

Factors Influencing The Activity of Knowledge Management for Performance of Manufacturing Firms

Shu-Hui Chuang

Department of Business Administration
Asia University
500, Liufeng Rd., Wufeng, Taichung, Taiwan
joyce@asia.edu.tw

Tin-Chang Chang

Department of Business Administration
Asia University
500, Liufeng Rd., Wufeng, Taichung, Taiwan
ervine@asia.edu.tw

Abstract—Knowledge management (KM) has attracted significant attention from researcher and practitioners as a facilitator of firm performance. Even though companies have implemented KM, they offer inconsistent support that KM enhances firm performance. Thus, the present article examines a research that determined the factors influence activity of knowledge management to enhance performance. Data from 135 manufacturing firms provide empirical support for the research. The KM activity creates and influences factors from infrastructure capability and business strategy of the firm. KM activity also has significant direct effect on firm performance.

Keywords—*knowledge management; infrastructure capability; business strategy*

I. INTRODUCTION

Knowledge is recognized as an important weapon for sustaining competitive advantage and improving performance. The twenty first century is the era of knowledge economy, in which most firms possess knowledge that enables them to improve firm performance. How does the firm enhance organizational capabilities to boost internal performance and external competitiveness through the creation of effective knowledge management is a critical task.

Recent research interest in the information systems (IS) literature indicates that infrastructure capability (e.g., structure, culture, etc.) can enhance the knowledge management activities [1][6]. For example, Some enterprises emphasize organizational culture to build supportive knowledge sharing [15][16]. Other firms improve the knowledge access to make the collect, storage, and exchange knowledge more accessible [6] and to integrate fragmented flows of knowledge [1]. Infrastructure capability operates as a two-edged sword. Because organizational culture with traditional thinking tends to value existing relationship with firms or contact point persons as a standard of selecting products in comparison to knowledge-based culture with knowledge thinking focusing on attributes of products, knowledge management activities in knowledge-based culture can be more effective to improve firm performance. Considering the possibility of more powerful influence of knowledge management activities on firm performance in knowledge-based culture, IS research in knowledge-based culture is expected to show the process by

which infrastructure capability translates into organization's outcomes more definitely and to generalize successful knowledge management activities.

The research of enterprise internal knowledge management also focuses on the connection of knowledge management and organization performance or the introduction through the effectiveness of knowledge management organization innovation [5]. Before, less attention is paid to the companies' implementation of the strategy of knowledge management within the company and the influence of its related activities. On the other hand, the importance and the value of business strategy are highly valued. In contrast less study focuses on knowledge management activity. Thus this research hopes, through the exploration of the infrastructure capability and business strategy to understand more deeply these two roles influencing on performance. Thus, the objectives of this paper are to suggest an integrative framework describing how infrastructure capability use translates into firm performance and to make a generalization of the mechanisms involved in the successful knowledge management activities. Specifically, we discussed some antecedents and outcomes of knowledge management activities. In our proposed model, we suggest that business strategy operates as an independent variable. Moreover, this study summarize model from the result of this in-depth case study, and to understand that the next step is to combine the infrastructure capability and business strategy in order to offer many industries to utilize knowledge management activity to increase their competitiveness.

II. LITERATURE REVIEW

A. Knowledge Management Activity

The knowledge management activities are defined as the degree to which the firm creates, shares, and utilizes knowledge resources across functional boundaries. Spek & Spijkervet [18] consider that the major knowledge management lays in the flow of the organization including the development of innovative knowledge, the distribution of knowledge when needed, the storage of knowledge for the future and the field of application and the integration of the knowledge within the entire organization. This study is based on Beckman's [20] research to define knowledge management

activities: knowledge choice, access, storage, and sharing. First, knowledge choice: based on the value to carry out an appropriate access to knowledge and to filter out knowledge based on the value. Second, knowledge access can be defined through internal working experience in the firm, external information such as market, technology, and product. Third, knowledge storage can be extracted into different categories with proper methods. Four, knowledge sharing can be understood through internal organization users and it should be able to exchange information in a regular place with contexts not only limited internal corporate best practice, also with the suppliers', the employees' and customers' interactions.

B. Infrastructure Capability

Knowledge-based culture describes the degree to which organization culture provides support for viewing knowledge as valuable assets and resources. The culture is the most important factor for successful KM. For example, Dialogue between individuals or groups are often the basis for the creation of new ideas and can therefore be viewed as having the potential for creating knowledge. An appropriate culture within a firm can encourage people to create and share knowledge [2][3]. A knowledge-based culture fosters this knowledge dissemination so that employees understand the value and significance of knowledge [3].

H1a: Knowledge-based culture has a significant positive influence on KM activities.

Knowledge-based structure refers to the extent of an organization's structural disposition toward encouraging knowledge-related activities. The structures must be possible to encourage these vital interactions, as well as to give the firm the ability to adapt to an ever-changing environment [17]. The structure within a firm may encourage or inhibit knowledge creation, sharing, and application [7]. Our study examines the knowledge-based structure within a firm that may encourage knowledge, a practice seen as vital in the effective management of knowledge. The structure must be appropriate to the firm in order to adapt to an ever-changing environment.

H1b: Knowledge-based structure has a significant positive influence on KM activities.

Knowledge-based technology is defined as the technical systems within a firm, which determine how knowledge travels throughout the enterprise and how knowledge is accessed. It includes information technology (IT) and its capabilities [8]. IT contributes to knowledge management effectively [13]. For example, business intelligence technologies enable a firm to generate knowledge regarding its competition and the broader economic environment. Knowledge application technologies enable a firm to use its existing knowledge. With the improvement of science and technology, the techniques of information system become more and more important in recent years. Information system can be used to support and promote knowledge management activities. Organizations should establish an appropriate IT that encourages people to generate knowledge. IT can facilitate rapid knowledge collection, storage, and exchange [13]; thus, it not only integrates fragmented knowledge flows [1] but also

conserves existing knowledge and helps to create new knowledge.

H1c: Knowledge-based technology has a significant positive influence on KM activities.

Knowledge-based human resource describes the extent to which employees specialize in a particular domain and demonstrate the capability of applying that knowledge to interact with others. The human resource is at the heart of creating knowledge resources [2]. The knowledge embodied in humans is most often associated with KM. For example, Iansiti [12] insisted that humans possess knowledge of not only being competent with a discipline but also of knowing how the discipline interacts with other disciplines. Humans possess knowledge that is extremely valuable for creating further knowledge because they are capable of integrating diverse knowledge resources [3].

H1d: Knowledge-based human resources have a significant positive influence on KM activities.

C. Business Strategy

The objective of business strategy is to create competitive advantages in the industry in which a firm operates with the strategy which represents a way how firms arrives a decision [11]. Generic business strategies—e.g., low cost, differentiation, and focus—have been actively addressed in strategic management studies [23][23][19]. For the difference between the businesses of corporation itself, business strategy is due to the difference in relation with knowledge management activity. Davenport & Prusak [21] believe that knowledge management should combine internal infrastructure capability and competitive advantages. As a result, the business strategy will enable the knowledge management activity to be the definition of knowledge management strategy in order to support corporate goals and the missions to secure the status of competition [22]. Knowledge management must be the reflection of the business strategy in order to create customers' value, earn profit for the organization, and to manage employees.

H2: Business strategy has a significant positive influence on KM activities.

D. Firm Performance

In the past, much of researches address on the knowledge management activity and firm performance. Sharp [4] considers that knowledge is the key factor in corporate competition and corporate future value. To invest knowledge management, companies usually realize the great benefits involved.

H3: Knowledge management activities have a significant positive influence on firm performance.

III. METHODS

A. Measures

A multiple-item method was used to construct the questionnaires. All of the items were rated on a seven-point Likert scale ranging from strongly disagree (1) to strongly agree (7). Infrastructure capabilities were operationalized based on the works of Gold et al. [1] and Grover & Davenport

[22]. The index measures organizational resources by focusing on four dimensions such as knowledge-based culture, knowledge-based structure, knowledge-based technology, and knowledge-based human resource. The business strategies were operationalized based on the Porter [11], such as low-cost strategy, differentiation strategy, and focus strategy. Next, we will measure the extent to which the knowledge management activities that the firms are involved such as the choice of knowledge, the storage of knowledge, and the sharing of knowledge. The last construct is built to measure the firm performance. Firm performance includes market share gain, sales growth, profitability, efficiency of operations, and quality of services. This study adopts a specific measure, which is developed and validated by Deshpande et al. [14].

B. Data Procedures

We adopt empirical studies to analyze the impact of infrastructure capability and business strategy on knowledge management activities and in turn to improve the firm performance. The empirical analysis focuses on the manufacturing firms in Taiwan. The sample frame consists of a relatively homogenous sample of larger manufacturing firms in order to reach a higher degree of internal validity. These firms maintain similar applications and organizational resources, alleviating moderating effects of the economy and industry.

IV. RESULTS

The hypothesized relationships are tested using regression analysis. Fig. 1 summarizes our regression results.

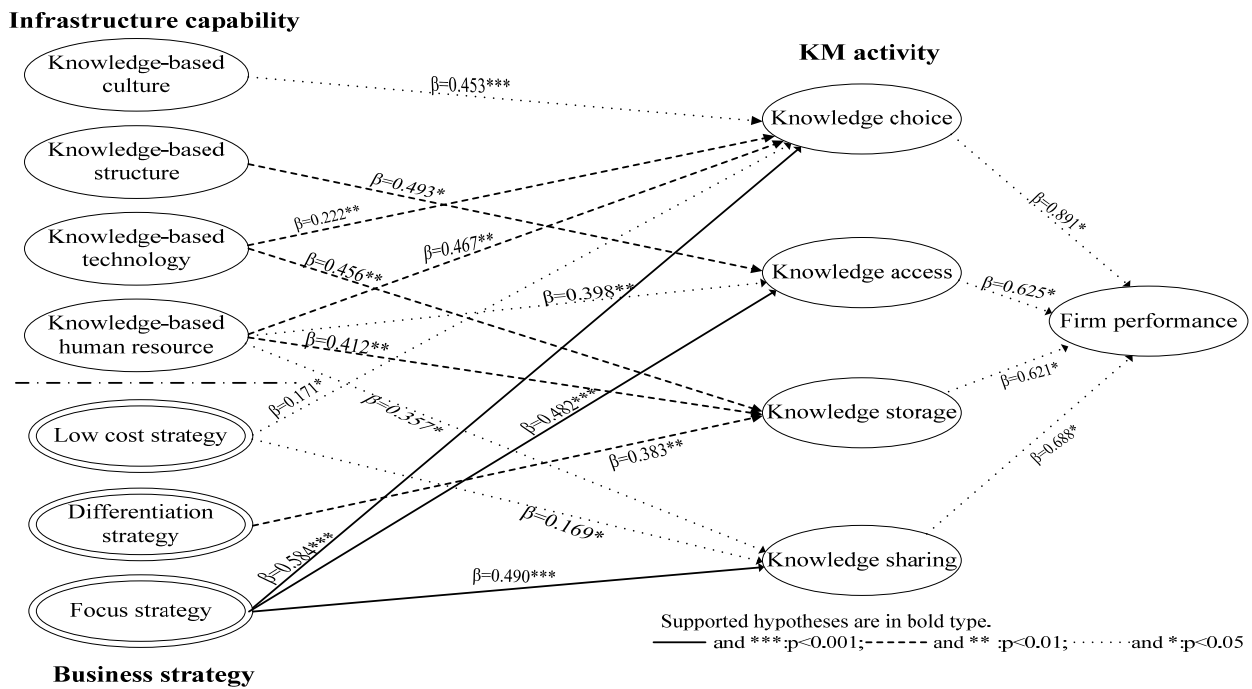


Fig. 1 Significant Relationships in Regression Results

Hypothesis 1a, 1b, 1c, and 1d examine the effects of infrastructure capability on the knowledge management activities. First, results show that 79.3 percent of the variance of the knowledge choice is explained by knowledge-based culture, structure, technology and human resource. Knowledge-based culture has a significantly strong and positive influence on the knowledge choice ($\beta= 0.453, p < 0.001$). Knowledge-based technology has a significant effect on the knowledge choice ($\beta= 0.222, p < 0.01$). Knowledge-based human resource has a significant effect on the knowledge choice ($\beta= 0.467, p < 0.01$). Second, results show that 53.5 percent of the variance of the knowledge access is explained by knowledge-based culture, structure, technology, and human resource. Knowledge-based structure has a significantly strong and positive influence on the knowledge access ($\beta= 0.493, p < 0.01$). Knowledge-based human

resources have a significantly strong and positive influence on the knowledge access ($\beta= 0.398, p < 0.05$). Third, results show that 43.7 percent of the variance of the knowledge storage is explained by knowledge-based culture, structure, technology, human resources. Knowledge based technology has a significantly strong and positive influence on the knowledge storage ($\beta= 0.412, p < 0.01$). Knowledge based human resources have a significantly strong and positive influence on the knowledge storage ($\beta= 0.456, p < 0.01$). Finally, results show that 34 percent of the variance of the knowledge sharing is explained by knowledge-based culture, structure, technology, human resources. Knowledge based human resources have a significantly strong and positive influence on the knowledge storage ($\beta= 0.357, p < 0.05$). Therefore, hypothesis 2 is partially supported.

Hypothesis 2 examines the effects of corporate business strategy on the knowledge management activities. Results show that 45.2 percent of the variance of the knowledge choice is explained by low-cost strategy, differentiation strategy, and focus strategy. Low-cost strategy has a significant effect on the knowledge choice ($\beta = 0.171$, $p < 0.05$). Also, focus strategy has a significantly strong and positive influence on the knowledge choice ($\beta = 0.584$, $p < 0.001$). Focus strategy has a significant positive influence on the knowledge access ($\beta = 0.482$, $p < 0.001$). Results show that 34 percent of the variance of the knowledge storage is explained by low-cost strategy, differentiation strategy, and focus strategy. Low-cost strategy has a significant effect on the knowledge sharing ($\beta = 0.171$, $p < 0.05$). Also, focus strategy has a significantly strong and positive influence on the knowledge sharing ($\beta = 0.490$, $p < 0.001$). Therefore, hypothesis 2 is partially supported.

Hypothesis 3 examines the effects of knowledge management activities on the firm performance. To investigate the hypothesis, entering all variables in a single block, researchers found that the proposed model explains a significant percentage of variance in firm performance ($R^2 = 38.9\%$, $F\text{-value} = 2.227$). Specifically, the study results show that the knowledge choice has a significant positive influence on firm performance ($\beta = 0.891$, $p < 0.05$). Furthermore, the knowledge access ($\beta = 0.625$, $p < 0.05$), the knowledge storage ($\beta = 0.621$, $p < 0.05$), and the knowledge sharing ($\beta = 0.688$, $p < 0.05$) variables are all found to be essential for firm performance. Therefore, hypothesis 3 is supported.

V. CONCLUSIONS

The advantages that the infrastructure capabilities bring can be described using four categories to reflect knowledge management activities: knowledge-based culture, structure, technology, and human resource. The knowledge-based culture has been proven to be supportive for knowledge-related activities. This structure grants the firm the necessary capability to adapt to a knowledge-intensive environment. Knowledge-based technology is important to establish new knowledge and provide rapid retrieval of knowledge resource. Knowledge-based employees play a very important role in shaping KM activities because they can be more innovative in various tasks.

Companies can strictly control the variety of manufacturing costs in management and lower the difference in which companies run their businesses is derived from cost control strategy. Only the possession of operational costs so that companies can utilize cost strategy to win their counterparts in the early stage. The outstanding ability in knowledge management can support the companies to achieve continuing competitive advantages [9]. Focus strategy can obtain through market segmentation concentrating on targeted customers, targeted geographic range, and targeted channels to build market survival advantages. Thus, focus strategy is one important task. Also by the execution of knowledge management activities combining with corporate business strategy, companies can enhance their performance efficiency.

Through knowledge management activities, companies can have more related information to provide high level of management to select and compare, and come out with more effective strategy to gain the utmost benefits for companies themselves. Besides, flattened organization structure will contribute more in knowledge accumulation and sharing, and makes organizations more flexible to adopt all kinds of different environments. In the activity of knowledge integration, it will increase organization efficiency and eventually increase corporate value and competitiveness to help improve firm performance more obviously.

Although the results are interesting and promising, they need to be viewed with caution because there are limitations in this research. This study focused on manufacturing firms. Thus, caution should be exercised in generalizing the results to other firms that have a different environment and competitive structure. This study also suggests several promising avenues for future research. The researchers should investigate the key factors in determining various type of knowledge management in different aspects.

REFERENCES

- [1] A. H. Gold, A. Malhotra, and A. H. Segars, "Knowledge management: An organizational capabilities perspective," *Journal of Management Information Systems*, vol. 18, pp. 185-214, 2000.
- [2] C. W. Holsapple and K. D. Joshi, "Organizational knowledge resource," *Decision Support Systems*, vol. 31, pp. 39-54, 2001.
- [3] D. Leonard-Barton, "Wellsprings of Knowledge: Building and Sustaining the Sources of Innovation," Boston: Harvard Business School Press, 1995.
- [4] D. Sharp, "Knowledge management today: challenges and opportunities," *Information Systems Management*, vol. 20, pp. 32-37, 2003.
- [5] H. G. Andrew, M. Arvind, and H. S. Albert, "Knowledge management: an organizational capabilities perspective," *Journal of Management Information System*, vol. 18, pp. 185-214, 2001.
- [6] H. Lee, and B. Choi, "Knowledge management enablers, processes, and firm performance: an integrative view and empirical examination," *Journal of Management Information Systems*, vol. 20, pp. 179-228, 2003.
- [7] I. Nonaka and H. Takeuchi, "The Knowledge Creating Company," New York: Oxford University Press, 1995.
- [8] J. E. Scott, "Organizational knowledge and the internet," *Decision Support Systems*, vol. 23, pp. 3-17, 1998.
- [9] J. P. Liebeskind, "Knowledge, Strategy and the Theory of the Firm," *Strategic Management Journal*, vol. 17, pp. 93-107, 1996.
- [10] K. Gronhaug, and O. Nordhaug, "Strategy and competence in firms," *European Management Journal*, vol. 10, pp. 438-444, 1992.
- [11] M. E. Porter, "Competitive Advantage: Creating and Sustaining Superior performance," New York, NY: Free Press, 1985.
- [12] M. Iansiti, "Real-world R&D: jumping the product generation gap," *Harvard Business Review*, vol. 71, pp. 138-147, 1993.
- [13] P. J. Sher, and V. C. Lee, "Information technology as a facilitator for enhancing dynamic capabilities through knowledge management," *Information and management*, vol. 41, pp. 933-946, 2004.
- [14] R. Deshpande, U. Jarley, and F. Webster, "Corporate culture, customer orientation, and innovativeness in Japanese firm: a quadrad analysis," *Journal Marketing*, vol. 57, pp. 23-37, 1993.
- [15] R. M. Grant, "Prospering in dynamically-competitive environment: organizational capability as knowledge integration," *Organization Science*, vol. 7, pp. 375-387, 1996.
- [16] R. M. Grant, "Toward a knowledge-based theory of the firm," *Strategic Management Journal*, vol. 17, pp. 109-122, 1996.
- [17] R. Sanchez, and J. T. Mahoney, "Modularity, flexibility and knowledge management in product and organization design," *Strategic Management Journal*, vol. 17, pp. 63-76, 1996.

- [18] R. Spek, and A. Spijkervet, "Knowledge Management: Dealing Intelligently with Knowledge," New York: CRC Press, 1997.
- [19] S. Rivard, L. Raymond, and D. Verreault, "Resource-based view and business strategy: An integrated model of the contribution of information technology to firm performance," *Journal of strategic Information Systems*, vol. 15, pp. 29-50, 2006.
- [20] T. Beckman, A methodology for knowledge management, proceeding of the TASTED International Conference on AI and Soft Computing, 1997.
- [21] T. H. Davenport, and L. Prusak, "Working Knowledge: How Organization Manage What they Know," Harvard Business School Press, Boston Massachusetts, 1998.
- [22] V. Grover, and T. Davenport, "General perspectives on knowledge management: fostering a research agenda," *Journal of Management Information Systems*, vol. 18, pp. 5-21, 2001.
- [23] Y. E. Spanos, and S. Lioukas, "An examination into the causal logic of rent generation: contrasting Porter's business strategy framework and the resource-based perspective," *Strategic Management Journal*, vol. 22, pp. 907-934, 2001.