

Knowledge Management Enablers, Processes, and Organizational Performance: An Integration and Empirical Examination

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Abstract

Because of the increasing interests on knowledge management (KM), various researches have been accomplished. Many conceptual research frameworks have been proposed and thus empirical researches are required to provide practical benefits. However, most current empirical researches have dealt with the relationship of knowledge management enablers, processes or performance in isolation. Accordingly, an integrated view of knowledge management is missing and thus how to perform knowledge management to improve organizational performance is not clear. In order to alleviate these limitations of the previous researches, this study analyzes the current research frameworks and finds their relationships. An integrated research model is built by incorporating knowledge management processes into organizational performance. The model is tested empirically to investigate the relationship between knowledge management processes and enablers such as organizational structure, culture, and information technologies. The correlation between knowledge management processes and organizational creativity is also identified. Both non-financial and financial performance measures are adopted to measure the impact of knowledge management.

The findings of this study imply that knowledge management processes are significant predictors for organizational creativity, i.e., business organizations can achieve strategic and economic benefits of knowledge management by utilizing organizational creativity in an effective fashion. Organizational structure and culture are found to be significant in predicting the knowledge management processes. In addition, it is noted that technology-related variables are not significantly related to the knowledge management. This unexpected finding may result from the early stage of knowledge management in Korea. From a theoretical perspective, this study provides not only a research model for knowledge management but also relationships among knowledge management components. It establishes a generic research model by providing an integrated view of knowledge management. Empirical evidences are likely to help business organizations sharpen their knowledge management strategies.

1. Introduction

Because of the increasing interests on knowledge management (KM), various researches have been accomplished [1, 9, 12, 13, 27, 29, 31, 32, 42, 46]. Many conceptual research frameworks have been proposed and empirical researches are required to provide practical benefits. However, most current empirical researches have dealt with the relationship of knowledge management enablers, processes or performance in isolation; some researches have focused on the relationship between knowledge management enablers and knowledge management processes [33, 43], and others have concentrated on the relationship between knowledge management enablers and organizational performance [5, 14, 40]. Accordingly, an integrated view of knowledge management is missing and how to perform knowledge management to improve organizational performance is not clear.

In order to alleviate these limitations of the previous research, this study analyzes the previous empirical studies and finds their relationships. An integrated empirical research model is built by incorporating knowledge management processes into organizational performance. This model is tested empirically to investigate the relationship between knowledge management processes and enablers such as organizational structure, culture, and information technologies. The correlation between knowledge management processes and organizational creativity is also identified. Both non-

financial and financial performance measures are adopted to measure the impact of knowledge management. The emphasis is on the creation process among knowledge management processes, because knowledge creation emerges as one of the most important and widespread practical management issues in 1990s [25, 27, 31, 32, 37, 43, 49].

2. Literature Reviews

2.1 Knowledge Management Enablers and Knowledge Management Processes

Nonaka et al [33] conducted confirmatory factor analyses to test Nonaka's [32] organizational knowledge creation model. In this study, they validated the hypothesis that the construct of knowledge creation consists of four major knowledge conversion processes: socialization, externalization, combination, and internalization. As a result of the study, they suggested that all the four conversion processes explain a high amount of variance in organizational knowledge creation construct.

Hansen [17] combined the concept of weak ties and the notion of complex knowledge to explain the role of weak ties in sharing knowledge in a multiunit organization. They suggested that weak interunit ties help a project team search for useful knowledge in other subunits but impede the transfer of complex knowledge. Having weak interunit ties speed up projects when knowledge is not complex but slows projects down when the knowledge is highly complex.

Appleyard [3] examined patterns of knowledge sharing in semiconductor industry compared to steel industry, based on the different characteristics of the two industries. In addition, he examined international differences in knowledge sharing, based on different employment systems and intellectual property regimes found in the United States and Japan. He suggested that public sources of technical data play a larger role in knowledge diffusion in Japan than in the United States, and they play larger role in semiconductors than steel.

Szulanski [43] reported the findings of systematic empirical investigation of internal stickiness. He analyzed the internal stickiness of knowledge transfer and tested a transfer model with canonical correlation analysis. Contrary to conventional wisdom that placed primary blame on motivational factors, he found that barriers related to knowledge, such as the recipient's lack of absorptive capacity, causal ambiguity, and an arduousness of the relationship between source and recipient, were most important impediments to knowledge transfer within firms.

Zander and Kogut [49] proposed that the transfer and imitation of capabilities be related to the characteristics of social knowledge. They analyze the effects of the ease of codifying and communicating a manufacturing capability not only on the time to its transfer, but also on the time to imitation of new product. Based on the empirical test, they suggested that codifiability, teachability, and parallel development have significant effects on the hazard of transfer.

2.2 Knowledge Management Enablers and Organizational Performance

Drew [14] presented the results of a research on benchmarking and confirmed that benchmarking was one of the best tools for promoting organizational performance. However, he suggested that benchmarking be not equally desirable or effective for all types of firms and that benchmarking be not always a fast or low cost solution to knowledge acquisition and organizational change. He used self-reported measures to measure organizational performance.

Simonin [40] proposed that the experience of a firm have to be transformed into know-how before it could improve organizational performance. To prove this theme, he tested the relationship between collaborative experience and collaborative know-how, and the relationship between collaborative know-how and the achievement both of tangible and intangible performance. In this study, performance was divided into tangible like financial benefits and intangible like learning or knowledge based benefits. Based on the empirical test, he suggested that firms do learn from the past collaborations by developing skills in knowledge transfer.

Bierly and Chakrabarti [5] tried to identify groups of firms with similar generic knowledge strategies, determine how these strategies change over time, and compare profit margins of the groups. Through analyzing knowledge strategies of 21 U.S. pharmaceutical, they divided groups into explorers, exploiters, loners, and innovators. They suggested that the firms in innovator and explorer groups be more profitable than the firms in exploiter and loner groups.

2.3 Summary of previous studies

The previous empirical studies yielded some observations. First, there is no integrated empirical study on knowledge management. Most studies focused on the relationships between knowledge management enablers and knowledge management processes or the relationship between knowledge management enablers and organizational performance. There is lack of an integrative view of knowledge management. Second, there are a very few empirical studies on organizational performance in knowledge management, because knowledge is intangible and difficult to measure [45]. The traditional financial measure is not enough to measure knowledge; there is no common or standard way of assessing knowledge. Third, only a few studies address knowledge creation because no generic measurement tool is developed for knowledge creation contrary to the hazard rate in knowledge transfer. Fourth, creation or transfer was

measured by static measurements such as the hazard rate or the degree of satisfaction in most researches except Nonaka et al's [33] and Szulanski's [43] although knowledge management was regarded as a process type not an object type.

Table 1 Literature Review

Focus \ Criteria	Authors	Characteristics
Creation	Nonaka et al [33]	Nonaka's knowledge creation model
Transfer	Hansen [17]	Role of weak ties in sharing knowledge across organization subunits in a multiunit organization
	Appleyard [3]	Industry and national characteristics in knowledge transfer
	Szulanski [43]	Knowledge transfer processes
	Zander & Kogut [49]	Role of codifiability and teachability in knowledge transfer
Performance	Drew [14]	Benchmarking as knowledge acquisition solution
	Simonin [40]	Collaborative experience and know-how
	Bierly and Chakrabarti [5]	Generic knowledge strategies

3. An Empirical Research Framework

3.1 Theoretical Background

In comparative studies for knowledge management frameworks, many researchers suggested three major components for knowledge management [4, 8, 19, 26]. The first component is knowledge management enablers (or influencing factors) which are defined as organizational mechanisms for intentionally and consistently developing knowledge [22]. The second component is knowledge management processes (or knowledge management activities) such as creation, sharing, store, and use. The third component is organizational performance such as market share and profitability [8]. The relationship of these three components can be interpreted by the input-process-output model that was suggested by Hackman and Morris [16]. The fundamental assumption underlying this model is that the input factors affect performances through some kind of interaction process. Based on this model, we can assume that knowledge management enablers affect organizational performance through knowledge management processes.

In spite of considerable discussion of knowledge management processes and organizational performance, there is no clear link between them. To establish the relationship between them, we must consider the fourth component for knowledge management. The fourth component is the intermediate measure such as knowledge worker capability, specific process, innovation, or organizational creativity [11]. Based on four components, we propose our empirical research model as follow.

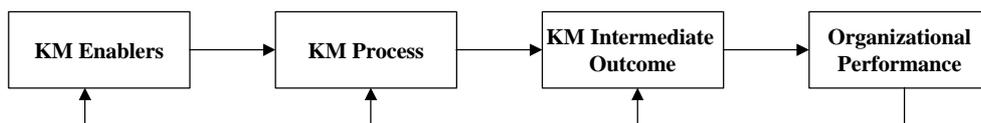


Fig. 1 Research Framework in Knowledge Management

3.2 Variables

(1) KM Enablers

Knowledge management enablers can be classified according to a socio-technical theory. Socio-technical theory assumes that an organization or an organization work system can be described as a social-technical perspective [7]. According to this perspective, we can identify that enablers are made up of two jointly independent but correlative interacting systems. The technical system is concerned with processes, tasks, and technology. The social system is concerned with attributes of people, relationships among people, reward systems, and authority structures. Organizational structure, organizational culture, and people are considered as a social system, and information technology is considered as a technical system in this study.

(2) KM Processes

Many researches identify knowledge management processes [13, 31, 46]. Choi and Lee [8] proposed knowledge

management processes which consist of creation, sharing, store, use on the basis of their comparative study. Lai and Chu [26] divided knowledge management processes into initiation, generation, modeling, repository, distribution and transfer, use, and retrospect. Most studies on knowledge management involve knowledge creation process and organizational capability. That is because knowledge creation is gaining attention as a potential source of competitive advantage for firm operating in today's global marketplace [33]. Therefore we focus on knowledge creation process among knowledge management processes. Nonaka et al. [33] constructed a measuring tool which could measure four knowledge conversion processes. In this study, Nonaka et al's construction is used. It is more effective for measuring knowledge creation process than a number of ideas or the degree of satisfaction with creation processes.

(3) KM Intermediate Outcome

Intermediate outcome will ideally reflect an aspect of organization's performance which will lead to better financial and nonfinancial performance [11]. These might include knowledge worker capability, specific process, innovation, ideas or organizational creativity. Among them, organizational creativity is defined as the creation of a valuable, useful product, service, idea, procedure, or process by individuals working together in a complex social system [2, 47]. Therefore, we consider organizational creativity as intermediate outcome.

(4) Organizational Performance

Measuring the organizational performance is very difficult. However, there is no unique way to measure organizational performance related to knowledge management. The measures of organizational performance are classified into four categories: i) financial measure, ii) intellectual capital, iii) balanced scorecard, iv) tangible and intangible benefits. In this study, the financial measure is selected owing to its easiness and objectivity. Self-reported items are also used because they do represent broad measures of performance which are commonly tracked, and they are used to compare business units and industries [14].

3.3 Hypothesis

(1) KM Enablers and KM Process

Knowledge management is related to organizational structure [18, 34]. It has profound implications for organizational structure [31]. Therefore, new organizational structure was proposed such as hypertext organization or N-form organization for knowledge management [18, 31].

Two of the most common dimensions of structural frameworks are centralization and formalization. Formalization refers to the degree to which decisions and working relationships are governed by formal rules, standard policies, and procedures [36]. Centralization refers to the locus of decision authority and control within an organizational entity [44].

In order to develop organizational knowledge in a turbulent environment, firm should have various information sources, various interpretation of information, and various perspectives developed from diversity of interpretation. When this variety has been given, the range of organizational activities will be enlarged and the wide range of activities will increase the possibility of developing organizational knowledge [22]. An organization that supports variation in process and structure is more adaptable when unforeseen problems arise. It provides more options and allows rich stimulation and interpretation for all its members [30]. Therefore, centralization and formalization are important variables in our study.

H1: There is a negative relationship between centralization and knowledge creation process.

H2: There is a negative relationship between formalization and knowledge creation process.

Most researches have shown culture to be the principal determinant of success of knowledge management [12, 13, 31, 34]. However, it is the most neglected variables. As a result, cultural issues often create enormous complexity. Therefore, culture is the biggest issue in managing knowledge in organizations [34, 38]. Organizational culture should have several components with regard to knowledge: i) people have positive orientation to knowledge, ii) people are not inhibited in sharing knowledge, iii) knowledge management project fits with the existing culture [12].

Concerned with cultural factors, the value of care in organizational relationships is one key enabling condition. Care characterizes a process of interaction between receivers and providers in firms, and should be understood as a quality of a relationship rather than a quality of roles or functions [22, 25]. Care can be translated into real collaboration, mutual trust, and learning and development. Therefore we examine collaboration, trust, and learning and development for cultural factors.

Many researchers have considered collaboration as an important variable in knowledge creation or sharing processes. In this study, collaboration is defined as the degree to which people in the group actively support and help one another

in their work. Scott and Bruce [39] insisted that collaboration reduce fear and increase openness and therefore encourage new ideas and risk taking. Krough [25] asserted that collaboration be one of the fundamental problems of sharing knowledge in companies. Ruggles [38] persisted that collaboration be indeed strongly conducive to knowledge creation and transfer. Therefore, collaboration is the important factor in knowledge management.

Trust facilitates learning between partners. We define trust as reciprocal faith in others' intention and behaviors according to Kreitner and Kinicki [24]. Decisions by exchanging knowledge under certain conditions are based on trust [21]. The current literature on social psychology of teams suggests that trust among team members have a significant influence on team performance [28]. Trust is critical in a cross-functional or as interorganizational team, because the withholding of information with the lack of trust can be especially harmful to the processes of knowledge articulation, internalization, and reflection [18]. Therefore, we consider trust as an important variable in knowledge creation process.

Learning and development is important. An emphasis on individual learning and development infuses an organization with new ideas [10, 20, 23]. Intense training, mentoring, and peer pressure literally force professional to the top of their knowledge works. The great intellectual organizations seem to develop deeply ingrained learning and development culture [35]. However the mere presence of traditional training and development activities is not sufficient for knowledge management. Continuous learning is required [30]. In this study, learning and development is defined as the degree to which learning and development is encouraged in an organization.

H3: There is a positive relationship between collaboration and knowledge creation process.

H4: There is a positive relationship between trust and knowledge creation process.

H5: There is a positive relationship between learning & development and knowledge creation process.

One adage states that knowledge management is made up of ten percent technology and 90 percent people [49]. This implies that people is one of the most important enabler in knowledge management. There are many factors which are related to people such as personality, cognitive style, self-efficacy, and skills. Concerned with skill, many researchers refer to T-shaped skill [27, 29]. T-shaped skills means that they are both very deep (the stem of the T) yet broad enough (the cross of the T) to enable their possessors to explore the interfaces between their particular knowledge domain and various applications of that knowledge in particular product [27]. Madhavan and Grover [29] argue that the horizontal stroke of the T-shaped skill set enables organizational members to meaningfully interact with one another. Without these skills, such interaction would be hampered. Therefore, T-shaped skill is an important variable.

H6: There is a positive relationship between T-shaped skill and knowledge creation process.

Technology context is referred to the existing information technology infrastructure and capabilities supporting the knowledge management architecture [49]. There is an ongoing debate on the role that information technology can play in knowledge management [6]. On the one hand, information technology is pervasively used in organizations, and thus qualifies as a natural medium for the flow of knowledge. Knowledge projects are more likely to succeed when broader technology infrastructure is adopted [12]. At the other end of spectrum, many theorists leading knowledge management have warned about the attitude towards strong investments in information technology, possibly at the expense of investments in human capital [42]. However, investments in information technology seem to be unavoidable in order to scale up knowledge management projects [6].

One aspect of technology infrastructure is knowledge-oriented tools such as Lotus Notes and World Wide Web-based intranet. Another aspect of technology infrastructure is a common, pervasive set of technologies for desktop computing and communication. This means a capable, networked PC on every desk or in every briefcase, with standardized personal productivity tools that people can exchange documents [12]. If these tools are already in place, knowledge projects can be more likely to succeed. Therefore, we consider the support of the information technology as the important variable.

H7: There is a positive relationship between support of information technology and knowledge creation process.

(2) KM Process and Intermediate Outcome

It is important for researchers to find the relationship between knowledge creation and intermediate outcome like creativity. A number of researchers have suggested that knowledge creation have been related to organizational creativity. Davenport [11] suggested that company should try to link knowledge management process with intermediate outcome of business performance. Glynn [15] insisted that organizations with more and better diffusion and institutionalization mechanism would be more intelligent. Woodman et al [47] proposed that knowledge be the most closely related to organizational creativity. Stein [41] identified both positive and negative effects that previous

experience and learning had on creativity.

H8: There is a positive relationship between knowledge creation process and organizational creativity.

(3) Intermediate Outcome and Organizational Performance

A number of researchers have considered organizational creativity as an important factor for organizational improvement. Woodman et al [47] suggested that creativity for organizations represent a dramatic organizational change. Organizational change may include organizational effectiveness, survival, and organizational performance. Davenport [11] suggested improvements of ideas might lead to better organizational performance. Quinn [35] suggested that motivated creativity gives more value to a firm.

H9: There is a positive relationship between organizational creativity and financial performance.

H10: There is a positive relationship between organizational creativity and nonfinancial performance.

An empirical research model in this study describes the relationship between variables (Fig. 2).

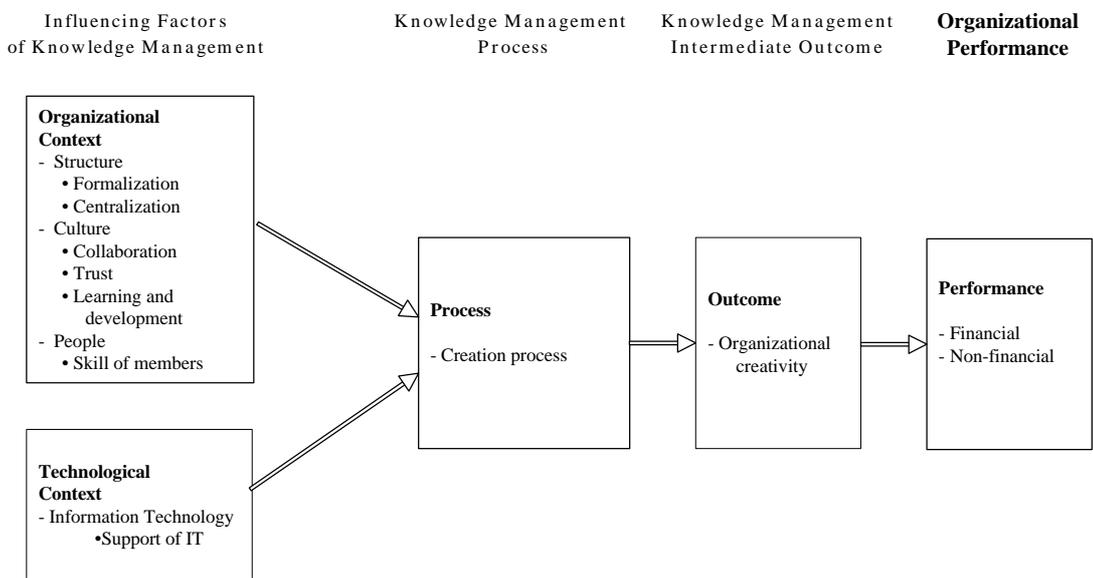


Fig 2 Research Model in This Study

4. Research Design

Research constructs are operationalized based on pretest, related literature reviews and various theories. For the questionnaire, the multiple-item method was used and each item was based on 6 point Likert scale from ‘very low’ to ‘very high’. A multiple regression method is used to test the data.

The unit of analysis in this study is organization. For this study, we selected 900 organizations in Korea as a convenience sample. At our request, these organizations identified the representatives in charge of the firm's KM project or similar project. We focused on the middle managers that were emphasized in Nonaka and Takeuchi [31]. The mail survey was performed in parallel with visits. We collected 227 questionnaires, but fourteen were not appropriate for our study. In sum, 203 valid responses were used.

We performed reliability test for internal consistency. Items with cronbach's alpha values less than 0.6 were dropped for further analysis. Since each variable was measured by the multi-item constructs, factor analysis with varimax was conducted to check the unidimensionality among the items. Analyses were performed on the 21 items that measured the components of KM processes, on the 43 items that measured the components of KM enablers, and on the 6 items for nonfinancial performance and return on investment (ROI) for financial performance. Items with factor loading values lower than 0.5 were abandoned for further analysis. Among them, 2 items related to KM process and enablers had loading value less than 0.5 or had item-to total correlation less than 0.4 were dropped. There was one item with loading value lower than 0.5 for organizational performance.

5. Results

5.1 Testing the Hypothesis

(1) KM Enablers and KM Process

For the organizational structure factors, we found that centralization was a significant predictor of knowledge creation ($\beta=-0.17$, $p < 0.05$), which supported H1. However, formalization was not significantly related to the KM processes (H2 was not supported). For the organizational culture factors, collaboration, learning and development, and trust had significant positive influences on knowledge creation, which support H3, H4, and H5. For T-shaped skill and support of information technology, there was no significant effect on knowledge creation.

For further analysis, we divided knowledge creation process into socialization, externalization, combination, and internalization. Centralization had a significantly negative influence on socialization, externalization, and internalization. Collaboration had a positively significant influence on socialization and internalization. Trust was a significant predictor of all knowledge creation processes. Learning and development was significant in socialization and internalization. Support of IT had a significantly positive influence on combination.

Table 2 KM Enablers and Knowledge Creation Processes

Relationship	Socialization		Externalization		Combination		Internalization	
	t-value	p-value	t-value	p-value	t-value	p-value	t-value	p-value
Centralization and knowledge creation	-2.34	0.02	-2.31	0.02	-0.70	0.49	-2.65	0.01
Formalization and knowledge creation	-1.14	0.25	-0.72	0.48	1.58	0.12	-0.89	0.37
Collaboration and knowledge creation	4.41	0.00	1.56	0.12	0.30	0.77	5.03	0.00
Trust and knowledge creation	4.97	0.00	2.77	0.01	2.62	0.01	1.84	0.07
Learning & development and knowledge creation	2.18	0.04	0.53	0.60	0.07	0.90	2.69	0.01
T-shape skill and knowledge creation	0.43	0.67	0.17	0.87	-0.33	0.74	0.17	0.86
Support of IT and knowledge creation	0.66	0.51	0.28	0.78	3.01	0.00	0.97	0.33

(2) KM Process and Intermediate Outcome

For the knowledge creation process, we found that knowledge creation was a significant predictor of organizational creativity ($\beta=0.65$, $p < 0.00$), which support H8. For further analysis, we divided creation processes into socialization, externalization, combination, and internalization. Socialization, externalization, and combination had a significantly positive influence on organizational creativity.

Table 3 Knowledge Creation Processes and Organizational Creativity

Relationship	Socialization		Externalization		Combination		Internalization	
	t-value	p-value	t-value	p-value	t-value	p-value	t-value	p-value
Knowledge creation and organizational creativity	2.28	0.024	5.04	0.000	2.67	0.008	0.783	0.434

(3) Intermediate Outcome and Organizational Performance

As proposed in hypothesis 9, organizational creativity showed a strong positive relationship with nonfinancial performance ($\beta=0.373$, $p < 0.00$). The strength of this association indicated a very significant relationship between organizational creativity and organizational performance. However, organizational creativity was not significantly related to financial performance ($\beta=0.106$, $p < 0.133$). Thus H10 was not supported. In sum, Table 4 shows the results for the hypotheses.

5.2 Findings and Implications

In the relationship between creation processes and KM enablers, variables such as organizational structure and organizational culture are found to be significant in predicting creation processes. When organizational culture variables have high values, creation processes are likely to be greater. In particular, trust was a significant predictor of all knowledge creation processes. Centralization was found to be negatively related to the knowledge creation; except combination process, centralization affects on socialization, externalization, and internalization. Enablers such as T-shaped skill of organizational member and support of information technology were not significantly related to the

creation processes. However, support of information technology had a meaningful effect on combination process as expected.

Table 4 Result for Hypotheses

Hypotheses	Standardized beta coefficient	t-value	Results
H1: Centralization and knowledge creation	-0.17	-2.58	Not Reject
H2: Formalization and knowledge creation	-0.02	-0.34	Reject
H3: Collaboration and knowledge creation	0.28	3.92	Not Reject
H4: Learning & development and knowledge creation	0.27	4.23	Not Reject
H5: Trust and knowledge creation	0.11	1.86	Not Reject
H6: T-shape skill and knowledge creation	0.01	0.25	Reject
H7: Support of IT and knowledge creation	0.09	1.27	Reject
H8: Knowledge creation and organizational creativity	0.65	12.09	Not Reject
H9: Organizational creativity and nonfinancial performance	0.37	5.69	Not Reject
H10: Organizational creativity and financial performance	0.10	1.50	Reject

In the relationship between creation processes and organizational creativity, we found that socialization, externalization, and combination were the significant predictors of organizational creativity. Externalization especially showed a strong positive relationship with organizational creativity. The findings of this study indicated that organizational creativity was the significant predictors for nonfinancial performance of organization. That is, an organization can achieve strategic benefits of KM from effective creation processes.

The nonsignificant findings in the pilot study bear discussion. We expected that technological contexts would have a positive relationship with KM. However, the study indicated that these contexts were not significantly related to KM. These results may reflect the early stage of KM in Korea. Since KM in Korea is in the introduction stage, many firms may have not considered technology context yet. The relationship between organizational creativity and financial measure may reflect the unique economy environment in Korea between 1997 and 1998. During the period, Korea had experienced the IMF. Therefore, many financial measures had had great fluctuation. This implies that financial measure may not be stable in the period.

We showed that each creation process was affected by different KM enablers. For example, externalization was negatively affected by centralization but combination was positively affected by the support of information technology. Therefore, organizations should consider appropriate KM enablers to improve their ill-operated processes out of the four knowledge creation processes.

6. Conclusion

We present an integrated empirical research model for KM and report results of relationships among KM enablers, KM processes, intermediate outcome, and organizational performance. There are several contributions in this paper. First, a theoretical framework is provided for empirical study on KM. Second, the relationship between KM processes and organizational performance is addressed. Third, this study attempts to find the relationships between enablers and each creation process such as socialization, externalization, combination and internalization.

In spite of the interesting implications, this study has several limitations as follows. First, this study was the snapshot research that did not consider the feedback effects. Second, we surveyed one individual in each organization. Even if we tried to avoid response bias through careful questionnaire design, we were not totally free from such bias. Finally, the results from this survey were limited to Korean firms. Therefore, the results of this study may have to be carefully interpreted.

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