

Knowledge Management System Framework for Sharing Knowledge in Public Organizations

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Abstract—This research aims to incorporate academics' Knowledge Sharing Behavior (KSB) into a Knowledge Management System (KMS). This qualitative study proposed a Knowledge Management System Framework (KMSF) for Knowledge Sharing (KS) in public organizations. The KMSF is developed based on real KSB of knowledge workers as end users. KSB encompasses four main dimensions: knowledge types, KS networks, KS methods, and KS motivations. This KMSF has been validated by an expert who has more than fifteen years' experience in information systems (IS) development. The research site was Malaysia's largest academic institution in terms of student population. Data were collected from fifteen professors and associate professors through face-to-face interviews over a six-month period. Content analysis was used to extract and describe findings. The research contributes toward new knowledge through the development of a KMS which drew upon qualitative findings. University administrators may utilize the proposed framework as a guide for KS activities among academicians in their institutions.

Keywords— *knowledge management; knowledge management system; knowledge sharing; public organization*

I. INTRODUCTION

Knowledge Management (KM) is an essential element for any organization to be successful and compete. Organizations are "struggling to gain sustainable competitive advantage in order to survive among aggressive huge competitors" [1, p. 137]. Nevertheless, the KM field remains unclear, even though that it has received some attention from practitioners and academics [2]. More specifically, there are few studies on KM in the Malaysian public sector [3], and questions on how to implement KM successfully [4], and how to exchange and use knowledge effectively in public organizations has become a matter of concern for both management practice and research [2, 5]. There are many challenges in KM implementation and one of them is understanding the factors that influence the adoption of Knowledge Management Systems (KMS) as well as diffusion of KM practices [6]. Few researchers have explored and examined knowledge sharing behavior (KSB) in public organizations although recent resource-leveraging strategies emphasize its importance across their boundaries [7]. For effective use of KMSs, individual management practices

need to be considered [8]. More specifically, individuals' KSB plays an important role in the design of a KMS [9] and academicians' "knowledge is not necessarily easy to be accessed" [10, p. 286]. Hence, this research explored the human factor affecting the KSB of academicians as end users, and incorporates these factors into a KMS framework.

II. LITERATURE REVIEW

A. Knowledge Sharing Behavior (KSB)

KSB refers to the attitudes and manners in which individuals do things in the process of KS [11]. KSB has been categorized into three levels [12] which are: individual level, knowledge level and organizational level. Individual level includes motivational factors; knowledge level includes knowledge categories; organizational level includes structures, people (social interactions and networks), and technology (KS method). Hence, this research focused on four dimensions of KSB (knowledge types, KS networks, KS methods, and KS motivations or human factors). For the purpose of this research, KSB is defined as a behavior by which academicians share knowledge, including the knowledge types they share, their KS networks, KS methods they use, and their KS motivations. KS behaviors need to be studied in order to develop a complete understanding of the role of behavior in KM [13] so as to ensure the success of a KM effort [14].

B. Knowledge Management in Academic Institutions

KM has not been critical only in profit-oriented organizations; it can also affect non-profit organizations such as public learning organizations. However, attempts to manage knowledge in learning organizations without suitable KM strategies can lead to failure. KM in higher learning institutions has been recognized as a key element in extracting its value [15]. There are several reasons for adopting and implementing KM in learning organizations. For instance, integrating the knowledge produced at all levels and using it towards achieving the institute's targets, will have implications leading to an enhancement of the quality of operations, capacity, and effectiveness of the learning organization, thereby resulting in improved productivity and performance [16].

C. Knowledge Management Systems

Although there is no uniform definition of what is meant by a KMS, most definitions concur that it is an IT-based system which is designed to manage an organization's knowledge. For instance, [17] defined KMS as an information system (IS) that is used to run the KM. It is "a complex socio-technical system that encompasses various forms of knowledge generation, storage, representation, and sharing" [18, p. 94]. For the purpose of this research, a KMS is defined as a system which supports the KM processes between academicians and their networks. The use of a KMS to support knowledge creation and sharing activities has become the priority of organizations [19]. The production of large amounts of data accumulated over long periods results in an urgent need for an effective KMS in the management of an enterprise [20]. It can be argued that the use of KM technologies in learning organizations is more important than in corporate organizations [21].

III. METHODOLOGY

The intent of this research was to carry out an in-depth study of academicians' KSB and incorporate this behavior into a KMS framework, thus a qualitative approach was the most appropriate. According to [22], qualitative research has been found to be a more successful approach to achieve a better understanding of the use of an IS. The primary data were collected through knowledge workers from one of the public universities in Malaysia. This university was selected because it is one of the largest Malaysian universities with about 480 academic programs conducted both through coursework as well as research modes. Hence, this would offer opportunities for a rich and deep understanding and description of the real behavior of KS among its academic staff members.

A purposeful sampling technique was used to select participants. Through the use of a purposive sample, the researcher can select a group of people who can best inform him/her about the issues of research under study [23]. Fifteen academic staff with a gender mix of male and female participants were selected from a range of faculties in the public university to make up the sample group. (As pointed out by several researchers [24, 25, 26], the sample size in qualitative research is often small) The interview questions were developed based on an understanding of the research problem. As explained by [23], qualitative researchers "do not tend to use or rely on questionnaires or instruments developed by other researchers" (p. 45). A schedule of all interviews was prepared in a standard manner for all participants, allowing minimal allowances for researcher bias. A series of face-to-face interviews were conducted with participants in order to understand their KSB. The interviews continued until the participants no longer provided differing or new information, and data saturation began to appear in their answers. The criterion of saturation determines the theoretical point at which adequate data have been generated. The data were collected from the participants over a six-month period.

When conducting a qualitative study, the researcher should consider the findings' validity [27]. To ensure research results are reliable and valid, a high level of researcher integrity is necessary to minimize the threat of bias. Some strategies to promote qualitative research validity have been suggested by [28] and two of them have been incorporated in this study in order to promote qualitative study validity. These strategies are Low Inference Description (LID) and Data Triangulation (DT). In this study, the LID strategy was implemented by including direct quotations from participants' responses to research questions to express the views of study participants. As described by [28], "A verbatim [response] is the lowest inference descriptor of all because the participants' exact words are provided in a direct quotation" (p. 285). The DT strategy was achieved by conducting numerous interviews in different places and times, as suggested by [28, p. 289]: "Data triangulation involves collecting data at different times, at different places, and with different people". Additionally, the knowledge management system framework (KMSF) was validated by an expert who has more than fifteen years' experience in IS development. The expert is an IS lecturer specializing in IS framework and architecture. She has been in charge of the development of a KMS in an academic institution for the past five years and has evaluated various KMS in various organizations. Due to limited space in this article, the research stages are summarized as illustrated in Fig. 1.

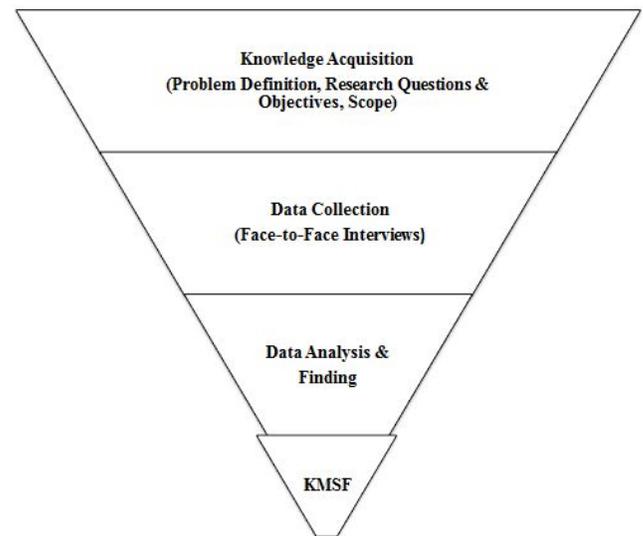


Fig 1. Stages of the Research

IV. DATA ANALYSIS

As a case study with a qualitative approach, the study procedure established a protocol for the analysis and coding of respondents' answers to the research question. In the coding process, an electronic recording device was used to tape all the interviews, which were then transcribed into a text format. The participants' responses were reviewed many times in order to identify and determine relevant concepts. The main concepts were identified through free coding into categories and subcategories. Qualitative researchers "review all of the data

and make sense of it, organizing it into categories or themes" [23, p. 45]. The categorization process has been achieved based on grouping of similar responses together. After coding, the data were subject to constant comparison and analysis. The constant comparative method is a technique "that allows the researcher to group answers to common questions, analyze different perspectives on central issues" [29, p. 367].

V. RESEARCH CONTRIBUTION AND FRAMEWORK DEVELOPMENT

The main contribution of this study is the incorporation of academics' KSB into a KMSF. Based on the interview findings, the KSB includes four main dimensions, namely: Knowledge types (Corporate, Social) KS networks (Community of Practice, Personal, Business Club network), KS methods (Synchronous, Asynchronous), KS motivations (Building a reputation, Acknowledgement, Knowledgeability, vision and mission, Reciprocity). The proposed KMSF is formulated based on the KSB of knowledge workers (as end users) for the system. It consists of three layers which are: Knowledge Presentation Layer (KPL), Knowledge Management Layer (KML), and Data Source Layer (DSL). The developed KMSF is illustrated in Fig. 2.

The KPL is the first layer of the framework and it acts as the main gateway for the KMS. The KPL provides access to data stored in repositories. In the KMSF, a Web browser is proposed to be the access platform. It is supported by the Internet and multiple access platforms which include tablet, smartphone, iPad, and PDA. This is to address the issue of system accessibility allowing the system to be accessed at any time (24/7) and anywhere.

The KML is the second layer in the KMSF. It consists of three dimensions from the KSB, which are: KS motivations, KS methods, and KS networks. In the first dimension, two types of motivations are included, which are acknowledgement and knowledgeability. To address the acknowledgement motivation, Gamification features are suggested as these have become a popular tactic to encourage specific behaviors and to increase motivation and engagement [30] and they have been applied in several domains, including education [30, 31]. According to [32], the main idea of applying these techniques is to encourage users to participate. Users need some form of incentive to volunteer to contribute willingly. Gamification can be used to raise the engagement of users by using game-like techniques such as scoreboards and personalized fast feedback [33].

On the other hand, the Social Network Analytics (SNA) technique is suggested to address the knowledgeability motivation. Knowledgeability concerns the interest to learn and acquire more knowledge in a certain field of an area. The SNA technique is an application which supports relationship discovery in the enterprise [34] for many reasons, including pursuing shared interests, addressing community issues, and solving technical problems [35] through the use of methods such as node-link diagrams, matrix visualizations [36] or hybrids [37]. Based on these methods, the SNA technique

allows the user to easily view areas he might have in common with another particular user and offers recommendations of other users within his institution who might share common areas of interest but who are not known to the user. This helps the user to reach out to new knowledge providers and resources which consequently fulfil his knowledgeable motivation.

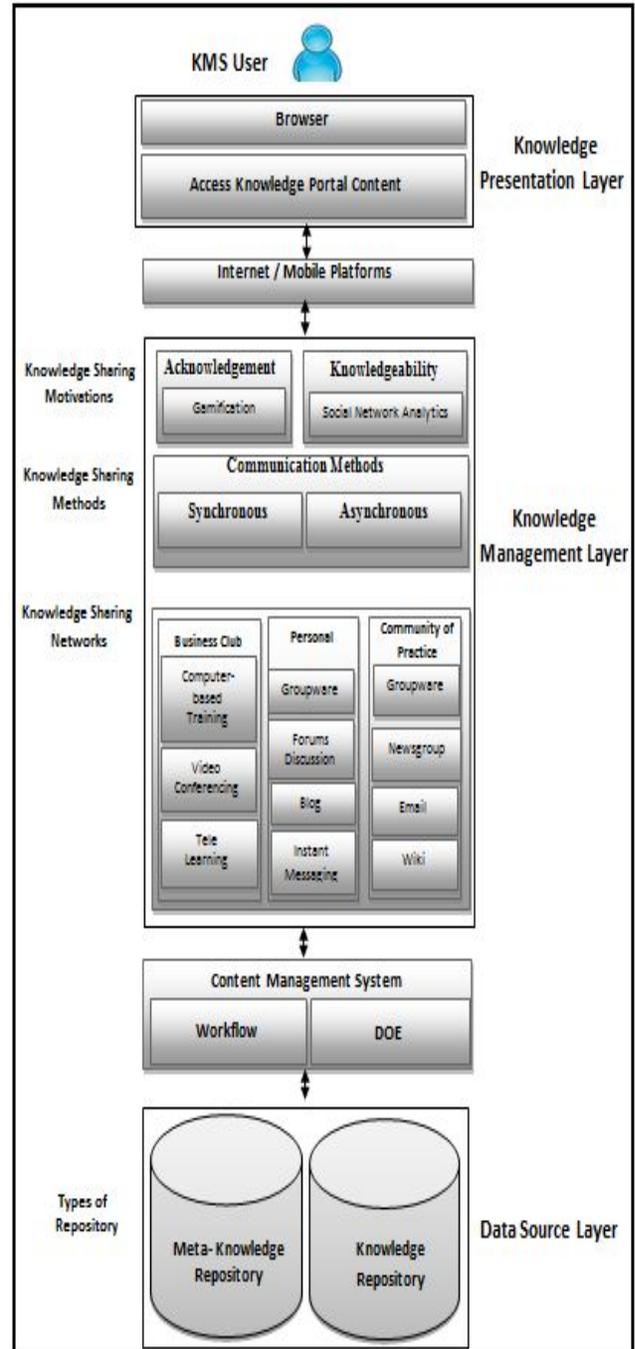


Fig 2. KMS framework

The second dimension in the KML concerns KS methods.

There are two types of KS methods: Synchronous methods (shared in real time) and Asynchronous methods (shared in delayed time) [38, 39]. The Synchronous method consists of various communication platforms including computer-based training and tele-learning (live broadcasting of videos), video conferencing and instant messaging, whereas the Asynchronous method includes newsgroups, groupware, email, wiki, blogs, and forum discussions [40].

The third dimension is the KS networks. The framework proposed that academicians share their knowledge within three main networks, which are: Business Club network (BCN), Personal network (PN), and Community of Practice network (CoP). The BCN is a formal network where work-related knowledge is shared in real time, suggesting the possibility of computer-based training, tele-learning and video conferences. Computer-based training and tele-learning were suggested because they provide a technological basis for the BCN members to share their work-related knowledge with each other in a real-time environment. It supports the broadcasting of presentations or talks to participants who have to be on-line and “tuned in” at the time of the broadcasting. Video conferences also support interaction between the BCN receivers of the broadcast and the sender (feedback channels for text, audio or video). On the other hand, the PN is a network where members have developed links among each other and they share knowledge in an informal manner. Various applications were recommended for members of this network, including groupware, instant messaging, electronic discussions, and blogs, as these are already being used informally among friends and relatives.

The CoP is defined as a group of people informally bound together to share matters of common interest in a virtual environment. Although the members of this network may not know each other personally, they are bonded by sharing the same interest. Hence, they evolve naturally because of the members' common interest. As they often share and collaborate online informally, newsgroup, email, wiki and groupware applications were proposed.

According to [40], the Content Management System (CMS) supports the organization of information and contents and publication on the system. CMS is a computer application that allows the publishing, editing, and modifying of the system content, as well as maintenance from a central interface. Such systems of content management provide procedures to manage workflow in a collaborative environment [41]. In the context of the present case study, where there are volumes of institutional knowledge in various mediums, content management has to have a good archiving system, besides an efficient search-and-retrieve system. In the KMSF, the CMS encompasses two main components, which are the directory of expertise (DOE) and Workflow.

The DOE issue can be achieved through a Profiling function. The success of a knowledge directory is largely reliant upon accurate and current expert profiles [42]. For expert profiling, the aim is facilitate the identification of an

expert. User profiles contain general information about an expert such as job description, roles, privileges, interest profiles, or level of experience, which are used to narrow the search domain and improve the relevance of search results [40]. The user can use profiles to find experts with a particular expertise. In this way, the profiling function can support and reach out to potential experts.

One of the main CMS components is the workflow. The workflow defines, creates and manages the execution of workflows. It supports the distribution of knowledge elements. The CMS should manage the entire lifecycle of content management by providing a complete range of workflow capabilities [43]. These include support creation, editing and approval of content [41], content publishing, content reporting and content maintenance [43]. In addition, it helps assure consistency, quality, auditability and reliability of content [44]. For these important capabilities, the workflow component is suggested.

Thirdly, the DSL is proposed to address the need to store and integrate the wide variety of electronic sources for knowledge. The system encompasses two main repositories which are Meta-knowledge repository and Knowledge repository. Meta-knowledge in a KMS according to [45] is as important as the original knowledge itself. Meta-knowledge describing knowledge elements that come from a variety of sources with the help of meta-data for a number of dimensions, includes person, topic and process [40]. This repository is allocated to store corporate knowledge, since it is explicit knowledge in the form of documents and in a variety of sources. Storing corporate knowledge in a meta-knowledge repository will facilitate the organizing, searching and retrieving of all the knowledge sources. On the other hand, according to [40], the knowledge repository is used to store meta-data about objects of IS. Additionally, knowledge repositories support the management of meta-information for knowledge elements such as documents, authors, experts, and communities [40]. The knowledge repository is also recommended for social knowledge, which it considers as tacit knowledge that comes from various knowledge artifacts, either in structured, semi-structured, or non-structured forms.

Finally, the participants in this study suggested three issues that they believed were important to be considered or addressed in the system. These issues are: Management and categorization of the contents, accessibility, and provision of information about experts for consultation.

First, the issue of content management and categorization could be addressed by classifying the content of the system based on, for example, type of knowledge or a subtype of knowledge. The user can access the content based on the knowledge type or subtype categories. Second, the respondents suggested that the system should be accessible. That means that the system contents should be both easy to access and navigate at any time, from any place, and through several platforms. Third, as participants recommended, the proposed system should offer a directory of expertise with

information about individuals' areas of expertise, their address and contact information for consultation services. The system should have this service under, for instance, a 'find experts' function or through the DOE services.

VI. CONCLUSION

KMS in public learning organizations can be a capable techno-management tool to improve performance in significant areas such as teaching and research. The combination of findings obtained from the interviews and from the intensive review of related literature has made it possible to develop the proposed KMSF. This framework is important as it has been developed based on the actual experience of several potential end users (knowledge workers). It is important, particularly, for academic institutions, which are knowledge-based organizations, to gain a better understanding of their academicians' KSB, and then design and implement an appropriate KMS that is compatible with their behavior. This study extends prior research in the field of KMS. Furthermore, it is a multi-disciplinary study that covers both the social field (represented by the human KSB) and the technology field (developing a KMSF). However, this framework cannot necessarily be generalized to represent all public learning organizations, because the study adopted a qualitative case study research method and was conducted at a single public university. The study has identified five factors that influence academicians' KSB, including building a good reputation, acknowledgement, desire to be knowledgeable, vision and mission, and reciprocity, and further research on why these factors affect academicians' KSB is recommended.

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