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Justification on Knowledge Management Strategies:

A New Perspective on Knowledge Creating Process*

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Abstract

A variety of knowledge management strategies have been developed because knowledge has come to be considered as a most valuable strategic asset. These strategies have been categorized as being either human or system oriented. However, it is still unclear how these strategies are affected by knowledge creating processes such as socialization, externalization, combination, and internalization. This paper proposes a model to illustrate the relationship between knowledge management strategies and their creating processes. The model is derived on the basis of samples from 58 Korean firms. The model shows that the strategies vary depending on different knowledge creating processes. Our finding is that, in order to manage knowledge effectively, human strategy is more likely to be adopted in the case of the socialization process while system strategy is more likely to be adopted in the case of the combination process.

Keywords: KM Strategy, Knowledge Creating Processes, Integrative view

1. Introduction

Managing knowledge is important because knowledge is one of the most strategic weapons for corporate sustainability. Many researchers have investigated enablers for sharing and codifying knowledge (Ichijo et al. 1998; Nonaka et al. 2000; O'Dell and Grayson 1998: Teece 2000). Typically, these knowledge enablers are categorized from people, organization, process, and system perspectives. Although knowledge enablers can enhance a firm's capability to manage knowledge, it is still unclear how to use these enablers in a strategic fashion. Knowledge management strategies are necessary for facilitating these enablers; they determine how to use knowledge resources and capabilities (Hansen et al. 1999; Zack 1999a).

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Three research areas for knowledge management strategies have been identified (Zack 1999b). First, it is important to find which knowledge is unique and valuable. Studies on intellectual capital or intangible resources are related to this category. Second, it is necessary to identify how these resources and capabilities support a firm's product and market positions. These studies deal with resource-based theory and organizational capability. Lastly, knowledge creating processes need to be further investigated for enhancing competitive capabilities. This paper deals with this issue.

Although the fit between knowledge management processes and knowledge creating strategies is critical for organizational effectiveness, previous studies fail to answer how the strategies can support these creating processes. Knowledge creation is a continuous process whereby individuals and groups within a firm and between firms share tacit and explicit knowledge (Nonaka 1994). Knowledge makes it possible for firms to be innovated continuously. Organizational capability to create knowledge is the most important source of firms' sustainable competitive advantage (Krogh and Grand 2000; Nonaka et al. 2000; Parent et al. 2000). As a result, an integrative view of knowledge management strategy can help many managers sharpen their abilities to build effective strategies.

The primary objective of this paper is to investigate how knowledge management strategies can vary depending upon knowledge creating processes.

2. Knowledge Management Strategies

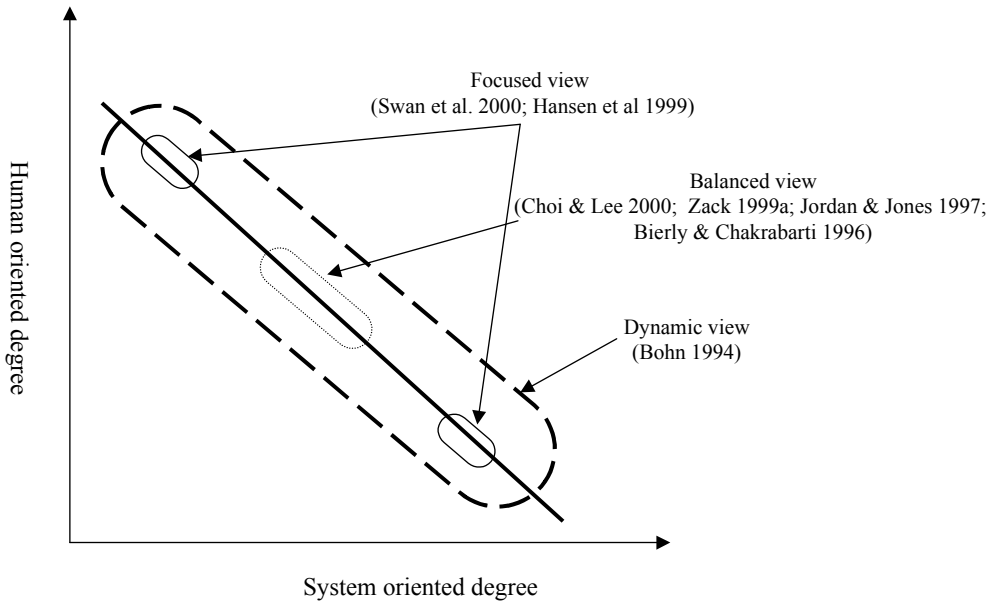
Knowledge management focus is one of the most common considerations for establishing knowledge management strategies. Knowledge management strategies can be described along two dimensions reflecting their focus (Hansen et al. 1999). One dimension refers to explicit knowledge and emphasizes the capability to help create, store, share, and use an organization's explicitly documented knowledge. The strategy as per this dimension stresses codifying and storing organizational knowledge. Typically, knowledge is codified via information technology (Davenport et al. 1998; Scott 1996; Swan et al. 2000). Codified knowledge is more likely to be reused. Furthermore, this strategy stresses completely specified sets of rules about what to do under every possible sets of circumstances (Bohn 1994). This strategy is referred to as system strategy. Another dimension refers to tacit knowledge and emphasizes knowledge sharing via interpersonal interaction. The strategy as per this dimension emphasizes dialogue through social networks including occupational groups and teams (Swan et al 2000). It also stresses sharing through person-to-person contacts (Hansen et al 1999). This strategy attempts to acquire internal and opportunistic knowledge and share it informally (Jordan and Jones 1997). Knowledge can be obtained from experienced and skilled people in this strategy. This strategy can be referred to as human strategy. Table 1 summarizes the features of system and human strategies.

[Table 1] Features of system and human strategies

Strategy	Features
System	Emphasizes codified knowledge in knowledge management processes Stress on codifying and storing knowledge via information technology Attempt made to share knowledge formally
Human	Emphasizes dialogue through social networks and person-to-person contacts Stress on acquiring knowledge via experienced and skilled people Attempt made to share knowledge informally

Researchers have suggested guidelines for choosing the right strategy. Previous studies can be categorized into three perspectives; focused, balanced, and dynamic. Figure 1 compares these three views. The system oriented degree corresponds to the degree of codifying and storing organizational knowledge for anyone to access and use it easily. The human oriented degree corresponds to the degree of acquiring and sharing tacit knowledge through interpersonal interaction.

[Figure 1] Three perspectives of knowledge management strategies



The studies from a focused view propose that companies should pursue one strategy predominantly. Swan et al. (2000) argue that the human strategy is superior to system strategy. Hansen et al. (1999) suggest that companies pursue one strategy predominantly and use another to support it.

The balanced view suggests that companies should balance between explicit and tacit knowledge. Choi and Lee (2000) suggest that integrating system strategy with human strategy results in better organizational performance. Zack (1999a) states that exploration and

exploitation of knowledge without regard to organizational boundaries leads to better performance. Jordan and Jones (1997) emphasize the balance between explicit oriented strategy and tacit oriented strategy for encouraging the development of more innovative knowledge. Furthermore, Bierly and Chakrabarti (1996) found that most firms adopt the same knowledge management strategy over time.

The dynamic view indicates that firms change their strategies according to the characteristics of knowledge. For example, Bohn (1994) states that managers should change knowledge management strategies along with the spectrum from pure expertise to pure procedure.

The above previous studies can be compared in terms of knowledge management (KM) focus, KM strategy category, research methodology, industry applications, and suggested KM strategy (see Table 2). Interestingly, knowledge management strategies are likely to be categorized on the basis of system oriented and human oriented characteristics without regard to their different views. Some studies have focused on particular industry sectors such as consulting or pharmaceutical companies. It is confirmed that most studies have not considered the relationship between knowledge management strategies and knowledge creation processes.

[Table 2] Comparison of knowledge management studies

Criteria / View	Researcher	KM Strategy Category	Research Methodology	Industry Application	Suggested KM Strategy
Focused	Swan et al. (2000)	Cognitive Community	Case	Manufacturing Financial	Community
	Hansen et al. (1999)	Codification Personalization	Case	Consulting	80-20
Balanced	Choi and Lee (2000)	Passive System-oriented Human-oriented Dynamic	Empirical	All	Dynamic
	Zack (1999a)	Conservative Aggressive	Case	All	Aggressive
	Jordan & Jones (1997)	Tacit-oriented Explicit-oriented	Conceptual	All	Balanced
	Bierly & Chakrabarti (1996)	Explorer Exploiter Loner Innovator	Empirical	Pharmaceutical	Explorer Innovator
Dynamic	Bohn (1994)	Pure expertise Pure procedure	Conceptual	All	Dynamic Change

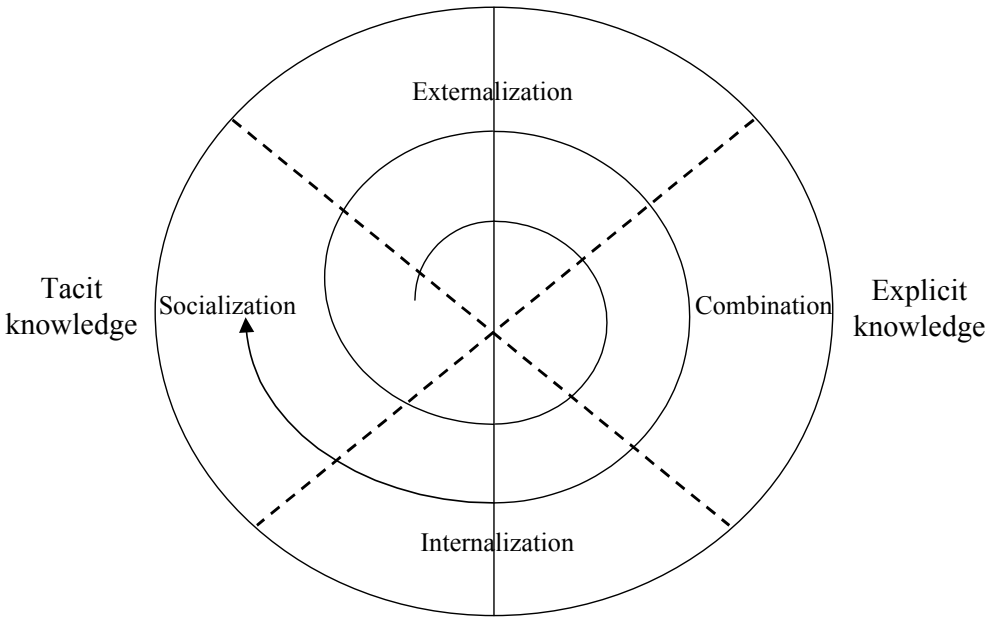
3. Knowledge Creation Process

To describe the knowledge creation process systematically, this paper adopts the work by

Nonaka and Takeuchi (1995) for the following reasons. First, their work has become widely accepted (Scharmer 2000). It has been used in many research areas such as organizational learning, joint ventures, new product development, and information technology (Kidd 1998; Nonaka et al. 1998; Nonaka et al. 2000; Scott 1996). Second, their model includes not only creation but also the transfer process. Because efficient transfer of existing knowledge and the effective creation of new knowledge have become two major management tasks, transfer and creation should be considered together in knowledge management (Krogh and Grand 2000). They describe the transfer of knowledge as a process of both internalization and externalization (Venzin et al. 1998).

Nonaka and Takeuchi (1995) proposed the SECI process which explores knowledge creation through conversion between tacit and explicit knowledge. Knowledge conversion processes consist of socialization (S), externalization (E), combination (C), and internalization (I). Socialization converts new tacit knowledge such as shared mental models and technical skills through shared experience. It typically occurs from an apprenticeship rather than documents or manuals. Externalization transfers tacit knowledge into explicit concepts. It is typically seen in the process of concept creation and is triggered by dialogue or collective reflection. Combination converts explicit knowledge into more systematic sets of explicit knowledge. Information technology can facilitate this knowledge conversion. Internalization is a process of embodying explicit knowledge into tacit knowledge. Explicit knowledge is internalized into individuals' tacit knowledge bases in the form of shared mental models or technical know-how. Figure 2 shows four modes of knowledge conversion (Nonaka et al. 2000).

[Figure 2] Knowledge creation processes



4. Samples and Measures

This paper investigates Korean firms empirically to find the relationship between knowledge management strategies and knowledge creation processes. For this purpose, 100 firms in *Annual Corporation Reports* by Maeil Business Newspaper (2000) were selected randomly. We surveyed from 5 to 15 middle managers in each firm. Middle managers were selected for the following reasons. First, middle managers are found to play key roles in knowledge management (Nonaka and Takeuchi 1995). Second, top managers are sensitive to showing their roles in organizational success (Easterby-Smith 1997). Finally, line managers are incapable of understanding the characteristics of the overall organization. Both interviews and mails were used for sampling.

Research constructs were operationalized through related studies and a pilot test. For the questionnaires, a multiple-items method was used and each item was based on a 6 point Likert scale from 'very low' to 'very high'. A six point Likert scale avoids a midpoint which prevents respondents from a neutral default option (Amabile et al. 1996).

We adopted the constructs that have already been used and validated by Nonaka et al. (1994) for assessing the level of knowledge creation processes. To measure corporate performance, the constructs by Deshpande et al. (1993) and Drew (1997) were adopted. Although corporate performance items do not present a fully balanced scorecard, these items are effective for comparing business units and industries (Drew 1997).

5. Results

5.1 Sample characteristics

In total, 441 questionnaires from 61 out of 100 firms were returned. Seventeen responses from three firms were eliminated from analysis due to incomplete data, and thus 424 responses from 58 firms were analyzed. Characteristics such as industry type, number of respondents, and their departments are summarized in Table 3.

[Table 3] Sample Characteristics

Industry	Number of Companies	Department							Total
		Planning	Sales	Production	Accounting	IS	R&D	Etc.	
Manufacturing	19	36	17	22	14	20	35	6	150
Service	25	66	28	1	25	41	9	6	176
Financial	14	37	28	-	3	21	-	9	98
Total	58	139	73	23	42	82	44	21	424

5.2 Reliability and validity

Table 4 outlines numerous items and the results of reliability and validity tests between them. The content validity of the instruments was established through the adoption of constructs that have already been used and validated by other researchers. The reliability of the measurement instrument is assessed by using Cronbach's alpha (Kerlinger 1964). Internal scale reliabilities (Cronbach's alpha) vary from 0.7902 to 0.8845. For convergent validity, items whose item-to-total correlation score was lower than 0.4 were eliminated from further analysis. Discriminant validity was checked by a factor analysis. Because multi-item constructs measure each variable, factor analysis with varimax is conducted to check the unidimensionality among the 34 items. Among them, one item related to corporate performance had an item-to-total correlation below 0.4 and thus was eliminated from further analysis. Items with factor loading values lower than 0.5 also were eliminated.

[Table 4] Reliability and validity test results for measures

Measure	**Acronym**	**Item**	**Reliability** (cronbach alpha)	**Convergent Validity** (correlation of item with total score-item)	**Discriminant Validity** (factor loading on single factors)
Knowledge Creation Process					
Socialization	KC_S	5	0.8589	0.5977; 0.7330; 0.6937; 0.6859; 0.6565	0.737; 0.843;0.815; 0.815; 0.785
Externalization	KC_E	5	0.8845	0.7298; 0.7675; 0.6527; 0.7061; 0.7539	0.862; 0.851; 0.835; 0.815; 0.702
Combination	KC_C	5	0.8524	0.5915; 0.6573; 0.7439; 0.7118; 0.6306	0.859; 0.834; 0.793; 0.760; 0.728
Internalization	KC_I	5	0.8763	0.7083; 0.7443; 0.7517; 0.7483; 0.5944	0.854; 0.849; 0.847; 0.827; 0.725
Knowledge Management Strategy					
System	S	4	0.8268	0.7134; 0.7263; 0.5713; 0.6067	0.859; 0.867; 0.745; 0.776
Human	H	4	0.7902	0.6047; 0.6652; 0.6233; 0.5125	0.796; 0.837; 0.800; 0.705
Corporate Performance	CP	5	0.8651	0.7569; 0.5507; 0.7670; 0.7345; 0.6368	0.856; 0.700; 0.865; 0.842; 0.772

5.3 Interrater reliability and agreement analysis

Interrater reliability and agreement analysis are necessary because of multiple respondents

(Chen 1993; Venkatraman and Grant 1986). Interrater reliability, an index of consistency, presents prepositional consistency of variance among raters (Kozlowski and Hattrup 1992; Lawlis and Lu 1972). In contrast, interrater agreement represents interchangeability among raters, the extent to which raters make the same ratings (James et al. 1993).

The interrater reliability is assessed by the use of the interclass correlation coefficient (ICC). Because each organization is rated by different raters and their ratings are averaged, ICC (1,k) is appropriate. ICC (1,k) can be calculated via one-way analysis of variance (ANOVA) (Shrout and Fliess 1979).

James et al. (1984) developed indexes for measuring within-group agreement for a set of raters for a single target with a single item ($r_{wg(1)}$) or multiple-item scale ($r_{wg(J)}$). Because the multiple-item scale is adopted, $r_{wg(J)}$ is assessed for each target and these $r_{wg(J)}$ values are averaged for all targets. Table 5 summarizes the results of interrater reliability and agreement. Acceptable cutoff value of ICC and r_{wg} vary depending on research areas. Because our analysis is the first to assess ICC or r_{wg} in knowledge management, our results should be compared with previous management researches. In the fields of management, a number of studies suggest that ICC ranges from 0. 512 to 0.991, and $r_{wg(J)}$ ranges from 0.69 to 0.96 (Amabile et al. 1996; Hater and Bass 1988; James et al. 1980). Our results are consistent with these ICC and $r_{wg(J)}$ ranges, and thus interrater reliability and agreement may be acceptable. That is, our results may show that all firms surveyed are consistent and interchangeable.

[Table 5] Results of interrater reliability and agreement

Variables / Index	Knowledge Creation Processes				KM Strategy		Performance
	S (Socialization)	E (Externalization)	C (Combination)	I (Internalization)	System	Human	
ICC (1, k)	0.8606	0.7668	0.5985	0.6852	0.6673	0.6618	0.8667
$R_{wg(J)}$	0.8563	0.8827	0.8499	0.8664	0.8194	0.7754	0.8572

5.4 Comparison of corporate performance

Table 6 summarizes the result of cluster analysis according to knowledge management strategies by using Ward's hierarchical technique. Firms are categorized in view of high or low level of system strategy. Similarly, they are categorized in view of high or low level of human strategy. Because ANOVA results are significantly different at the 0.01 confidence level, each group may be well classified.

[Table 6] Result of cluster analysis

Group / KM strategy	High	Low	Mean	p-value
System	4.45	3.61	3.95	0.00
Number of cases	23	35		
Human	4.65	3.96	4.22	0.00
Number of cases	22	36		

ANOVA is performed between system strategies and corporate performance. Table 7 shows that the highly system strategy oriented group obtains results which are significantly higher in terms of corporate performance than the low group at the 0.01 confidence level. It implies that firms in the highly system strategy oriented group are more effective than those in the low group.

[Table 7] ANOVA test results for system strategy and corporate performance

System strategy	Sum of Square	Degree of Freedom	Sum of mean square	F-value	p-value
Between Group	5.49	1.00	5.49	17.17	0.00
Within Group	17.92	56.00	0.32		
Total	23.42	57.00			

Similarly, ANOVA is performed between human strategies and corporate performance. Table 8 shows that the highly human strategy oriented group has significantly higher corporate performance than the low group at the 0.01 confidence level. It implies that firms in the highly human strategy oriented group are more effective than those in the low group.

[Table 8] ANOVA test results for human strategy and corporate performance

Human strategy	Sum of Square	Degree of Freedom	Sum of mean square	F-value	p-value
Between Group	5.42	1.00	5.42	16.86	0.00
Within Group	18.00	56.00	0.32		
Total	23.42	57.00			

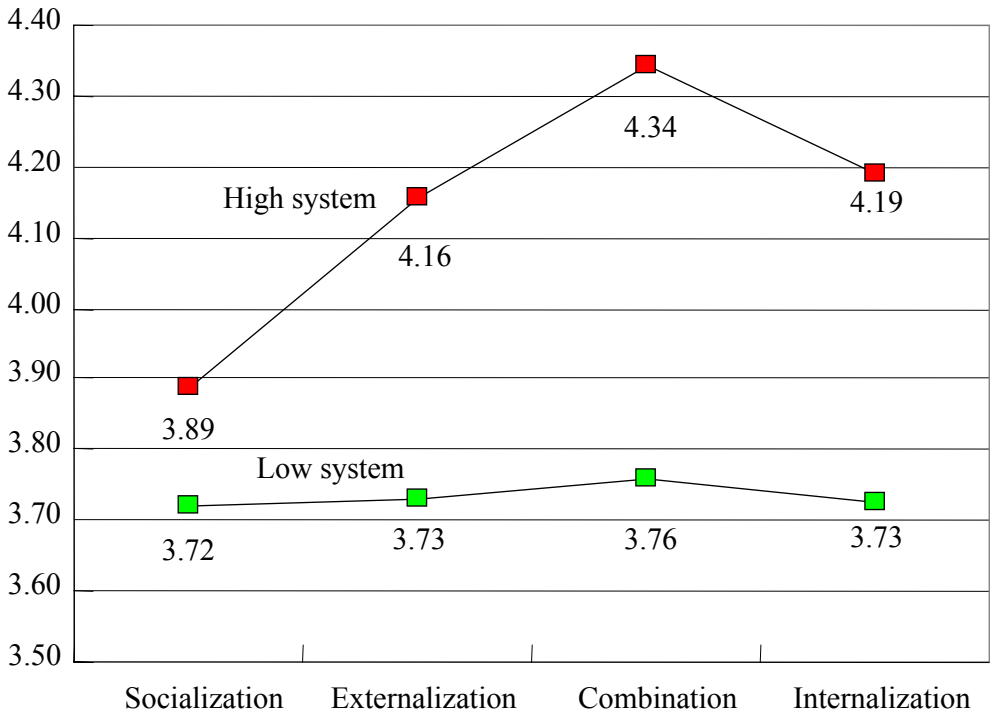
5.5 Relationship between knowledge creation process and KM strategy

In order to explore their relationship with knowledge management strategies, knowledge creation processes are measured in terms of high or low system strategy oriented perspective.

Firms in the highly system strategy oriented group try to increase codifiability and thus decrease complexity for acquiring knowledge and using knowledge; knowledge is managed in a formal and public fashion. Conversely, firms in the low system strategy oriented group show little interest in codifying, storing, and acquiring knowledge; knowledge is not managed in a systematic manner.

As shown in Figure 3, a significant difference is noted among knowledge creation processes in the highly system strategy oriented group (p=0.019). The figure takes a "skewed arc" form. Combination shows the highest value while socialization shows the lowest. In contrast, the figure for the low system strategy oriented group has a nearly horizontal form. No significant difference is noted among knowledge creation processes values in low groups (p=0.985).

[Figure 3] Knowledge creation processes and system strategy

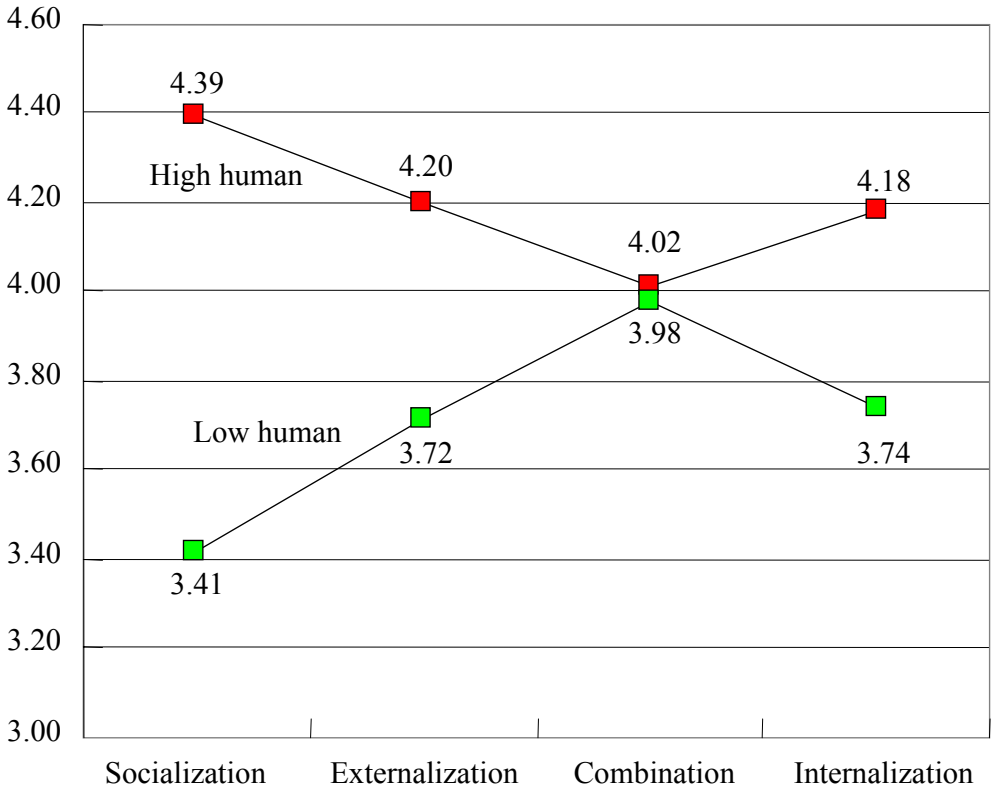


Similarly, the relationship between knowledge creation processes and human strategy is investigated. Compared with the system strategy oriented group, these relationships have different features.

As shown in Figure 4, in the case of the highly human strategy oriented group, socialization shows the highest value while combination shows the lowest. The figure takes a "skewed U" form. A significant difference is noted (p=0.023). The shape of the figure is opposite to that of the highly system strategy oriented group. However, the figure of the low human strategy oriented group has a "skewed arc" form. Contrary to our expectation, a significant difference is also noted (p=0.000). The combination process is higher than other processes. This may be

the result of two factors: (i) an early stage of knowledge management in Korea and (ii) a sample characteristic of the low human strategy oriented group. First, because of still being at the introductory stage, many Korean firms may emphasize explicit knowledge, which is more likely to be easier to manage than tacit knowledge. Second, 10 out of 36 firms in the low human strategy oriented group belong to banking or financing industries. These industries have invested more than others in information technology (Marcoccio 1999). Information technology is one of the most important factors which enhances the combination process (Lee and Choi 2000; Nonaka et al. 1998).

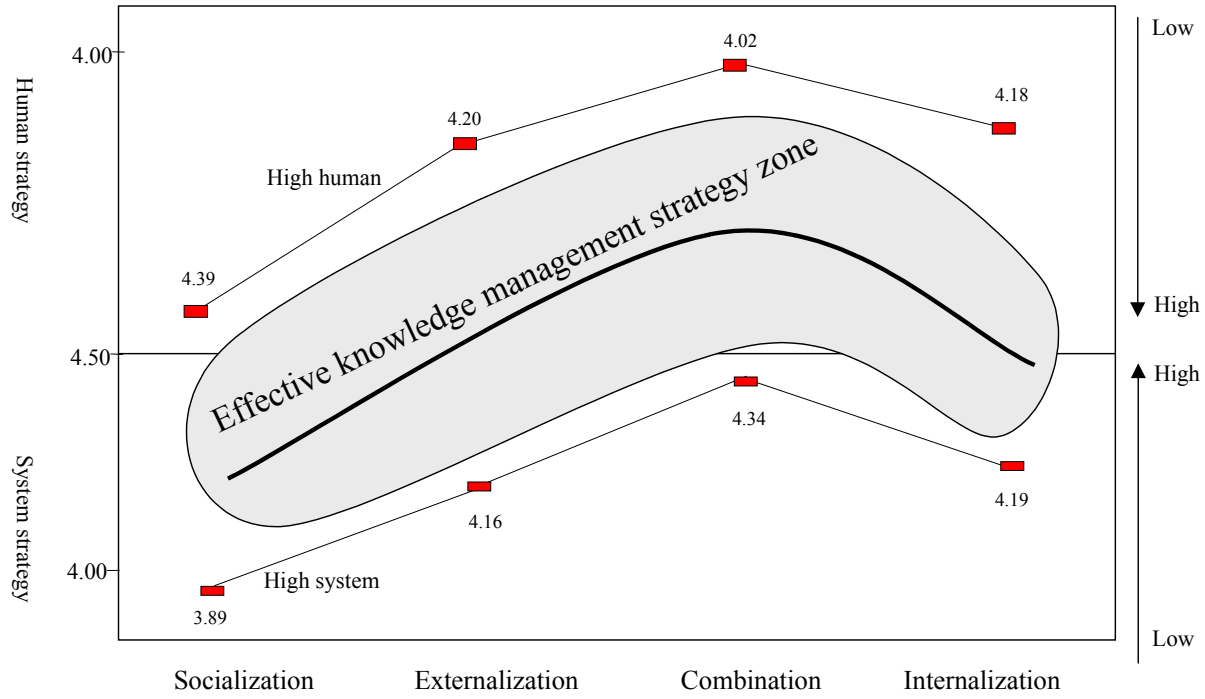
[Figure 4] Knowledge creation processes and human strategy



Based on the above two figures, a distinctive feature is pointed out. Firms that use knowledge management strategies effectively adjust their strategies as the knowledge creation processes vary. They tend to focus on human strategy in socialization, while using system strategy in combination. Therefore, this paper proposes a model and effective knowledge management zone as shown in Figure 5. The shape of this model (bold line) and the effective knowledge management zone imply that firms focus on different knowledge management strategies depending on the knowledge creation processes. Human strategy is appropriate for socialization while system strategy is appropriate for combination. Balancing between human and system strategies is appropriate for externalization and internalization.

Interestingly, our model can illustrate the previous three different knowledge management strategy perspectives in an integrative fashion. Our model indicates that a dynamic view is appropriate for the entire knowledge creation process. It suggests a balance between human and system strategies in case of externalization and internalization. Finally, it suggests that strategists focus on human or system strategies in case of socialization or combination.

[Figure 5] Knowledge creation processes and KM strategies for effective KM



6. Conclusion

The primary objective of this paper is to investigate how knowledge management strategies differ in knowledge creating processes. An empirical result proposes a “skewed arc model” to describe the relationship between strategies and processes. This model implies that companies, which take an effective knowledge management strategy, are more likely to adopt human strategy for the socialization process while they tend to adopt system strategy for the combination process. That is, this model illustrates a dynamic relationship between knowledge management strategies and knowledge creation processes.

On the basis of this research, the following future studies are suggested. First, a real-life case should be explored to illustrate the usefulness of the suggested model. Second, knowledge management strategists should identify which knowledge management enablers trigger which knowledge creating process. Strategies with appropriate enablers may nurture socialization or combination. In addition, our results may differ in particular industries or companies; a

comparative study is of interest; i.e., consulting companies vs. manufacturing companies.

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