KEY BARRIERS AND THEIR STRATEGIC RESPONSES TO ACTIVATE KNOWLEDGE SHARING IN CONSTRUCTION ORGANIZATIONS

Tae-Wan Kim and Hyoun-Woo Joh [1]

[1] Associate Researcher, Construction Strategy Research Institute, HanmiParsons, Seoul, Korea
Correspond to kimtw@hanmiparsons.com

ABSTRACT : Being in a knowledge-based industry, many construction organizations are seeking to manage their own knowledge in an effective way. To manage knowledge, the organizations must motivate in-house people to share their knowledge. However, some barriers to knowledge sharing do exist and researches on these barriers considering construction organizations' characteristics seem rare. This study aims to identify key barriers to knowledge sharing considering the characteristics of construction organizations. Based on the identification, strategic responses to each key barrier are presented in two perspectives of technical and behavioral approach to activate knowledge sharing.

Key words : Knowledge Management, Knowledge Sharing, Key Barrier

1. INTRODUCTION

As one of the most popular managerial concepts, knowledge management(KM) can be defined as the way in which organizations create, find, use, share and organize knowledge[1]. This phenomenon does not seem to be a passing phase with the rapid development of information technology, rising demands for measuring knowledge assets, the keen competition in a market, the changing business environment in a continuous and even unpredictable way and so on.

Construction is also a knowledge-based industry and construction firms have been managing knowledge informally for years. However, construction firms have begun to commit knowledge management officially while facing challenging internal and external environment. For example, in Korea, 20 entities of 30 largest construction companies have their own KM team in their organization openly[2].

To ensure that knowledge is available to be reused in an organization, individuals and project teams within construction firms have to share their own knowledge. However, some barriers to knowledge sharing do exist and researches on these barriers considering construction organizations' characteristics seem rare.

Therefore, this study aims at identifying barriers to knowledge sharing in construction organizations and prioritizing them to develop the key barriers list. And strategic responses to each key barrier are to be designed to activate knowledge sharing in construction organizations.

2. METHODOLOGY

This study is designed to combine these two knowledge area; the one is the barriers to knowledge sharing in general application area and the other is the characteristics of construction organizations. The characteristics of construction organization can be defined by literature review on the generally accepted natures of the industry and a survey of attitude of construction experts on knowledge sharing.

Considering those two factors, the key barriers which need to be eliminated or mitigated to increase knowledge sharing can be established. Then strategic responses to each key barrier are presented in two perspectives of technical and behavioral approach. The overall procedure is illustrated in figure 1.
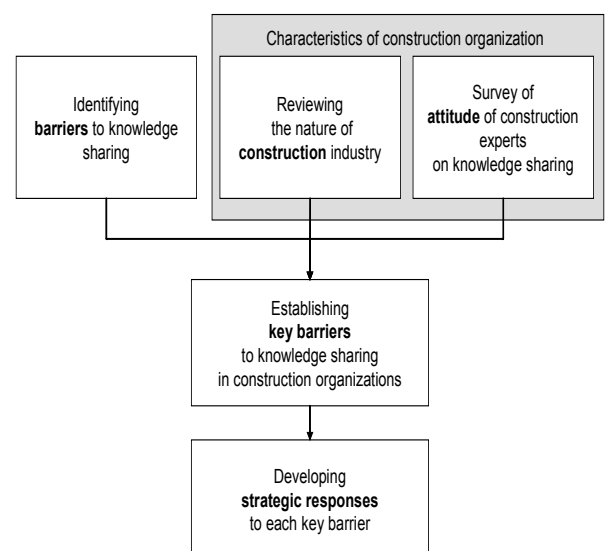

Figure 1. Overall procedure of the research

3. LITERATURE REVIEW

3.1 Knowledge Management and Knowledge Sharing

Something known that has more relevance and contextual meaning than something manifest, assumed or merely experienced is referred to as knowledge. Knowledge is a group of information, facts and framework of thoughts that are objective or verifiable[3]. KM is defined as the way in which organizations create, find, use, share and organize knowledge. In implementation, KM is an effort to benefit from the knowledge that resides in an organization by using it to achieve the organization's mission[4].

The origins of the term 'Knowledge Management' are obscure. However, an American information/AI origin, a Japanese knowledge creation/ innovation origin and a Swedish strategy/measuring origin notably contributed to the KM concept[5]. This implies that KM was generated concurrently throughout the world from the need of the business environment which includes:

(1) rapid development of information technology

(2) rising demands for measuring knowledge assets

(3) keen competition

(4) changing in a continuous and even unpredictable way

(5) loss of knowledge due to increasing turn-over and early retirement of employees

Sveiby analyzed the initiatives of KM and categorized into three groups shown in table 1[6].

Table 1. Initiatives and objectives of KM

Initiatives	Objectives
External Structure Initiatives	- gain information and knowledge from customers - offer customers additional knowledge - create new revenues from existing knowledge
Internal Structure Initiatives	- build knowledge sharing culture - capture, store, spread individuals' tacit knowledge - measure knowledge creating processes and intangible assets
Competence Initiatives	- create careers based on knowledge management - create micro environment for tacit knowledge transfer - support education with communication technology - learn from simulations and pilot installations

As one of the important processes in KM, knowledge sharing activities support internal structure initiatives. Knowledge sharing can be defined as voluntary activities associated with transferring or disseminating knowledge from one person to another person, to a group or to a knowledge archive[7]. As the word 'voluntary' implies, knowledge sharing strongly depends on individuals' active engagements. Therefore, chief knowledge officers, KM facilitators or team managers of organizations should motivate knowledge workers and eliminate barriers to activate knowledge sharing of their own organization.

3.2 Barriers to Knowledge Sharing

Barriers, or obstacles, to knowledge sharing in an organization can be seen in many documents and studies. Bock et al. organized barriers to knowledge sharing into five groups as natural, cognitive, motivational, structural and institutional barriers[7]. Shin classified barriers preventing effective knowledge sharing into four entities of source, context, knowledge transferred and recipient[8]. Disterer grouped 8 barriers into two categories of individual and social barriers[9]. Riege reviewed over three dozen potential knowledge-sharing barriers and categorized them into three domains: individual/personal, organizational and technological barriers[10]. These are of importance as they allow establishing an effective frame to identify and analyze barriers.

In this study, Riege's categorization method was adopted as a frame of listing barriers to knowledge sharing and each barrier of literatures is amended and summarized into one frame. Summarized barriers to knowledge sharing are shown in Table 2.

Table 2. Summary of barriers to knowledge sharing

Domains	Barriers
Individual	(a-1) lack of time (a-2) public good dilemma (a-3) poor communication skills (a-4) loss of power or hegemony (a-5) 'not-invented-here' mindset (a-6) lack of up-to-date knowledge (a-7) lack of commitment (a-8) lack in trust in people or the organization (a-9) personal differences (a-10) unfriendly relationships between source and recipient
Organizational	(b-1) bureaucracy and hierarchy (b-2) intolerance of failure (b-3) weaker co-location (b-4) preferences for 'hard data' over intuition (b-5) lack of managerial support (b-6) lack of transparent rewards and recognition systems (b-7) incoherent paradigms (b-8) shortage of infrastructure supporting knowledge sharing (b-9) in-house competition (b-10) inappropriate size of business units
Technological	(c-1) lack of integration of IT systems and processes (c-2) unrealistic expectations of employees as to IT systems (c-3) lack of familiarity and experience with IT systems

It has ten individual barriers, ten organizational barriers and three technological barriers. Public good dilemma(a-2) means that a knowledge asset contributed for the 'good of the organization' can be used by others regardless of whether or not they contribute in return[7]. 'Not-invented-here' mindset occurs when people are reluctant to learn from others' experience[1]. Personal differences include age, gender, language, national culture, experience levels, educational levels among people in an organization. As for bureaucracy and hierarchy(b-1), communication and knowledge flows can be restricted into certain direction and hierarchical organization structure inhibits or slows down most sharing practices[10]. Weaker co-location(b-3) has something to do with distances in time and space. 'Hard data'(b-4) means analytical, logical and rational data. And incoherent paradigms(b-7) can be generated when the integration of KM strategy and sharing initiatives into the company's goal and strategic approach is missing or unclear[10].

Though this list provides better understanding of knowledge sharing barriers, drawing some important barriers considering characteristics of construction organization is still needed. It is due to the scarcity of managerial resources. Because almost construction firms do not have enough resources to eliminate all of the barriers, they have to choose which barriers they should exert their effort to eliminate or mitigate.

The barriers that construction firms should concentrate their effort on with limited managerial resources are called key barriers in this study. Key barriers can be figured out by considering both general barriers to knowledge sharing and the characteristics of construction organization. This study regards the barrier with high relevance to the characteristics of construction organization as a key barrier.

3.3 Generally Accepted Nature of Construction Industry

Generally accepted nature of construction industry is shown in many construction documents and researches. Construction has many characteristics common to both manufacturing and service industries[11], and those can be accepted even without any proof. For example, construction firms have their own construction sites which are located far from each others.

In relation to communication, Emmitt and Gorse organized consistent characteristics of construction industry into three groups as follows[3]:

(1) Project dependent – lack of continuity within and between projects, different participants for each new project, and uniqueness of individual projects in their design and specification.

(2) Complex structure – temporary (ad hoc) arrangement of different organizations, difficulty in sharing an overall goal.

(3) Temporary supply chains – many different sectors for the supply of services and materials, temporary contact.

Baik and Kim[12] introduced eight characteristics of construction industry in relation to knowledge management as follows:
 - various and unique condition project by project

 - a number of participants
 - fluctuating and changing project environment
 - depending on quality human resources
 - low level of sharing of individuals' tacit knowledge
 - acceleration of information integration with the help of information technology
 - lack of endeavor to improve their own competency by research and development
 - focusing simply on financial status of projects

This nature of construction industry must be considered as an important factor to draw key factors to knowledge sharing in construction organizations. And it also plays an important role on establishing strategic responses to activate knowledge sharing in construction organizations.

4. KEY BARRIERS OF CONSTRUCTION INDUSTRY TO KNOWLEDGE SHARING

4.1 Survey of the Attitude of Construction Experts

In addition to identifying barriers to knowledge sharing and reviewing generally accepted natures of construction industry, a survey is needed to understand the attitude of construction experts toward knowledge sharing.

A questionnaire was constructed and used after a pre-test to measure the extent of the attitude of each barrier in table 2. Data were collected from experts in a construction company via internet. Respondents were encouraged to choose one answer for five-point Likert style questions regarding to each barrier: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, (5) strongly agree. Therefore the higher a value responded is, the more strongly people agree that a certain barrier prevents them from participating in knowledge sharing activities of construction organizations.

During two days, 87 respondents participated in the survey and about 75% of them(65 respondents of 87) had experienced any knowledge sharing activities. The number of year respondents had worked in construction industry averaged about 14. Though the survey was conducted in only one construction organization, there seems to be no problem in figuring out the attitude of construction experts to barriers to knowledge sharing. Results of the survey in mean value and rank by domains are shown in Table 3.

Table 3. Results of the survey

Barriers	Mean	Rank
(a-1) lack of time	2.6	2
(a-2) public good dilemma	1.9	7
(a-3) poor communication skills	2.4	3
(a-4) loss of power or hegemony	1.8	8
(a-5) 'not-invented-here' mindset	2.0	5
(a-6) lack of up-to-date knowledge	2.9	1
(a-7) lack of commitment	1.8	8
(a-8) lack in trust in people or the organization	1.7	10
(a-9) personal differences	2.0	5
(a-10) unfriendly relationships between source and recipient	2.2	4

Barriers	Mean	Rank
(b-1) bureaucracy and hierarchy	2.5	7
(b-2) intolerance of failure	2.9	3
(b-3) weaker co-location	2.5	7
(b-4) preferences for 'hard data' over intuition	2.4	10
(b-5) lack of managerial support	3.0	2
(b-6) lack of transparent rewards and recognition systems	3.3	1
(b-7) incoherent paradigms	2.8	5
(b-8) shortage of infrastructure supporting knowledge sharing	2.9	3
(b-9) in-house competition	2.6	6
(b-10) inappropriate size of business units	2.5	7

Barriers	Mean	Rank
(c-1) lack of integration of IT systems and processes	2.7	2
(c-2) unrealistic expectations of employees as to IT systems	2.9	1
(c-3) lack of familiarity and experience with IT systems	2.4	3

There seems to be a somewhat underestimation in the individual domain because it is looked like a self-assessment to respondents. This illustrates why barriers in each domain were ranked separately.

4.2 Development of Key Barriers to Knowledge Sharing

The results of survey were studied to identity key barriers to knowledge sharing in construction organizations. Expertise on the nature of construction industry was used in the study. Of highly ranked barriers, 'lack of managerial support'(b-5) was excluded because it covers all the causes of barriers and the management has the total responsibility of sharing an organization's knowledge effectively and efficiently. 'Unrealistic expectations of employees as to IT systems'(c-2) were also excluded because the respondents seemed to focus on their lack of knowledge of IT systems rather than to focus on its impact on knowledge sharing.

As a result, seven key barriers to knowledge sharing in construction organizations are developed as follows:

(1) lack of time – Construction projects are the endeavors to produce different, unique products and need a great deal of efforts. Furthermore, they have their own time limits as one of their objectives, which makes people involved in projects to feel like being busy all the time. It prevents construction experts from having their time to share their own knowledge.

(2) poor communication skills – In many cases, construction experts have not experienced any lecture on communication methodology. Therefore, they tend to be in difficulty when they are to share or transfer what they know. The lack of communication skill becomes more serious when they have to share tacit knowledge.

(3) lack of up-to-date knowledge – Though not having been much stated in literatures, this barrier seems to be one of key barriers which prevent many construction experts from sharing their knowledge continuously. It leads to low quality of knowledge shared as time goes on.

(4) intolerance of failure – Causes, countermeasures and results of failure of projects should be recorded, analyzed and disseminated to acquire lessons learned. However, many experts in construction organizations try to hide their failures fearing the organization's intolerance of failure.

(5) lack of transparent rewards and recognition systems – A transparent rewards and recognition system motivates people to share more of their knowledge. Though there has been a debate about the effectiveness of both reward and recognition, it is clear that the opaque systems ruin KM of an organization.

(6) shortage of infrastructure supporting knowledge sharing – Many construction companies have a number of construction sites in which construction projects are managed. Because they are not co-located in a place, the organization do not have enough infrastructure such as meeting room, hallway and IT system to encourage people to share their knowledge.

(7) lack of integration of IT systems and processes – This concerns about the compatibility between diverse IT systems and processes. Construction organizations have many IT systems like PMIS(Project Management Information System), intranet system, KMS(knowledge management system), EDMS(electronic document management system), and so on. However, almost construction organizations seem to have a difficulty in integrating those IT systems and work processes.

Construction organizations should concentrate their limited resources and effort on these seven key barriers to activate knowledge sharing effectively. And possible responses should be established to each key barrier.

5. STRATEGIC RESPONSES TO KEY BARRIERS

5.1 Two Approaches to Activate Knowledge Sharing

In general, possible responses to key barriers to knowledge sharing can be divided into technical and behavioral approaches.

The technical approach emphasizes mathematically based models. The disciplines that contribute to the technical approach are computer science, management science and operations research. Meanwhile, behavioral approach concerns about behavioral issues that arise in the development and long-term maintenance of KM systems. Issues such as strategic business integration, design, implementation, utilization, and management cannot be explored usefully with the models used in the technical approach. Therefore, behavioral approach concentrates on changes in attitudes, management and organizational policy, and behavior[13].

No single theory or perspective dominates. Organic uses of two approaches can lead to successful responses to activate knowledge sharing.

5.2 Development of Strategic Responses to Key Barriers

Table 4 shows possible strategic responses to each key

barrier to activate knowledge sharing. Each key barrier may have technical approaches, behavioral approaches, or both of them. Chief knowledge officers and knowledge management facilitators of construction organizations can determine which response is applicable to their own organizations and to what extent they should execute the strategy. Therefore, it must be deeply relevant to the culture and characteristics of the organization they belong to.

Table 4. Possible response to seven key barriers

Key Barriers	Technical	Behavioral
lack of time	work templates	organizational slack
poor communication skills		education/ training
lack of up-to-date knowledge		organizational slack, emphasis on lifelong education
intolerance of failure		cultural change
lack of transparent rewards and recognition systems	transparency index	emphasis on transparent systems
shortage of infrastructure supporting knowledge sharing	efficient IT systems, office design	hallways
lack of integration of IT systems and processes	efficient IT systems, flowcharting	

Developing and offering work templates, an organization can allow people to work efficiently and to have extra time to participate in knowledge sharing activities. And work templates also make it easier to be shared through the whole organization.

An organizational slack can mean building non-chargeable time into peoples' work schedules, allowing people to experiment with different solution to a problem or making sure that people with specialist knowledge are not fully committed to projects – so they have time to help out and share knowledge as problems arise[1]. It also can help experts have time to learn up-to-date knowledge along with the emphasis on lifelong education.

Construction experts can be better knowledge activists when they are educated and trained to understand how to communicate with other people. Knowledge activists have these three roles: (1) catalysts of knowledge creation, (2) connectors of knowledge creation initiatives and (3) merchants of foresight[14]. The more construction experts become knowledge activists, the better KM of an organization should be activated.

Intolerance of failure should be solved through cultural changes. A knowledge festival to collect failure cases can be considered to change culture and peoples' mindsets.

A transparency index may be needed to measure and monitor the extent of transparency of rewards and recognition systems. And the management should emphasize on the importance of transparent systems.

While many construction organizations are investing in diverse IT systems, more attentions should be taken to the efficiency of the systems. The management should figure out if IT systems obstruct work routines and communication flows or not. Work processes in construction organizations should be examined in more detail using flowcharting techniques.

Company floor layout or spatial arrangements of work area can be considered to settle the shortage of infrastructure supporting knowledge sharing. Traditionally, offices and even departments tend to be arranged along hierarchies or management seniority rather than focusing on who needs to work together regularly and identifying which person benefits the most from the exchange of knowledge[10].

Hallways are places where collective meaning is made – in other words, meaning is not just exchanged, it is constructed in the dialogue between organizational members. Following is six characteristics of hallways: (1) reliance on discussion, not speeches, (2) egalitarian participation, (3) encouragement of multiple perspectives, (4) nonexpert-based dialogue, (5) use of a participant-generated databases and (6) the creating of a shared experience[15]. Providing hallways in an organization can play a positive role.

6. CONCLUSION

In recent years, KM has captured the attention of both academics and practitioners. And knowledge sharing is the corner-stone of many organizations' KM strategy. However, some barriers to knowledge sharing exist and researches on these barriers considering construction organizations' characteristics seem rare.

This study was conducted to identify key barriers to knowledge sharing in construction organizations and to develop strategic responses to each key barrier to activate knowledge sharing in construction organizations. To do this, barriers to knowledge sharing were examined through literature reviews. Then, key barriers were established by reviewing the nature of construction industry and conducting a survey of attitude of construction experts on knowledge sharing. Based on these findings, strategic technical or behavioral responses to each key barrier were developed to activate knowledge sharing.

Major contributions of this study are as follows:

(1) Barriers to knowledge sharing were collected and summarized in one frame.
(2) Seven key barriers considering construction organizations' characteristics were identified using survey, literature review and expertise.
(3) Possible countermeasures to activate knowledge sharing were presented to each key barrier.

Future research on application strategies of each response is required to gain more usability. And more refined survey can be carried out to obtain extra information on barriers to knowledge sharing in construction organizations.

REFERENCES

[1] Payne, J., *Demystifying Knowledge Management: A Best Practice Guide for the Construction Industry*, Constructing Excellence, 2004.

[2] Baik, J. and Kim, J., "Correlation between Knowledge Management and Business Performances of Construction Corporations", *Journal of Architectural Institute of Korea*, Vol. 19(2), pp. 167-176, 2003.

[3] Emmitt. S. and Gorse, C., *Construction Communication*, Blackwell Pub., 2003.

[4] McInerney, C., "Knowledge Management and the Dynamic Nature of Knowledge", *Journal of the American Society for Information Science and Technology*, Vol. 53(12), pp. 1009-1018, 2002.

[5] Sveiby, K., "Knowledge Management – Lessons from the Pioneers"*, http://www.sveiby.com/*, 2001.

[6] Sveiby, K., *The New Organizational Wealth: Managing and Measuring Knowledge-Based Assets*, Berrett-Koehler, 1998.

[7] Bock, G., Zmud., R., Kim, Y. and Lee, J., "Explaining Knowledge Sharing in Korean Firms: Effects of Individual Agency and Organization Climate", *Working Paper(KGSM-KMRC-2003-03), Knowledge Management Research Centre*, KAIST, 2003.

[8] Shin, M., "A framework for Evaluating Economics of Knowledge Management Systems", *Information & Management*, Vol. 42, pp. 179-196, 2004.

[9] Disterer, G., "Individual and Social Barriers to Knowledge Transfer", *Proceedings of the 34th Hawaii International Conference on System Sciences*, pp. 3008-3014, 2001.

[10] Riege, A., "Three-dozen Knowledge-Sharing Barriers Managers Must Consider", *Journal of Knowledge Management*, Vol. 9(3), pp. 18-35, 2005.

[11] Barrie, D. and Paulson, B., *Professional Construction Management, 3rd ed.*, McGraw-Hill, Inc., 1992.

[12] Baik, J. and Kim, J., "Implementing Knowledge Management for a Competitive Enhancement in Construction Company", *Journal of Architectural Institute of Korea*, Vol. 19(3), pp. 131-138, 2003.

[13] Laudon, K. and Laudon, J., *Essentials of Management Information Systems: Organization and Technology in the Networked Enterprise, 4th ed.*, Prentice Hall, 2001.

[14] Krogh, G., Nonaka, I. and Ichijo, K., "Develop Knowledge Activists!", *European Management Journal*, Vol. 15(5), pp. 475-483, 1997.

[15] Dixon, N., "The Hallways of Learning", *Organizational Dynamics*, Vol. 25(4), pp. 347-356, 2004.