

**USING KNOWLEDGE MANAGEMENT TO GAIN COMPETITIVE ADVANTAGE IN
THE TEXTILE AND APPAREL VALUE CHAIN:
A COMPARISON SMALL AND LARGE FIRMS**

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ABSTRACT

The ability to store, capture, and disseminate knowledge within and across organizational boundaries has challenged managers for many years. However, as product lifecycles have decreased and environmental complexity and volatility have increased, the need to manage knowledge is intensifying, particularly across the value chain. Firms view knowledge and knowledge management as part of their strategic orientation. The difficulties of managing knowledge of are faced by firms of all sizes. Low-cost strategies may emphasize knowledge that can be used to cut costs, lower prices, and shorten cycle times whereas differentiation strategies may emphasize knowledge that adds value to a product giving it unique characteristics that serve to differentiate it from the competition. This research examines the process of acquisition, retention, maintenance, and retrieval of knowledge both within the firm through organizational memory and across the value chain through knowledge management and compares these practices for small and large firms.

KNOWLEDGE AND KNOWLEDGE MANAGEMENT

Knowledge theories span over 30 years (Polyani, 1966), however, it is only recently that knowledge has become regarded valuable asset in corporate boardrooms. Knowledge acquisition has become a critical resource for creating and sustaining competitive advantage as the competitive environment continues to intensify (Hitt, Ireland, & Lee, 2000). As with other corporate assets, the processes surrounding creation and transfer of knowledge must be managed with significant insights in order to derive the most value from knowledge investments (Bhagat, Kedia, Harveston, & Triandis, 2002; Conner & Prahalad, 1996; Davenport & Prusak, 1998; Edvinsson & Malone, 1997; Stewart, 1997). The purpose of this research is to examine the significance of managing knowledge both within firm (internal knowledge) and across the value chain (external knowledge) for small and large firms. First, we review the literature on knowledge management systems and propose some hypothesis for internal and external knowledge management. Next, we present the data and measures and follow with the results. Discussion of the results follows and the paper closes with managerial implications, limitations, and suggestions for future research.

The quest to innovate through research and development is essential for firms to remain ahead of competitors. Indeed, many firms view the acquisition of new knowledge as a way to gain and maintain competitive advantage (Danskin, Englis, Solomon, Goldsmith and Davey, 2005). However, few firms fully realize the benefits from highly valued knowledge. Knowledge that is isolated in one department or in a specific segment of the value chain is not utilized to its full extent. New knowledge should be harnessed and managed through internal knowledge management systems that create learning opportunities for other departments or product areas within the firm. Internal knowledge management systems may provide platforms for further development of knowledge transfer to external partners. By implementing internal and external

knowledge management systems, firms can experience a greater competitive advantage and sustained success over a longer period of time.

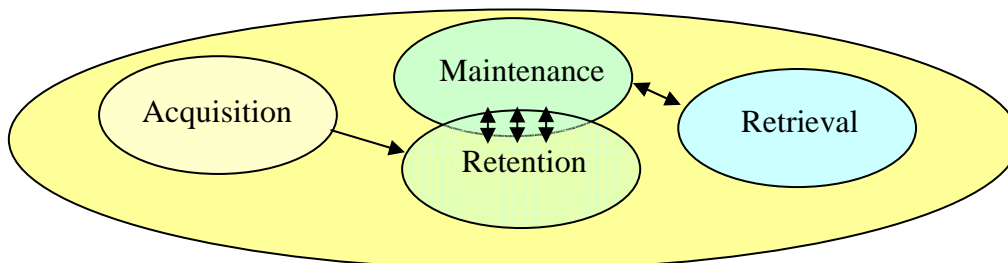
Types of Knowledge Management Systems

There are two general types of knowledge management systems that firms use to provide a basis for renewing competitive advantage. Passive knowledge management systems (such as the EDI system used by Wal Mart) are distinguished by their orientation to the “present” and tend to be used with channel members such as suppliers to more closely schedule component deliveries, reduce cycle time, cut inventories, and decrease the overall costs of production based on current behaviour of buyers and sellers. In contrast, active knowledge management systems have a "future orientation" and tend to be used with channel members to add value to the product as it passes through value chain. Active knowledge management systems reap not only the benefits of reduced costs and cycle time but also develop valuable knowledge that anticipates of future buyer/seller behaviour (e.g. market back R&D). Proactive knowledge management systems do not simply enhance efficiency through time and cost savings. They also provide a way to link and leverage the “voice of the consumer” to all stages of product development, production and distribution through the value chain. While anecdotal evidence suggests that some firms are building knowledge management systems that include both active and passive systems to provide feedback loops throughout the value chain, there is no empirical research relating these developments to strategy, value-chain position, and firm performance.

Knowledge Management Systems – Internal Processes

The effectiveness of building knowledge within the firm depends on the firm’s ability to monitor and absorb newly acquired knowledge from many sources and integrate this knowledge into its existing knowledge base (Hamel, 1991; Hansen, Nohria, and Tierney, 1999). Internal knowledge management systems can also be thought of as organizational memory. Establishing organizational memory via knowledge management systems is an essential task before firms venture into knowledge sharing with value chain partners. Before developing knowledge management systems, businesses need to understand the process of organizational memory. As shown in Figure 1, this process is divided into four separate parts acquisition, retention, maintenance, and retrieval (Stein, 1995).

Figure 1
Internal Organizational Memory



As shown above, part of internal knowledge management involves organization memory. Acquisition and retention play key roles in this process. Acquisition involves both internal and external research and development. Innovation or new knowledge facilitates value added product development that leads to an increase in competitiveness. Retention of organizational knowledge typically involves developing processes, procedures, and systems. In this way, retention can be thought of as a codification process to create organizational memory. Some firms' retention processes involve the use of databases that record knowledge for future use; whereas, other firms may have an organizational culture where knowledge is shared by informal mechanisms such as talking at the water cooler or the coffee pot. While informal networks retain knowledge at a higher rate than distributed information system, the knowledge is not easily maintained for future use. Retention is facilitated by three mechanisms. These mechanisms include schemas, scripts, and systems. The importance of harnessing internal knowledge cannot be underestimated. Small firms may lack the time, money, or other resources needed to develop knowledge retention systems. As firms grow larger, they generally build internal systems and structures to manage the flow of information across the firm. Therefore, we expect that smaller firms will have fewer resources to develop and establish internal knowledge management systems, particularly those that facilitate organizational memory.

Hypothesis 1: Large firms will have more developed organizational memory than smaller firms will.

A second part of internal knowledge management involves the role of maintenance and retrieval or organizational memory. Indeed, maintenance of knowledge is often overlooked when discussing organization memory; however, if knowledge is not properly maintained, information could become misconstrued or lost all together. When knowledge is stored in databases, maintenance is simple; however, when information is stored within informal networks using individual minds, the maintenance becomes complicated. This is especially true in employee turnover, when valuable knowledge leaves with the former employee and is not transferred back to new hires. Of particular importance is the role of experts. When experts leave the firm, they take their knowledge and their informal knowledge network with them, which can be damaging to firm competitiveness (Prahalad and Hamel, 1990). Retrieval of knowledge is one of the most important aspects of organizational memory. Managers should develop support mechanism, motivation, and rewards for knowledge sharing and retrieval in order to be successful. Individuals must be motivated in order to retrieve and communicate information. Ernst & Young, for example, evaluates and rewards its employees based on their contribution to the knowledge of the firm (Hansen, Nohria, and Tierney, 1999). A major problem within many organizations is the fact that employees view knowledge as a method of securing their jobs and are reluctant to share their knowledge. The retrieval across the firm of internal knowledge can facilitate the discovery and exploitation of opportunities. Internal knowledge may lead to a technological breakthrough that represents an opportunity despite its market applicability not being readily apparent (Abernathy and Utterback, 1978). This knowledge can also enhance a firm's ability to effectively exploit an opportunity by, for example, determining the product's optimal design to optimize functionality, cost, and reliability (Rosenberg, 1994) and ultimately the economic impact of exploiting the opportunity (McEvily and Chakravarthy, 2002). Therefore, the ability to retrieve internal knowledge provides a firm with the ability to rapidly

exploit opportunities, or to be able to respond quickly when competitors make advancements (Cohen and Levinthal, 1990).

From the above, we expect that larger firms with more resources will focus on internal knowledge systems and structures more than smaller firms. More developed internal knowledge management systems will enable people across the firm to more fully access internal knowledge for market applicability and new opportunities. Thus, the following hypothesis is offered.

Hypothesis 2: Organizational memory will be more dispersed in large firms than small firms.

Knowledge Management Systems – External Processes

External knowledge management systems are often comprised of internet based systems that link members of the value chain. On a functional level, external knowledge management systems are transparent and allow every member of the value chain to “see” the operations of every other member through production schedules, shipping schedules, ordering schedules, and inventory levels. At a strategic level, knowledge management systems when shared across the value chain bring the “voice of the consumer” very clearly into the process. This allows the entire value chain to view changing customer preferences. Early knowledge of changing consumer preferences creates opportunities for all members of the value chain to react almost immediately, thus reducing cycle time of product development and change.

External knowledge management has received increasing attention from the academic community (Andersen and Christensen, 2000; Bessant, 2004; Dyer and Singh, 1998; Dyer and Nobeoka, 2000; Håkansson, Havila and Pedersen, 1999; Sako, 1999; Hult, Ketchen and Slater, 2004; Wagner and Bukó, 2005.). Most research has been conceptual to date. For instance, Dyer and Singh (1998) suggest value chain relationships are significantly affected by learning and shared knowledge. Exceptions include case studies by Andersen and Christensen (2000) and Håkansson et al. (1999). The case studies show that firms tend to learn and share more knowledge when they are embedded in a network – such as a supply chain. Larger firms may have more structured systems that emphasize learning to tap into their knowledge networks. These external knowledge management systems can lower costs tremendously by increasing communication and eliminating steps in the manufacturing process that are either unnecessary or duplicated. For instance, Toyota uses this type of system to emphasize knowledge sharing with its supplier network (i.e., Kogut, 2000). Firms can gain significant benefits by integrating knowledge from external sources outside the firm (Dyer and Nobeoka, 2000; Kogut, 2000; Mohr and Sengupta, 2002). Value chain partners can also experience rapid learning by jumping onto another’s learning curve with particular processes or procedures such as Six Sigma Continuous Improvement. Knowledge sharing leads to increased quality and heightened customer perceptions of brand platforms. Such knowledge stores can be accessed through interorganizational relationships with customers, suppliers, and other bodies outside the company (Dyer and Singh, 1998; Madhok and Tallman, 1998). Schroeder, Bates and Junttila (2002) found that that external learning and knowledge transfer among the firms and their suppliers and customers is the strongest contributor to manufacturing performance in their empirical study of 164 manufacturing plants. Learning and sharing knowledge with suppliers play an important role in interfirm buyer-supplier relationships (Dyer and Singh, 1998; Sobrero and Roberts, 2002).

Suppliers may possess resources that complement the firm's knowledge base which may generate positive externalities and allow the firm to capture spill over from its suppliers (Lorenzoni and Lipparini, 1999). Based on our review of the literature, we expect that the ability to establish an external knowledge management system to learn from the others in the value chain is likely to result in sustained competitive advantages for the firm. Based on our review of the literature, larger firms are more likely than smaller firms to focus on learning from value chain members.

Hypothesis 3: Larger firms are likely to have external knowledge management systems that emphasize learning more than smaller firms.

We expect that larger firms will also focus on developing external knowledge management systems that foster innovation with value chain partners more than smaller firms. Larger firms will be more likely to standardize practices, processes, and platforms among value chain partners. This drive for uniformity across the value chain increases knowledge sharing, cooperative developments, and the utilization of information captured from supply chain systems. The more developed the external knowledge management systems, the more likely the firm will learn from partners' knowledge for market applicability and new opportunities. We expect that smaller firms will also focus on developing external knowledge management systems that foster entrepreneurship activities with value chain partners more than larger firms. Smaller firms are more likely to be entrepreneurially focused than larger firms and more flexible to take advantage of entrepreneurial opportunities. They are likely to adopt the latest supply chain technologies and may engage in higher risk projects. We expect larger firms will focus more on innovation and smaller firms will focus more on entrepreneurship.

Hypothesis 4: Larger firms are likely to have external knowledge management systems that emphasize innovation more than smaller firms.

Hypothesis 5: Smaller firms are likely to have external knowledge management systems that emphasize entrepreneurship more than larger firms.

METHODOLOGY

The goal of this research was to develop a descriptive framework and explore possible relationships among variables (Campbell & Stanley, 1963). The design selected was a non-experimental, static group comparison survey that is suitable for exploratory investigations where a phenomenon is described (Denzin, 1978).

Sample

To allow for maximum generalizability, a national sample of US firms participating in the apparel and textile industries was used. We chose this industry because it has come under severe international competition in the past decade and many low cost participants have moved operations overseas. We expected that firms in this industry would be forced to compete on other factors such as knowledge management. A U.S. national sample reduces any bias due to

economic variations in certain areas of the country. The sample was drawn from a database maintained by InfoUSA, an information services company located in Boston, MA. The database contained archival information on all firms in the sample and was used to compare the groups across broad categories (total sales, year the firm was founded, and number of employees) to test for non-response bias. The firms in the sample competed in many segments along the value chain of the US textile and apparel industries.

Survey

The major method of data gathering was an online survey. The survey was developed inductively using existing scales that were slightly modified for the specific purpose of this study. Pre-testing was used to check the questionnaire for comprehension and content validity. The instrument was evaluated by a group of academic experts and a practitioner from the National Council of Textile Organizations. This group reviewed and commented on issues such as clarity, order of questions, comprehensiveness and parsimony, and overall presentation of questionnaire. Efforts to increase the response rate were taken including offering to send respondents an executive summary of the results (Hinrichs, 1975) and the survey was emailed during a non-holiday period. The survey was also reviewed and approved by the Institutional Review Board at Berry College.

The survey was sent to members of the top management team of the firm since previous studies have found that top executives have relevant information about the strategy of the firm (Hambrick & Mason, 1984) and value chain management (Kobrin, 2000). Of the 310 people who work in textile and apparel industries to whom we sent the survey, 32 completed it resulting in a response rate of 10.32%. This sample was used to test the internal consistency of the measures. We are currently collecting more data using a larger sample of 2535 managers in the textile and apparel industry value chain. This study is in the field for data collection. Full results will be presented at the HTSF conference.

Measures

Internal Knowledge Management

Research on internal has focused on two main areas: Organizational memory level and organization memory dispersion. Before answering questions on internal knowledge management, respondents were first asked to think about a specific new project that they are familiar with that recently occurred within their firm. The respondents were asked to keep this project in mind when answering questions about internal knowledge. Organizational memory (ORGMEM) is defined as the amount of stored information or experience an organization has about a particular phenomenon (Moorman & Miner, 1997). It was measured by asking respondents to answer four questions on a seven point Likert scale, where 7 = strongly agree and 1 = strongly disagree. Respondents were asked, "Prior to the project, compared to other firms in our industry, my division had" "a great deal of knowledge about the category," "a great deal of experience in the category," "a great deal of familiarity with the category," and "invested a great deal of R&D in this category." The responses to these questions were subjected to exploratory factor analysis using principal component analysis and were tested for reliability through Cronbach's alpha (Nunnally, 1978). All items loaded on the same factor (Eigenvalue = 2.82) and the reliability was consistent with previous studies (Cronbach alpha = .85, N = 32).

The second component of internal knowledge management is organizational memory dispersion (MEMDIS). Memory dispersion refers to the degree to which organizational memory is shared throughout the relevant organizational memory unit. If memory is widely shared, memory dispersion is high. If memory is not widely shared, memory dispersion is low. Respondents were asked to rate on a seven-point scale where “7 = high” and “1 = low” the degree of consensus among the people working on the project for the following new product areas: Product design, Brand name, Packaging, Promotional content, and product quality level. The responses to these questions were subjected to exploratory factor analysis using principal component analysis and were tested for reliability through Cronbach’s alpha (Nunnally, 1978). All items loaded on the same factor (Eigenvalue = 3.39) and the reliability was acceptable (Cronbach alpha = .88, N = 32).

External Knowledge Management

Three constructs pertaining to external knowledge management were adapted from (Hult, Ketchen, and Nichols, 2002). Supply Chain Innovativeness (SCINN) is continuous improvement through creativity and ingenuity (Hult, Ketchen, and Nichols, 2002). Generally, firms possessing innovativeness will strive to not only meet customer’s current needs, but also anticipate future needs. This construct was assessed on a seven point Likert scale where “1= strongly disagree” and “7= strongly agree.” Respondents were asked to click on the response that best indicates the extent of your agreement with each statement below: “Technical Innovation, based on research results, is readily accepted in the supply chain,” “We actively seek innovative supply chain ideas,” “Innovation is readily accepted in the supply chain process,” “People are not penalized for new supply chain ideas that do not work,” and “Innovation in our supply chain is encouraged.” The responses to these questions were subjected to exploratory factor analysis using principal component analysis and were tested for reliability through Cronbach’s alpha (Nunnally, 1978). All items loaded on the same factor (Eigenvalue =3.44) and the reliability was acceptable (Cronbach alpha = .88, N = 32).

The second external knowledge management is supply chain learning (SCLEARN). This is the generation of new insights that have the potential to change behaviour gained from other value chain members (Huber, 1991; Hult, Ketchen, and Nichols, 2002). This construct was assessed on a seven point Likert scale where “1= strongly disagree” and “7= strongly agree.” Respondents were asked to click on the response that best indicates the extent of your agreement four items were listed, “The sense around here is that employee learning is an investment, not an expense in the supply chain,” “The basic values of this supply chain process include learning as a key to improvement,” “Once we quit learning in the supply chain we endanger our future,” and “We agree that our ability to learn is the key to improvement in the supply chain process.” The responses to these questions were subjected to exploratory factor analysis using principal component analysis and were tested for reliability through Cronbach’s alpha (Nunnally, 1978). All items loaded on the same factor (Eigenvalue =3.20) and the reliability was acceptable (Cronbach alpha = .91, N = 32).

The third and final component of external knowledge management is supply chain entrepreneurship (SCENT). Entrepreneurship in the context of the supply chain is defined as pursuit of new market opportunities and the renewal of existing areas of an organization’s

operations (Hult, Ketchen, and Nichols, 2002). This construct was assessed on a seven point Likert scale where “1= strongly disagree” and “7= strongly agree.” Respondents were asked to click on the response that best indicates the extent of your agreement. There were five items: “We believe that wide-ranging acts are necessary to achieve our objectives in the value chain,” “We initiate actions to which other organizations respond,” “We are fast to introduce new administrative techniques and operating technologies in the supply chain,” “We have a strong proclivity for high risk projects in the supply chain,” and “We are bold in our efforts to maximize the probability of exploiting opportunities in the supply chain.” The responses to these questions were subjected to exploratory factor analysis using principal component analysis and were tested for reliability through Cronbach’s alpha (Nunnally, 1978). All items loaded on the same factor (Eigenvalue =2.78) and the reliability was acceptable (Cronbach alpha = .79, N = 32).

DATA ANALYSIS AND RESULTS

The first set of analysis involved examining a listwise correlation among all variables for the sample (n=32). In this research, correlation analysis showed several of the correlations were significant indicating that continuation of additional analyses was warranted. To test the hypotheses, a second set of analyses (t-tests) examined the mean differences for the involved variables between small and large firms. The sample was broken into two groups based on the average sales of the firms (\$500,000). There were 18 small firms and 14 large firms.

Table 1 - Correlations

	ORGMEM	MEMDIS	SCINN	SCLEARN	SCENT
ORGMEM					
MEMDIS	.400*				
SCINN	.068	.207			
SCLEARN	-.044	.319	.617**		
SCENT	.331	.035	.147	.195	

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

The first set of hypotheses, H1 and H2, predicted differences between internal knowledge management practices of small and large firms competing in the textile and apparel value chain (organizational memory, organizational knowledge dispersion). Overall, the results provide support for these hypotheses regarding differences between small and large firms. Specifically, that larger firms will have more developed organizational memory than smaller firms (H1) will and that organizational memory will be more dispersed in larger firms than smaller firms did. The first hypothesis was supported. Our results show that organizational member is significantly higher (p=.09) in larger firms (mean 13.57) than smaller firms (Mean 10.05). On the other hand, the second hypothesis was not supported. Although larger firms did have higher levels of organizational memory dispersion (mean 14.21), this was not significantly different than small firms (mean 12.33).

The second set of hypotheses (H3, H4, and H5) predicted differences between external knowledge management practices of small and large firms competing (supply chain innovation, supply chain learning and supply chain entrepreneurship). The results were mixed. In terms of supply chain learning, the results showed that larger firms did have higher levels of learning (mean 10.35 versus 8.61); however, these differences were not significant. Thus, H3 was not supported. For supply chain innovation, we proposed that larger firms will emphasize innovation more than small firms (H4). This hypothesis was supported. Our results show that supply chain innovation is significantly higher ($p=.05$) in larger firms (mean 18.71) than smaller firms (Mean 14.33). The final hypothesis was not supported. We proposed that smaller firms have higher levels of supply chain entrepreneurship. Results show that small firms' level of entrepreneurship (mean 16.16) was not significantly different than large firms (mean 17.71).

DISCUSSION AND CONCLUSIONS

The difficulties of managing knowledge are faced by firms of all sizes. The purpose of this research was to examine knowledge management systems within the firm through organizational memory and outside the firm through innovation, learning, and entrepreneurship across the value chain. Specifically, we proposed that small firms manage knowledge differently than large firms.

Our results show that large firms differ significantly from small firms in how they manage knowledge both internally and externally. Larger firms have significantly more developed organizational memory systems. However, small firms are just as good as their larger counterparts at dispersing organizational memory or sharing information with employees across the firm. Survey results indicate that smaller firms may not require formal knowledge structures to preserve knowledge. Small size may facilitate informal mechanisms such as meetings around the water cooler or around the coffee pot to share internal knowledge. Small firms also do not have as distinct hierarchal structures and the fierce departmental rivalries seen within large organizations that thwart system-less internal knowledge management.

In terms of external knowledge management, large firms emphasize supply chain innovation more than smaller firms. This may be due to increasing pressures in the textile and apparel value chain to cut cycle time. Larger firms generally coordinate longer portions of the value chain than smaller firms thus facing increased pressure to innovate and decrease cycle times among several firms. Large firms also tend to have more expertise specific to supply chains at their disposal and have significantly more capital to fund supply chain projects.

The goal of our research was to understand more about knowledge management and how the process of acquisition, retention, maintenance, and retrieval of knowledge both within the firm by improving organizational memory and across the value chain through knowledge management systems may help firms gain competitive advantage. This research will also help both small and large firms to examine and develop their knowledge management systems internally and externally. Internal systems create and sustain organizational memory. Organizational knowledge such as routines and processes are more easily stored whereas tacit knowledge of key individuals is much more difficult to codify. Organizational memory creates

opportunities to minimize knowledge isolation in functional departments and creates a greater base for tacit learning to be leveraged. Firms with robust organizational memories are less impacted when key personnel leave. External knowledge management systems bring value chain members closer together and add value to products (i.e., increased quality, customer perceptions of brand platforms) throughout the value chain. The opportunity for innovation increases as partners discover new possibilities or combinations from their input in the value chain processes. These opportunities may decrease costs of products or create innovative applications for mature products. The overall impact of knowledge management systems engaged across the value chain is to differentiate products from low cost substitutes in the market place and create sustainable competitive advantage for all partners.

Managerial Implications

From a managerial perspective, this study has several important implications. First, managers need to create and manage both internal and external knowledge management systems whether they are active or passive in nature. Internal systems are important as means to codify and create organizational memory. They also facilitate dispersion of knowledge across the firm giving employees a fuller picture of the firm's knowledge base. While larger firms have more resources to create and store internal knowledge, small and large firms were equally good at dispersing knowledge across the firm. Managers should also manage knowledge-sharing in their supply chain (i.e., customers, suppliers and manufacturers, mills) by committing sufficient resources to setting up, maintaining and monitoring the knowledge-sharing network. Managers of larger firms may have more resources at their disposal to create these networks; but, managers of small firms can still benefit from supply chain networks. Our research shows that small firms are just as capable of innovating through the value chain as large firms and have similar levels of entrepreneurship gained through value chain interaction.

Limitations and Suggestions for Future Research

The results presented here are subject to some limitations. First and perhaps most important, the results were based on a very small sample aimed at a single industry. Data collection is not yet complete; therefore, we hope to confirm and extend these results with future analysis. A second limitation is the use of a single respondent per firm and we cannot ascertain from the responses whether any of the respondent firms are value chain partners. We recommend continued study of how knowledge is maintained and shared across the value chain. A longitudinal study of knowledge-sharing networks would be an excellent addition to this body of literature. We also looked only at differences in knowledge management systems in large and small firms and did not tie this information to firm performance. We propose that knowledge is strategically important and can be a source of competitive advantage. We recommend that further research be conducted to tie knowledge management systems to multiple forms of performance including both financial and cycle time performance implications.

Other areas that offer some interest include examining the role of absorptive capacity and firm culture (Cohen and Levinthal, 1990; Levinson and Asahi, 1995). It may also be interesting to investigate the use of knowledge management tools, shared communication vehicles, and the

facilitation of information technology as they may augment our understanding of internal knowledge management and external knowledge sharing.

Notes

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