

National Textile Center  
FY 2003 (Year 12) Project Proposal

Project No. S03-AC01

Competency: Management Systems

Knowledge Management--Competitive Advantage in the Value Chain

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Industry partner: E. I. DuPont de Nemours, Inc. -- DTI (DuPont Textiles and Interiors) Division

**Objective:**

U.S. textile producers typically are unable to compete strictly on a price basis. Instead, they must differentiate their product offerings to gain global competitive advantage. Value-added products that bundle unique process knowledge with a basic commodity offering can transform commodities into differentiated offerings. For example, the Lycra<sup>®</sup> Assured program includes specific DuPont expertise as part of the product offering to mills and manufacturers. This strategy effectively differentiates Lycra<sup>®</sup> from its generic spandex counterpart. A critical and unique aspect of our proposed research is to articulate this value-added component throughout the value chain. Objectives for this project thus are to (1) explore the relationship between low-cost and differentiation strategies on firm performance, (2) understand the relationship between firm strategy (i.e., low-cost v. differentiation) and use of different knowledge management systems, and (3) understand the impact of proactive knowledge management systems on firm performance. By conducting empirical research using a longitudinal design with multiple waves of data collection, we will establish causal relationships among strategic decisions involving implementation of knowledge management systems and future firm performance.

**Relevance to NTC Mission:**

The failure of many textile and apparel companies to differentiate themselves has had a negative effect on their profitability and viability throughout the value chain. This commoditization has been partly driven by U.S. firms pursuing a low-cost strategy in response to offshore competition. Our research will focus on enhancing our understanding of how business level strategies and the use of different knowledge management systems across the value chain impact firm performance in the textile and apparel industry. The results of this project directly address the NTC mandates to (1) increase academic knowledge by involving a multi-disciplinary team of researchers to develop a new conceptual and empirical framework, (2) train graduate students in disciplines relevant to the industry and thereby (3) enhance the competitiveness of U.S. firms by understanding the impact of strategy (low-cost v. differentiated) and knowledge management systems (passive v. proactive) on a broad array of firm performance measures (e.g., cost reduction, rapidity of new product development, process cycle time reductions, increased profitability and market share).

**State of the Art:**

The U.S. textile and apparel industry faces stiff competition from international firms, particularly those based in the Pacific Rim. Yet, key markets for apparel and textile products are North America, Europe, and South America in order of economic significance. Many U.S. firms are following low cost strategies (e.g., moving production facilities offshore) to improve their competitive position within the global textile industry. The U.S. textile and apparel industry must differentiate its products to remain globally competitive, or it runs the very real risk of competing on a purely price basis (a dimension upon which it cannot ultimately prevail). One method of differentiation is to employ knowledge management systems that facilitate and leverage the creation, flow, and absorption of knowledge both within the firm and across the value chain. Although knowledge management has been studied in several other industries (i.e., Davenport & Glazer, 2002), published research has not yet appeared regarding the textile and apparel industry. While other NTC projects have studied time compression in the value chain (I98-P03) and have used knowledge management to make more effective decisions within a segment of the value chain (I99-S10), none have

focused on the role of knowledge management as a source of competitive advantage across the value chain. Indeed, only recently have textile firms begun to examine management of knowledge flows across the value chain (e.g., Burlington and Milliken & Co.) and to consider leveraging shared knowledge in order to reduce product development times, facilitate faster response strategies and reduce inventories.

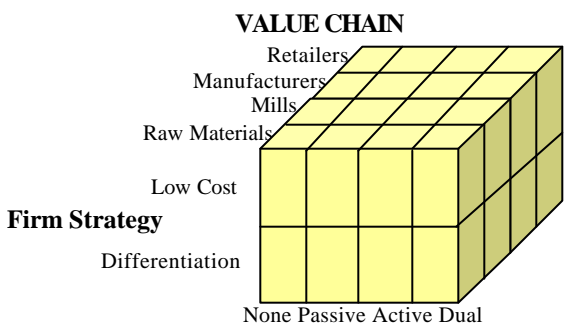
**Firm Strategy.** Porter's (1980) generic business strategies are a widely used typology that identifies potential routes to competitive advantage within an industry. Two such strategies are of particular relevance to the apparel and textile industry: (1) a *cost leadership* strategy, which requires a firm to emphasize those variables that allow it to achieve and maintain low per-unit costs; and (2) a *differentiation* strategy, which is based on creating a unique image or value for a product or service. Furthermore, a review of the literature applying Porter's framework of generic strategies leads us to the conclusion that the U.S. textile and apparel industry is most likely to pursue one of two primary types of differentiation strategies: (1) *market-based differentiation* where an organization seeks to set itself apart from the competition primarily through product positioning, or (2) *innovation-based differentiation* where the organization attempts to differentiate itself through innovative application of technology to meet customer needs. In the first (more common situation), the firm closely monitors competitors so that it can differentiate its goods or services from those of its rivals. In contrast, innovation-based differentiation is less concerned with positioning against the competition and more with developing entirely new markets. This strategy is successful only insofar as the innovation appropriately anticipates future market/customer needs, desires, aesthetics, etc. It has great potential for the textile industry, as it is not based simply on brand differentiation, but rather on creating a shared and dynamic "knowledge network" throughout an integrated value chain. This network, in turn, can enhance the flexibility and profitability of the value chain, enabling anticipation of changing market dynamics and more effective new product innovation to meet those market changes.

**Value Chain Position.** The concept of industry value chains reflects the value-added, natural sequence of operations or stages in a chain of supply (Porter 1985). The value chain in the textile and apparel industry begins with a raw material extraction or production stage (i.e., harvesting cotton, or developing new synthetic fibers) that supplies the second stage of primary manufacturing. The second stage usually produces a standardized output of commodity material (fibers and fabrics) used to fabricate commodity products. Progressing downstream, commodity products from the previous stage are used by manufacturers, who apply product development technologies, patents, and proprietary features to further add value. The next stage includes marketers of consumer products, followed by

distributors and finally, the retailers who sell to the final consumer. The stage a firm occupies along its industry's supply chain has important implications for its strategy development and, therefore, its ability to compete. Porter (1985) cites a number of ways that firms can leverage linkages across their value chains to reduce cost, increase performance and be more effective. These leverage opportunities include: performing the same function in different ways (e.g., specifying close tolerances), improving the cost or performance of indirect activities (such as improved delivery time based on servicing customer needs gained through online data), reducing the need to demonstrate, and explaining or servicing a product in the field by performing these activities within the firm (such as co-design with customers through Internet-based platforms). Only recently have knowledge management systems as a

means of aligning and optimizing value-chain relationships received attention by textile researchers (i.e., I99-S10).

**Knowledge Management Systems.** Effective management of knowledge within and across organizations (e.g., among value-chain members) is becoming increasingly critical as competition intensifies and value chain boundaries blur. Knowledge is an asset that provides a basis for renewing competitive advantage (Almeida, Grant, & Song, 1998), as a function of how readily knowledge can be acquired, transferred and integrated. 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 behavior of buyers and sellers (I98-P03, I98-S1). In contrast, proactive knowledge management systems have a "future orientation." They reap not only the benefits of reduced costs and cycle time, but also develop valuable knowledge geared toward the anticipation of future buyer/seller behavior. For example, manufacturers can attempt to anticipate future changes in buyer/seller needs, perceptions and behaviors that may result in changes to product specifications, levels of service desired, and so on. Proactive knowledge management systems do not simply enhance efficiency through time and



cost savings. They also provide a way to link all stages of product development (I99-S07), production and distribution through the value chain. For example, in the automotive industry some firms are experimenting with knowledge management systems that monitor, capture, and model constraints and dependencies across an entire value chain. Auto supplier Molex uses such a system to monitor upstream customers' daily consumption of its connectors in order to increase production as soon it identifies a demand spike for Saturn's SL2 model. By using proactive knowledge management systems, firms can spot unplanned events and exceptions earlier and continuously track collaborators' performance. While anecdotal evidence suggests that some firms are building knowledge management systems that include both proactive and passive systems to provide feedback loops throughout the value chain, there is no empirical research relating these developments to firm strategy, value-chain position and performance outcomes. This project will provide that research base.

**Approach:** The project team is working with DuPont's new DTI group (DuPont Textiles and Interiors) on a broad-based new technology development project. This effort is focused on creating market-back knowledge early in the new technology development process by incorporating "voice of the consumer" (VOC) data into its Design for Six Sigma development process. This consumer knowledge will be used to help firms to better align members of the value chain for specific consumer product segments. Using the DuPont DTI value chain as an exemplar, the proposed project will build upon previous work to launch a longitudinal data collection effort that will include both qualitative (one-on-one interviews) and quantitative (survey research) methods to examine the relationships among firm strategy (low cost v. differentiation), position in the value chain, and type of knowledge management system on firm performance. The research will examine the joint effects of firm strategy (low-cost v. differentiated), knowledge management approach (none, passive, active, dual), and value-chain position (see Figure) on firm performance. The outcome will be an enhanced understanding of matching firm strategy and knowledge management combinations at different levels of the value chain, i.e. creating a new conceptual model based upon empirical research.

**This Year's Goals:** Examine firms within a single value-chain segment (i.e., manufacturers), (2) conduct qualitative interviews to assess "state of industry" regarding knowledge management systems, (3) identify firms using each level of knowledge management system, (4) design survey instrument and test measures via pilot study within the textile and apparel industry.

Research activities and goals for Years 2 and 3 are as follows:

**Year 2:** (1) Examine and classify textile and apparel firms by value chain position, business strategy, and use of knowledge management system (none, passive, active, dual), (2) collect data through survey instrument using on-line survey methods developed by PIs under previous NTC projects (I97-A11, I01-A21), (3) initiate quarterly survey schedule. Disseminate findings through academic conferences and publication of research articles.

**Year 3:** (1) Collect and analyze longitudinal data via on-line survey platform, (2) triangulate findings with qualitative (one-on-one interviews), (3) disseminate findings through academic conferences and publication of research articles.

**Outreach to Industry:**

Our involvement with DuPont as our industry partner will provide access to a significant number of firms that play a role in that company's value chain, including mills, manufacturers and retailers. DTI is undergoing a major strategic realignment that emphasizes greater input from value chain partners as it integrates the Design for Six Sigma process into its new product development efforts and is highly committed to assisting us.

**New Resources Required:** Graduate students to assist in data collection and analysis. A web-server to host data capture and analysis systems. Laptop computers, video and audio recording equipment to conduct qualitative interviews in the field. Recruitment of value chain executives for surveys and travel to interview participants.