National Textile Center
FY 2005 for 3rd Year Continuing Project Proposal (03 Projects)

Project No.

Project No. S03-AC01
Competency: Management Systems

Knowledge Management in the Textile & Apparel Value Chain

Project Team:
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Objective:
This project examines how knowledge can be a source of sustainable competitive advantage in the textile and apparel industry. Specifically, we examine the processes of internal (acquisition, retention, maintenance, and retrieval of knowledge) and external (with value chain partners) knowledge management. Many textile and apparel companies have failed to differentiate themselves with negative effects on their profitability and viability throughout the value chain. By integrating research from strategic management and consumer behavior and by leveraging the emerging capabilities of on-line methodologies, we will develop a cross-disciplinary, integrative framework for firms to gather information that will help them to realign their value chains and become more efficient and effective.

Progress Statement:
As discussed in our annual report, we have completed reviewing cross-disciplinary literature on the role of knowledge in the firm and competitive advantage. This review resulted in the development of an integrative framework to examine firms and their internal and external knowledge management activities. The review resulted in a publication in the *Journal of Knowledge Management* that focuses on the broad conceptual domain of applying feedback loops involving online research tools to the strategic development and management of corporate value chains. Additional academic articles in preparation are approaching the issue from at least two perspectives: 1) integrating marketing and strategic management research generally in corporate decision making and 2) integrating marketing /stakeholder research in the strategy/policy issues surrounding effective value-chain management.

In Year 1, we conducted a series of case studies to examine how textile and apparel firms manage knowledge internally and externally through relationships with downstream partners across the value-chain within the textile industry. Through these qualitative interviews we assessed the "state of the industry" regarding knowledge management systems. To date we have focused our case work on Invista and CINTAS. In addition to our work with Invista on external knowledge management systems, we also visited CINTAS corporate headquarters in Cincinnati and toured their research and development facilities. Our work with CINTAS focused on internal knowledge management. We met with David Summe, the Director of New Product Development, and interviewed other key members of the firm's new product development team. CINTAS is trying to integrate Six Sigma processes into new product development to decrease cycle time and improve knowledge retention, and the company hopes to use the learnings from this project to facilitate that effort. These case studies will be submitted to the *Journal of the International Academy for Case Studies* for publication.

In Year 2, we are expanding the process to include a more comprehensive quantitative on-line survey of key segments of the apparel and textile industry. The survey is designed to assess the state of internal (within the firm) and external (with value chain partners) knowledge management, the firm's strategy and firm performance. The National Council of Textile Organizations has agreed to work with us to survey their members, which encompass all levels of the textile value chain. The survey will be administered at least two times in Year 2 to collect longitudinal data. We are particularly interested in assessing the textile industry before and after the quota system ends on January 1, 2005.

Final Year's Goals:
During Year 3, the quarterly industry survey will continue in order to provide a total of 5-8 quarters of data by the end of the project. This will permit a clear determination of how changing industry practices as regards knowledge

management systems affect financial performance over varying lag periods (i.e., lag between change in systems and outcome measures). In addition, during Year 3 the project team will develop materials summarizing the Year 1 case studies and the Year 2/Year 3 quantitative quarterly surveys for dissemination to industry members. The Year 3 goal is to help firms use our project results to develop systems that will increase their retention and retrieval of organizational memory in order to build robust knowledge systems. This will also help to establish shared systems with value chain partners to decrease cycle time and add value to end products by connecting the voice of the consumer throughout the textile and apparel value chain.

Approach:

Knowledge Management Systems – Internal Processes

Internal knowledge management systems are synonymous with organizational memory, which is defined as "…the means by which knowledge from the past is brought to bear on present activities, thus resulting in higher or lower levels of organizational effectiveness" (Stein, 1995, p.22). Firms can benefit from organizational memory by implementing knowledge management systems that help to organize and preserve the knowledge of a company. 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 that enable the firm and its partners to codify 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. Maintenance of knowledge is often overlooked. 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 when employees turnover and take valuable knowledge with them. Indeed, expert turnover in an informal knowledge network 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. Ernest & Young, for example, evaluates and rewards its employees based on their contribution to the knowledge of the firm (Hansen, Nohria, and Tierney, 1999). In 2003, we reviewed the literature for measures that assess the internal knowledge base of the firm that fit our research goals. Table 1 shows these measures.

Table 1 Measures of Internal Knowledge Management

Measure	Definition	Source
Organizational Memory Level	Amount of stored information or experience an organization has about a particular phenomenon	Moorman & Miner, 1997
Organizational Memory Dispersion	Degree to which organizational memory is shared throughout the relevant organizational memory unit	Moorman & Minter, 1997
Absorptive Capacity	Ability to acquire, assimilate, transform, and exploit knowledge	Daghfous, 2004

Knowledge Management Systems – External Processes

External knowledge systems bring value chain members closer together and add value to the product throughout the value chain resulting in products that are differentiated from low cost substitutes in the marketplace. In the textile and apparel industry, knowledge is rarely shared between firms, even if they are the in same 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.

Early results show that knowledge management systems reap the benefits of reduced costs and cycle time, but they also link the voice of the consumer to all stages of product development, production, and distribution. For

example, Invista currently hosts an online fabric library that is accessible to anyone, not just those firms that are already members of its value chain. This database is the largest, most-used online fabric library with over 22,000 fabrics from 500 mills in 64 countries. Interested apparel makers can check if Invista is able to fulfill an order before placing that order and to sample a variety of fabrics blended at the mills. This service allows Invista to further understand fabric properties such as durability, breathability, and quicker drying times manufacturers desire, and it allows Invista to improve its offerings to meet those needs. Both parties benefit from drastically decreased time-to-market, decreased expenses for outsourcing fabric, and increased product usage. In 2003, we reviewed the literature for measures that assess the external knowledge base of the firm that fit our research goals of tapping into the value chain. Table 2 summarizes these measures.

Table 2 - Measures of External Knowledge Management

Measure	Definition	Source
Cycle Time (Objective)	Number of days it takes for supply chain to process information	Hult, Ketchen, & Nichols, 2002
Cycle Time (Subjective)	Satisfaction with time from initiation to completion of the purchasing process	Hult Ketchen, & Nichols, 2002
Value Chain Innovativeness	Continuous improvement through creativity and ingenuity	Hult, Ketchen, & Nichols, 2002
Value Chain Learning	Generation of new insights that have the potential to change behavior	Hult, Ketchen, & Nichols, 2002
Value Chain Entrepreneurship	Pursuit of new market opportunities and the renewal of existing areas of an organization's operations	Hult, Ketchen, & Nichols, 2002

Knowledge management systems can lower costs tremendously by increasing communication and eliminating steps in the manufacturing process that are either unnecessary or duplicated. 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.

Outreach to Industry:
In Year 1, we worked directly with Invista (George Coulston) and CINTAS (David Summe) to identify key knowledge management systems (internal and external). From the qualitative case study results and the quantitative on-line industry survey in Year 2, we will develop a series of seminars and workshops to be offered to benefit textile and apparel industry members over the course of the funding period. In Year 3, training materials will be developed and made available to members of the textile and apparel industry. These may include live workshops (conducted by the PIs), online training tools, textbook materials, and so on. In addition, we are working with a new trade association partner, The National Council of Textile Organizations, to collect data from firms across the textile value chain. The PIs will also actively recruit industry members to participant in different phases of the research effort (case studies, surveys, field experiments); the results of these studies will be shared back directly to participating firms.

New Resources Required:
Additional resources required for Year 3 include software programming development for web-based survey tools that will be used to conduct the quantitative studies, as well as database manipulation and statistical data analysis software. Graduate student research assistants will work on the qualitative and quantitative data collection phases of the project. Laptop computers, camcorders and audio recorders will be needed to record the field interviews. We will purchase Dun & Bradstreet's database for the Textile and Apparel Industry to provide an additional list for the quantitative survey work and to provide the financial data that will be used to assess firm performance. Incentives will be given to industry survey participants.