Knowledge Management Enablers and Process in Hospital Organizations

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Objectives: This research aimed to investigate the effects of knowledge management enablers, such as organizational structure, leadership, learning, information technology systems, trust, and collaboration, on the knowledge management process of creation, storage, sharing, and application.

Methods: Using data from self-administered questionnaires in four Korean tertiary hospitals, this survey investigated the main organizational factors affecting the knowledge management process in these organizations. A total of 779 questionnaires were analyzed using SPSS 18.0 and AMOS 18.0.

Results: The results showed that organizational factors affect the knowledge management process differently in each hospital organization.

Conclusion: From a managerial perspective, the implications of these factors for developing organizational strategies that encourage and foster the knowledge management process are discussed.

Key Words: hospital organization, knowledge management, knowledge management enablers, knowledge management process

INTRODUCTION

Knowledge management (KM) has been recognized as being central to product and process innovation, executive decision making, and organizational adaptation and renewal [1]. To achieve competitive sustainability, many organizations are launching extensive KM efforts [2]. Several KM enablers have been recognized in previous research and many of these factors overlap [3–5]. In this research, KM enablers are categorized into six categories such as organization structure, leadership, information technology (IT) systems, learning, trust, and collaboration. KM starts with the process of knowledge creation, knowledge storage, knowledge sharing, and knowledge application among employees to support the organization becoming more competitive. Several studies have demonstrated that the KM process is essential because it enables organizations to enhance innovation performance and reduce redundant learning efforts [6,7]. Moreover, when individual members share their knowledge or expertise, it is crucial for organizations to increase significant organizational resources and decrease time wasted in trial-and-error [8]. However, the lack of a KM process has proven to be one of the major barriers to effective KM [9]. The success of an organization ultimately depends on the KM process, which creates long-term benefits, learns new techniques, solves problems, creates core competencies, and adapts to new situations [10].
Hospital organizations are knowledge-intensive environments involving rapidly changing medical technologies, requiring tools, skills, and methods with more knowledge resources. Hospital organizations have been interested in communities of practice as a means of transferring and generating knowledge within them [11–14]. However, unlike other organizations, hospital organizations reveal one of the most complex structures in our society. They require a highly divergent set of activities, such as providing health care, testing, diagnosis, and treatment and planning and executing hospitalization, surgical interventions, and other procedures, as well as understanding complicated decision-making processes and networks. Due to the organizational culture and systems within hospital organizations, setting up successful KM has not been easy. Different departments within them must adopt the KM process to share employees' new knowledge and various techniques in a number of ways [15]. Various studies have focused on the relationship between KM enablers and processes [16–18]. However, studies in the healthcare field concerning how KM enablers affect the KM process remain rare. The KM process rests in the brain of the person who has this particular knowledge [19]. Therefore, hospital organizations need to understand organizational structure, culture, and systems to perform successful KM.

Concepts derived from a literature review of KM, its enabling factors, and the KM process have been presented in this section. The next section describes the research model and then reviews data collection and data analysis. The subsequent section presents the results of this study. The last section is a discussion of this study’s findings and the conclusions of this research.

**Figure 1.** Research model. IT, information technology.

**Table 1.** Background information of respondents

| Variable               | Hospital A (n = 205) | Hospital B (n = 191) | Hospital C (n = 187) | Hospital D (n = 196) |
|------------------------|---------------------|----------------------|----------------------|----------------------|
| Location               | Seoul               | Seoul                | Gyeonggi-do          | Seoul                |
| Public verse private   | Private sector      | Private sector       | Public sector        | Private sector       |
| Hospital history (y)   | 25 more             | 130 more             | 10 more              | 20 more              |
| No. of employees       | Around 7,600        | Around 6,000         | Around 3,000         | 7,500 more           |
| No. of beds            | 2,600 more          | 1,700 more           | 1,200 more           | 1,900 more           |

**MATERIALS AND METHODS**

**1. Hypotheses and research model**

This research hypothesizes that the four modes of the KM process are subject to several organizational forces by hospital organizations and their management. Based on the previous literature review, we proposed that organizational structure, leadership, IT systems, learning, trust, and collaboration affect the KM process, and we aimed to assess their influence in four different hospitals. The following research model is derived from the previous discussion on the influence of KM enablers on the KM process (Figure 1).

This study did not propose definite hypotheses about which constructs positively or negatively affect KM processes, but rather it aimed to compare the importance of these organizational forces for each hospital.

**2. Sample and data collection**

The main criteria for selecting the subjects were that they must be knowledge workers involved in some knowledge tasks in their hospital organizations. Because hospitals mainly focus on medical and administrative areas, it is difficult to identify KM enablers and the KM process questions. Therefore, this survey only focused on large-sized hospitals that have a vision and a mission about hospital management, medical care, research and development, education, hospital culture and systems, and their employees’ minds including “Medical Innovation” and “Administration Innovation” strategies. There are 43 tertiary hospitals in Korea. From these 43 tertiary hospitals, a sample of 779 employees including nursing specialists, clinical technicians, and administrative staff were randomly selected from 4 tertiary hospitals in Seoul and Gyeonggi-do. All the participants voluntarily took part in this research and were also diverse in terms of gender and position (Table 1). The current study contributes to KM research by further clarifying which KM enablers are essential for the KM process to occur effectively. The survey that is analyzed in this paper is part of an effort to measure the success of this initiative.

To measure the variables, this study used a multiple-item scale.
derived from existing studies. The quantitative analysis is drawn from a 69-item questionnaire using a 7-point Likert scale (ranging from 1 = strongly disagree to 7 = strongly agree). The questionnaire items were set up to inhibit insincere answers and then normalized. Scores closer to 7 were interpreted as positive, while scores closer to 1 were negative. The questionnaire itself was developed over many years with the collaboration of KM researchers from several universities in Korea.

The total number of respondents for the targeted hospitals was 779, with hospital A accounting for 26.3% (205), hospital B 24.5% (191), hospital C 24.0% (187), and hospital D 25.2% (196) of respondents.

3. Measures

To select relevant constructs, this study adopted an exploratory approach in which several factor analyses were conducted with KM enablers and KM process factors. The independent constructs were related to KM enablers including organizational

Table 2. Results of factor analysis of constructs

| Constructs              | Factors                                      | Cronbach’s α | Factor loading |
|-------------------------|----------------------------------------------|--------------|----------------|
| Organizational structure| Decentralization                             | 0.574        | 0.689          |
|                         | Formalization                                |              | 0.770          |
|                         | Centralization                               |              | 0.614          |
| Leadership              | Strong will for KM                          | 0.911        | 0.798          |
|                         | Creative environment support                 |              | 0.789          |
|                         | Material support                             |              | 0.787          |
| IT systems              | Distinguished IT systems                     | 0.917        | 0.685          |
|                         | Support for policy and administration        |              | 0.690          |
|                         | Utilization for decision-making and work     |              | 0.692          |
| Learning                | Continuing study of the learning process     | 0.888        | 0.807          |
|                         | Wide variety of education and training       |              | 0.730          |
|                         | Encourage the creativity                     |              | 0.724          |
| Truth                   | Openness                                     | 0.910        | 0.822          |
|                         | Reliability                                  |              | 0.802          |
|                         | Belief                                       |              | 0.786          |
| Collaboration           | Knowledge exchange                           | 0.911        | 0.880          |
|                         | Mutual exchange in emergency situations      |              | 0.894          |
|                         | Reciprocity                                  |              | 0.837          |
| Knowledge creation      | Try knowledge creation                       | 0.884        | 0.877          |
|                         | Develop knowledge creation                  |              | 0.732          |
|                         | Create new knowledge                         |              | 0.855          |
| Knowledge storage       | Store knowledge                              | 0.887        | 0.890          |
|                         | Classify knowledge                           |              | 0.747          |
|                         | Accumulate knowledge                         |              | 0.824          |
| Knowledge sharing       | Share knowledge                              | 0.884        | 0.754          |
|                         | Share rearranged knowledge                   |              | 0.616          |
|                         | Share new knowledge                          |              | 0.737          |
| Knowledge application   | Apply knowledge                              | 0.876        | 0.831          |
|                         | Apply new knowledge to real work             |              | 0.722          |
|                         | Apply knowledge to other work                |              | 0.776          |

KM, knowledge management; IT, information technology.
structure, leadership, IT systems, learning, trust, and collaboration. The dependent constructs related to the KM process were creation, storage, sharing, and application of knowledge. These constructs have already been subjected to factor analysis [9], and are consistent with the theoretical basis of this work.

This survey presents the results of reliability and validity tests. An analysis was performed on the 30 items that measured the components of KM enablers and KM processes. Cronbach’s alpha was used to examine the reliability of the instruments. Alpha values over 0.6 are generally considered acceptable. All constructs had alpha values higher than 0.6, ranging from 0.607 to 0.917. Factor analysis with varimax rotation was used to check the discriminant validity of the constructs. Factor analysis of the KM enablers and the KM process is shown in Table 2. The relatively high values for reliability and validity imply that the instruments used in this study were adequate.

4. Descriptive statistics

Table 3 reveals the results of employees’ responses about KM activities in their hospitals. All four hospitals believed that major knowledge resides in the individual brain, groupware, and personal computers. Many respondents of hospital A (60.0%), hospital B (66.0%), hospital C (58.3%), and hospital D (52.6%) thought that their knowledge exists in individual brains. Barriers to KM in all four hospitals are the lack of enthusiasm for learning, the absence of collaborative culture, and lack of time. Most respondents of hospital A (75.6%), hospital B (75.9%), hospital C (84.5%), and hospital D (71.9%) agreed that one of the barriers to KM is the lack of enthusiasm for learning. Ways to inspire KM in hospitals are clear vision and consistent impulse, the link between hospital work processes and KM, professional workforce and budget allocation, fair rewards, and so on. Many respondents of hospital A (48.8%), hospital B (48.7%), hospital C (50.3%), and hospital D (51.5%) thought that the most important ways to inspire KM are clear vision and consistent impulse.

Table 3. Results of knowledge management (KM) research (multiple answers)

| Classification                        | Hospital A | Hospital B | Hospital C | Hospital D | Total   |
|---------------------------------------|------------|------------|------------|------------|---------|
| Knowledge existence                   |            |            |            |            |         |
| Cabinet & files of document           | 47 (22.9)  | 47 (24.6)  | 35 (18.7)  | 44 (22.4)  | 173 (22.2)|
| Individual brain                      | 123 (60.0)| 126 (66.0)| 109 (58.3)| 103 (52.6)| 461 (59.2)|
| Groupware                             | 92 (44.9)  | 73 (38.2)  | 92 (49.2)  | 75 (38.3)  | 332 (42.6)|
| Knowledge network system              | 55 (26.8)  | 50 (26.2)  | 49 (26.2)  | 62 (31.6)  | 216 (27.7)|
| Personal computer                     | 73 (35.6)  | 52 (27.2)  | 73 (39.0)  | 73 (37.2)  | 271 (34.8)|
| Barriers to KM                        |            |            |            |            |         |
| Unacceptable culture about creativity | 81 (39.5)  | 76 (39.8)  | 55 (29.4)  | 60 (30.6)  | 272 (34.9)|
| Absence of collaborative culture      | 124 (60.5)| 106 (55.5)| 104 (55.6)| 118 (60.2)| 452 (58.0)|
| Rigid culture                         | 40 (19.5)  | 49 (25.7)  | 38 (20.3)  | 36 (18.4)  | 163 (20.9)|
| Lack of time                          | 93 (45.4)  | 108 (56.5)| 69 (36.9)  | 102 (52.0)| 372 (47.8)|
| Lack of enthusiasm for learning       | 155 (75.6)| 145 (75.9)| 158 (84.5)| 141 (71.9)| 599 (76.9)|
| Distrust and lack of trust            | 29 (14.1)  | 42 (22.0)  | 30 (16.0)  | 28 (14.3)  | 129 (16.6)|
| Ways to inspire KM                    |            |            |            |            |         |
| Clear vision and consistent impulse   | 100 (48.8)| 93 (48.7)  | 94 (50.3)  | 101 (51.5)| 388 (49.8)|
| Professional workforce & budget allocation | 82 (40.0) | 85 (44.5) | 77 (41.2) | 78 (39.8) | 322 (41.3)|
| Knowledge-friendly organizational culture | 59 (28.8) | 88 (46.1) | 71 (38.0) | 66 (33.7) | 284 (36.5)|
| Objective & fair rewards              | 75 (36.6)  | 77 (40.3)  | 84 (44.9)  | 85 (43.4)  | 321 (41.2)|
| The control of knowledge contents     | 78 (38.0)  | 70 (36.6)  | 73 (39.0)  | 62 (31.6)  | 283 (36.3)|
| The link between hospital work processes & KM | 96 (46.8) | 72 (37.7) | 92 (49.2) | 72 (36.7) | 322 (42.5)|
| Reinforcement of KM system            | 23 (11.2)  | 28 (14.7)  | 27 (14.4)  | 25 (12.8)  | 103 (13.2)|

Values are presented as number (%).
RESULTS

Multiple regression analyses were examined for each hospital sample with the six KM enablers. The independent variables were organizational structure, leadership, IT systems, learning, truth, and collaboration, while the dependent variables were application, storage, sharing, and application of knowledge. The research model was evaluated based on the amount of variance in the dependent constructs accounted for by the model ($R^2$). For each hypothesis, models were run for each of the dependent variables separately as shown in Tables 4–7. The absolute value of the beta coefficient indicates which of the KM enablers have a greater impact on the KM process in each multiple regression analysis.

In the hospital A sample (valid n = 205), the research model explained 18% of the variance for knowledge creation, 13% for knowledge storage, 29% for knowledge sharing, and 24% for knowledge application ($p < 0.001$). IT systems show the strongest effect on knowledge application ($p < 0.001$), and truth on knowledge creation and knowledge sharing ($p < 0.05$), while leadership correlated with knowledge sharing ($p < 0.05$) (Table 4).

In the hospital B sample (valid n = 191), the research model explained 15% of the variance for knowledge creation ($p < 0.001$), 11% for knowledge storage, 10% for knowledge sharing, and 9.8% for knowledge application ($p < 0.01$ or $p < 0.001$). Collaboration explains the most significant variance in all four KM processes that affect knowledge creation ($p < 0.001$), knowledge sharing, knowledge application, and knowledge storage ($p < 0.05$). IT systems showed the strongest effect on knowledge storage ($p < 0.01$), while leadership equally affected knowledge creation and knowledge storage ($p < 0.05$) (Table 5).

In the hospital C sample (valid n = 187), the research model explained 16% of the variance for knowledge creation, 22% for knowledge storage, 16% for knowledge sharing, and 13% for knowledge application ($p < 0.001$). IT systems showed the strongest effect on knowledge creation and knowledge application ($p < 0.05$) and collaboration on knowledge sharing and knowledge application ($p < 0.05$) (Table 6).

In the hospital D sample (valid n = 196), the research model explained 38% of the variance for knowledge creation, 29% for knowledge storage, 39% for knowledge sharing, and 43% for knowledge application ($p < 0.001$). Both leadership and IT systems explained the most significant variance in all four KM processes. Leadership showed the strongest effect on knowledge

| Table 4. Results of the multiple regression analysis for the hospital A sample |
|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| Hospital A sample                              | Knowledge creation beta | Knowledge storage beta | Knowledge sharing beta | Knowledge application beta |
| Organizational structure                       | 0.134                 | 0.060                 | –0.085                | 0.006                |
| Leadership                                     | 0.023                 | 0.161                 | 0.143*                | 0.121                |
| Information technology systems                 | 0.127                 | 0.129                 | 0.121                 | 0.262***             |
| Learning                                       | 0.052                 | 0.047                 | 0.127                 | 0.047                |
| Truth                                          | 0.175*                | 0.061                 | 0.193*                | 0.055                |
| Collaboration                                  | 0.050                 | –0.041                | 0.065                 | 0.002                |
| $R^2$                                          | 0.181***              | 0.134***              | 0.286***              | 0.236***             |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

| Table 5. Results of the multiple regression analysis for the hospital B sample |
|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| Hospital B sample                              | Knowledge creation beta | Knowledge storage beta | Knowledge sharing beta | Knowledge application beta |
| Organizational structure                       | –0.124                | –0.035                | 0.065                 | 0.155                |
| Leadership                                     | 0.192*                | 0.177*                | 0.119                 | 0.008                |
| Information technology systems                 | –0.077                | 0.276**               | 0.004                 | 0.019                |
| Learning                                       | 0.082                 | –0.142                | –0.032                | 0.017                |
| Truth                                          | 0.020                 | –0.172                | 0.058                 | 0.053                |
| Collaboration                                  | 0.267***              | 0.205*                | 0.186*                | 0.173*                |
| $R^2$                                          | 0.154***              | 0.110**               | 0.101**               | 0.098**              |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. 
creation ($p < 0.05$), knowledge storage ($p < 0.01$), knowledge sharing ($p < 0.05$), and knowledge application ($p < 0.05$), IT systems showed significant effects on knowledge creation ($p < 0.05$), knowledge storage ($p < 0.01$), knowledge sharing ($p < 0.05$), and knowledge application ($p < 0.05$), while truth correlated with knowledge storage ($p < 0.01$), knowledge sharing ($p < 0.001$), and knowledge application ($p < 0.01$) (Table 7).

Table 8 summarizes the findings of the multiple regression analyses assessing the effects of organizational structure, leadership, IT systems, learning, truth, collaboration on each KM process for the of samples A, B, C, and D hospitals.

**DISCUSSION**

There is heightened awareness of the importance of KM in the healthcare field, especially for hospital organizations. However, KM is still a complex knowledge area with much more to be explored [20]. This is reflected in the results of the statistical analysis of the survey data, with the hospital samples being much more significant in the KM process as defined by Alavi and Leidner’s model [9].

The regression model of hospital A, although significant, provided the lowest explanatory power among the four hospitals, and revealed that truth affects both knowledge creation and knowledge sharing, that leadership contributes to knowledge sharing, and that IT systems strongly influence knowledge ap-
application (Table 3). However, not all organizational factors affect knowledge storage (Table 3). Regarding all factors, the hospital A sample showed the factors related to KM processes, truth, leadership, and IT systems. Leaders will foster values like trust that are necessary for knowledge sharing to flourish [21,22]. When trust is high, individuals are more prone to participate in knowledge sharing, resulting in knowledge creation gain [23]. To achieve creation of new knowledge for the hospital, organizational knowledge must be shared and applied through trust with members.

In terms of the regression analysis of hospital B shown in Table 4, the most striking result for the hospital B sample is the impact that collaboration has on all KM processes of knowledge creation, knowledge storage, knowledge sharing, and application, while leadership correlated with knowledge creation and knowledge sharing. Compared to hospitals A and C, the second remarkable result for the hospital B sample was the impact that leadership, IT systems, truth, and collaboration had on knowledge storage. These findings suggest that collaborative culture affects knowledge creation through increasing knowledge exchange [24] and high collaboration helps the KM process to set mutual purposes for performance [25]. According to Davenport and Prusak [19], top managers advocate that the behaviors of knowledge sharing within an organization become possible when knowledge sharing is considered as a fundamental resource for creating value.

The regression model of hospital C, although significant, provided lower explanatory power than hospitals A and B, and revealed that IT systems affect both knowledge creation and knowledge application, that collaboration contributes to both knowledge sharing and knowledge application, and that leadership influences knowledge sharing. Similar to hospital A, not all organizational factors affect knowledge storage (Table 3). These three organizational factors—IT systems, leadership, and collaboration—are consistent with working together characterized by strong leadership. These findings suggest that, information and communication technology can enable rapid search, access, and retrieval of information, and can support communication and collaboration among employees [26].

In terms of the regression analysis of Hospital D shown in Table 4, the four KM processes were most correlated with the impact of leadership and IT systems that promote knowledge application, storage, and sharing [27], while truth affects knowledge storage, knowledge sharing, and knowledge application. Eventually, the top managers’ support as an essential requirement for the successful KM establishes organizational culture to share employees’ knowledge within the organization [28]. The top managers of hospitals must try to support an important role of providing organizational culture and systems to create and share employees’ knowledge based on truth.

This analysis reveals that deliberate and continued practice of KM, as demonstrated in the tertiary hospitals in Korea, reflects employees’ opinions about the KM activities of hospitals. Most workers in the four hospitals believed that major knowledge resides in individual brains, groupware, and personal computers. Many respondents thought that barriers to KM were the lack of enthusiasm for learning, the absence of collaborative culture, and lack of time. All of them thought that the most important way to inspire KM involved clear vision and consistent impulse. Therefore, there is a strong need for systematic management such as clear vision, budget allocation, fair rewards, task forces team, and the link between hospital work processes and the activities of KM.

Additionally, this study presented the main factors, variables, and links between KM enablers and the KM process among these hospitals. Each hospital displayed very different patterns of KM and organizational features. The regression model showed that different organizational factors—especially IT systems, truth, and collaboration—were responsible for the resulting KM profiles of each hospital: truth in hospital A, collaboration in hospital B, and IT systems in both hospitals C and D.

Although these findings are specific to the hospitals surveyed here, they can be considered for the development of practical strategies to enhance an understanding of critical factors between KM enablers and KM processes. Knowledge managers of each hospital must build an organization culture and systems and continuously educate employees about KM based on trust and collaboration.

**CONFLICTS OF INTEREST**

No potential conflict of interest relevant to this article was reported.

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