



The Hidden Value of Knowledge in New Products

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Abstract. The purpose of this article is to evaluate the impact that knowledge management has on new product success. In this study, two aspects of knowledge management—knowledge acquisition and knowledge dissemination—were examined relative to traditional determinant of new product success. Moderating effect of competitive intensity is also investigated. The results generally support the importance of knowledge management to new product success. These findings imply that if organizations fail to understand the subtle ways by which different features of KM influence new product success, they may fail to harvest the full value of KM.

Keywords: knowledge acquisition, knowledge dissemination, knowledge management, new product development

Introduction

When tangible capital-based industrial age has been changed into knowledge-based knowledge economy era, how a company creates and shares its knowledge becomes a key source of sustainable competitive advantage. In the age of globalization and shortened product life cycle, the primary value-adding capability of the firm lies on its ability to exploit its intellectual capital. New Product Development (NPD) literature has addressed the importance of knowledge management for the NPD to create value, the exchange of information is the lifeblood of product development. But to our knowledge no study has explicitly focused on the impact of the acquisition and dissemination of knowledge on the performance of NPD, and in particular, the constructs under knowledge acquisition, dissemination, and moderator facilitating such impact.

The primary objective of this study was to examine the link between knowledge management (KM) and new product financial performance. In particular, we considered two specific aspects of KM—knowledge acquisition and knowledge dissemination (see figure 1). We selected these two aspects of KM because knowledge acquisition (KA) and knowledge

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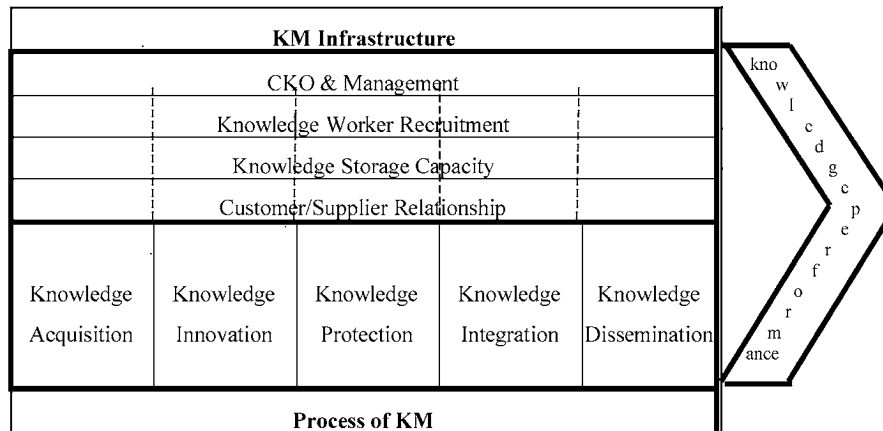


Figure 1. Knowledge value chain (Lee and Yang, 2000).

dissemination (KD) interactively create the environment for knowledge sharing and organizational learning, as depicted in the knowledge value chain model (Lee and Yang, 2000) (figure 1). We also investigated the moderating effect of competitive intensity on the link between KM and new product financial performance.

We begin with an overview of our proposed conceptual framework and research hypotheses, then describe our research design and finally discuss the sample and data collection procedures, measures and methodology.

Conceptual framework and hypotheses

The relationship between KM and new product financial performance is illustrated in figure 2. We also expect the relationship between KM and new product financial performance to be moderated by competitive intensity. We first discuss theoretically the hypotheses about the effects of two aspects of KM (knowledge acquisition and knowledge dissemination) on new product financial performance and then discuss the moderator hypotheses.

The effects of KM on new product financial performance

The effect of the cost of knowledge acquisition. Acquiring knowledge through learning can be costly in terms of organizational resources necessary to exploit learning opportunities. A decision to initiate knowledge acquisition efforts must be balanced with the cost of doing so. There are three types of cost of acquiring knowledge (Choudhury and Sampler, 1997): opportunity cost, knowledge transfer cost, and verification cost. According to Choudhury and Sampler (1997), opportunity cost is the cost of missed opportunities or losses suffered because the relevant information was not available to the right person at the right time. Knowledge transfer cost is the cost of transferring knowledge from the user to the acquirer

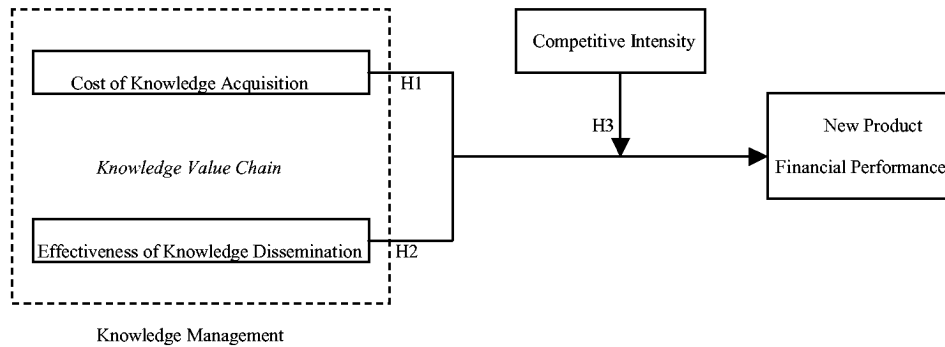


Figure 2. Conceptual framework.

in order to allow the latter to interpret and acquire the relevant information. Verification cost is the cost incurred by a user to verify the accuracy of the information acquired by the individual to whom the task was delegated.

A productive process means lower costs and thus, higher margin, which, in turn, should lead to greater product success. When does the cost of acquiring new knowledge exceed the value of the knowledge? Because knowledge acquisition and its benefits may be separated in time, or the benefits may be masked by intervening forces, assessing the true cost of knowledge acquisition efforts will never be easy. Acquiring complex, tacit knowledge can be costly. It is unlikely that organizations acquire complex knowledge without substantial learning effort. Ignoring the cost of learning entirely may lead to inefficient knowledge acquisition. Assuming the cost is prohibitive may mean no new knowledge is acquired.

Organizations acquire knowledge through two processes: one is searching and the other is organizational learning. In both processes, cost is an important consideration. Kulkarni (2000) states that the cost of information acquired is positively related to the amount of information acquired, which is a key factor in developing a profitable new product. When the investment in knowledge acquisition is low, firms have exploited the sources of cost advantage. According to Porter (1985), low-cost producers typically sell a standard, or no-frills, product and place considerable emphasis on reaping scale or absolute cost advantages from all sources. From this view, those investing low in knowledge acquisition can achieve the cost advantage to compete from knowledge, an important source in knowledge economy. At equivalent or lower prices than its rivals, a cost leader's low-cost position translates into higher returns (Porter, 1985). Firms seek to be unique in its industry along some dimensions that are widely valued by buyers. They select one or more attributes that many buyers in an industry perceive as important, and uniquely position themselves to meet those needs. Differentiation requires firms to invest largely in acquiring knowledge. For example, when a firm wants to get an innovative patent to produce unique product, it must have substantial investment in its R&D or spend large sum of money to buy the patent from owners. In addition, Mansfield, Schwartz and Wagner (1981) show that developing and introducing an innovative product increases average costs by 50%. Robinson (1991)'s study demonstrates

that a major product advantage typically generates major market share rewards, while relative product advantage is the most important product innovation characteristic. That is, developing innovative products or processes will create high rewards. Levin et al. (1987) find that a proprietary technology reduces the threat of competitive imitation. Consequently, customers are forced to buy from a monopolist, which in turn increase the financial performance of the producer. R&D intensity is significantly associated with increases in market share and with investments in new process innovation (Ettlie, 1998), innovation itself is a process of knowledge acquisition (Ding and Peters, 2000). Chaney and Devinney (1992) present that firms with true innovations are rewarded more than firms with product updates. Porter (1985) states that adopting differentiation strategy, a firm can be rewarded for its uniqueness with a premium price, resulting in improved financial performance. On the other hand, those stuck in the middle, that is, they engage in each generic strategy but fail to achieve any of them, possess no competitive advantage. This strategic position is usually a recipe for below-average performance. Consequently, financial performance is impaired. Firms stuck in the middle will compete at a disadvantage because the cost leader or differentiators will be better positioned to compete in any segment. Becoming stuck in the middle is often a manifestation of a firm's unwillingness to make choices about how to compete. It tries for competitive advantage through every means and achieves none, because achieving different types of competitive advantage usually requires inconsistent actions. Such firms will be much less profitable than rivals achieving one of the generic strategies. In other word, being "all things to all people" is a recipe for strategic mediocrity and below-average performance, because it often means that a firm has no competitive advantage at all. We therefore hypothesize:

H1. There exists a curvilinear relationship between cost of knowledge acquisition for a new product domain and financial performance of the new product: moderate levels of cost of knowledge acquisition produce the lowest financial performance; high and low costs of knowledge acquisition result in higher financial performance of new products.

The effect of the effectiveness of knowledge dissemination. The proposition that creativity and new ideas spring from the interaction of different knowledge sets has been accepted in knowledge literature (Song and Parry, 1997) as well as in related fields such as social networks and the emerging scientific literature on complexity. Jones, White and Uyanik (1999) find that the encouragement of face-to-face interaction between NPD team members during product development enables creative improvisation and real-time knowledge sharing, leading to effective knowledge dissemination. Organizational knowledge can be judged from a "routine" perspective (Cyert and Hames, 1963; Pelham, 1996), within which the concept of "routine" refers to the set of regular and predictable patterns of organizational behavior resulting in the financial performance of a new product. According to this perspective, companies are repositories of productive knowledge (Zirger and Modesto, 1990) that resides in the routines that underlie the behavior of employees. Certainly, not all of the knowledge residing in organization is beneficial for organizations. There is no clear boundary between "good" and "bad" knowledge. When the knowledge impedes the creating of creative ideas of employees, it is harmful. It occurs in R&D department, while

some thoughts deeply entrench in their mind, they tend to think in their own way, which will result in low creativity. Sometimes, inaccurate information and incorrect understanding also mislead them to the wrong way. Therefore, effective dissemination of useful knowledge multiplies the value of organizational intellectual capital. An important process of knowledge management in organizational settings is the transfer of knowledge to locations where it is needed and can be used. However, this is not a simple process in that, according to Huber (1991), organizations often do not know what they know and have weak systems for locating and retrieving the knowledge that resides within them. Knowledge is the raw material of product development. For complex projects, knowledge from multiple technical and functional domains is a necessity (Curtis, Krasner and Iscoe, 1988). Ideally, a product design team is staffed in such a way that both the levels and the distribution of knowledge within the team match those required for the successful completion of the project, resulting in the development of a profitable new product. This discussion suggests our hypothesis:

H2. The greater the effectiveness of knowledge dissemination for a new product domain, the greater the financial performance of the new product.

The moderating effect of competitive intensity

Competitive intensity (compinte) is defined as the degree of perceived hostility in the environment stemming from competition (Pelham, 1996). A previous study of new product success directly links the level of competition in the marketplace to the level of new product failure (Cooper and Kleinschmidt, 1986). The most commonly cited reason for product failure was “competitors firmly entrenched in the market.” Similarly, in a study of the electronics industry, Zirger and Modesto (1990) report that “failures were more likely for products introduced into highly competitive markets.” Recently, Song and Parry (1997) found strong negative correlations between measures of competitive intensity and new product success ratings in both China and Japan. As Kohli and Jaworski (1990) observe, in the absence of competition, an organization may perform well because customers are “stuck” with the organization’s products and services. By contrast, under conditions of high competition, customers have many alternative options to satisfy their needs and wants. The preceding discussion suggests our hypotheses:

H3. Competitive intensity has a negative impact on the positive relationship between (a) the cost of knowledge acquisition and (b) the effectiveness of knowledge dissemination and the financial performance of a new product.

Research design

Sample and procedures

Firms were solicited from a wide variety of industries in order to avoid industry biases. Following related studies, we used a 7-point Likert scale for all items to ensure higher statistical variability among survey responses (Roth and Miller, 1992; Saraph, Benson

and Schroeder, 1989; Schonberger, 1983). Thus, with the exception of those representing financial performance and cycle time, items for all the constructs were measured on a 7-point scale (1 = Strongly Disagree, 7 = Strongly Agree). The items for the financial performance were rated on a 7-point scale, where 1 = Low, 7 = High. For cycle time, the firms were asked to report actual figures. Once a draft of the questionnaire had been designed, two pretests were conducted to assess face validity of the measurement items. In the first, a draft questionnaire containing the measurement properties was administered to a total of nine expert judges (four academics and five executives) with knowledge of working experience with KM concepts. They were asked to complete the questionnaire and point out any item that was either ambiguous or otherwise difficult to answer. Based on the detailed comments, some items were modified and others were eliminated. After completing the initial pretest, input was obtained from 47 executives, representing a variety of industries in Hong Kong. In this phase, the scales for all the constructs were clearly marked and the experts were asked to critically evaluate each item relative to the assigned construct to provide a verification of the content validity of the scale. Again, the respondents were also asked to identify any item that was ambiguous or difficult to answer. At this phase of the process, very few concerns were noted and only minor modifications were suggested, primarily in instructional content and wording.

Following the two pretests, the complete survey was sent out to various firms. These firms represented a cross-section of various industries in terms of product, process type and characteristics. Industries in the sample included manufacturing, consulting, high technology, container trading and finance. The size of these firms ranges between 16 and 22000 employees, with an average size is 410. The number of respondents of each firm is 2–12 project leaders, the average is 6. Obviously, the responding firms exhibited significant diversity. These responses formed the basis for validating the scales for the KM constructs.

Information about each development project was collected from a number of respondents. In order to obtain measures of the variables of interest, information was obtained from project leaders who are responsible for the completion of the project. 394 questionnaires were sent out to different firms. Some questionnaires were administered in one-on-one interview formats, others were distributed to key individuals who supervised their completion with the designated respondents within each firm. Follow-up visits to the participated firms to verify questionable responses, cascading interview methods and verification of details with neutral observers supplement the data collections. The total effective sample size was 225, representing a response rate of 57%. The sample size satisfied the recommendation made by Jaccard and Wan (1996) to achieve power of 0.90 at $\alpha = 0.05$, the sample size needed is approximately 130 in case of the interaction term consists of a single variable (such as would be the case in a single product term between continuous variables).

Measures

Measures are summarized in the appendix. The cost of knowledge acquisition was operationalized by measuring opportunity cost, knowledge transfer cost, and verification cost occurring during the knowledge acquisition activity (Choudhury and Sampler, 1997). The effectiveness of knowledge dissemination was measured by the degree of barriers to

Table 1. Correlation matrix for measurements.

	Compinte	Cost	Effectiveness	Financial
Compinte	0.8365			
Cost	0.0460	0.9147		
Effectiveness	0.1910 ^a	0.1394	0.9702	
Financial	0.1239	0.0792	0.3652 ^b	0.9430

Notes: The coefficient alpha for each measure is on the diagonal (and in italics).

^aCorrelation is significant at the 0.05 level (2-tailed).

^bCorrelation is significant at the 0.01 level (2-tailed).

knowledge dissemination (Huber, 1991; Curtis, Krasner and Iscoe, 1988) and the knowledge sharing environment (Jones, White and Uyanik, 1999).

In developing our research instrument, we followed the adapted paradigm for developing better measures of new product financial performance construct developed by Moorman (1995) and measure of moderator construct by Jaworski and Ajay (1993).

In Table 1, we present the correlation matrix of all measures and their reliability coefficients. Cronbach's coefficient alpha (α) is a widely used measure of scale reliability (Cronbach, 1951). All of the scales are specified as having acceptable reliability.

Structural model

We examined the hypothesized structural relationships by using path analysis. The main effect variables were mean-centered before we constructed the interactions and quadratic versions to reduce the potential effects of collinearity (Cronbach, 1987). For all paths, variance inflation factors were estimated to examine collinearity and found to be below a harmful level (Miller and Roth, 1988).

The results indicate that the overall fit of the model is satisfactory (the fit indices exceed 0.90) and four predicted paths were significant ($p < 0.05$). Table 2 presents the path coefficient estimates for the hypothesized relationships of the study model.

Results

The impact of the cost of knowledge acquisition

Table 2 presents the results of the path analysis using the centered data. The first hypothesis focuses on the effect of the cost of knowledge acquisition on new product financial performance. *H1* predicts a curvilinear effect of the cost of knowledge acquisition on the financial performance of NPD. Results support this quadratic prediction ($\beta = 0.19$, $t = 1.95$), indicating that financial performance decreases with the increased investment in knowledge acquisition, but increases when the investment increases to a certain level. Competitive intensity was shown to have a moderating effect on the relationship between cost of knowledge acquisition and financial performance, which supports *H3a* ($\beta = -0.26$, $t = -1.93$).

Table 2. Path coefficients for the structural equation model.

Proposed path	Expected sign	Path coefficient	t-statistic
H1 Cost to financial performance	U ^a	0.19*	1.95
H2 Effectiveness to financial performance	+	0.63***	5.70
H3a Cost_compinte to financial performance	-	-0.26*	-1.93
H3b Effectiveness_compinte to financial performance	+	0.29*	1.81
Overall fit indices			
Goodness of fit index (GFI)	0.92		
Normed fit index (NFI)	0.97		
Non-normed fit index (NNFI)	0.88		
Comparative fit index (CFI)	0.97		
Incremental fit index (IFI)	0.97		
Relative fit index (RFI)	0.86		

^aH1 predicts an U relationship.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

The impact of the effectiveness of knowledge dissemination

The second hypothesis is on the effect of the effectiveness of knowledge dissemination on the performance of NPD. H2 predicts a positive relationship between the effectiveness of knowledge dissemination and financial performance, and this is strongly supported by the results ($\beta = 0.63$, $t = 5.70$). H3b predicts that competitive intensity has a moderating effect on the significant positive relationship between effectiveness of knowledge dissemination and financial performance, but results show that the direction of that significant moderating effect is positive ($\beta = 0.29$, $t = 1.81$), contrary to the expectation that it would be negative.

Overview of the result

This study examined the effects of knowledge management on new product financial performance. The study tested four hypotheses derived from a conceptual model of knowledge management and new product financial performance. All of these hypotheses were supported.

Apparently, the results show that financial performance is significantly related to the cost of knowledge acquisition and effectiveness of knowledge dissemination; the two relationships are significantly moderated by competitive intensity, but the results show that the effect on the second relationship is positive, in contradiction to our hypothesis. To facilitate interpretation, we plotted these interactions, as shown in figures 3 and 4 below.

To gain further insight into these relationships, we examined the effects of cost of knowledge acquisition (X) on financial performance (Y) over the range of values for competitive

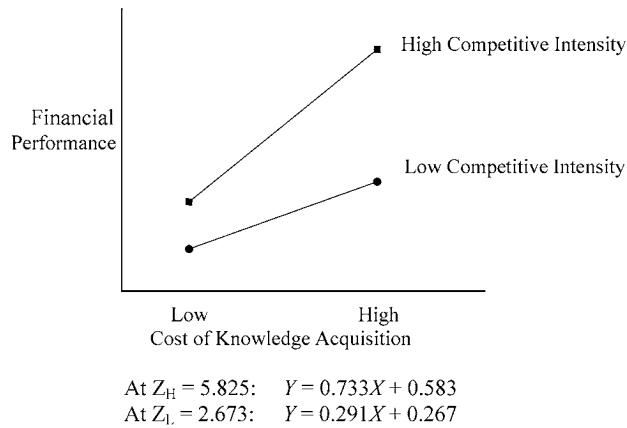


Figure 3. Interactive effects of the cost on knowledge acquisition and competitive intensity on financial performance.

intensity (Z). For this analysis, we followed Aiken and West (1991) and computed the partial derivative of financial performance in the regression equation with respect to cost as $Y/X = -0.083 + 0.140Z$. Following Cohen and Cohen (1983), values of Z were chosen to be one standard deviation below the mean ($Z_L = 2.395$), and one standard deviation above the mean ($Z_H = 5.911$). Over the observed range of the uncentered competitive intensity values ($2.673 \leq Z \leq 5.825$), Y/X was more negative for values of competitive intensity greater than 0.593 than for values lower than 0.593. From these analyses, we confirmed that $H3a$ was supported. Similarly, figure 4 indicates the influence that the effectiveness of knowledge dissemination has on financial performance; $Y/X = 1.070 - 0.280Z$ (the critical value is 3.821).

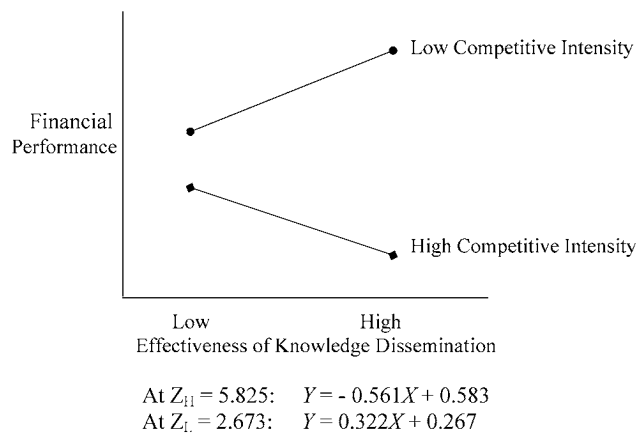


Figure 4. Interactive effects of the effectiveness of knowledge dissemination and competitive intensity on financial performance.

Theoretical explanations

In our empirical study, we explore how the cost of knowledge acquisition and the effectiveness of knowledge dissemination affect new product financial performance. There is a moderator—competitive intensity, which acts on the relationship between knowledge management and new product financial performance. The broad findings described above, along with more specific features of these relationships, point to important priorities for practitioners seeking to improve product development processes by enhancing the competency of knowledge management and suggest fruitful areas for further research.

Results tell us that financial performance relates curvilinearly to the cost of knowledge acquisition. The hypothesis of a curvilinear relationship is supported, which confirms that a boundary of decreasing financial performance exists. The higher the cost of knowledge acquisition, the lower the financial performance will be, but when the cost reaches a certain level, the financial performance will be increased. As concern as the negative relationship in first stage, besides the explanation in terms of fixed cost discussed in hypotheses part, another theoretical explanation would be as follows. Although knowledge acquisition carries a positive connotation, organizational learning research has found that learning does not always lead to positive outcomes (Miner and Mezias, 1996). Just as with individuals, learning does not always lead to intelligent or improved behavior (Levitt and March, 1988). Organizations can incorrectly learn and they can correctly learn that which is incorrect (Huber, 1991). Although learning is a major component in any effort to improve new product financial performance and strengthen competitive advantage, the increased knowledge associated with a learning process may reduce the variability of performance rather than increase it (March, 1991). Hence, learning makes performance more reliable but the risk associated with reduced variability is that the organization may become resistant to contradictory information. With the increase of investment in knowledge acquisition, the marginal return on investment (ROI) increases accordingly. Hence, it is logical that the curvilinear relationship between cost of knowledge acquisition and financial performance is supported. Effectiveness of knowledge dissemination enhances financial performance, which should suggest to new product development (or R&D) project managers that it is very important to consider a substantial budget for prompting organizational learning. Project managers should encourage employees to acquire information through various channels, then digest it and disseminate it in the interior company. In time, such intelligent capital aggregates, forming a very strong property owned by the company itself. With the development of information technology, the effectiveness of knowledge dissemination should be enhanced through cross-functional coordination, commitment of senior management and strategic planning. Competitive intensity negatively affects the relationship between the cost of knowledge acquisition and financial performance, but positively affects the relationship between the effectiveness of knowledge dissemination and financial performance. This positive interaction of competitive intensity suggests that in the intensively competitive environment, companies must force themselves to introduce and adopt more effective methods of expediting the knowledge dissemination process within their organizations. Effective dissemination can enable companies to

develop more popular products and gain a greater market share, thereby increasing their profit.

Conclusion

Our results indicate that investment in knowledge acquisition and effectiveness of knowledge dissemination affects financial performance. These results imply that managers or practitioners must address not only the ongoing knowledge acquisition processes for product development, but also look seriously at the question of current knowledge management in their companies if they are to harvest the full value of organizational NPD potential.

To attain and sustain competitive advantage, firms need to foster knowledge acquisition and dissemination within their firms and therefore develop a knowledge sharing culture. In particular, under high competitive environment, the competence of firms revolves around their capability to manage their existing intellectual capital effectively and efficiently. Firms need to learn how to design innovative processes and organizational structures and apply technology to foster leveraging of knowledge. Adopting appropriate competitive strategy is critical in reallocating resources so that they can lead to maximum profit and therefore increase financial performance of firms. Intensive competition can force competitors to strive in the best of their interest, this does act as catalyst to inspire firms to introduce advanced technology and put greater effort in allocating limited organizational resources so as to achieve higher rewards from markets.

To compete, firms must select and execute a strategy that best leverages their intellectual capital to position themselves in the value chain to develop customized new products. According to these results, managers or practitioners must understand the mechanism by which knowledge management impacts on NPD performance, as this can enable them to manipulate the knowledge value chain of their organizations by controlling the initial process—knowledge acquisition—and the final process—knowledge dissemination. Consequently, they can guide their companies to benefit greatly from KM in the right direction and proper way.

Appendix: Study measures

(Seven-point scale, where 7 = strongly agree and 1 = strongly disagree)

Cost of knowledge acquisition

New scale

Your company has a significant investment budget in introducing new technology and systems.

Your company has a significant investment budget in seeking external information and knowledge, such as acquiring consulting services from outside experts or subscribing to major journals and periodicals related to your industry.

Your company has a significant investment budget in recruiting qualified employees.

Your company has a significant investment budget in providing staff with continuing education, training and workshops to update their knowledge and skills.

There is significant cost incurred by employees in classifying and selecting acquired information/knowledge.

Effectiveness of knowledge dissemination

New scale

Building up a cross-functional working team has been a management practice to deal with a specific project in your company.

Different types of information and knowledge are disseminated across functions according to their different needs.

There is shared commitment among senior management towards goals and performance.

The framework for strategic planning is well recognized by R&D staff.

Competitive intensity

Jaworski and Ajay (1993)

Competition in our industry is cut-throat.

There are many "promotion wars" in our industry.

Anything that one competitor can offer, others can match readily.

Price competition is a hallmark of our industry.

One hears of a new competitive move almost every day.

Our competitors are relatively weak. (reverse scored)

Financial performance

Moorman (1995)

Rate the extent to which the product has achieved the following outcomes during the first 12 months of its life in the marketplace.

(Seven-point scale, where 7 = high and 1 = low)

Market share relative to its stated objective.

Sales relative to its stated objective.

Return on assets relative to its stated objective.

Profit margin relative to its stated objective.

Return on investment relative to its stated objective.

References

Aiken, L.S. and S.G. West. (1991). *Multiple Regression: Testing and Interpreting Interactions*. CA: Sage.

Chaney, P.K. and T.M. Devinney. (1992). "New Product Innovations and Stock Price Performance." *Journal of Business Finance and Accounting* 19(5), 677-685.

Choudhury, V. and J.L. Sampler. (1997). "Information Specificity and Environmental Scanning: An Economic Perspective." *MIS Quarterly* March, 25-53.

- Cohen, J. and P. Cohen. (1983). *Applied Multiple Regression/Correlation Analyses for the Behavioral Sciences*. Hillsdale, NJ: Lawrence Erlbaum.
- Cooper, R.G. and E.J. Kleinschmidt. (1986). "An Investigation Into the New Product Process: Steps, Deficiencies, and Impact." *Journal of Product Innovation Management* 3, 71–85.
- Cronbach, L. (1951). "Coefficient Alpha and the Internal Structure of Tests." *Psychometrika* 16, 297–334.
- Cronbach, L.J. (1987). "Statistical Tests for Moderator Variables: Flaws in Analyses Recently Proposed." *Psychological Bulletin* 1(3), 414–417.
- Curtis, B., H. Krasner, and N. Iscoe. (1988). "A Field Study of the Software Design Process for Large Systems." *Communication ACM* 31, 1268–1287.
- Cyert, R.M. and G. Hames. (1963). *A Behavioral Theory of the Firm*. NJ: Prentice Hall.
- Ding, H.B. and L.S. Peters. (2000). "Inter-Firm Knowledge Management Practices for Technology and New Product Development in Discontinuous Innovation." *International Journal of Technology Management* 20(5–8), 588–601.
- Ettlie, J.E. (1998). "R&D and Global Manufacturing Performance." *Management Science* 44(1), 1–11.
- Huber, G.P. (1991). "Organizational Learning: The Contributing Processes and the Literatures." *Organizational Science* 2, 88–115.
- Jaccard, J. and C. Wan. (1996). *Lisrel Approaches to Interactive Effects in Multiple Regression*. CA: Sage Publications.
- Jaworski, B.J. and A.K. Kohli. (1993). "Market Orientation: Antecedents and Consequences." *Journal of Marketing* 57, 53–71.
- Jones, R., L. White, and H. Uyanik. (1999). "Employee Involvement and Organizational Restructuring: Implementing Change in a Leading Turkish Bank." *International Journal of Management* 16(4), 510–520.
- Kohli, A.K. and B.J. Jaworski. (1990). "Market Orientation: The Construct, Research Propositions, and Managerial Implications." *Journal of Marketing* 54, 1–18.
- Kulkarni, S.P. (2000). "The Influence of Information Technology on Information Asymmetry in Product Markets." *Journal of Business and Economics Studies* 6(1), 55–71.
- Lee, C.C. and J. Yang. (2000). "Knowledge Value Chain." *Journal of Management Development* 19(9), 783–793.
- Levin, C.L., A.K. Klevorick, R.R. Nelson, and S.G. Winter. (1987). "Appropriating the Returns from Industrial R&D." *Brookings Papers on Economic Activity* 3, 783–820.
- Levitt, B. and J.G. March. (1988). "Organizational Learning." *Annual Review of Sociology* 14, 319–340.
- Mansfield, E., M. Schwartz, and S. Wagner. (1981). "Imitation Costs and Patents: An Empirical Study." *Economics Journal* 91, 907–918.
- March, J.G. (1991). "Exploration and Exploitation in Organizational Learning." *Organization Science* 2, 71–87.
- Miller, J.G. and A.V. Roth. (1988). *Manufacturing Strategies*. MA: Boston University.
- Miner, A.S. and S.J. Mezias. (1996). "Ugly Duckling No More: Pasts and Futures of Organizational Learning Research." *Organization Science* 7, 88–99.
- Moorman, C. (1995). "Organizational Market Information Processes: Cultural Antecedents and New Product Outcomes." *Journal of Marketing Research* 32(3), 318–336.
- Pelham, A.M. (1996). "A Longitudinal Study of the Impact of Market Structure, Firm Structure, Strategy, and Market Orientation Culture on Dimensions of Small-Firm Performance." *Journal of Academy of Marketing Science* 24(1), 27–44.
- Porter, M.E. (1985). *Competitive Advantage*. NY: The Free Press.
- Robinson, W.T. (1990). "Product Innovation and Start-Up Business Market Share Performance." *Management Science* 36(10), 1279–1289.
- Roth, A.V. and J.G. Miller. (1992). "Success Factors in Manufacturing." *Business Horizons* 35(4), 73–81.
- Saraph, J.V., P.G. Benson, and R.G. Schroeder. (1989). "An Instrument for Measuring the Critical Factors of Quality Management." *Decision Sciences* 20(4), 810–829.
- Schonberger, R.J. (1983). "Work Improvement Programs: Quality Control Circles Compared with Traditional Western Approaches." *International Journal of Operations and Production Management* 3(2), 18–32.
- Song, M.X. and M.E. Parry. (1997). "The Determinants of Japanese New Product Successes." *Journal of Marketing Research* 34, 64–76.
- Zirger, B.J. and A.M. Modesto. (1990). "A Model of New Product Development: An Empirical Test." *Management Science* 36, 867–893.

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