How does Knowledge Management affect Service Innovation in Academic Libraries?: A survey study

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ABSTRACT
Effective management of all knowledge produced within an organization is frequently identified as a key criteria for innovation of new products and services within the organization. Academic libraries are beginning to realize the importance of knowledge management (KM) in this regard. However, there aren’t any quantitative studies studying KM and service innovation in the context of libraries. Islam, Agarwal and Ikeda came up with a framework for knowledge management for service innovation in academic libraries (KMSIL). Through a survey of 107 librarians from 39 countries, this study seeks to investigate the effect of KM (and each phase of the KM cycle) on service innovation. Preliminary findings support the KMSIL framework. They should help academic libraries in the process of service innovation by utilizing phases of the KM cycle.

Keywords
Knowledge management, service innovation, academic libraries, knowledge creation, sharing, use

BACKGROUND & INTRODUCTION
Changes brought about by technology, increased user expectations and shrinking budgets have led to innovation becoming the life blood of every organization. Innovation allows organizations to come up with new and improved services for their user communities. To keep pace with the changes in user expectations, libraries need to leverage strengths such as physical space and collections, and innovate to provide more responsive and agile services (Li, 2006). A number of studies have reaffirmed the importance that knowledge management (KM) plays in improving innovation and organizational performance (Darroch & McNaughton, 2002; Adams & Lamont, 2003; du Plessis, 2007). KM can help improve communication among library personnel and between users and service providers, between top management and staff, and can promote a culture of knowledge sharing (Teng & Hawamdeh, 2002). In knowledge organizations such as libraries, KM is needed for managing user knowledge (their need, who to contact, information seeking), resource knowledge (sources, services, where these services are available, and other features) and personnel practice knowledge (expertise available, the quality of service they provide) (Agarwal & Islam, 2014). Libraries need to embrace a scenario where knowledge is not just managed by the library (in the form of books or periodicals) but created within the library. Thus, libraries need to leverage employee and user knowledge, along with rapidly evolving technology (Islam, Agarwal, & Ikeda, 2015). However, while there have been studies on KM in libraries, the extant literature is yet to provide empirical evidence linking knowledge management with service innovation in academic libraries (apart from the qualitative data by 17 librarians gathered by Islam, Agarwal & Ikeda (2015) in their study).

OBJECTIVE OF THE STUDY
This study investigates the effect of knowledge management on service innovation in academic libraries. The following research questions guide the study:

1. How does KM affect service innovation in academic libraries?
2. How do different phases of the KM cycle affect service innovation?
3. How do the different phases of the KM cycle affect each other?

KM is operationalized through three phases of the KM cycle 1) knowledge capture/creation, 2) knowledge sharing/transfer, and 3) knowledge application/use (Agarwal & Islam, 2014; Dalkir, 2011). The service innovation framework by Hertog (2000) is used to explain service innovation. In order to relate KM and service innovation, the KM for Service Innovation in Libraries (KMSIL) framework by Islam, Agarwal & Ikeda (2015) is used. This study will empirically test the framework by designing survey questions based on the framework.

LITERATURE REVIEW
Service innovation and the library
Service innovation refers to changes that affect service characteristics and offer value to the provider, and are new to others (Gallouj & Weinstein, 1997). It can be related to changes in the service concept, the client interface, the delivery system and technology use (Hertog, 2000). Combining changes in these dimensions are most widely recognized as new services. We use Hertog’s dimensions in
our study to operationalize service innovation. Service concept relates to how the library user needs are to be satisfied and what is to be done for the user. Interface relates to the design of the interface between library and users. Delivery refers to the way of providing services. Technology works as facilitator or enabler. Very few studies have looked at innovation in academic libraries – relationship between library size and innovation in digital reference services (White, 2001), knowledge innovation culture (Sheng & Sun, 2007), innovation ideas in academic libraries (Jing & Jin, 2009) and customer role for service innovation (Scupola & Nicolaisen, 2010). However, these studies have not incorporated the core concept and dimensions of service innovation adequately.

**KM and service innovation in libraries**

Salomann, Dous, Kolbe, & Brenner (2005) conceptualize customer KM as the utilization of knowledge for, from and about customers in order to enhance the customer-relating capability of organizations. In academic libraries, knowledge for customers refers to satisfying patron requirements for knowledge about services and other relevant items. Knowledge from customers refers to ideas and suggestions that would be useful for the library to implement. Knowledge about customers refers to understanding the patterns of patron information needs – those that have been met through library services, and those that are still not met. However, this needs to be supplemented with the librarians’ own knowledge, critical thinking ability, and continuous learning from external and internal sources. To offer new and innovative services to the user communities, libraries need to generate creative and implementable ideas based on their knowledge from direct customer contact. For example, blogging enables the library to aggregate knowledge from users (Kim & Abbas, 2010). While KM is important for innovation in libraries, Islam, Agarwal & Ikeda (2015) is the only study that proposed combining innovation and KM in the context of academic libraries through their KMSIL framework. Through their qualitative study, Islam, Agarwal, & Ikeda found that for any change management or service innovation, being response to user needs and continuously gathering knowledge of those needs is important. Islam et al. define KMSIL as gathering knowledge of user needs, innovation possibilities and barriers, analyzing and synthesizing these to overcome barriers, leading to service innovation in libraries.

**RESEARCH MODEL**

To empirically test Islam et al. (2015) framework and to answer the research questions for this study, we propose a research model which is helpful in demonstrating the relationships between the variables of interest (Figure 1). Service innovation is the dependent variable. Three integrated phases of the KM cycle (Dalkir, 2011; Agarwal & Islam, 2014) – knowledge creation/capture, sharing/transfer and application/use are independent/mediating variables. The relationship between these are hypothesized through H1, H3 and H5. H2 and H4 investigate the relationship between the KM cycle phases. A set of control variables are also added to see if they have any influence on service innovation.

**Figure 1. Research Model**

**REVIEW OF VARIABLES AND HYPOTHESES**

We review specific variables identified in the research model and arrive at hypotheses.

**Innovation in library services (dependent variable)**

Hertog (2000) came up with a 4-dimensional model to operationalize service innovation, with changes being related to the service concept, the client interface, the delivery system and technology use. We operationalized innovation in library services as focusing on satisfying user needs through novel ideas and services, improved user interface, new outreach and delivery methods, and new technology applications.

**Knowledge creation/capture (independent variable)**

We operationalize knowledge creation/capture in the context of libraries as gathering knowledge of user needs, of innovation possibilities (incorporating Hertog’s 4 dimensions), and of barriers to innovation.

Hence, we hypothesize:

Hypothesis 1: Knowledge creation/capture will positively affect innovation in library services.

As per Dalkir (2011) and Agarwal & Islam (2014), the created/captured knowledge is assessed and then shared and disseminated to the concerned people. Therefore,

Hypothesis 2: Knowledge creation/capture will positively affect knowledge sharing/transfer.

**Knowledge sharing/transfer (mediating variable)**

Once knowledge has been captured and codified, it needs to be shared and disseminated throughout the organization (Dalkir, 2011). For the present study, we operationalized knowledge sharing as an activity through which knowledge (i.e. skills, expertise or information based on experience, as well as reports, manuals and documents pertaining to user needs, innovation possibilities, barriers and other areas) is exchanged through informal dialogues, face-to-face meeting and group discussion.

Therefore, we hypothesize:
Hypothesis 3: Knowledge sharing/transfer will positively affect innovation in library services.

As per Dalkir (2011) and Agarwal and Islam (2014), the shared/transferred knowledge is contextualized and applied/used. Unless relevant knowledge is shared and acquired by those who need it, it cannot be effectively utilized. Therefore,

Hypothesis 4: Knowledge sharing/transfer will positively affect knowledge application/use.

Knowledge application/use (mediating variable)
Knowledge application/use is the final phase of the integrated KM cycle (Dalkir, 2011; Agarwal & Islam, 2014). When knowledge has been captured/coded, and shared/transferred, it becomes available for actual use. KM succeeds when knowledge is used. Without that, other cycles of KM will be in vain (Dalkir, 2011). In this study, we operationalize knowledge application/use as an activity through which the knowledge of user needs, barriers, innovation possibilities, and the overall knowledge of employees and users is analyzed and synthesized to come up with creative/innovative ideas to overcome barriers to innovation and to enhance library services. Therefore, we hypothesize:

Hypothesis 5: Knowledge application/use will positively affect innovation in library services.

METHODOLOGY
For the present study, we relied upon the survey questionnaire method as the questions related to the perceptions of librarians regarding KM and service innovation in their libraries. This allowed us to reach a wide pool of academic librarians in different countries.

Study population and sample
The study population was academic libraries that were accessible using the International Federation of Library Associations and Institutions (IFLA) mailing list. Apart from these, we also reached out to academic librarians in Australia, the USA, Canada, the UK and other countries such as Bangladesh, Malaysia, India, Singapore, Thailand, Vietnam, Belgium, France, Denmark, where universities were found using web search. While this allowed for a wide pool of possible respondents, it necessitated the use of convenience sampling.

Instrument development
Items were developed for the 4 constructs of our research model, as well as other control and demographic variables. Where possible, survey items were taken from prior studies or adapted to suit the needs of this study. For other cases, the items were self-developed. The questionnaire used the 5-point Likert scale.

Data collection
The survey instrument was pre-tested to check for any question wording issues. Minor changes were made based on suggestions. The final survey had 56 questions (8 items on service innovation; 7 on knowledge creation; 9 items on knowledge sharing; 8 items on knowledge application; and 24 items on control and demographic variables. The questionnaire and the design of the study were approved by the Simmons College Institutional Review Board. Filling out the questionnaire implied consent. A web-based version of the instrument was created using Google form. About 946 librarians were individually contacted, with the rest in mailing lists. In total, 110 librarians (107 valid responses) from 39 countries in 6 continents filled out the questionnaire after multiple follow-up emails and efforts at reaching respondents and mailing lists. The response rate was calculated as 110/946 or = 11.63 percent (though the actual rate may be lower). Data was gathered in a 6-week period from mid-January to end-February 2015.

Data Analysis
A preliminary analysis has been done using PSPP 0.8.4 (the open source equivalent of SPSS). This included exploratory factor analysis with principal component analysis to extract the latent factors, followed by Varimax rotation. A number of survey items were removed at this stage to satisfy convergent and discriminant validities. Demographic distribution was arrived at based on gender, age, education, number of years in the library field, number of employees in the library, library location, work position and department. This was followed by reliability analysis using Cronbach’s alpha, and finally hypothesis testing using multiple linear regression.

The convergent and discriminant validities, as well as reliability were all satisfied for the data gathered. Based on the regression analysis, Hypothesis 3 (effect of KS on SI) was not supported, while Hypothesis 1 (effect of KC on SI) and Hypothesis 5 (effect of KA on SI) were strongly supported (p < 0.01). Hypothesis 2 (effect of KC on KS) was also strongly supported (p = 0.000). Hypothesis 4 (effect of KS on KA) was strongly supported as well (p = 0.000).

The results of the hypotheses testing are summarized in Figure 2.

![Figure 2. Results of hypothesis testing (β values and significance)](image)

To test our first research question, we computed the average of KC, KS and KA to arrive at scores for overall knowledge management (KM) on a scale of 1-5 as provided by each
respondent. On regressing SI on KM, we found that KM strongly affects SI ($p=0.000$, $\beta=0.67$, adjusted $R$-square=0.45). The other research questions are discussed below.

LIMITATIONS

Only a preliminary set of analyses is provided in this paper. The complete instrument and detailed analysis will be published subsequently. The study itself has other limitations. First, a bigger sample than 107 would yield more data. One of five hypotheses was not supported. A larger sample could help determine if knowledge sharing does have any direct effect on service innovation. Second, a number of survey items had to be dropped during analysis. Third, convenience sampling was used. This would limit the generalizability of the findings. Fourth, while the study supports the KMSIL framework, some of the dropped items limited the validation provided by the study. Finally, as KM ideas may not be all that familiar to academic libraries and/or applied on a regular basis, the questionnaire method for validating the model must be supplemented with interviews and case studies.

DISCUSSION

In this study, we set out to answer three research questions on the effect of KM on service innovation in academic libraries. The first research question was answered with a strong relationship established between knowledge management and service innovation in academic libraries. The second research question was addressed whereby a strong relationship was found between knowledge capture/creation and service innovation, and between knowledge application/use and service innovation. Both those phases are an integral part of Islam, Agarwal, and Ikeda (2015)’s KMSIL framework. While there was no direct relationship established between knowledge sharing and service innovation, an indirect effect was established whereby the created/captured knowledge affected the shared/transferred knowledge, which in turn positively affected knowledge application/use. This addressed the third research question showing the relationship between phases of the integrated KM cycle. The cycle established from knowledge capture/creation to knowledge sharing/transfer to knowledge application/use and back to knowledge capture/creation support the integrated KM cycle frameworks in Dalkir (2011) and Agarwal & Islam (2014) and most other frameworks of the KM cycle. The findings support the view that academic libraries with more capability of knowledge creation are likely to offer more innovative services to their user communities. Similarly, academic libraries with better-developed knowledge application/use practices are likely to be offering more new services. The entire process of synthesis and application of the knowledge captured (as per the KMSIL framework) is crucial for the enhancement of existing services and the development of new services in academic libraries. The study has shown the value of utilizing both users’ and librarians’ innovation potential. Future work will show how to cultivate both these sources for library service innovation.

REFERENCES


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