and sustainability must be considered before implementing Web 2.0 applications in libraries. Moreover, [Tandi Lwoga \(2014\)](#) confirmed that security and ownership of Web 2.0 services were challenges facing academic libraries in Tanzania.

Infrastructural barriers. This factor affects the implementation of Web 2.0 applications in L2 positively and negatively at the same time. In regards to the limited space at the library, user service staff of L2 highlighted that “we need to achieve a balance between digital resources and printed resources”, adding that “although the number of computers does not match with the number of students, lack of library space is prohibiting us from adding more computers”. Similarly, limited space in L5 is hindering librarians from providing extra computing equipment that is necessary to cope with Web 2.0 applications for both library staff and users. [Isfandyari-Moghaddam and Hosseini-Shoar \(2014\)](#) have reported similar results. They found that buying more software and hardware equipment was indicated by librarians in Iran as a means of coping with Web 2.0 applications. Similarly, lack of availability of computers was one of the main factors affecting the use of Web 2.0 applications in Pakistani libraries ([Arif and Mahmood, 2012](#)).

Absence of studies on users' needs. All participating libraries in this study indicated that there are no studies on the needs of users regarding the use of Web 2.0 applications for academic purposes. A user services staff member from L1 mentioned that “recently, the ET department has been made responsible for studying the way that social networks should be used in all departments of the college, including the library”. Studies on users' needs could assist librarians to identify and integrate relevant Web 2.0 applications into their services.

Conclusion and recommendation

The use of Web 2.0 applications is increasing among academic libraries around the world to coordinate with users' trends of using these technologies in their life. As a result, OALs should realize their role in adoption of Web 2.0 applications and fulfil this vital role in developing Web 2.0 policy, guidelines and awareness among librarians and decision makers to cope with the challenges of future era. Consequently, it is hoped that the results of this study will provide insightful information for the OALs community for better understanding of factors affecting the use of Web 2.0 applications, with a view to encouraging the incorporation of new technologies into the library services with regard to Web 2.0 applications. Despite a number of factors hindering the implementation of Web 2.0 applications in OALs, the main challenges to utilization of Web 2.0 applications in OALs are technical issues, lack of awareness, lack of training and the slow speed of the network. It is recommended that the development of knowledge and implementation of Web 2.0 should begin in the Information Studies Department at SQU to prepare future library staff for the new obstacles ahead. The establishment of specialized associations or committees was suggested to take on the responsibility of discussing new trends in library services. Most participants agreed that such discussion would help in catalysing ideas from these new trends and enhance the possibility of their application in real life. Consequently, these associations, which would bring together individuals with similar interests, would save time and effort through discussing the benefits and drawbacks of the involved concepts. As [Rehman and Shafique \(2011\)](#) found, professional associations,

such as LISolutions in Pakistan, have made some headway in providing basic information and awareness regarding the implementation of Web 2.0 applications in academic libraries.

In addition, a training program for librarians should be held to raise awareness about using Web 2.0 in OALs. From past experience, the University of Pretoria held training sessions for reference librarians to increase their skills in the use of various social networking tools before shifting to Library 2.0 (Penzhorn, 2009). It is suggested that collaboration between the SQU departments of Information Studies, Information Systems and Computer Science could facilitate expert input into teaching and training Omani librarians regarding the adoption of Web 2.0 in their library services. Furthermore, OALs need employees who have expertise in the work of the library and IT who will be able to effectively deal with technical issues and identify clearly which applications the library needs to enhance services to its users. Figure 2 presents a proposed model for improving the use of Web 2.0 applications in OALs. Figure 2 also demonstrates that enhancing the use of Web 2.0 applications in OALs entails three main

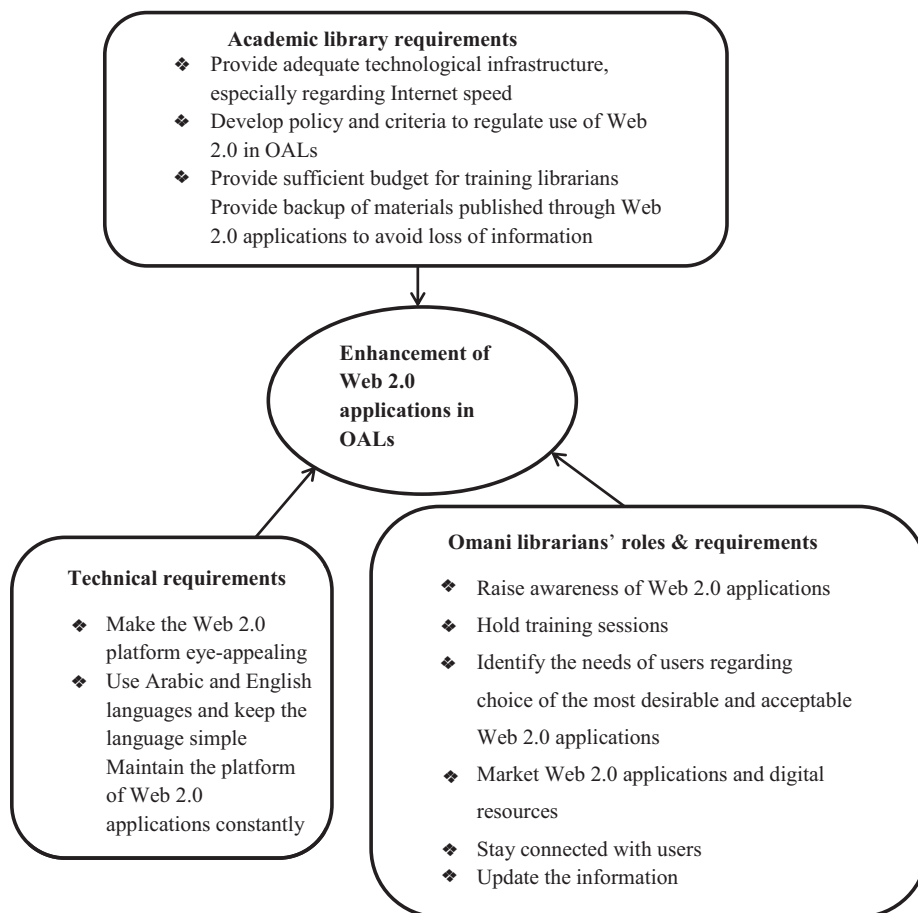


Figure 2.
Proposed model for
improving the use of
Web 2.0 applications
in OALs

requirements: academic library requirements, requirements relating to Omani librarians' roles and technical requirements. The present study provides only a partial picture of the factors affecting the implementation of Web 2.0 applications in OALs. Therefore, the researchers suggest the following research areas for future research. Further studies are needed to gain a more thorough understanding of the importance of using Web 2.0 applications in academic libraries. Future studies should include both library staff and users to gain a comprehensive and rich perspective on the use and role of Omani librarians in implementing Web 2.0 technologies. There is a need also for further exploration of users' preferences regarding the use of Web 2.0 applications in OALs using a mixed methodology.

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Appendix

The following are interview questions:

- Q1. Do you apply any of the Web 2.0 applications in your library?
- Q2. Why is the college management using Facebook and Twitter on its web site and yet the library does not use them?
- Q3. How can the problem of lack of communication with top management be addressed?
- Q4. Could you explain how changes of library directors and lack of staff hinder the use of Web 2.0 applications?
- Q5. Could you suggest some solutions to deal with the lack of library staff?
- Q6. In what ways do you think the Ministry of Higher Education can play a significant role in your adoption of Web 2.0 applications?

- Q7. Do you employ or ask for assistance from IT professionals to help develop use of the applications?
- Q8. How do you think training programs can help you in applying Web 2.0 applications?
- Q9. Further, what are the reasons behind not holding such training?
- Q10. What is your view toward Internet services within the college and Oman in general?
- Q11. Do you think improving the network infrastructure will assist your library to implement Web 2.0 better and faster?
- Q12. Do you have any thoughts about the procedures that the college management have taken to enhance the network infrastructure in college?
- Q13. What is your opinion of the new generation of Web 2.0 interactive applications in terms of electronic reference services?
- Q14. Do you face any financial limitations in implementing Web 2.0 applications? Is there a definite budget allocated for the library?
- Q15. Could you explain to what extent having a definite budget could help the library in applying Web 2.0 applications?
- Q16. Why does the library not have a definite budget?
- Q17. How can the library's budget situation be addressed? Do you have any suggestions?
- Q18. Are the library staff members capable and well trained to implement Web 2.0 applications?
- Q19. What challenges face the library in applying Web 2.0 applications?
- Q20. Why has no research been done regarding understanding the users' needs?
- Q21. Why do you have limited electronic resources?
- Q22. Could you clarify why Arabic language could hinder the use of Web 2.0 applications and the use of digital resources?
- Q23. How do you think the culture of users and colleges can play a crucial role regarding implementing Web 2.0 applications?
- Q24. What is the role of the library in overcoming these problems and applying Web 2.0 applications?

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