



Identifying knowledge-sharing requirements in academic libraries

Knowledge-sharing requirements

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Abstract

Purpose – The purpose of this paper is to provide an evaluation of the existing state of practice in knowledge sharing in university libraries.

Design/methodology/approach – This is survey research which is based on an electronic questionnaire.

Findings – Results reveal that the majority of libraries investigated are quite friendly towards knowledge sharing, and the majority of librarians value the importance of knowledge sharing. Results also confirm that the knowledge that they mostly use is mainly intangible knowledge.

Originality/value – If knowledge-sharing requirements of librarians while collaboratively performing reference and information services can be acknowledged, guidelines for enhancing conceptual collaborative process would be suggested.

Keywords Knowledge sharing, Reference services, Knowledge management, University libraries

Paper type Research paper

Background

In today's knowledge economies knowledge is the driving force for economic and social development. The attention of the society to information and knowledge is rising as a result of higher demand for information and knowledge by knowledge workers in today's societies. Along with the growing interest in knowledge management (KM), the literature on different aspects of KM is extensive. Many researchers from various disciplines have stressed the significance and impact of KM research on sustained organizational success in the new era (Devlin, 1999; Stewart, 1997). This recent emphasis on KM has provided a good environment for the development of libraries and librarians (Wang, 1999). The authors of this paper demonstrate that this situation is leading to a dramatic shift in the role of university libraries in managing knowledge, from a traditional, strictly informational role to a resource-based and collaborative role. This in turn would require much of the librarians' tasks to be performed collaboratively. We envisage that the knowledge-sharing capabilities of academic libraries will eventually become one of their major critical success factors.

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A number of models have been developed for conceptualization and illustration of the elements that exist within the knowledge transfer and sharing processes within organizations. Nonaka (1991) developed the socialization, externalization, combination, internalization (SECI) model, which describes how knowledge is shared through the processes of socialization, externalization, combination and internalization. Handzic (2003) has proposed a conceptual model, which illustrates culture and technology as the two most important factors influencing knowledge-sharing process. These are also in line with many similar studies that emphasize socio-technological factors as prime factors influencing the process of knowledge sharing considerably (Warkentin *et al.*, 1997; Davenport *et al.*, 1998; Bender and Fish, 2000; MacDermott and O'Dell, 2001; Ford and Chan, 2003).

The requirements and procedures for knowledge sharing within organizations have also been emphasized. Nonaka and Knonno (1998) believe that the type of organization has an important role in promoting knowledge sharing. Handzic (2003) states that organizational culture and technology are considered critical factors in the process of knowledge sharing. Gurteen (1999) states that knowledge-sharing culture must start at the individual level because "every employee has a sphere along with their own individual knowledge".

This paper presents results of a study that is part of a major ongoing research project by researchers in different universities with various organizational cultures. The main research question in this study is to identify knowledge-sharing requirements of librarians in today's university libraries.

Knowledge sharing in university libraries

Libraries, like other organizations, can benefit from KM initiatives. Some researchers from the library profession have attempted to identify requirements by which libraries can promote knowledge sharing among librarians, their customers and suppliers in their every day activities. However, this is an emerging interest that is relatively new in this profession, and therefore approaches that deal with these issues are mainly general in nature. Among the first librarians who introduced the concept of "KM" to the library information science (LIS) profession are Xiaoping (1999) and Rui (1999). Shanhong (2000) also describes how libraries can manage the creation and sharing of knowledge among their staff. She proposes that libraries should create and develop their own "document information resources". She also emphasizes that, in sharing of knowledge, libraries should make comprehensive utilisation of expert systems and all media.

White (2004) reports the finding of a case study she carried out at Oxford University Library Services and found how academic libraries can benefit from KM in integrating librarians' knowledge into the whole process of library services. She concludes that librarians consider their organization as a learning organization. Similarly, Sinnote (2004) explores KM in terms of its relevance to the library and information science professionals. Using a general approach, Sinnote describes the key points where LIS professionals can be involved in KM initiatives. Parirokh and Fattahi (2005) report how sharing of knowledge among librarians can improve organizational learning in academic libraries.

Based on the above emphasis on the importance of knowledge sharing in today's university libraries, this paper presents a modified version of an existing conceptual knowledge-sharing model called library reference knowledge-sharing model (LRKM) that was originally designed for generic collaborative business processes (Daneshgar, 2004), and is modified in this paper for library-specific collaborative processes. The

major goal of the LRKM is to identify knowledge-sharing requirements of librarians when working collaboratively within the reference and information services (RIS) process in university libraries, a concept which is further extended in the next section.

A knowledge-sharing model for university library processes

The collaboration context in this study is the RIS process in academic libraries. This context is defined by a set of collaborating roles, tasks that these roles perform within the process and the knowledge artifacts that these roles utilise/share for performing these tasks collaboratively. These concepts are defined later in this section.

In defining knowledge-sharing requirements an interactionist perspective was adopted in this research which is gaining popularity among the information systems (IS) research community as a suitable research perspective for explaining collaboration. According to this approach, objects in a given medium manipulate each others' understanding and awareness via focus and nimbus, which are subspaces within which an object chooses to direct either its presence, nimbus, or its attention, "focus" (Benford and Fahlén, 1993). The more an object is within one's focus, the more aware one is of that object; and the more an object is within one's nimbus, the more aware it is of the person. The proposed LRKM model represents various collaborative processes in today's library with the specific goal of identifying knowledge-sharing requirements of these roles within the process. The LRKM is a model showing a linked set of collaborative semantic concepts. When presented to library domain experts, this model is supposed to help them to devise appropriate strategies for removing undesirable knowledge-sharing barriers all at a conceptual level. These knowledge-sharing requirements, when compared to the actual knowledge-sharing capabilities of the roles/actors, will lead to the identification of knowledge-sharing gap for the roles within the collaborative processes. Removing such (undesirable) knowledge gap in turn can be considered as one major step towards enhancing organizational learning requirements for the process roles. Figure 1 shows a LRKM for the RIS process.

As implied earlier, the LRKM model of Figure 1 is a connected graph that shows a knowledge map of the context of collaboration in today's typical western university libraries. It consists of a set of collaborative semantic concepts including roles, knowledge artifact and tasks as its building blocks. The filled ovals represent process

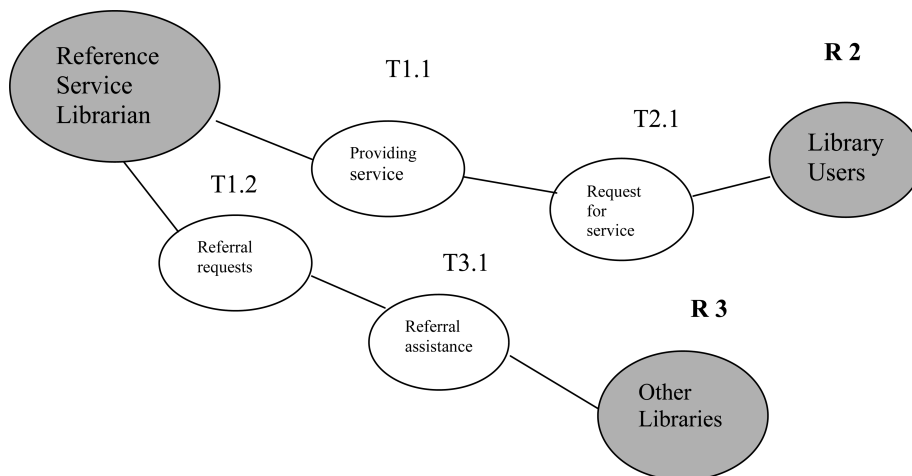


Figure 1.
An awareness net for the reference services process

roles, and plain ovals represent tasks. A line connecting a role to a task is a role artifact, and a line connecting two tasks is a task artifact.

A role artifact is a kind of knowledge artifact that a role utilises in order to execute its relevant task. It corresponds to that component of the knowledge artifact that the role utilises privately for execution of the task. A task artifact, on the other hand, is the other component of the knowledge artifact that a pair of roles utilises (e.g. share, update, jointly create, etc.) in order to collaborate in a pair of related tasks.

Following is a list of components that make up the LRKM model of Figure 1. Lines are shown by their endpoints.

R1: Reference service librarian

R1-T1.1 = The first role artifact used by the R1. It is the knowledge artifact in possession of R1 to answer questions (i.e. the first task or T1). One example is the personal knowledge of reference librarians for such enquiries. This knowledge artifact can be enriched by organizational procedures (e.g. participating in training programs and committees, using collections, the Internet and databases), and personal advice from colleagues, academics, experts, etc.

R1-T1.2 = The role artifact used by R1 for his/her second task. Some enquiries that a reference librarian receives may need to be responded by a librarian from another library. For establishing this collaboration (requesting assistance), the R1 librarian need knowledge about information sources in those libraries, and their services. Examples for this artifact include personal knowledge and organizational procedures (e.g. other libraries' Websites, databases, profiles, or people and companies' profiles, etc.), and personal advice (from colleagues, experts, etc.).

R2: Library users (students, academics and other librarians)

R2-T2.1 = The role artifact used by R2 for his/her first (and only) process task (i.e. T2.1 requesting information). Examples for this knowledge artifact that is in possession of the role R2 include relevant organizational procedures (e.g. library newsletters, notices, signs), and personal advice (from lecturers, other students, reference librarians, etc.).

R3: Other/remote libraries

R3-T3.1 = The role artifact used by R3 for his/her first (and only) process task (i.e. T3.1 providing services to users in other libraries, such as interlibrary loan or document delivery). The role artifact required for fulfilling this process task can be acquired through various sources. Some examples include relevant organizational procedures (e.g. consortia contracts, guidelines, conferences) and personal advice (from colleagues/lecturers/experts, etc.).

Tasks

T1.1 = The first task performed by reference librarian. Examples are answering questions, searching, introducing information sources, etc.

T1.2 = The second task performed by reference librarian. Examples are asking assistance from her colleagues in other library or referring a request or the person who asked a question to other library in which the requested information source resides.

T2.1 = The only task performed by R2. Examples are the request for information and/or services.

T3.1 = The only task performed by R3. One example is answering the question raised by the reference librarian (R1) for providing services to a referral question.

Task artifacts: this assigned to communication media and/or platform between two roles
T1.1-T2.1 = The task artifact used for exchange of knowledge between R1 and R2. Examples include face-to-face communication, email contents, Website contents/address, reference desk, live-chat, telephone/fax numbers.

T1.2-T3.1 = The task artifact used by R2 and R3. Examples are organizational/Information Communication Technology (ICT) infrastructures (e.g. snail mail, email, fax, telephone) and user referrals.

Validation of LRKM model

The semantic and pragmatic aspects of the LRKM model were assessed before it was used for designing the study survey. Such validation will ensure both the correctness as well as the pragmatic nature of the LRKM model constructs for representation of the RIS collaborative process. It will also increase the external validity of the model and make it replicable in similar other situations with minimal adjustments. In other words, model validation will increase both validity as well as credibility of the results obtained from the study survey. Validation issues are discussed below.

Validation of LRKM

This study has adopted the conceptual model quality framework (CMQF) by Lindland *et al.* (1994). This model allows people other than the developers of the model to assess quality aspects of the model. In this study, while Farhad Daneshgar is the developer of the model, Mehri Parirokh and Rahmatollah Fattahi were domain experts (that is, library experts) who validated the quality aspects of the model, and eventually decided to base their investigation on this theoretical framework.

The CMQF has already been used for evaluating different types of conceptual models including data models, process models and interaction models. In this article, it is used specifically for collaborative processes. The CMQF framework has three distinct quality objectives to achieve. These are:

- (1) *Language domain appropriateness*: It measures how the language fits the domain, the degree to which the language makes the kind of model statements that are appropriate in the domain.
- (2) *Language audience appropriateness*: This relates to the extent by which the audience agrees that the language is understandable and appropriate.
- (3) *Audience domain appropriateness*: This relates to the extent by which the audience is already familiar with, or is able to be familiar with, the problem domain.

The above quality goals correspond to the three categories namely, Syntactic, Semantic and Pragmatic quality measures which are based on semiotic theory (Kesh, 1995; Krogstie *et al.*, 1995; Lindland *et al.*, 1994).

In order to achieve the above goal, several meetings were initially arranged between the developer of the model (Farhad Daneshgar) and the library domain experts (Mehri Parirokh and Rahmatollah Fattahi). An initial draft of the LRKM model was prepared by the model developer and was presented to the domain experts over four in-depth interviews, two separate interviews with each of the domain experts. For conducting

these interviews an interpretivist case study methodology was adopted using a combination of theory building and sense-making mini-case study strategies. The objective of these interviews was to find appropriately modified phrases and model constructs that can best represent various aspects of the RIS process in university libraries in general. These aspects include correct identification of individual tasks, role artifacts, task artifacts and roles. It also included in-depth investigation on accuracy of descriptions for each of the semantic concepts, as well as meaningfulness and rationality of the relationships that exist among these concepts. And finally, domain experts' opinions were sought regarding the iconic choices made by the model developer for drawing the LRKM model in Figure 1.

Overall, the CMQF validation methodology highlighted required modifications to the concept descriptions of the initial version of the model in order to achieve the highest level of semantic, syntactic and pragmatic model quality. More specifically, it resulted in much improvements in individual task descriptions, identification of missing relevant roles and finally improvements in description and categorisation of various artifacts. A modified LRKM model was then constructed accordingly as shown in Figure 1. It is intended that in future studies eventually these findings be used for development of the knowledge-base component of a collaborative KM system that supports librarians in their day to day activities within the RIS process.

Research methodology

As mentioned before, this research aims to identify the knowledge-sharing requirements of the librarians within the RIS processes in university libraries. Reference librarians who are the members of RUSA Electronic Discussion Group are target population of this study. RUSA is a division of the American Library Association and is the foremost organization of reference and information professionals who make the connections between people and the information sources and services. The study adopts an interpretivist approach with an inductive research strategy aimed at producing an understanding of the collaborative context of the RIS as a precursor for identifying knowledge-sharing requirements of the librarians involved in the process. Reliability is assured by consistently and appropriately recording observations from focus group, document studies and survey questionnaires.

The overall research methodology in this study consists of four stages. In the first stage, the theoretical foundation of the LRKM is utilised to construct a correct and representative conceptual model of the RIS process. A focus group consisting of two library scientists and one IS expert collaborated at this stage. For the two library domain experts to provide input to this process they used both their own domain experience in similar other situations as well as existing documents such as literature on RIS including RUSA Guidelines for Information Services (RUSA Access to Information Committee, 2000).

Using the results obtained from the above stage, in the second stage, once more, the focus group technique was employed to design domain-appropriate survey questions. The questionnaire was designed to collect answers to the following research questions:

- (1) To what extent librarians use different information sources for responding to the needs of their users?
- (2) To what extent librarians use various knowledge artifacts in order to satisfy users' information needs?
- (3) What obstacles prevent knowledge sharing in academic libraries?

A pilot test was conducted to gain confidence on the applicability of these questions. The questionnaire was then published on the RUSA Electronic Discussion Group (rusa-l@ala.org) and 30 academic librarians, mainly from the American university libraries, responded. In the third stage, empirical data were collected. In the last stage, data were analyzed and interpreted. And finally, findings were used to derive conclusions regarding the knowledge-sharing requirements of the librarians within the RIS process, as well as identifying future directions of this study. These constitute the last two sections of this article.

Empirical results

Demographic information

Most of the respondents to the questionnaires (60 per cent) were female. About 60 per cent of them were more than 40 years old. About the same per cent of them have been working more than four years in their library environment. This shows that most of the respondents should have good knowledge of their library, its policies, culture and users/clients. This, to some degree, also increases credibility of their responses. Almost all participants (94 per cent or 28 out of 30) have a degree equivalent to a Master of Library Science. About half of them (47 per cent) have more than one master's degree. About 40 per cent can be categorised as the subject librarians. That is, their educational background has some relationship to the field of study of students for whom they provide services. The educational backgrounds of 27 per cent of them have some relationship to those students and educational groups with whom they mostly interact.

Results also show that 81 per cent of reference librarians who participated in this research are involved in more than five tasks. This increases the validity of the contextual variables considered for this research. The variety of titles assigned to these librarians reveals the variation in their duties and also the fact that a single title is not assigned to the position of RIS librarian within the university libraries. These titles are:

- (1) Reader services librarian.
- (2) User education librarian.
- (3) Document delivery.
- (4) Director of reference services.
- (5) Public services librarian.
- (6) Reference librarian.
- (7) Coordinator of user education.
- (8) Access librarian.
- (9) Head of reference services.
- (10) Liaison librarian.

Results reveal that for responding to the library users (corresponding to the task T1.1 in Figure 1), librarians have to possess relevant knowledge about how to perform these tasks. The sources for acquiring these two different types of knowledge, referred to as "role artifacts" are shown in Tables I and II, respectively.

The information provided in Table I show that reference librarians use a variety of information sources to acquire knowledge about where to find the requested information.

For acquiring knowledge, they value the Internet to almost the same extent that they consider library collection and consultation with their colleagues (other librarians) who might have knowledge about information sources. It seems that they believe in knowledge sharing as a mechanism for obtaining relevant information. Three librarians also specified different information sources. These sources are community expertise, web logs and professional discussion groups. Librarians are involved in constant interactions with information sources and users; and this results in accumulation of a vast amount of knowledge and experience.

According to Nonaka and Knonno (1998), communication between actors, which results in conversion of tacit knowledge into tacit and/or explicit knowledge, is possible through sharing ideas and will result in self-development. It seems that participating librarians are actually quite interested in consulting their colleagues, but most of the respondents do not consider academics as a source of knowledge acquisition. On the other hand, most of them (about 93 per cent) rely on the Internet more than the information that resides in other libraries (about 53 per cent, that is, R1-T1.2). This might be due to an ineffectiveness of the role artifacts R1-T1.2 and R3-T3.1 in Figure 1.

Table II shows the preferred methods of anticipating information needs of library users. The importance of this table is to demonstrate that formal approaches for anticipating information needs such as university publications, survey results and other published academic information are not common practices among librarians. On the other hand, informal approaches such as communication with users or academics are considered more common. The problem of such informal approaches however is that the nature of their knowledge contents is tacit, meaning that it cannot be codified easily so that it can be made available to, and be shared by, all other librarians.

In Figure 1, the role artifact R2-T2.1 represent the role artifact that holds relevant information available to the library users. This information forms the knowledge base of user about library services. Librarians must normally inform users about their services and conversely, users can request about available and future services. This role artifact can also be used by marketing and publicity officer within the library. Different approaches, which have been used for marketing library services to the users, are demonstrated in Table III.

Table I.
Role artifacts used by librarians for performing the T1.1 task

Personal experience	Consultation with colleagues	Library collection	Internet	Consultation with academics	Using other libraries' collections	Others
30 (100%)	27 (90%)	30 (100%)	28 (93%)	12 (40%)	16 (53%)	3 (10%)

Notes: Sources of knowledge about information sources; *n* = 30

Table II.
Preferred methods of anticipating information needs of library users (*n* = 30)

University publications and products	Surveys results	Contact with users	Contact with academics	Formal communication with educational groups	Subject librarians	Others
17 (57%)	13 (43%)	30 (100%)	29 (97%)	4 (13%)	20 (67%)	2 (7%)

	Library notice	Library signs	Library internal newsletter	University newsletter	Library presentation and demos	Library instructional programs	Library alert system	Library mailing list of users	FAQ database	Staff database	Reference librarian	Liaison librarian
Students	22	28	9	13	23	27	9	3	15	5	24	15
Teachers	24	26	12	15	27	24	9	6	14	4	24	20
Other librarians	19	22	13	12	16	12	7	5	11	3	22	15
Other libraries	5	2	5	3	10	2	3	3	8	4	9	4

Table III. Role artifacts used by users (the R2-T2.1) for acquiring knowledge about library services (i.e. approaches used by librarians for marketing library services ($n = 30$))

The results in Table III show that librarians mostly use conventional approaches in marketing their programs. Technology-related methods such as (electronic) mailing list, automatic alert system, FAQ database and accessing staff through computerized databases are among the least used methods for sharing knowledge between librarians and users. It seems that participating libraries have not effectively used available technologies for this activity.

Various task artifacts that are currently used by the librarians for communication with other roles, i.e. library users or other libraries, are shown in Table IV. These task artifacts correspond to the communication channels, repositories and business procedures that enable a pair of roles collaborate in performing their collaborative tasks. In Figure 1, lines that connect T1.1 to T2.1 and T1.2 to T3.1 show these artifacts. Table IV shows the extent to which participating libraries have used the T1.1-T1.2 and T1.2-T3.1 artifacts.

Almost all libraries use email and library Website as part of their communication system. The Intranet and telephone lines have also been used by most libraries. However, the traditional face-to-face communication method still is also widely used. Virtual reference desk and user mailing lists, which are relatively new artifacts, have been used by about half of the participating libraries, probably waiting for a wider acceptance in future. This claim is based on the current trend that a large number of library users are invisible users who only remotely communicate with libraries. As a result, the two latter artifacts seem to be suitable channels for a considerable number of users in future.

Sharing of knowledge requires both organizational support as well as personal interest. The first group of factors requires appropriate KM enablers such as organizational procedures, organizational culture and technological infrastructures for effective support of knowledge sharing. For example, librarians need access to both tacit and explicit knowledge residing in other people's minds that may be in the form of organized knowledge bases and experiences of other librarians and experts. The extent to which libraries provide appropriate organizational procedures for knowledge sharing was examined in this research and results are shown in Table V.

The scattered data in Table V need closer investigations that there is a matter for future studies. In this research, however, we may simply conclude that there is a lack of comprehensive organizational policies and procedures dealing directly with the knowledge-sharing process. It may also suggest a mismatch between available technologies and lack of their use among librarians.

Organizational policies and procedures provide infrastructure for KM and knowledge sharing. In this study, communication policies which encourage knowledge sharing within the library and between the library and remote libraries were taken into consideration and the related question was added to the questionnaire. A summary of responses is demonstrated in Table VI.

Based on the information provided in Table VI, only 9 (out of 30) libraries have documented policies for cooperation, collaboration and communication within the library and/or with remote libraries.

Table IV.
Communication channels
between pairs of roles
T1.1-T2.1 and T1.2-T3.1

	Intranet	Email	Virtual Library reference web site	Virtual reference desk	Mailing lists	Face-to-face communication	Telephone	Fax	Snail mail	Others
	20 (67%)	30 (100%)	26 (87%)	15 (50%)	16 (53%)	28 (93%)	25 (83%)	8 (27%)	16 (53%)	2 (7%)

Establishing a KM unit will facilitate development of appropriate organizational procedures for institutionalization of KM policies and procedures and also for controlling related activities. The analysis of responses to the related question is shown in Table VII.

It seems that KM position is an unfamiliar position for most responding librarians. Only three of them mentioned that the library manager or the executive manager is already responsible for KM in their library. That means that KM and knowledge-sharing initiatives have not been institutionalized in majority of the academic libraries participated in this research. Most libraries, therefore, are not aware of the value of such activities for their staff and their library.

The second factor that contributes to effective knowledge sharing is related to the personal interests and degree of enthusiasm of librarians for sharing their knowledge with others. According to Jashapara (2004) such personal traits, that is, “personal attitudes” and “personal beliefs” towards knowledge sharing, constitute two of the four pillars of organizational cultures (with the other two being “organizational values” and “organizational assumptions”). This article does not take into consideration the effects

Knowledge bases	Frequency
Lessons learnt	1
Databases of users' profiles	1
Databases of staff profiles	2
Experts' publications	2
Good work practices	3
Data analysis reports	3
Lecturers' profiles	3
Database of staff publications	4
Databases of experts	5
Reports of observations and experiences	6
Database of information in specific subjects	12
Reports of library surveys	14
Training manuals	17
Statistics about use and users	18

Table V.
Organizational procedures and knowledge bases for supporting knowledge sharing in academic libraries ($n = 30$)

	Frequency	Percent
Within the library	2	6.7
With remote libraries	3	10.0
Both	4	13.3
Neither	21	70.0
Total	30	100.0

Table VI.
Breakdown of libraries in terms of adopting formal policies for communication with other libraries

	Frequency	Per cent
Executive management team	3	10.0
Do not know	5	16.7
No response	22	73.3
Total	30	100

Table VII.
Frequency of libraries that established either a KM unit or position

of organizational culture on knowledge sharing and it will be dealt with in a future study.

And finally, in their own words, librarians specified the following activities and strategies as factors that can encourage knowledge sharing among librarians.

- Sharing research projects.
- Training programs.
- Online newsletters.
- Teaching methods.
- Knowledge-sharing policies and strategies.
- Leadership and dedication of time.
- Group discussions.
- More communication channels.
- Formal procedures including publication of manuals for staff.
- Group discussion.
- Documenting experiences.

Conclusions

This study is part of larger a multidisciplinary research project that aims to find methods for enhancing KM and knowledge sharing in academic libraries. It focuses on aspects of knowledge-sharing practices in academic libraries particularly those that deal with organizational, technological and managerial factors associated with knowledge sharing.

A modified version of an existing process model was introduced as a systematic effort for identifying the above requirements. Due to this novel application in academic library domain it was only appropriate to assess the quality of the proposed model in terms of its suitability in addressing library processes as well as its practicality and usefulness for the domain of academic libraries. The model was then assessed using the CMQF. Results of this evaluation confirmed the LRKM's suitability for both of the above purpose and this in turn prompted us to confidently investigate the actual state of KM practice in academic libraries, that in turn would shed lights on identifying librarians' need for enhancing these practices.

Since the RIS process is an information-rich process dealing with various kinds of knowledge transformation, exchange and storage, this process was selected; although the methodology introduced in this paper can be equally applied in any other knowledge-intensive collaborative processes in academic libraries. In fact this is one of the ongoing research activity of the authors.

Answers to the survey questions were then published on the RUSA Electronic Discussion Group and 30 academic librarians who were members of this discussion group responded to the questionnaire. Results show that most librarians use both formal organizational procedures as well as informal face-to-face communication methods for capturing knowledge about information sources. At the same time less number of librarians tend to communicate with academics and with other libraries as their information sources (40 and 53 per cent, respectively). The reason behind such lack of tendency among librarians in using the above two sources will be further investigated in future studies along with other relevant issues. One possibility might

be a lack of suitable policy in the library or lack of awareness towards the value of such communication.

On the other hand, most librarians mainly use informal face-to-face methods for acquiring information about users and their information needs. However, the major problem with this method is that such interpersonal communication method is generally considered as a less valid source for capturing knowledge about information needs of users. Authors believe that providing a formalized procedure for improving validity of results obtained from face-to-face communications and their storage and re-use will certainly enhance socialization process and effectiveness of knowledge sharing. Some current KM technologies that may provide required functionality would be chat rooms equipped with mind-map functions. As a complementary solution it may also be appropriate to nourish a culture that values credible information.

Looking at the above problem differently, one may also argue that since majority of the current information technologies in the libraries are designed to perform specific functions rather than facilitating an organizational process (that is, they are functional systems rather than process-based systems) this may be responsible for discouraging librarians to use these systems and infrastructures. More studies need to be done in order to provide a definite answer to this question.

On the basis of the results obtained in this study following list summarizes knowledge-sharing requirements of librarians.

- (1) Specific KM policies and strategies are currently missing in majority of today's academic libraries. Authors propose a more active stance on this matter is required. For example, a policy which supports the management of knowledge which resides in the minds of librarians who perform different RIS activities (e.g. run information literacy sessions or conduct user satisfaction surveys), provides appropriate infrastructure for KM and knowledge sharing. This can be performed via content management system or in a single database which is accessible for everybody in an organization.
- (2) In terms of technological requirements adoption of an integrative approach to IS acquisition, rather than a traditional functional view seem to enhance knowledge-sharing capabilities of the librarians.
- (3) Like any other resources, knowledge also needs a custodian for protection. It is suggested that to achieve this creation of a KM unit or officer would enhance effectiveness of knowledge-sharing activities.
- (4) Appropriate ICT infrastructures for supporting cross-functional areas within the academic libraries, is highly recommended for facilitation of the (1) and (2) above. Examples for such infrastructures are establishing alert system, library mailing list of users, staff database, electronic library newsletter, virtual reference desk, library weblogs, social networks, etc.
- (5) It was also noted that providing a variety of communication channels for librarians might enhance both efficiency and effectiveness of their communication and subsequent knowledge-sharing activities.

And finally, the required KM policies/procedures and strategies, and their corresponding ICT infrastructures mentioned above can be classified in the light of Nonaka's SECI framework (Nonaka and Knonno, 1998), in the following four categories:

- (1) Those that correspond to conversion of tacit knowledge to tacit knowledge (socialization). This type of knowledge sharing is related to the self-development of librarians through modifying and enriching their own experiences and mental models through informal interactions with others. One solution is to facilitate interpersonal communication between experts and librarians through various existing ICT infrastructures.
- (2) Those that correspond to the conversion of tacit to explicit knowledge (externalization). Classic examples include expert databases or FAQ databases that are based on tacit knowledge of others, organized in a way that can be stored within, and be accessed from, computerized systems. Existence of such databases in libraries will enhance organizational learning among librarians.
- (3) Those that correspond to the conversion of explicit to explicit knowledge (combination). Selective subject bibliographies, graph and charts of event such as the most frequent users, the books which have been in high demands, and similar facilities are examples of this kind of knowledge conversion.
- (4) Those that correspond to the conversion of explicit knowledge to tacit knowledge (internalization). In this process, new knowledge can be created. For example, observation of user's behavior in the library or their questions at the reference desk can give new knowledge to the librarians and managers about some advantages and disadvantages of the library services. The result of reading articles, survey results or listening to a lecture can also create new innovative ideas.

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