THE CLASSIFICATION OF TYPES OF KM STRATEGY

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Abstract- Based on the usage levels of target costing systems (TCS) and information technology (IT) infrastructure, this study aimed to develop a framework useful for classifying four types of knowledge management (KM) strategies in manufacturing firms: process-oriented, product-oriented, mixed and negative. We empirically confirmed the four types of KM strategies, and also explained the evolution of KM strategies.

Index terms- Target costing systems, Knowledge management, IT infrastructure.

I. INTRODUCTION

Knowledge management (KM) is defined as the systematic and organizationally specified processes for acquiring, organizing and transferring both tacit and explicit knowledge of employees in organizations [1]. In prior research, two alternative approaches to KM were suggested; codification and personalization. A codification strategy is an approach that seeks to obtain and store knowledge in explicit form for subsequent use and transfer or sharing by employees [6]. A personalization approach, on the other hand, seeks to link people to each other to communicate and share knowledge across the organization in tacit or explicit form. Compared to the codification approach, the personalization strategy, which depends on interpersonal interactions, requires a moderately low degree of usage of IT infrastructure for the sharing and communication of tacit knowledge [7]. To support the flow and sharing of tacit knowledge, other systems or mechanisms that assist the implementation of a personalization strategy are required. In manufacturing firms, target costing systems (TCS) may be considered as the cross-departmental mechanisms that can support the realization of a personalization strategy [8]. TCS can be defined as a cost management tool designed to reduce the overall cost of a product over its entire life cycle with the help of the Production, Engineering, R&D, Marketing and Accounting Departments, etc. [3]. The types of KM strategies can be decided and developed based on the usage degrees of KM instruments, such as IT infrastructure for the codification and TCS for the personalization. Thus, in this study, based on the usage levels of IT infrastructure and TCS, we suggest a framework that is useful to identify the kinds of KM strategies in manufacturing firms.

II. THEORETICAL UNDERPINNINGS

A. Elements of a Personalization Strategy

New knowledge creation, especially in tacit knowledge, occurs when people combine and exchange their personal knowledge with others. The personalization approach, which mainly supports the creation, transfer and sharing of tacit knowledge, comprises diverse elements or means, such as interpersonal interactions and communication, personal experience and job rotation [4].

Since new knowledge creation involves the sharing of existing knowledge by individuals, it is inherently a group process. The physical interactions and communication among group members represented by the organizational practice of forming task forces or working teams are a means for organizations to pool and share tacit knowledge of their members. The sharing of tacit knowledge is also affected by the extent to which members have experience with the task and the training they receive [4]. Diverse groups whose members possess different explicit or tacit knowledge due to variations in their backgrounds, training or experiences are more likely to share their various unshared knowledge than homogeneous groups composed of similar members. Nonaka [10] proposed that the members of an organization should shift repeatedly among several physical settings (e.g., lab and plant), because the experiences of employees in diverse settings contribute to the development of organizational or group redundancy. The organizational redundancy helps to create a common cognitive ground among employees, and thus, facilitates the transfer or sharing of tacit knowledge. Job rotation or exchanges between functions such as R&D and Marketing is a mechanism to promote the formation of organizational redundancy. Nonaka indicated the importance of the role of key middle managers for the creation and synthesis of tacit knowledge in company teams. When a firm's traditional categories of knowledge no longer work, they suggest a fresh way to think about things or a new sense of direction, which stimulates the creation of new tacit knowledge by employees.

B. Characteristics of TCS

In the execution of TCS, the physical interactions among members of many departments are essential. TCS are normally applied in the product development

style characterized as simultaneous engineering or 'rugby' style product development. 'Rugby' style development demands continuous involvement of members of related departments, and produces conditions which give rise to knowledge creation [10]. In the target costing process, the functional manager who is responsible for a stage in product development should influence the activities of the functional managers of the subsequent and preceding stages to achieve, through cooperation, the targets of costs and quality, and the timely introduction of new products to the market. Product planning and cost meetings in TCS are the devices used to promote interactions among functional managers or members of various departments. They are, therefore, very important for simultaneous engineering to work effectively. Through interactions, members of many departments can share knowledge and values. To increase the diversity in experience, members of the product planning meetings are rotated through several functional departments before being named to the product planning committee. In firms that use TCS successfully, knowledge flows smoothly among marketing researchers, product designers, manufacturing personnel and cost analysts, etc.

Elements of a personalization approach	Characteristics of TCS
. Interactions among members	. Interactions among members of various departments
. Smooth communication	. Smooth communication through meetings and face-to-face interactions
. Diversity in background, training and personal experiences	. Diversity in experiences of members
. Job rotation	. Job rotation of members
. Key middle managers	. Chief engineer responsible for new product committee . Continuous involvement of related members

Table 1 Personalization approach and TCS

C. IT Infrastructure and Codification Strategy

A codification strategy is mainly used for the management of knowledge that can be converted into comprehensible forms. In the codification strategy, various kinds of knowledge are codified and stored in the firm's memory system, and ultimately, treated as a structural asset owned by the firm. If knowledge is codified and systematically stored, everyone in the organization can access, retrieve and utilize the knowledge without having to contact the individual who originally developed it.

IT infrastructure in KM represents a firm's basic IT platform and features needed to implement effective KM [2]. IT infrastructure that generally supports the realization of a codification strategy is classified into three broad types; knowledge storage (memory), search and transfer or cooperation infrastructure. IT infrastructure for knowledge storage utilizes a common database or electronic knowledge repository that stores codified and text-based knowledge as well as video, audio and graphics. The search infrastructure helps knowledge seekers to locate and retrieve requisite codified knowledge. The transfer and collaboration infrastructure are employed to exchange information or knowledge between individuals, and to promote the cooperation among employees of the firm and other related firms, as well as the learning of members of the organization.

III. A FRAMEWORK FOR THE TYPES OF KM STRATEGIES

The types of KM strategy can be decided, formed and identified based on the usage degrees of KM instruments [9]. KM tools are broadly classified into two main groups: technological (e.g., IT infrastructure) and non-technological instruments (e.g., TCS). The choice of KM instruments also must depend on the firm's strategic orientation to KM. Thus, the use degrees of KM instruments in an organization and the kinds of KM strategy adopted by a firm are closely related. In this study, it is suggested that to implement and activate KM in manufacturing firms, both TCS and IT infrastructure can be adopted, since striking differences exist between the roles of TCS and those of IT infrastructure in KM. According to the adoption degrees of the TCS or IT infrastructure, manufacturing firms may pursue different kinds of KM strategies. Thus, based on the usage levels of the TCS and IT infrastructure, a framework that represents forms of KM strategy can be developed and proposed. Figure 1 shows the framework and the four types of KM strategies in manufacturing firms: process-oriented, product-oriented, mixed and negative KM strategies.

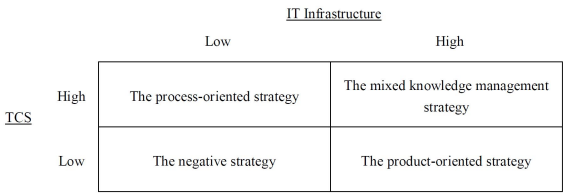


Figure 1: A framework for knowledge management strategies

The process-oriented KM strategy in manufacturing firms primarily uses TCS, and stresses a personalization approach in KM. To the extent that knowledge in the industry is changing quickly, the company needs to be creating new knowledge just to keep pace. In this situation, the organization must employ the process-oriented strategy to acquire new knowledge, which is required to become and to remain competitive in its strategic condition. The product-oriented KM strategy mainly depends on the use of IT infrastructure, and emphasizes the codification approach for KM. When knowledge resources and capabilities of a firm are sufficient for satisfying the knowledge requirements in an organization, the product-oriented strategy can be employed. Under this strategy, companies put more emphasis on codifying, storing and reusing an enormous amount of knowledge.

The mixed KM strategy stresses both personalization and codification methods and thus, it is integrative and aggressive approach in KM. It depends on TCS to acquire new types of tacit knowledge as well as IT

infrastructure to exploit various kinds of explicit one. The exploration of novel knowledge and the exploitation of present one are not mutually exclusive. While existing knowledge is applied in practical works, new one also must be produced to respond to continuous knowledge demands in an organization. To cope with the turbulent and volatile environments, and so, to continually create, integrate and reconfigure new knowledge resources, companies have to maintain both the balance and the integration between knowledge exploitation and exploration. The manufacturing firms employing the negative KM strategy have little interest in KM. Both TCS and IT infrastructure are not positively used for managing knowledge, and thus, it is not managed in a systematic manner. Under the negative strategy, firms are less learning efficient, and they are just in isolation.

IV. RESEARCH METHODS

Data for this study were drawn from a survey of the current status of TCS and IT infrastructure used in Korean manufacturing firms. In total, 330 organizations were randomly selected from a population of about 1,000 firms that are listed on the Korean stock market. First, the chief production managers or executives of the selected firms were contacted to ask them for their participation in the research. At the beginning, 154 organizations responded to the request for information. However, during the survey, 24 firms withdrew from the survey, and as a result, 130 firms were finally included in the study. In order to collect data, this research both administered questionnaires and conducted interviews with the participating firms. Only chief production managers or plant executives were selected as respondents. The survey was conducted during a 4-month period between September and December 2015.

Type of industry	Chemical industry	Machine industry	Auto-mobile	Electronic industry	Textile	Food	Paper & pulp	Non-metal	Metal industry	Rubber	Total
No. of firms	19	20	21	22	8	8	4	16	10	2	130

No. of employees	Below 100	100 - 300	300 - 500	500 - 1,000	1,000 -	Total
No. of firms	12	31	35	24	28	130

Table 2 Sample characteristics

The distinctive features of TCS include: cooperation of many departments, collaboration with suppliers, use of VE and cost table, consideration of corporate planning, and emphasis on the developing and design phases of a product [3]. Ten questionnaire items were developed with these characteristic features. They are: in the planning, developing and design stage of a product, the cooperation with the Marketing, Accounting and other departments for cost management, the collaboration with suppliers to reduce cost and the utilization of the technical information of production floor, the consideration of the medium or long-term profit plans and business planning, the extent of the introduction and utilization of VE and cost table, and the degree of emphasis being placed on the planning and design stage to manage cost. The usage degree of TCS was measured on a seven-point Likert-type scale that ranged from 'not at all' to 'to a great extent'.

Types of IT infrastructure are grouped into three kinds: the transfer or cooperation, storage and search infrastructure. Based on previous studies [5], the 13 question items were constructed to measure the adoption and usage levels of IT infrastructure. For the transfer or cooperation IT, the 6 items were used. They include the usage of IT in collaboration with other people inside and outside the organization, the use of IT for communication with other people inside and outside the firm, and the IT usage for employees to learn from a single source as well as multiple sources. The two items, which measure the storage infrastructure, comprise the clear rules and procedures for knowledge classification, and the use of database or data warehouse to store knowledge. The five items used for measuring the search IT represent the usage of IT to seek for new knowledge, to find out the location of an individual and the specific area of database for obtaining knowledge, and to retrieve knowledge about firm's products and markets or competition. The usage levels of IT infrastructure were measured on a seven-point Likert-type scale, anchored by 'strongly disagree' and 'strongly agree'.

V. EMPIRICAL EVIDENCE OF THE FOUR TYPES OF KM STRATEGY

In the current study, cluster analysis provides groups of companies that are similar in terms of the use degrees of TCS and IT infrastructure. Based on the values of TCS, the storage and transfer IT, and the search infrastructure, a cluster analysis was performed to find four clusters of organizations: the process-oriented, product-oriented, mixed and negative strategies. A formal approach in determining the most appropriate number of clusters is to examine the distance coefficient. The distance coefficient is presented in Table 3.

Stage	120	121	122	123	124	125	126	127	128	129
Coefficient	91.4	99.0	108.3	118.7	132.3	152.3	172.8	215.4	288.2	468.2
Increasing rate of coefficient	-	8.7%	9.0	9.0	11.0	15.0	13.0	25.0	33.0	62.0
No. of cluster	10	9	8	7	6	5	4	3	2	1

Table 3 Distance coefficients of cluster analysis

In Table 3, the distance coefficient increases greatly at three points - between the fifth and sixth clusters, between the fourth and fifth clusters, and between the third and fourth clusters. To show various cases in the combination of the usage levels of TCS and IT infrastructure, the six-cluster solution can be selected. The mean values of variables within each cluster are

presented in Table 4, along with the Kruskal-Wallis test results ($\chi 2$ values) for each clustering variable.

Since, in this study, a seven-point Likert-type scale was used for the measurements of TCS and IT infrastructure, the middle score (i.e., four-score) can be employed as the common dividing point, with which the usage levels can be roughly classified into two groups: high and low. In the cases of clusters A, D and E, the mean values of TCS and IT infrastructure are higher than the middle point. Thus, clusters A, D and E may represent the firms that prefer the mixed KM strategy. In terms of cluster B, the mean of TCS is lower, but those of IT infrastructure are higher than the middle score. Accordingly, the B shows the manufacturing firms adopting the product-oriented strategy. However, in the case of cluster C, the mean value of TCS is higher, but those of IT infrastructure are lower than the middle point. The firms of cluster C may prefer and pursue the process-oriented KM strategy. In cluster F, the mean values of TCS and IT infrastructure are remarkably lower than the middle score. Thus, cluster F indicates the manufacturing firms adopting the negative strategy. Figure 2 shows the location of each cluster on the grid of usage levels of TCS and IT infrastructure. These results seem to support the assertion that the KM strategies of manufacturing firms are generally grouped into the four types.

Clusters	A (N=32) mixed strategy	B (N=11) product-oriented strategy	C (N=18) process-oriented strategy	D (N=27) mixed strategy	E (N=38) mixed strategy	F (N=4) negative strategy	χ^2
Target costing	5.0(3)	3.0(5)	4.5(4)	5.2(2)	5.9(1)	2.9(6)	80.4 [a]
Storage & transfer IT	4.6(4)	4.9(3)	3.6(5)	5.8(1)	5.8(1)	2.2(6)	87.2 [a]
Search IT	4.7(3)	4.4(4)	3.1(5)	4.9(2)	5.9(1)	1.8(6)	90.0 [a]

Table 4 Results of cluster analysis
· The numbers are mean values, and the numbers in parentheses are rankings. a: p<0.01

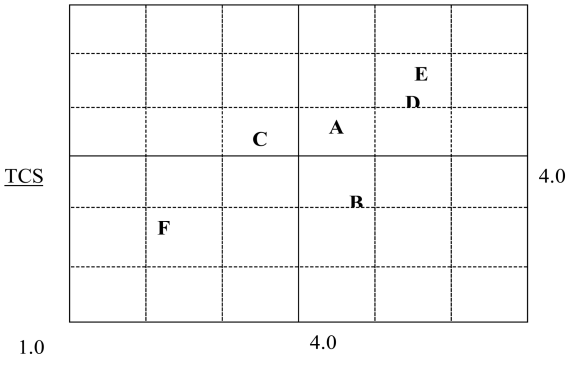


Figure 2: Location of each cluster on the grid

CONCLUSION AND DISCUSSION

The framework shows the relative emphasis or focus of a manufacturing company in the KM strategies, and the focus can be changed according to the firm's circumstances. The changing or changed focus implies that the KM strategy of a firm may evolve from the negative strategy to the process-oriented or product-oriented strategy, and finally, evolve into the mixed strategy. Nowadays, Korean global manufacturing firms, such as Hyundai Motor Company, and LG and Samsung Electronics, certainly follow a mixed strategy. Fifteen or twenty years ago, both LG and Samsung Electronics were strictly cost leaders. They competed on the basis of cost or price, and to a greater extent emphasized the process improvement to dramatically reduce their products' costs, while copying their products from the superior competitors, such as Sony, Hitachi and National.

REFERENCES

[1] S. Bollinger, and D. Smith, "Managing organizational knowledge as a strategic asset", Journal of Knowledge Management, vol.5, no.1, pp. 8-18, 2001.

[2] A. Chua, "Knowledge management system architecture: a bridge between KM consultants and technologists", International Journal of Information Management, vol. 24, no. 1, pp. 87-98, 2004.

[3] R. Cooper, "Target costing for new product development", Journal of Cost Management, vol. 16, no. 1, pp. 5-12, 2002.

[4] Z. Erden, G. Krohg, and I. Nonaka, "The quality of group tacit knowledge", Journal of Strategic Information Systems, vol. 17, no. 1, pp. 4-18, 2008.

[5] H. Gold, A. Malhotra, and H. Segars, "Knowledge management: an organizational capabilities perspective", Journal of Management Information Systems, vol. 18, no. 2, pp. 185-214, 2001.

[6] E. Greiner, T. Bohmann, and H. Krcmar, "A strategy for knowledge management", Journal of Knowledge Management, vol. 11, no. 1, pp. 3-15, 2007.

[7] M. Jasimuddin, "Exploring knowledge transfer mechanisms: The case of a UK-based group within a high-tech global corporation", International Journal of Information Management, vol. 27, pp. 294-300, 2007.

[8] T.W. Lin, K.A. Merchant, Y. Yang, and Z. Yu, "Target costing and incentive compensation", Journal of Cost Management, vol. 19, no. 1, pp. 29-42, 2005.

[9] R. Maier, and U. Remus, "Implementing process-oriented knowledge management strategies", Journal of Knowledge Management, vol. 7, no. 1, pp. 62-74, 2003.

[10] I. Nonaka, and H. Takeuchi, The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation, New York, Oxford University Press, 1995.

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