지식관리혁신의 동화를 위한 지식의 축척과 흐름의 관점

A Knowledge Stock and Flow Perspective for the Assimilation of Knowledge Management Innovation

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ABSTRACT

In order to provide a better understanding about the phenomenon of KM assimilation, this study attempts to conceptually develop and empirically compare two different models: (1) the first model, which considers the KM process as the flow of knowledge that plays an intervening role between knowledge stocks (i.e., knowledge worker, technical knowledge infrastructure, external knowledge linkage, knowledge strategy, and internal knowledge climate) and the level of KM assimilation; and (2) the second model is a simple direct effect formulation without any distinction between knowledge stock and flow. These two models were then tested and compared using the responses of 187 Korean organizations that had already implemented enterprise-wide KM systems. The findings indicate that the two models are useful in explaining successful KM assimilation. However, the first causal model with the distinction between knowledge stock and flow assesses the effectiveness of KM more accurately than the second model without the distinction. Interestingly, the KM process was shown to be the most critical factor for the proliferation of KM activities across an organization. The findings of this study are expected to serve not only as early groundwork for researchers hoping to understand KM and its effective assimilation in organizations, but should also provide practitioners with guidelines as to how they can enhance their KM assimilation level so as to improve their organizational performance.

Keywords : *Knowledge management, Knowledge management assimilation, Knowledge stock, Knowledge flow, Structural equation model*

Ⅰ. Introduction

Knowledge management (KM) has become a major topic in organizations. Therefore, managers have made significant investments on KM and have tried to build successful KM initiatives in their organizations. However, initiating KM is not sufficient. If promising KM is not thoroughly assimilated into organizations, the benefits of KM will be curtailed. Successful KM must be assimilated into ongoing work activities in organizations in order to improve the efficiency of business processes, and consequently, to enhance

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organizational effectiveness (Fedor et al., 2003; Nonaka & Takeuchi, 1995).

Despite the importance of KM assimilation in organizations, very few empirical studies have been conducted thus far to understand exactly what factors are relevant to achieving a higher level of organizational assimilation of KM. The identified factors in the prior studies cover the two important perspective of knowledge: stocks and flows (Dierickx & Cool, 1989). While knowledge stocks are accumulated knowledge assets that are internal to the firm, knowledge flows are represented by knowledge streams into the firm or various parts of firms which may be assimilated into stock of knowledge (DeCarolis & Deeds, 1999). Firms with higher knowledge stocks may be better to facilitate knowledge flows from external sources and to integrate newly acquired knowledge in their internal knowledge stocks. That is, effective assimilation of KM is the joint function of knowledge stocks and knowledge flows. However, the relationships between knowledge stocks and knowledge flows were not adequately taken into consideration in the previous studies. Therefore, there is a clear need for empirical research to understand the tight interrelationship between knowledge stocks and flows and its influence on KM assimilation level.

In response, this study attempts to provide a better understanding with regard to the phenomenon of KM assimilation by comparing two different models: (1) the first model, which considers the *knowledge management process* as the flow of knowledge that plays an intervening role between knowledge stocks (*knowledge worker, technical knowledge infrastructure, external knowledge linkage, knowledge strategy,* and *internal knowledge climate*) and KM assimilation level, based on the Dynamic Capability View (DCV); and (2) the second model is a simple direct effect formulation without any classification between knowledge stock and flow, and is based on the Resource-Based View (RBV) and Knowledge-Based View (KBV) of the firm. These models are then tested and compared using the responses of 187 Korean organizations that had already implemented enterprise-wide KM systems.

Ⅱ. THEORETICAL BACKGROUND

1. KM Assimilation

Assimilation can be defined as the manner in which an innovation diffuses across organizational work activities and processes, and becomes routinized and embedded in these activities (Cooper & Zmud, 1990; Fichman & Kemerer, 1997; Purvis et al., 2001). The assimilation has drawn attention to force influencing the organizational use of complex innovation once they have been adopted in organizations. In this study, the assimilation of innovation is considered as a set of activities spanning from an organization’s first awareness of an innovation to its potential acquisition and widespread deployment (Fichman & Kemerer, 1997; Meyer & Goes, 1988). The successful use of an innovation depends on the degree of the mutual adaptation of the innovation and the organizational context into which the innovation is being introduced. Further, as innovations result in the adaptation of the existing organizational and industrial arrangements and the transformation of the existing structure and practice in the given environment, innovation activities should be managed by a holistic vision, which allows idea to be transformed into actual and concrete reality (Van de Ven, 1986). Therefore, the theory of innovation assimilation is very important to this study because KM is an interrelated innovation and its assimilation represents the activity by which an organization adopts and deploys a KM innovation. In this study, we define KM assimilation as *the degree of the proliferation of knowledge management related technical and managerial work activities across an organization.*

2. Key Factors of a Successful KM

Many previous KM studies uncovered common key factors of successful KM in organizations. Among them, we adopted key factors of a successful KM on the basis of Lee and Choi's (2010) work because they identified six factors for successful KM through in-depth review of prior KM studies. They analyzed a variety of KM studies that adopted different research methods including conceptual development, case studies, and empirical studies, which is very important to improve validity of research.

First, the knowledge worker, being the primary agent of knowledge creation and the knowledge carrier (especially in the case of tacit knowledge), is viewed as one of the key factors of successful KM. Second, the use of information technology in support of KM objectives can integrate the fragmented flows of information and knowledge between different parts of the organization(Das, 2003; Gold et al., 2001), resulting in strengthening the organization's resources and their utilization, and increases the level of KM performance. Third, more and more scholars have come to agree that *corporate climate or culture* is one of the most crucial factors influencing the effectiveness and efficiency of an organization's use of knowledge-related resources (Janz & Prasarnphanich, 2003). Fourth, the *knowledge management process* is a central issue in the use of all physical, human, and organizational capital resources, and thus is critical factor for a higher level of KM assimilation. Fifth, *external knowledge linkages* (Badaracco, 1991; Mowery, 1996) with outside partners are a crucial component of successful KM because KM is often considered to extend beyond the traditional boundaries of an organization, and the success of KM frequently results from integration across multiple entities in the industry, or even across the whole of society. Finally, *knowledge strategy* (Sher & Lee, 2004; Zack, 1999) actually direct all KM activities and determine the utilization of all organizational resources. Companies that wish to leverage KM activities must approach KM with an appropriate strategy.

3. Distinction between Knowledge Stock and Knowledge Flow

The principal focus of prior studies adopting the RBV and/or KBV has been placed on the asset stocks of knowledge in organizations--including knowledge itself, knowledge infrastructure, knowledge workers, and so on (Easterby-Smith & Prieto, 2007). The accumulation of *the asset stocks of knowledge* is critical to the laying of the foundation of an organizational competitive advantage, but a more important factor is the manner in which the accumulated asset stocks can be assimilated via *the regulation of asset flows*, such as knowledge processes (Dosi et al., 2000; Dierickx & Cool, 1989) .

According to Nahapiet and Ghoshal (1998), two different aspects of intellectual capital pursued by firms include the resource of knowledge (i.e., knowledge stock) and process of knowing (i.e., knowledge flow). In addition, a few KM studies have explicitly discussed the notion that knowledge as possession (i.e., knowledge stock) and knowledge as process (i.e., knowledge flow) play significant roles together in improving organizational competitiveness (Easterby-Smith & Prieto, 2007). These distinctions are reflected in the centrality of knowledge stocks, as well as knowledge flows, to KM and its assimilation. Therefore, the primary concern of KM in organizations should be how to improve organizational capability or ability not only to accumulate critical knowledge resources, but also to manage their assimilation and exploitation (Grant, 1996a). In particular, knowledge flow, which is viewed as the processes that generate, distribute, and apply a firm's knowledge asset stocks, is crucial, because the concept of knowledge encompasses dynamic and fluid aspects in and of itself .

However, the RBV and KBV are essentially static theories, which cannot easily differentiate between knowledge flows and stocks, which together form the basis of competitive advantage (Priem & Butler, 2001). In other words, both theories view the knowledge stocks and flows without any distinction, which is not applicable to the dynamic and discontinuous environment of business. Therefore, the concept of dynamic capabilities, as an extension theory of the RBV, was developed to fill these gaps by emphasizing that a firm must rely on the ability to create, maintain, and renew its bases of competitive advantage under turbulent environmental conditions (Grant, 1996a; Zollo & Winter, 2002). Whereas the RBV and KBV focus on the selection of appropriate key resources, an approach involving dynamic capabilities emphasizes the processes of resource development and renewal. While it is necessary for a firm to possess resources (i.e., knowledge stocks), such conditions are insufficient. In addition to possessing these resources, firms must also demonstrate an ability to integrate and reconfigure them in such a manner that their full potential is realized to address ever-changing environments (i.e., knowledge flows) (Newbert, 2007).

Ⅲ. TWO ALTERNATIVE MODELS OF KM ASSIMILATION

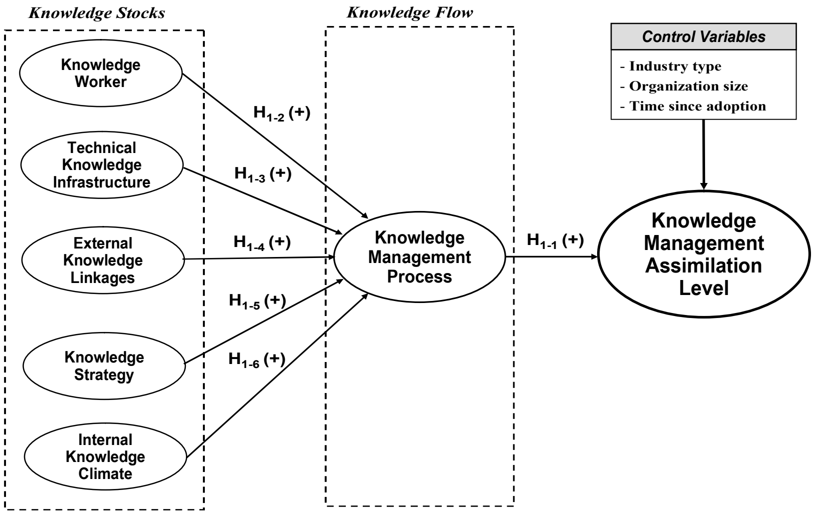
1. A Causal Model with the Distinction between Knowledge Stock and Flow

The first theoretical model for KM assimilation is based on the distinction between knowledge stocks and flows from the perspective of the DCV (Teece et al., 1997). This study considers the accumulated knowledge stocks in KM as critical antecedents for facilitating the regulation of knowledge flows in organizations (Kogut & Zander, 1996). A stock is a "strategic asset", which enables the enactment of organizational capabilities (Dierickx & Cool, 1989). These stocks are organization-specific and are therefore accumulated over time, not simply acquired on strategic factor markets (Dierickx & Cool, 1989). Consequently, knowledge stocks have been conceptualized as knowledge reservoirs, "meaning 'to keep for future use' because it connotes that the knowledge can be used again" (Argote & Ingram, 2000). On the other hand, the regulation of flows allows for the accumulation of stocks over time and their deployment in product markets (Dierickx & Cool, 1989). The deployment of the accumulated organizational knowledge is contingent on an identification process by which learning is developed socially via the formation of values and convergent expectations (Kogut & Zander, 1996). Thus, the regulation of knowledge flows should be viewed as a critical intermediary between knowledge stocks and KM assimilation levels in organizations.

With the above classification of knowledge stocks and flows, the first model introduced one mediating variable and its five antecedent variables to explain the assimilation level of KM. First, among six previously-identified key factors, we consider the *knowledge management process* as a critical knowledge flow, which acts as a buffer between a firm's knowledge stocks and the level of KM assimilation. Second, the KM process might be significantly shaped by knowledge stocks, including *knowledge workers, technical knowledge infrastructure, external knowledge linkages, knowledge strategy, and internal knowledge climate*. A structural equation model that represents a causal model is depicted in Figure 1.

1.1 KM Assimilation Level as a Dependent Variable

The assimilation of KM is more challenging than other managerial or technical innovation projects, because KM is an interrelated innovation which requires an effective combination of well-prepared technical and managerial activities. In this sense, KM assimilation can be regarded as a critical outcome in the efforts of organizations to leverage the potential of knowledge in their business practices and strategies (Armstrong & Sambamurthy, 1999). In particular, a firm's performance is believed to be linked with a firm's ability to integrate organizational knowledge and assimilate it to make it available for their daily business and work



〔Figure 1〕 The First Causal Model

activities (Teo et al., 2006). Therefore, understanding and measuring the level of KM assimilation is an important way to evaluate the impact of KM on business performance.

1.2 KM Process as a Knowledge Flow

The value of organizational knowledge can then depend on the efficiency of its management process. As organizations have limited management resources and individuals also possess limited cognitive capabilities, organizational knowledge must be managed efficiently for maximum strategic value. The KM process consists of the following activities: knowledge acquisition or creation, justification, storing, sharing and application, and evaluation (Gold et al., 2001). To facilitate the KM process efficiently, organizations should define and specify the process at the activity level with its associated policies and rules (Carlile & Rebentisch, 2003). Furthermore, the KM process results from an interaction between KM innovation and organizational contexts, which in turn influences the organizational assimilation of innovations (Meyer & Goes, 1988; Teo et al., 2006). As a final goal of KM, the process should be familiar to all organizational members and should be institutionalized in ordinary work behavior. Therefore, it is anticipated that the existence of an effective KM process would positively influence the level of KM assimilation.

H1-1: The more effective the KM process is, the more progress will be made through the levels of KM assimilation.

1.3 Knowledge Stocks as Antecedent Variables of Knowledge Flow

Knowledge worker: A knowledge worker is generally defined as an individual who creates and uses organizational knowledge (Nonaka & Takeuchi, 1995). The principal concerns with regard to the management of knowledge workers are how to recruit the best workers, increase individuals' knowledge capabilities, and build trust-based human networks. Knowledge capabilities include an individual's learning capability, which is a key source of knowledge creation and involves open-minded inquiry consisting of active scanning, experimentation, and learning from others about environmental changes and opportunities. Selecting knowledge workers and maintaining the continuity of knowledge workers are both major issues for a successful KM process (Mayer & Nickerson, 2005). The management of such human resources involves motivation and reward systems, personnel rotation, empowerment, and education/training. Accordingly, the majority of KM literature discusses the importance of human resources as a key component of organizational change and innovation. Thus, it is expected that the effective management of knowledge workers should positively influence the KM process:

H1-2: The more effective the management of knowledge workers is, the more effective the KM process will be.

Technical knowledge infrastructure: An organization manages its knowledge via a knowledge infrastructure, which is a framework that connects different members of the organization with different sources of internal and external knowledge (Tippins & Sohi, 2003). Technical knowledge infrastructure is a support system, which consists of knowledge and guidelines (technical as well as non-technical) regarding how knowledge is to be used, developed, and transferred to meet efficiently the KM objectives of an organization. The usefulness and roles of information technologies in KM have been discussed fairly extensively (Tanriverdi, 2005). Accordingly, it has been fairly widely accepted that technology can help an organization to connect not only people to people, but also people to knowledge, both internally and externally. This can eliminate communication barriers between different parts of an organization and with other external organizations. Organizations can also support formal or informal communities by providing diverse communication channels on the basis of various information systems. Therefore, we hypothesize that the introduction and use of a technical knowledge infrastructure is likely to lead to a better KM process:

H1-3: The more effective the use of technical knowledge infrastructure is, the more effective the KM process will be.

External knowledge linkages: Knowledge can be viewed as intrinsically relational to its surroundings (Mowery, 1996). It is not an isolated construct, but rather a consequence of the dynamic networking of individuals, groups, and social entities. Many scholars have emphasized strategic alliances as one of the principal motives for learning and knowledge acquisition (Menon et al., 2006). According to Badaracco (1991), alliances for knowledge sharing and transfer should be predicated on mutual trust, and managed not only through diverse communications, but also through formally specified rules and processes. External learning occurs through external relationships built via acquisitions and joint ventures (Kogut & Zander, 1992). External relationships as knowledge stocks confer benefits of information volume, information diversity, and information richness (Koka & Prescott, 2002). New knowledge may then be created by recombining that which has been learned internally with externally acquired knowledge through the KM process (Kogut & Zander, 1992). Therefore, we believe that the introduction of external knowledge linkages with other parties should be positively associated with a more effective KM process, as formally stated below:

H1-4: The more effective the external knowledge linkages are, the more effective the KM process will be.

Knowledge strategy: KM strategy is necessary to facilitate KM initiatives, because it determines how knowledge resources and capabilities should be utilized. According to Sher and Lee (2004), the critical role of the top executive who understands the growing importance of knowledge is to develop and deploy his/her vision of KM, and subsequently to establish a KM strategy. Many theorists have suggested that an organizational strategic change is generally realizable when there is organizational collaboration and strong commitment from all organization members (Kanter, 1995). In particular, KM is a social activity that requires the voluntary involvement of individuals (Nonaka & Takeuchi, 1995). A strong commitment and voluntary involvement of organization members can be acquired only when they share the same vision and goals (Kanter, 1995). Furthermore, KM is an ongoing commitment over an extended period of time, requiring significant expenditures of human capital and managerial resources (Davenport & Prusak, 1998). This means that an organization should clearly specify a shared vision and its goals in KM, and should disseminate these throughout the organization through a variety of communication channels. Therefore, we believe that a knowledge strategy provides basic and initial impetus for better and more effective KM processes:

H1-5: The more effective the knowledge strategy is, the more effective the KM process will be.

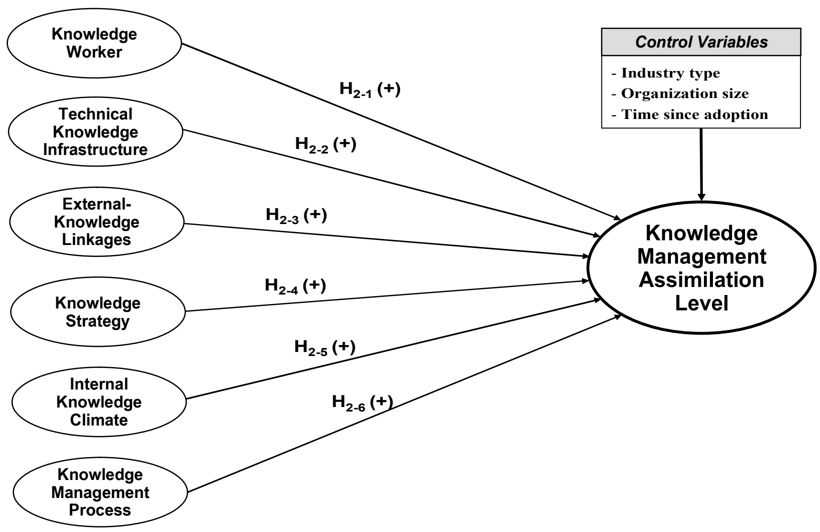
Internal knowledge climate: Since KM is as much a social activity as a managerial or technical activity, cultural change is a prerequisite for its successful implementation (Fedor et al., 2003). Nonaka and Takeuchi (1995) emphasized the importance of the organizational cultural background by arguing that tacit knowledge is rooted deeply in an individual's actions and experiences, as well as in their ideas, values, schemata, and mental models. If a supportive organizational climate for KM does not exist, there will be no motivation for organization members to engage in unfamiliar social activities. As knowledge is inherently created by and resides in individuals (Nonaka & Takeuchi, 1995) and as KM is a social activity requiring active participation from organization members (Schein, 1996), the creation of an internal knowledge partnership between employees at all levels of an organization and an appropriate organizational climate are both crucial factors in the success of a KM process. This leads to the following hypothesis:

H1-6: The more supportive the knowledge climate is, the more effective the KM process will be.

2. A Simple Direct Model

The second proposed model for the assimilation of KM is based on the RBV and KBV as proposed by Barney (1991) and Grant (1996b), respectively. Whereas general resources including physical, human, and organizational assets are critical for understanding how organizations gain and sustain competitive advantage from the RBV viewpoint, the KBV considers knowledge as the most crucial resource for organizational competitive advantage. These theories view a firm as a collection of productive resources, and focus on an internal analysis of a firm in terms of resources. This indicates that organizational competitive advantage can accrue in situations of firm resource heterogeneity and firm resource immobility (Newbert, 2007). The assumption underlying these theories is that a firm's resources that satisfy the requirements of value, rareness, imperfect immutability, and non-substitutability are all equally important, and can be critical sources of sustained competitive advantage, regardless of whether these resources are asset stocks or regulations of asset flow (Priem & Butler, 2001).

In other words, from the RBV and KBV perspectives, all six key factors identified in this study are equally important, which illustrates that the regulation of knowledge



〔Figure 2〕 The Second Single-dimensional Model flows (i.e., KM process) is not distinguishable from the accumulation of knowledge stocks (i.e., all five variables). Accordingly, a simple one-dimensional model (i.e., independent – dependent variables) was adopted because it treated all resources without distinction, as is shown in Figure 2. That is, this formulation posits only direct paths from each KM variable to its assimilation level, regarding the KM process as similar to other variables, each directly influencing the level of KM assimilation (H2-1toH2-6).

Ⅳ. RESEARCH METHODOLOGY

1. Measure Development

Survey instruments were designed to measure six key variables of KM and organizational assimilation of KM. Based on the previous literature on KM, especially Lee and Choi (2010), we developed a questionnaire to empirically test and compare two proposed models. Perceptual measures were employed for all variables. When developing the measurement, multiple-item measures were used for all variables to improve the reliability and validity of the measures (Churchill, 1979). In addition, each variable was measured based on a seven-point Likert scale from 'strongly disagree' to 'strongly agree'. The assimilation of KM, which is the dependent measure of this study, was measured by the best-known six-stage model of the assimilation of technology innovation in organizations developed by Cooper and Zmud (1990). Guttman scale was used to operationalize the assimilation stage for KM in organizations. Organizations were classified according to the highest stage achieved as of the time when the survey was conducted. To account for extraneous sources of variation in the KM assimilation levels, we incorporated *industry type, organization size,* and *time length after KM systems were introduced as control variables in our models.*

2. Data Collection and Sample Characteristics

The primary source of the sampling frame was a list of Korea's 1,000 largest firms based on revenue, which was originally reported in an influential economic daily newspaper in 2007. The survey questionnaire was mailed to 1,000 corporate-level IS executives of the firms. While it would have been ideal to measure six KM variables and KM assimilation levels from the perspective of different individuals, the scale of the survey and its administrative complexity, coupled with the anticipated low response rate typical of Korea, limited the survey to one individual from each organization – namely, a senior representative in charge of the firm's IS operations.

A large proportion of the responses came from the manufacturing (28.9%), banking / finance / insurance (20.9%), and retail / wholesale (19.2%) industries. Among the 187 companies, 112 firms had total sales of 1billion dollars or more. Similarly, Response shows some variances in terms of the numbers of total employees and size of the IS budget. Among the 187 respondents, 83.4% were male and 16.6% were female. The respondents were primarily in their 30s and 40s..

As top IS executives can be expected to be knowledgeable about the status of KM and its assimilation level, they were selected as key informants. Classification based on job titles revealed the following distribution: CIO (44.4%), director of information systems (27.3%), information service manager (24.1%), and other titles (4.2%). It appears that the respondents were at the appropriate management level and could therefore be expected to provide informed answers to the questionnaire.

Since this study adopted a single respondent approach to data collection, we conducted a post-hoc check of common method variance using Harman's single factor test, as proposed by Podsakoff et al. (2003). The results of the post hoc test suggest that common method variance is not of great concern. Finally, based on the guidelines suggested by Babbie (1973), the respondents and non-respondents were compared with regard to two key organizational features: total sales revenue and number of employees. The T-test results showed no difference among all four comparisons at a significance level of 0.05.

3. Reliability and validity of measurement instrument

This study adopted a two-stage analysis for structural equation modeling, in which the measurement model was first estimated, a process much like factor analysis, and the measurement model was then determined in a second stage, in which the structural model was estimated. Confirmatory factor analysis was first conducted on each construct independently to validate the scale, since each variable was measured by multi-item constructs. Secondly, an overall confirmatory factor analysis was conducted on all items. To validate the measurement model, three types of validity were assessed: the content validity, convergent validity, and discriminant validity of the instrument. The instrument's content validity was first established by ensuring that the measurement items were consistent with the reports in the literature, and by interviewing academic professionals and pilot-testing the instrument. Convergent validity was then evaluated by looking at the composite reliability and the variance extracted from the measures (Hair et al., 1995).

As is shown in Table 1, the composite reliability values ranged from 0.919 to 0.965, which exceeded the threshold value of 0.7. For the variance extracted by a measure, a score of 0.5 indicates an acceptable level (Fornell & Larcker, 1981). Table 1 shows that the variances extracted by the measures ranged from 0.758 to 0.845, above the acceptable value. Finally, the discriminant validity of the instrument was verified by looking at the square root of the variance extracted measures. The results revealed that, as shown in Table 2, the square root of the variance extracted for each construct was

〈Table 1〉 The Result of Confirmatory Factor Analysis for Measures

Construct	Items	Composite Reliability	Variance Extracted
Knowledge Worker	6	0.943	0.789
Technical Knowledge Infrastructure	5	0.939	0.811
External Knowledge Linkages	5	0.954	0.845
Knowledge Strategy	5	0.965	0.824
Internal Knowledge Climate	5	0.919	0.784
Knowledge Process	7	0.942	0.758

〈Table 2〉 Correlation between Latent Variables

Construct	1. Knowledge Worker	2. Technical Knowledge Infrastructure	3. External Knowledge Linkage	4. Knowledge Strategy	5. Internal Knowledge Climate	6. Knowledge Management Process
1	**0.888**	-	-	-	-	-
2	0.425	**0.900**		-	-	-
3	0.483	0.376	**0.919**	-	-	-
4	0.422	0.367	0.402	**0.908**	-	-
5	0.529	0.347	0.615	0.366	**0.885**	-
6	0.492	0.288	0.649	0.255	0.601	**0.870**

The shaded numbers on the diagonal are the square roots of the average variance extracted

greater than the correlations between it and all other constructs. Additionally, the results of the inter-construct correlations confirmed that each construct shared a larger variance with its own measures than with other measures. These results explain that the measurement models were strongly supported by the data gathered, and merited further analysis.

Ⅴ. ANALYSIS AND RESULTS

The two different models in Figures 1 and 2 were analyzed in terms of MLE (as calculated by the LISREL 8.71 (Joreskog & Sörbom, 1993). Since the questionnaire employed in this study involved interval scales (all variables for knowledge stocks and flows) and a Guttman scale (i.e., KM assimilation level), we computed polyserial correlation coefficients between variables, and used them as the input matrix of the LISREL, as recommended by Hair et al. (1995).

Table 2 shows the correlations between latent variables. The table shows that three dubious correlations did exist: between external knowledge linkage and internal knowledge climate (0.615), between external knowledge linkage and knowledge management process (0.649), and between internal knowledge climate and knowledge management process (0.601). The remaining correlations among variables ranged between 0.255 and 0.529. The multicollinearity for all variables was examined using the variance inflation factor (VIF). The results show that the values of VIF for all variables were acceptable (knowledge worker = 1.711; technical knowledge infrastructure = 1.328; external knowledge linkages = 2.154; knowledge strategy = 1.237; internal knowledge climate = 1.985; knowledge process = 2.037). The assimilation stage of KM was the response variable, and Table 3 shows the particular value of the assimilation stage of respondent companies as an innovativeness measure for KM.

〈Table 3〉 KM Assimilation Stage

Category	Count	Percent (%)
1. Initiation	11	5.9
2. Adoption	27	14.4
3. Adaptation	42	22.5
4. Acceptance	49	26.2
5. Routinization	42	22.5
6. Infusion	16	8.6
Total	187	100%

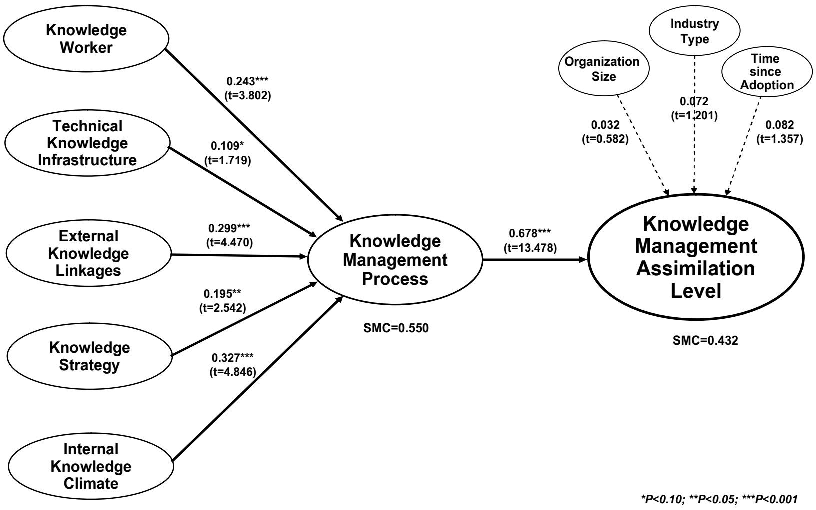
1. Testing the First Model

The exogenous constructs were allowed to be correlated by freeing the f matrix. The overall model fit was good. The first model was tested by considering the three basic measures of absolute fit: the likelihood-ratio chi-square, the goodness-of-fit index (GFI) and the root mean square residual (RMSR). The chi-square result was nonsignificant (c2 (512) = 1219.28, p>0.05), and the value of the goodness-of-fit index, GFI, was acceptable (0.951). The standardized residuals were generally small and nonsignificant, the Q-plot was approximately linear, and the largest modification index (2.89) did not exceed the threshold value of 3.84. In light of the input correlation matrix, the RMSR value (0.032) of the first model was close to zero, and acceptable. With such overall measures of fit, a model should be estimated in comparison to a null model, which is a single-factor model with no measurement error. The Tucker-Lewis index (TLI) (0.976), the normed fit index (0.964), and the adjusted goodness-of-fit index (0.901) values were acceptable and higher than the desired threshold of 0.9. The first model's comparative fit index, CFI, of 0.977 indicated a good fit. For parsimonious fit measures, one applicable measure for the evaluation of a single model is the normed chi-square measure. The value (2.381) for the first model was found to be within acceptable threshold limits (1.0~3.0).

The Squared Multiple Correlation (SMC) for the structural equations for KM assimilation level was 0.432, whereas the SMC of KM process was 0.550. It indicates that over 40% of the variance in KM assimilation level was explained by the direct effects of KM process and the indirect effects of knowledge workers, technical knowledge infrastructure, external knowledge linkage, knowledge strategy, and internal knowledge climate through the KM process. Also, all six hypothesized paths in the first causal model were significantly supported, as is shown in Figure 3. The power (0.853) of the first model was sufficiently great to detect any model misspecification. In the first model, all control variables showed insignificant relationships with the KM assimilation level.

2. Testing the Second Model

The chi-square of the second model was significant (c2 (507) = 1731.98, p=0.00). None of the standardized residuals exceeded the cutoff value of 2.58, and the largest



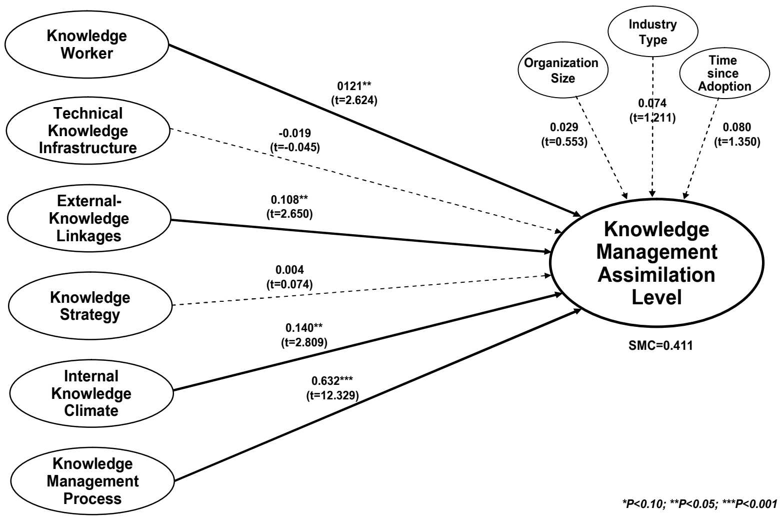
〔Figure 3〕 The Result of the LISREL Analysis of the First Model

modification index was 3.21. All absolute fit (GFI, RMSR, NCP) and incremental fit measures (AGFI, TLI, NFI, CFI) favored the first model. Also, all parsimonious fit measures of the second model were lower than those of the first model (normed chi-square=3.416; PGFI=0.566; and PNFI= 0.652).

Of the six hypothesized paths, four were supported, as is shown in Figure 4, but their overall significance levels were lower than those of the first model. Importantly, two non-significant paths concerning technical knowledge infrastructure and knowledge strategy in this second model showed significant indirect effects in the first model. Among the six independent variables, only four (knowledge worker, external knowledge linkages, internal knowledge climate, and knowledge management process) affected KM assimilation level in this second model.

The SMC for KM assimilation level in this second model indicated that around 40% of the variance (0.411) was explained by the direct effects of knowledge worker, external knowledge linkages, internal knowledge climate, and knowledge management process. But, the SMC of the KM assimilation level in this model (0.411) was lower than that of the KM assimilation level in the first model (0.432), although they did not differ significantly. As in the first model, all control variables were insignificantly related to the KM assimilation level.

As is shown in Figures 3 and 4, there was no difference in parsimony between the first model and the second model (i.e., 6 paths). In this situation, the two models were compared using the PNFI and PGFI, because the CFI does not account for parsimony. The results indicated that the PNFI and PGFI values of the first model were higher than those of the second model. The power of the second model (0.745) is acceptable, although it falls slightly below the desired level of 0.8. Comparing the two different models, the first model evidenced higher power than the second.



〔Figure 4〕 The Result of the LISREL Analysis of the Second Model

3. Comparison of the Two Models

In this study, the first causal model based on the distinction between knowledge stock and flow from the DCV perspective was compared with the second model, without the distinction from the RBV/KBV perspective in terms of the following criteria, as suggested by Lee and Kim (2005): (1) overall fit measures of the model-implied correlation matrix to the sample correlation matrix; (2) percentage of the model's hypothesized paths that are statistically significant; (3) ability to explain the variance in the outcomes of interest as measured by the SMC of the outcome variable; and (4) model power, the ability to detect and reject a poor model.

The first causal model was developed with six hypotheses that were tested in the context of KM. Structural equation modeling supported all hypotheses. It confirmed that the KM process is the most important variable affecting the level of KM assimilation in organizations, whereas knowledge worker, technical knowledge infrastructure, external knowledge linkages, knowledge strategy, and internal knowledge climate all exert significant impacts on KM assimilation levels through the KM process. The hypothesized five antecedents explained more than half of the variance in the KM process.

Although the customary goodness-of-fit measures showed an acceptable fit for both the first and second models formulated, overall fit measures favored the first causal model in this study. The examination of the paths not supported in the second model also indicated that the first model more closely represented the KM reality. Whereas the six variables identified in this study have been widely recognized as important for KM, the first model shows that the antecedents (five variables of knowledge stocks) significantly affect the level of KM assimilation, but through the intervening variable of the KM process (knowledge flow).

In terms of model parsimony, the overall fit of the second was acceptable, but all parsimonious fit measures favored the first causal model. As the objective of parsimony is neither to minimize the number of coefficients nor to maximize the fit, but rather to maximize the fit contributed by each estimated coefficient, this suggests selecting the model that has the maximum value of parsimonious fit measures among competing models if the number of their proposed paths is equal. Also, all goodness-of-fit measures of the first model were higher than those of the second model. The percentage of significant paths and the power in the first model were higher than those of the second model. In short, among the 15 measures over four criteria, all measures favored the model of the DCV with no exceptions, as is shown in Table 4.

Ⅵ. DISCUSSION

1. Findings and Implications

The first interesting finding is that the KM process was the most critical variable for proliferating KM activities across an organization. In the second single-dimensional model, the KM process functions as the highest impact factor on the KM assimilation level, and ranks as the first among six variables. Furthermore, in the first causal model, all antecedents exert significant impacts on the KM assimilation level, but only through the KM process. This indicates that the role of the KM process in the assimilation of KM is crucial, which is consistent with previous research from the dynamic capability view (e.g., (Carlile & Rebentisch, 2003)). For organizations in a rapidly changing dynamic environment, the value of organizational KM is dependent principally on the effectiveness and efficiency of the KM process, i.e., knowledge flow, rather than knowledge stocks.

A second finding worthy of attention is that the technical infrastructure does not play a critical role in KM assimilation to the extent we had expected. One possible explanation of the result is that technology functions as a tool to make knowledge acquisition, transfer, and sharing feasible and to facilitate knowledge activities within organizations. Even though information technologies are quite important, they are not sufficient to ensure success in KM (Tippins & Sohi, 2003). Only in cases in which information technologies are combined with all other key aspects can KM fully take effect. This helps to explain why knowledge infrastructure was not the primary dimension, as previous researchers have imagined (Alavi & Leidner, 2001; Gill, 1995).

The final noteworthy result is associated with the role of knowledge strategy. According to our analysis, knowledge strategy exerted no direct impact on the KM assimilation level, but had a significant indirect impact on it through the KM process. The majority of previous studies have agreed that having a knowledge strategy is critical for successful KM and its assimilation level, but this may be realizable only when the KM

〈Table 4〉 Comparison between the Two Different Models

Comparison Criteria	Recommended Level	First Causal Model	Second Direct Model
1. Goodness-of-fit Measures			
Absolute Fit Measures			
.Chi-square; df (p-value)	P > 0.05	1219.28; 512 (P > 0.05)	1731.98; 507 (P = 0.00)
.Goodness-of-fit index(GFI)	> 0.9	0.951	0.896
.Root mean square residual(RMSR)	Close to 0	0.032	0.067
.Noncentrality parameter(NCP)	Minimum value	707.28	1124.98
Incremental Fit Measures			
.Adjusted goodness-of-fit index(AGFI)	> 0.9	0.901	0.859
.Tucker-Lewis index(TLI) or (NNFI)	> 0.9	0.976	0.921
.Normed fit index(NFI)	> 0.9	0.964	0.896
.Comparative fit index(CFI)	Maximum value	0.977	0.946
Parsimonious Fit Measures			
.Normed chi-square	1.0 ~ 3.0	2.381	3.416
.Parsimonious goodness-of-fit index(PGFI)	Maximum value	0.659	0.566
.Parsimonious normed fit index(PNFI)	Maximum value	0.688	0.652
2. Percentage of significant paths			
. Direct Effect	% (Sig. / All)	100% (6 / 6)	66.7% (4 / 6)
. Indirect Effect	% (Sig. / All)	100% (5 / 5)	-
3. Ability to explain the variance (SMC: Squared Multiple Correlation)			
. KM Assimilation level	Close to 1	0.432	0.411
4. Power of model			
. Degree of model power	> 0.8	0.853	0.745

processes of an organization are guided by appropriate KM strategy, because KM should be considered a process that links knowledge activities with its related policies and strategic directions (Carlile & Rebentisch, 2003), which in turn influences the level of KM assimilation.

The results suggest several implications of both academic and practical importance. First, this paper extends the empirical research of KM by assessing the role of the KM process on the basis of the distinction between knowledge stock and flow from the DCV perspectives. Second, theoretically speaking, we conceptualized KM in terms of the accumulation of knowledge stocks and the regulation of knowledge flows (Dierickx & Cool, 1989), and perceived the knowledge stocks as an essential antecedent of the knowledge flows (Kogut & Zander, 1996). By integrating two different perspectives, i.e., the firm as identification processes and the firm as a collection of reservoirs, this study makes a theoretical contribution to both the RBV/KBV and the DCV.

Practically, these results indicate that considering the KM process is a key to understanding the development and deployment of organizational knowledge. Moreover, the proposed model provides organizations with a benchmark against which they can compare their own KM processes with their competitors. Second, many KM projects focus on information technologies (Davenport & Prusak, 1998). However, our results demonstrate that technological infrastructure is not crucial to KM assimilation processes. Simply improving information technologies does not ensure successful KM assimilation.

2. Limitations

We now turn to the limitations of this study, some of which offer opportunities for future research. First, it involved cross-sectional research that did not consider any possible feedback effect between the six selected variables and the KM assimilation level over time. Second, while information from the respondents in each organization should provide a high level of confidence in the quality of the information gathered, selection bias may still exist, due to the fact that the same individual responded to both the KM variables and assimilation level items. Finally, the respondent companies represent various industries, but are restricted to Korean companies.

Ⅶ. CONCLUSION

Because of the attention thus far focused on knowledge and its effective management, the assimilation of KM has emerged as an administrative innovation in the field of information systems. Drawing from a knowledge stock and flow perspective, this study proposed two alternative models. The survey results show that the first model from the view of knowledge stock and flow evaluates the effectiveness of KM assimilation better than the second model, without considering the classification. Interestingly, the KM process was shown to be the most critical factor for proliferating KM activities across an organization. The findings of this study serve not only as early groundwork for researchers seeking to understand KM and its effective assimilation in organizations, but also provide practitioners with guidelines as to how to enhance their KM assimilation level to improve their performance.

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