A Framework to Overcome Knowledge Sharing Barriers: Conversational Approach based on Web 2.0 and CoP

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Abstract: A key challenge emerging for organizations is how to encourage knowledge sharing within an organization because knowledge is an organization's intellectual capital and is of increasing importance in gaining a competitive business advantage. Isolated initiatives for promoting knowledge sharing and team collaboration without taking into consideration the limitations and constraints of knowledge sharing can halt any further development in the KM culture of an operation. Individual and social barriers often prevent effective knowledge sharing. It is therefore necessary to identify and eliminate or minimize as many barriers as possible.

This article investigates knowledge sharing bottlenecks and proposes the use of conversational knowledge sharing as an effective instrument for knowledge sharing. This paper determines the causes and effects of knowledge barriers and proposes solutions by using HOQ to develop strategies. The article introduces a financial company case study as an example of conversational knowledge sharing. Then, the developed strategies are applied to Company K.

Keywords: Knowledge sharing, Barriers of knowledge sharing, Conversational approach, CoP, Web2.0, HOQ

I. Introduction

Knowledge sharing is the most important critical success factor of all knowledge management strategies. Effective knowledge sharing practices implies the action of individuals to reuse and regenerate knowledge at the individual and organizational level [5]. However, at the heart of knowledge sharing, two types of bottlenecks exist; individual and organizational barriers. Individual barriers include internal resistance [2], trust [2], motivation [7] and a gap in awareness and knowledge [3]. Organizational barriers consist of language [3], conflict avoidance [3], bureaucracy [7] and distance [19]. Effective knowledge sharing occurs when appropriate solutions are built into an organization.

Despite the wide agreement that knowledge sharing occurs within a social context, current attempts at effective knowledge sharing continue to put a heavy emphasis on knowledge delivery and technology [11]. However, knowledge sharing is basically about people's interaction and its byproduct. This requires a great shift of focus from a technology-driven approach to a people-driven approach in the area of knowledge management [4]. In other words, with the evolution of technology, the paradigm of knowledge management is shifting from a conventional approach to a conversational approach. With technology as the medium, new conversational based knowledge management is characterized by a combination of formal and informal knowledge sharing within a social context.

As the focus is put on human factors, the main limitations for effective knowledge sharing such as collaboration are related to human nature and the lack of an adequate motivation policy [11]. In this context, conversational knowledge sharing appears to be an instrument which can overcome behavior constraints and help to manifest the emergence of a new organizational culture. For these reasons, we noticed not only the need for guidelines to overcome barriers to knowledge sharing in organizations but also the need for improvement in conversational knowledge sharing approaches to overcome barriers to knowledge sharing in organizations.

The main objective of this paper is to investigate knowledge sharing barriers and to propose the use of conversational knowledge sharing based on CoP (Community of Practice) and Web 2.0 to remove barriers. This study demonstrates the opportunity for more effective knowledge sharing through the application of the conversation driven SECI model based on knowledge sharing. Also, this study empirically analyzes an integrated operation and a maintenance community as a case study to provide evidence for the feasibility and effectiveness of the proposed approach. In order to provide a deep understanding of conversational knowledge sharing, the means to break down the barriers to knowledge sharing will be discussed in more detail via a case study.

In order to seeking a solution to the problems of organizational knowledge sharing, this paper makes the following argument. Section 2 gives an overview of knowledge sharing in organizations including two types of knowledge sharing barrier and some of the previous approaches taken to overcome knowledge sharing barriers. Then, Section 2 investigates the knowledge management paradigm in conversational knowledge sharing and examines in involvement of CoPs and Web 2.0. Section 3 proposes a framework for overcoming barriers of knowledge sharing based on conversational approach in an organization. Section 4 explains the integrated operation and maintenance of a conversational knowledge management system as a case study. Finally, section 5 gives conclusions and implications.

II. Related Works

Knowledge sharing in an organization

According to Nonaka and Takeouchi (1995), knowledge creation should be considered as a process whereby knowledge held by individuals is amplified and internalized as part of an organization's knowledge base. From this point of view, organizational knowledge is gradually accumulated and managed at the individual level [23]. Members in the organization obtain, store, use, and modify the knowledge in their daily activities at work [15]. Thus, knowledge is created and shared through interaction between individuals at various levels in the organization. In other words, organizations cannot create knowledge without individuals and a group, and the knowledge is likely to have a limited impact on organizational effectiveness unless individual knowledge is shared with other individuals and the group.

Knowledge sharing is basically the act of making knowledge available to others within the organization. Knowledge sharing between individuals is the process by which knowledge held by an individual is converted into a form that can be understood, absorbed and used by other individuals. Knowledge flow is concerned with the development of channels or networks between knowledge providers and seekers [22]. Knowledge flow in an organization is fundamentally driven by communication processes and information flows.

Knowledge sharing between individuals is also regarded as a process contributing to both individual and organizational learning [18]. Huber (1991) identified four further knowledge concepts that contribute to organizational learning; knowledge acquisition, information distribution, information interpretation and organizational memory. The concept of knowledge sharing presented in this article is linked to both knowledge distribution and knowledge acquisition. The voluntary act of sharing knowledge by an individual contributes to knowledge distribution. The process of sharing may also result in knowledge acquisition by other individuals within the organization. Knowledge sharing between individuals thus results in individuals learning, which in turn may contribute to organizational learning.

Barriers to knowledge sharing in an organization

We can regard internal resistance, trust, motivation and a gap in awareness and knowledge as the main individual barriers. Passing on knowledge to colleagues or putting work results into a knowledge database may be felt and considered as a revelation, because it announces that this knowledge has a certain value and is uncommon. Also, trust is an influence on both the receipt and the propagation of knowledge. If an individual does not trust the information or knowledge that they receive, they cannot enjoy the full benefit of information or knowledge obtained [2]. At the same time, some employees do not anticipate reciprocal benefits from transferring their knowledge to other since they do not just accept these benefits or they do not acknowledge the existence of reciprocal benefits [7]. In addition, some workers have largely only an awareness of problems but they do not know anything more. It has an influence in that they do not want to listen to things again that they already know [3].

On the other hand, we can identify language, conflict avoidance, bureaucracy [7] and distance as the main social barriers. Sometimes certain languages are used only in one section such as a department or division so it is unintelligible for others [3]. The result is that in some companies the lack of a primary language is a perceptible problem for knowledge sharing [14]. And sometimes we can observe the effort people make to avoid change and to not risk too much. This can influence knowledge and approaches negatively. Eventually new ideas and innovative points of view can be lost [3]. Also, high levels of bureaucracy from organizational institutions often result in the use of procedures and approaches that have a negative effect on knowledge sharing. In addition geographical separation may also result in the companies working in different cultural, legislative or linguistic environments. Face-to-face communication is the most efficient method of communication, but the geographical location of the organizations may mean that this is not possible [19].

To overcome the knowledge sharing barriers that existed for individuals and organizations, several papers have suggested methods. McDermott and O'Dell (2001) identified culture as one of the key inhibitors of effective knowledge sharing. So he proposes a link between sharing knowledge and solving business problems; builds a framework on the existing networks people use in their daily work. However, this approach just focuses on links and the collection of knowledge in a centralized repository and its accessibility.

Rosen et al. (2007) conducted research on how assigned constraints in building trusting relationships can be a barrier to knowledge sharing (e.g technology constraints on knowledge sharing or failure to develop a memory system.) As a best practice solution for overcoming barriers, he mentioned the need to adapt technology to what a virtual team needs by building a memory system. Yet it is a notional approach and it just focuses on the collection of knowledge technology and does not focus on conversational knowledge management.

Paradigm shift from conventional KM to conversational KM

With the evolution of technology, the paradigm of knowledge management is shifting from a conventional approach to a conversational approach. Traditional knowledge management focuses on the collection of knowledge in a centralized repository and making it accessible. In other words, a knowledge network in an organization is the key enabler for knowledge workers to communicate with each other [24]. An organization is capable of linking valuable knowledge that resides in

business competencies into a shared domain based using information and communication technology. Also, Lan and Unhelkar(2005) explained that the knowledge sources of an organization should originate from both intra and inter organizational sources.

In contrast, conversational knowledge management focuses on the knowledge network infrastructure and collaboration for knowledge creation among knowledge workers. Wagner (2006) identified knowledge acquisition bottlenecks and proposed the use of collaborative conversational knowledge management to remove them. Iverson and Mcphee(2002) described the new approach to knowledge management as a "Community of Practice (CoP)". A CoP is a group of people who have worked together over a period of time and through extensive communication have developed a common sense of purpose and a desire to share work-related knowledge and experience. Members of a CoP may not stay in the same geographical location, share the same time zone or use the same operating systems but should be on the same knowledge network [17].

From the available state-of-the-art KM techniques, Web 2.0 has emerged as the driver to enable more advanced technological support for user's knowledge work [26]. The term was officially coined in 2004 by Dale Dougherty, a vice-president of O'Reilly Media during an internal team discussion while planning a future Web conference. Following its conception by O'Reilly Media, Web 2.0 has taken on an important role in the KM field. Web 2.0 utilizes the idea of an open source environment. Its primary purpose is to share goals, share the work and share the results [8]. So Web 2.0 opens the possibility of a two-way interactive method to enable knowledge providers to contribute knowledge content to a shared domain. Moreover, knowledge content can be edited and fine-tuned to maintain its up-to-date status at any time [17]. Also Web 2.0 applications can maximize the enormous collective intelligence of a user community while also providing a benefit to each individual user [10].

In order to share dynamic knowledge within a real-time process, it needs to communication tool, creation of social networks, shared organizational goals and objectives, learning entities in an organization. CoP and Web 2.0 can be identified as effective tools for the creation, usage, distribution and application of knowledge. Therefore, the conversational approach is a powerful driver for knowledge sharing between the members of an organization.

III. Research framework

Overview of research framework

The overall framework of this research is shown in Fig. 1 and the framework consists of six phases. In this study, the house of quality (HOQ) is used to find the solutions to overcome the barriers to knowledge sharing outlined in Phase 1 to Phase 3. As with ordinary HOQ processes, the "What" and "How" variables are established in Phase 1 and

Phase 2 respectively. The relationship between the "What" and "How" variables is identified in Phase 3. Based on the Important-Performance Matrix, applicable strategies to yield participation, sharing and openness between employees will be developed in Phase 4.

Phase #1: List of customer requirements

The basic concept of QFD is to translate the desires of customers into product design or engineering characteristics, and subsequently into characteristic parts, process plans and production requirements. Each translation uses a matrix, called the HOQ, for identifying Customer Requirements (CRs) and establishing the priorities of Design Requirements (DRs) to satisfy the CRs [9]. The HOQ offers casual connection between customer's requirements and engineering characteristics.
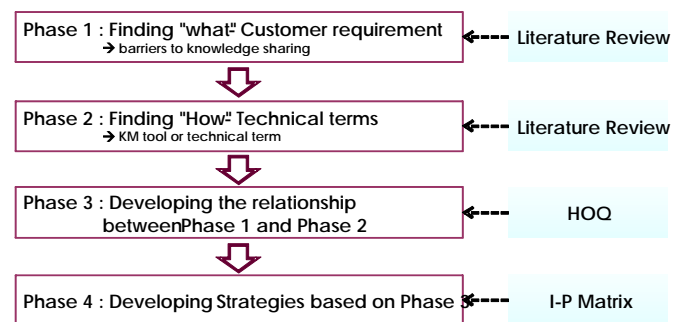

Figure 1 The research procedure

So in this study, the typical HOQ processes used in various applications are customized to solve the problems of knowledge sharing. The barriers to knowledge sharing can be the problems that individuals or organizations need to solve and both the KM tool and the technologies based on conversational knowledge sharing can be considered as engineering characteristics. The proposed application of HOQ is to examine the choices of KM tools and techniques against the requirements and objectives of Knowledge sharing. The attempted approach is to select the appropriate KM tools and technologies and then propose the type of KMS for the particular case. Fig. 2 represents the elements of HOQ for this application.
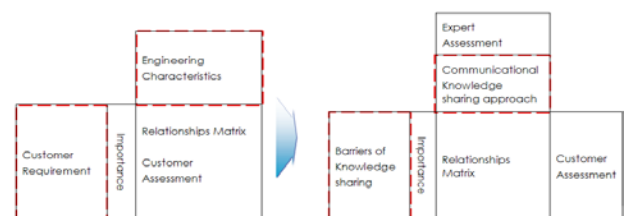

Figure 2 Application of HOQ

Phase #2: List of technical terms

Phase 2 is a step which derives the engineering characteristics to overcome the barriers to knowledge

sharing. The engineering characteristic of this problem is the conversational knowledge sharing approach. To derive engineering characteristics, previous literature reviews about improving KMS through the use of HOQ were extensively searched. The engineering characteristics found in the literature are set as the "how" variables. The 'How' variables are further modified to include the characteristics of CoP and Web 2.0 technology in order to find a KM tool that shares conversational knowledge. Integration, link, speed, bandwidth, security, real-time communication, video conference, bulletin board, e-learning, discussion forum and e-paper are also mentioned in the literature review. Variables relating to CoP and Web 2.0 will be established from the results of the literature review and presented in section 2.4. The characteristics of CoP are Informal space, Interaction, Best practice, Self motivation and Learning. These CoP characteristics are used as variables. The characteristics of Web 2.0 technologies are AJAX, RSS, Wikis and Blogs. These characteristics of Web 2.0 are set as 'how' variables.

Phase #3: Developing the relationship
Phase 3 is a step which establishes the cause and effect relationship for the variables found in Phase 1 and Phase 2. To find the relationship, the importance and customer satisfaction of barriers to knowledge sharing are surveyed from users of KMS in a 5 point likert-scale. Then, by using an interview and meetings with a knowledge management operator, and KMS developer, the correlation between barriers, KM tools, and techniques is examined. The purpose of the interview and meeting is to examine the existing applicable technologies for KMS. A strong correlation, semi-strong correlation, weak correlation and no correlation are assigned to the scare as 9, 3, 1, and 0 points respectively. The next step is to have a meeting with a KMS developer and knowledge management manager to reflect the first correlation found in the survey. The purpose of this meeting is to examine time, human resources, development difficulty and company conditions and include these in the correlation matrix. Based on the HOQ calculation results, the priorities of required technologies, actual existing barriers to the success of knowledge sharing and parts that need improvements in KMS are analyzed.

Phase #4: Developing strategies
In this study, Importance-Performance Matrix analysis is performed with relative importance and satisfaction of eight knowledge sharing constraints in final HOQ constructed.
X-axis, the performance completion, represents customer satisfaction per each indicator. Y-axis, importance, represents the relative importance per indicator.
The value of X-axis is converted to 100 points from 5 points Likert-scale which is used in the survey. Since the Y-axis is the relative importance, the sum of points of 8 indicators is 1. The reference values of importance and performance completion are determined by the middle value obtained

from the survey.
Based on the analysis result of Importance-Performance Matrix, the location of constraints in I-P matrix is identified. Then, in order to properly identify the correlation between each constraint and the knowledge sharing tools, HOQ based Relationship Matrix is analyzed. The strategies to improve barriers presented in constraints are developed based on the result of Relationship Matrix.

IV. Case Study

Company K is an institution in charge of operating diversified easy-to-use payment services for member banks and customers through the establishment of a payment system serving as the core infrastructure for the Korean financial industry. It was established in 1986, and it has about 800 employees. A knowledge management project in company K started in 2001. The knowledge management system for company K was constructed in 2002 and converted into a portal service system in 2004. Recently the core knowledge management of the company was carried out based on the CoPs activities. The CoPs activities were launched in 2006. It consists of job practice CoPs, project CoPs, learning & research CoPs and special interest groups. To illustrate the applicability of this research, a survey was conducted on company K's KMS based on this research methodology.

Developing the relationship
For steps 1 and 2, as explained earlier, two stages are already defined for the survey in section 3.2, and 3.3. For the step 3 activities, we composed a questionnaire based on an activity check list as specified in Fig. 3. The survey for this study consists of 26 questions asking the relative importance of each measure based on Fig. 3, and 8 questions asking about customer satisfaction. Relative importance was asked for on a 9 point likert-Scale, and customer satisfaction was asked for on a 5 point likert-scale. The survey questionnaires were distributed to the employees of company K who actually used KMS between Oct 12, 2009 and Oct 16, 2009 through e-mails and interviews. 40 out of the total of 60 distributed surveys were collected and analyzed. The 8 factors about barriers to knowledge sharing were analyzed to find the relative importance of each factor by using the AHP parallelism comparison technique. For parallel comparison, the Consistency Index was checked using the Expert 2000 software. Nine datasets with a confidence index greater than 0.2 were excluded from the analysis. Customer satisfaction about the existing KMS's barriers to knowledge sharing was analyzed in a 5 point Scale. The score was calculated by using the arithmetic mean of each factor as shown in Fig. 5. Scores for customer importance and satisfaction are presented in Fig. 5.
The analysis results indicate that Motivation, Internal Resistance and Bureaucracy exhibit a high relative importance to overcome barriers to knowledge sharing. The

result also implies that Conflict Avoidance, Bureaucracy and Language factors in the existing system needs to be improved in the existing system.

After conducting a survey of KMS users, interviews and meetings with KMS operators and developers were held in order to find the correlation between conversational knowledge sharing based KM tools and technologies. The result of the first interview and meeting is shown in Fig. 3.

Figure 3 Developing the relationship

Developing strategies

The result of Importance-Performance Matrix Analysis is shown in Fig. 4. The reference value of X-axis is 59, and of Y-axis is 0.118. Among 8 barriers, Internal resistance (IB-1) and Bureaucracy (OB-3) are located in the first quadrant, Language (OB-1) and Conflict avoidance (OB-2) are in the second quadrant, Motivation (IB-3) and A gap in Awareness and knowledge (IB-4) are located in the third quadrant. Finally, trust (IB-2) and Distance (OB-4) are located in the fourth quadrant.
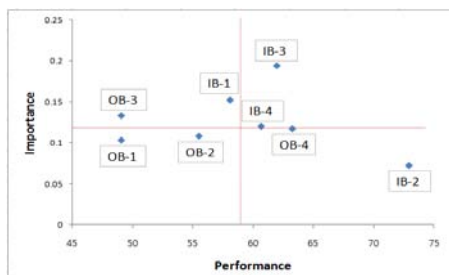

Figure 4 The result of I-P Matrix analysis

The results of Importance-Performance Matrix analysis indicate that internal resistance (IB-1) and Bureaucracy (OB-3) located in the first quadrant are the major barriers that need to be overcome in the short-term. The factors located in the first quadrant represent the high priority, but low performance. Thus, they are treated as short-term strategies. In order to find the correlation between each factor and knowledge sharing tools, as shown in Fig. 6, HOQ table was modified. Improvements on each factor are developed by combining knowledge sharing tools and HOQ tool which is presented in Fig. 5.

■ Strategy 1: Open-base learning space

CoP provides an informal space through a Q&A board and free discussion board which allows anonymity and reply functions. One can suggest new discussion topics in an open-management discussion. If the suggested topic is selected, the provider of a topic will be rewarded with KM points and gift certificates to facilitate the motivation of open-management discussion. An innovation mind channel of CoP is created to spread the organization's vision and strategies to organization members more effectively and to provide a place for employees and administrative managers to communicate with each other. A complimentary channel of CoP is also created to enhance the employees' connectivity to each other. Anonymity in discussions is guaranteed to induce more members to participate in discussions. The system also offers real time feedback on the original messages or replays. Also the system adds the recommendation function for the posted reply. The construction of CoP not only provides a new function but also provides improvements to the existing system through this upgrade.

Figure 5 The relationship between barriers of knowledge sharing and conversational knowledge sharing tools

■ Strategy 2: Linking between blog and CoP

By upgrading the existing KM system using Web 2.0 technologies, conversational knowledge sharing has been improved. Individual tacit knowledge such as know-how can be facilitated by warm support of the organization. The organization can support individual knowledge sharing by offering personal/experts blogs to each individual in organization, and providing a tagging function that enable member's blog connecting to others. The newest information on blog can be automatically forwarded to COP so that an issue of individual can be the issue of a whole organization or COP. On the contrary, an issue of organization or COP can be forwarded to personal blogs so that everyone can acknowledge organization's issue and provide opinions or solution regarding the issue.

■ Strategy 2: Personal communicational channel

By upgrading the existing KM system using Web 2.0 technologies, conversational knowledge sharing has been improved. First, from the KMS upgrade, non-members can request to access permission to member-only knowledge. If the permission is granted, a non-member can get access to knowledge. Second, KMS enhances the individual knowledge management function. The user can extensively manage their personal accounts and messages. Also users can search for data based on community title, author or tag.

A tagging function was added. The tagging function allows users to search for messages written by themselves and other knowledge more easily. Also users can put a tag on their favorite knowledge or the most useful knowledge. Lastly, a wiki function is added so that the author of a post and others can easily edit and update messages.

V. Conclusions

The knowledge management theoretical and practical literature review emphasized the need to overcome barriers to knowledge sharing as a major factor for the potential success of KM within an organization. Individual and social barriers often prevent effective knowledge sharing. It is therefore necessary to identify and eliminate or minimize as many of these barriers as possible.

To combat the individual and social barriers we proposed the use of conversational knowledge sharing to address the problems. Furthermore, we identified that knowledge management shifted from a conventional approach to conversational approach. So we examined the characteristics and limitations of CoP and Web 2.0, which are parts of a people-driven approach to knowledge management.

Based on a case study, and by using HOQ, we identified the cause and effect relationship for knowledge barriers and developed strategies to overcome them. Then, the developed strategies were applied to Company K.

With respect to all of the above information, this paper contributes as follows. Firstly, the developed strategies eliminated the knowledge sharing barriers based on the use of conversational knowledge sharing. As a result of the employee's participation, in a sharing and open manner, efficient and effective knowledge sharing became possible. Secondly, this research provided a causal connection to overcome the barriers to knowledge sharing in an organization. Also, the study matched Knowledge barriers with methods to overcome each matched barrier. Lastly, the research provided guidelines and methodology for successful conversational knowledge sharing. Based on this research's guidelines and methodology, other industry and organization's knowledge sharing problems can be solved..

References

[1] Alavi, M., 1999, Knowledge Management Systems: Emerging Views and Practices from the Field, Proceedings of the 32nd Hawaii International Conference on System Sciences, Hawaii, U.S.A., Jan. 5-8.

[2] Barson, R.J., Foster, G., Struck, T., Ratchev, S. and Pawar, K., 2000, Inter-and intra-Organisational barriers to sharing knowledge in the extended supply-chain, Proceedings of the eBusiness and eWork (e2000). Madrid, Spain, Oct. 18-20.

[3] Bureš, V., 2003, Cultural Barriers in Knowledge Sharing, *E+M Ekonomics and Management,* Liberec, 6, 57-62.

[4] Chatti, M.A., Klamma, R., Jarke, M. and Naeve, A., 2007, The Web 2.0 Driven SECI Model Based Learning Process, Proceedings of the 7th IEEE International Conference on Advanced Learning Technologies, Niigata, Japan, July 18-20.

[5] Chaudhry, A.S., 2005, Knowledge sharing practices in Asian institutions: a multi-cultural perspective from Singapore, Proceedings of 71th IFLA General Conference and Council, Oslo, Norway, Aug. 14-18.

[6] Chen, S.C., Yang, C.C., Lin, W.T. and Yeh, T.M., 2007, Construction of key model for knowledge management system using AHP-QFD for semiconductor industry in Taiwan, *Journal of Manufacturing Technology Management*, 18(5), 576-598.

[7] Disterer, G., 2001, Individual and social barriers to knowledge transfer, Proceedings of the 34th Hawaii international conference on system sciences, Hawaii, U.S.A., Jan. 3-6.

[8] Goetz, T., 2003, Open Source Everywhere, Wired, 11(11), Available online http://www.wired.com/wired/archive/11.11/opensource.html

[9] Hauser, J.R. and Clausing, D., 1988, The house of quality, *Harvard Business Review*, May–June, 63–73.

[10] Hoegg, R., Martignoni, R., Meckel, M. and Stanoevska-Slabeva, K., 2006, Overview of business models for Web 2.0 communities, Proceedings of the Workshop Gemeinschaften in Neuen Medien, Dresden, German, Sep. 28-29.

[11] Hong, D.G.., Koo, C.H. and Suh, E.H., 2009, Overcoming Barriers of Knowledge Sharing through Communities of Practice: A Case Study of Steel Company, *Korean journal of Information Systems Review*, 11(2), 131-145.

[12] Huber, G., 1991, Organizational learning: The contributing processes and the literatures, *Organization Science*, 2(1), 88-115.

[13] Iverson, J.O. and Mcphee, R.D., 2002, Knowledge management in Communities of Practice, *Management Communication Quarterly*, 16(2), 259-266.

[14] Krogh, G.V., 1998, Care in Knowledge Creation, *California Management Review*, 40(3), 133-153.

[15] Lam, A., 2000, Tacit Knowledge, Organizational Learning and Societal Institutions: An Integrated Framework, *Organization Studies*, 21(3), 487-513.

[16] Lan, Y. and Unhelkar B., 2005, Global Enterprise Transitions: Managing the Process, *IRM Press*, Hershey, PA, USA.

[17] Lee, M.R. and Lan, Y.C., 2007, From web2.0 to conversational knowledge management: Towards collaborative Intelligence, *Journal of Entrepreneurship Research*, 2(2), 47-62.

[18] Nidumolu, S.R., Subramani, M. and Aldirch, A., 2001, Situated learning and the situated knowledge web: Exploring the ground beneath knowledge management, *Journal of Management Information Systems*, 18(1), 115-150.

[19] Nonaka, I., 1991, The Knowledge-Creating Company, *Harvard Business Review*, 69(6), 96-104.

[20] Nonaka, I., and Takeuchi, H., 1995, The knowledge creating company: how Japanese companies create the dynamics of innovation, *Oxford University Press*, New York, NY, USA.

[21] Rosen, B., Frust, S. and Blackburn, R., 2007, Overcome Barriers to Knowledge Sharing in Virtual Teams, *Organizational Dynamics*, 36(3), 259-273.

[22] Shin, M., Holden, T., and Schmidt, R. A., 2001, From knowledge theory to management practice: towards an integrated approach, *Information Processing and Management*, 37(2), 335-355.

[23] Staples, S. D. and Jarvenpaa, S. L., 2001, Exploring perceptions of organizational ownership of information and expertise, *Journal of Management Information Systems*, 18(1), 151-183.

[24] Stewart, T. A. T., 2001, The Wealth of Knowledge, *Nicholas Brealy Publishing*, London, UK.

[25] Tan, K.C., Xie, M. and Chia, E., 1998, Quality function deployment and its use in designing information technology systems, *International Journal of Quality & Reliability Management*, 15(6), 634-645.

[26] Wagner, E.C., 2004, Wiki: A Technology for Conversational Knowledge Management and Group Collaboration, *Communications of the Association for Information Systems*, 13, 265-289.

[27] Wagner, E.C., 2006, Breaking the Knowledge Acquisition Bottleneck through Conversational Knowledge Management, *Information Resources Management Journal*, 19(1), pp.70-83.