ALFRED P. SLOAN FOUNDATION
Industry Studies
2008
Annual Conference | May 1 - 2, 2008 | Boston, MA
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Abstract

Over the past decade, the United States textile and apparel industry has become less competitive in the global marketplace. There are many reasons for this, including overcapacity and low profitability; however, the dramatic increase in imports from low cost producing countries, has, according to some opinions, had the greatest negative impact on the domestic industry. The goal of this research was to examine how the US textile and apparel industry can remain competitive in the face of global competition. Specifically what are the US's current competitive advantages and how they can be leveraged to enhance the performance of US textile and apparel companies. Also, the research sought to examine the key components that are driving the competitiveness of the top textile and apparel exporting regions in order to provide insight into how the US textile and apparel industry can adapt and compete.

The research methodology used a concurrent triangulation strategy, which involves collecting quantitative and qualitative data simultaneously. Overall, field-based interviews were conducted with 20 executives from 13 companies. The interview questions were categorized based on competitive advantage variables, specifically focusing on innovation, marketing, and sourcing criteria variables.

Key findings of this research include evidence that US textile companies drive the majority of the innovation in the supply chain to both suppliers and customers. Also, the three competitive strategies that differentiate the products of US firms from other regions of the world are research and development, marketing, and customer service.

Introduction

Over the past few decades, the United States (US) textile and apparel industry has become less competitive in the global marketplace. There are many reasons for this, including overcapacity and low profitability; however, the dramatic increase in imports from low cost producing countries, particularly China, has, according to some opinions, had the greatest negative impact on the domestic industry (Apparel and Footwear Industry, 2006; Plunkett's Apparel and Textiles Industry Almanac, 2007). Since 1997, over 500 textile and apparel plants have closed, and more than 400,000 jobs have been lost (National Council of Textile Organizations, n.d.; Plunkett's Apparel and Textiles Industry Almanac, 2007). The increase in textile and apparel imports into the US marketplace is the result of various occurrences including the Agreement of Textiles and Clothing phase-out of quotas in 2005, in addition to liberalized trade agreements, currency manipulation by some exporting countries, and lack of enforcement of trade laws. Rising oil prices, which are a key component of synthetic fibers, combined with the increasing pressures on upstream pricing, due to retailer consolidation and increased competition, has only contributed to the hastening decline of the domestic industry (Plunkett's Apparel and Textiles Industry Almanac, 2007). These factors have pushed US manufacturing into low-cost countries such as China and South East Asia, Mexico, and Central America as well as "opened the door more widely" (especially with quota elimination) for increased import penetration in the US marketplace (Apparel and Footwear Industry Survey, 2006).

Due to the concurrent factors impacting the textile and apparel industry, US producers can no longer compete based on cost alone. Those firms that have tried have either gone out of business or declared bankruptcy. Successful firms examined their business practices in order to ascertain their core competencies and have focused on that particular segment that offers them a competitive advantage over lower priced imports. The purpose of this research was to examine where the US competitive advantage is for the US textile and apparel industry using Porter's Competitive Advantage of Nations Model as a framework.

US Textile and Apparel Value Chain

Figure 1 illustrates the textile and apparel value chain. The value chain describes the full range of activities that firms and workers do to bring a product from its conception to its end use and beyond. This includes activities such as design, production, marketing, distribution and support to the final consumer. The activities that comprise a value chain can be contained within a single firm or divided among different firms. Value chain activities can produce goods or services, and can be contained within a single geographical location or spread over wider areas (Gereffi, 2005).

The textile & apparel value chain has several discernable product distinctions. The most common classification is in terms of fiber type. There is a major difference in the manufacturing process utilized between mills creating man-made fibers and natural fibers. The next common classification system is in terms of fabric construction process. Weaving, knitting, and non-wovens all vary in terms of capital and labor requirements. One further distinction that is used to segment the value chain is through the actual final product. For example, a textile mill commonly specializes in making one particular fabric type such as denim or corduroy (Gereffi, 2005).

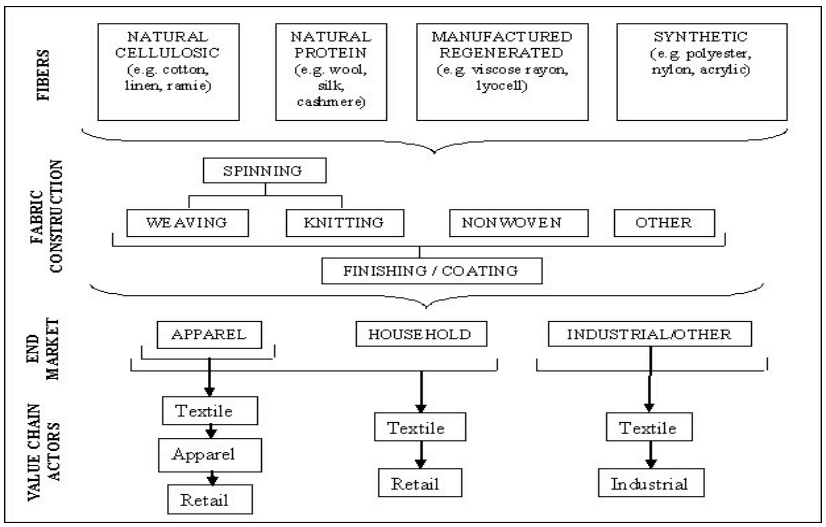

Figure 1: Textile & apparel value chain
Gereffi, G. (2005). *North Carolina in the global economy.* Retrieved 12/6, 2005, from www.soc.duke.edu/NC_GlobalEconomy/textiles/overview.php

This research focused on two areas of the United States. The first was the Southeast. The Southeastern US has the largest concentration of textile manufacturers in the country (NCTO, n.d.). The second area of research was California. California has the largest concentration of apparel manufactures in the US. California also has a significant textile manufacturing sector (Rucker, 2004).

Research Objectives

The overall research question for this study was: How can the US textile and apparel industry remain economically competitive in the face of global competition? Specific objectives were:

1. What are the US textile and apparel industry's current competitive advantages?
2. How can they be leveraged to enhance the performance of US textile and apparel firms?
3. What are the key components that are driving the competitiveness of the top textile and apparel exporting regions?
4. How can these components be adapted for the US textile and apparel industry in order to increase global competitiveness?

Conceptual Framework

Competitive Advantage of Nations

The conceptual model for this research was Michael Porter's *Determinants of National Competitive Advantage* (1998). Porter argued that it is not so much comparative advantage, factor proportions, or technology that determine what countries are more competitive in certain industries compared to other countries, but the presence or absence of particular attributes in individual countries that influence industry development. With his model, Porter sought to answer the following questions:

- Why does a nation become the home base for successful international competitors in an industry?, or more specifically,

- Why are firms based in a particular nation able to create and sustain competitive advantage against the world's best competitors in a particular field? (Porter, 1998).

In order to answer these questions, Porter developed his "diamond of national competitive advantage". This is shown in Figure 2. Porter determined that there are four main determinants of national competitive advantage. These are *factor conditions; demand conditions; firm strategy, structure, and rivalry; and related and supporting industries*. These four characteristics shape the environment in which firms compete in their global industries (Porter, 1998). He also noted the importance of government and chance on the success of a particular industry within a country.

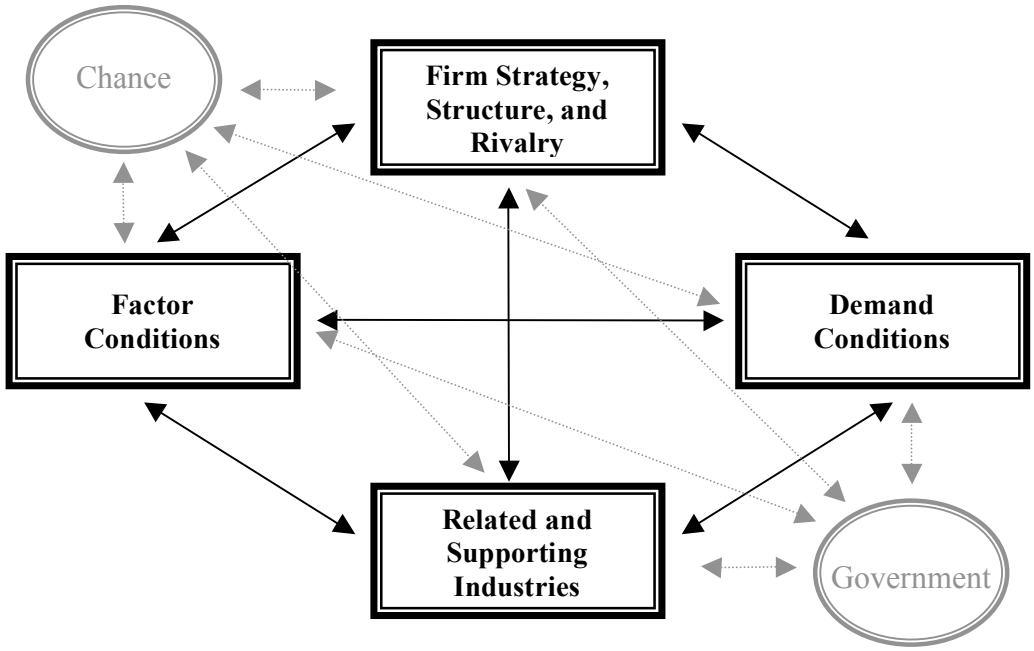

Figure 2: Porter's Diamond of National Competitive Advantage
Source: Porter, M., (1998), The Competitive Advantage of Nations, New York: The Free Press.

- The determinant of "Factor Conditions" includes not only the labor supply and infrastructure of a country, but also how effectively these factors are used within the country. Porter stated that the factor conditions that are most vital to productivity growth are "not inherited but are created within a nation" (1998, p. 74).

- The determinant of "Demand Conditions" affects a country's industry when domestic demand is high and buyers encourage manufacturers to innovate and improve their products. In other words, domestic demand sets the framework for the industry.

- The determinant of "Related and Supporting Industries" means that when an industry is located in the same country as internationally competitive suppliers and related industries there is an advantage for *that* industry in *that* country.

- The determinant of "Firm Strategy, Structure, and Rivalry" is "the conditions in the nation governing how companies are created, organized, and managed, and the nature of

domestic rivalry" (Porter, 1998, p. 71). This means that the competitive advantage can come from within the company such as the work ethic of the employees and by the way the industry/company is operated. Also, strong domestic rivalry forces companies to innovate and continuously improve their products, which also makes the industry more competitive internationally.

With the rise of multinational corporations over the past few decades, Porter's model has taken on a greater importance and applicability to business strategy formulation.

Competitive Advantage

A competitive advantage is defined as a condition which enables a country or firm to operate in a more efficient or otherwise higher quality manner than its competitors, and which results in benefits accruing. Competitive advantages usually originate in a core competency. A company's core competency is the one thing that a company can do better than its competitors. A competitive advantage can entail a variety of company characteristics; for example, customer focus, brand equity, product quality, Research and Development focus. To be effective a competitive advantage must be:

1. Difficult to mimic
2. Applicable to multiple situations
3. Unique
4. Sustainable
5. Superior to the competition (Porter, 1998)

At the heart of a competitive advantage is a firm's positioning in the marketplace as defined by their marketing strategy. There are two basic types of competitive advantages: *lower cost* and *differentiation*. Lower cost is the ability of a firm to design, produce, and market a comparable product more efficiently that its competitors. At prices at or near competitors, lower cost translates into superior returns. Differentiation is the ability to provide unique and superior value to the buyer in terms of product quality, special features, or after-sale service. Differentiation allows a firm to command a premium price, which leads to superior profitability provided costs are comparable to competitors (Porter, 1985).

Competitive advantage of either type translates into higher productivity than that of competitors. The low-cost firm produces a given output using fewer inputs than competitors require. The differentiated firm achieves higher revenues per unit then competitors (Porter, 1985). These strategies can be seen in Figure 3.

Michael Porter's Generic Strategies also takes into account a firm's competitive scope or the breadth of the firm's target within its industry. A firm must choose the range of products it will produce, the distribution channels it will employ, the types of buyers it will serve, the geographic areas in which it will sell ,and the array of related industries in which it will compete (Porter, 1985). The ultimate value a firm creates is measured by the amount buyers are willing to pay for its product or service. A firm is profitable if this value exceeds the collective cost of performing all the required activities. To gain competitive advantage over its rivals, a firm must either provide comparable buyer value but perform activities more efficiently than its competitors (lower cost), or provide activities in a unique way that creates greater buyer value and commands a premium price (differentiation) (Porter, 1985).

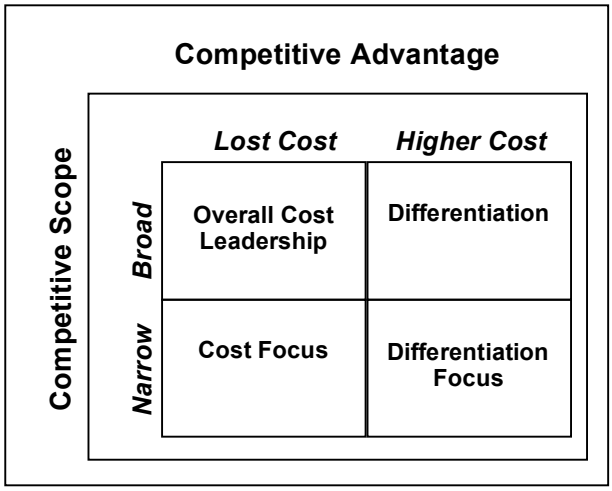

Figure 3: Porter's generic strategies for competitive advantage
Source: Porter, M. (1985). Competitive advantage: Creating and sustaining superior performance. New York, New York: Macmillan.

Innovation

Firms create competitive advantages by perceiving or discovering new and better ways to compete in an industry and bringing them to market which is ultimately an act of innovation. *Innovation* includes improvement in technology and better methods of doing things. Innovation can be manifested in product changes, process changes, new approaches to marketing, new forms of distribution, and new conceptions of scope. Innovation is the result of organizational learning as well as from research and development. Innovations lead to shifts in competitive advantage. The most typical causes of innovations that shift competitive advantage are:

1. New Technologies
2. New or shifting buyer needs
3. The emergence of a new industry segment
4. Shifting input costs or availability
5. Changes in government regulation (Porter, 1990)

Methodology

Mixed Methods

This research used a mixed methods approach in that the data collection consisted of both qualitative and quantitative approaches. This method of data collection recognizes that there are weaknesses inherent in each type of data. By combining both quantitative and qualitative data, researchers can neutralize the weaknesses involved in each single method of data collection (Creswell, 2003). Another advantage of the mixed methods approach is that results from one method can help develop or inform the other method. Mixed methods allow research to be conducted using both open and closed ended questions. Also, multiple forms of data are collected and statistical and text analyses can be performed. By combining these methods, the researcher can provide a comprehensive analysis of the research problem (Creswell, 2003).

Product Categories of Investigation

Cotton bottom weights and performance apparel were selected as the product categories for study. The cotton bottom weights market was chosen because it is an important product category for US manufacturers, as US manufacturers have significant market share in the US market. Although import penetration continues to rise in the bottom weights market, the domestic industry has a significant presence in this market with fabric and finished goods.

Performance apparel was chosen because it represents one of the fastest growing sectors of the international textile and apparel industry. In order to avoid commoditization, many US textile firms have shifted their product lines into performance segments as well as non-apparel related markets such as automotive and medical end uses. These areas are much more capital and research intensive; thus they are able to command higher markets than commodity products (Gereffi, 2005). The performance apparel market presents a significant opportunity for the US textile and apparel industry.

Sample Selection

The sample was selected based on the following criteria:

1. NAICS codes specific to cotton bottom weights and for performance apparel outerwear, underwear as well as knit and woven tops were compiled to initially identify the sample population [Table 1/Table 2].
2. The researchers consulted on-line data bases such as Mergent On-line, Davison's Textile Blue Book and the individual company's website to determine companies competing in the categories listed in Tables 1 and 2.
3. The researchers then examined companies identified as population through a subjective analysis of their website as well as through their Blue Book and Mergent On-line description. Companies were chosen as the initial sample for this study if they meet one or several of these requirements:
    a. Innovation in terms of product development
    b. Vertical integration—backwards and/or forwards
    c. Significant market share
    d. Leadership in their respective market
    e. Companies that compete in niche markets.
4. The researchers chose to conduct primary interviews in two areas of investigation: California and the Southeastern part of the US.
5. Retailers of bottom weights and performance apparel were also added into the sample due to the increasing role of retailers as product developers. However, due to a lack of retailers' headquarters in the areas of investigation, industry leaders were added back into the sample.

Table 1: NAICS Codes: Cotton Bottom Weights

Fiber/Yarn	
NAICS Code	**Description**
313111	Yarn Spinning Mills
313112	Yarn Texturizing, Throwing, and Twisting Mills
323221	Cellulosic Organic Fiber Manufacturing
313222	Noncellulosic Organic Fiber Manufacturing
Textile	
NAICS Code	**Decription**
313210	Broadwoven Fabric Mills
313311	Broadwoven Fabric Finishing Mills
Apparel	
NAICS Code	**Description**
315211	Men's and Boys' Cut and Sew Apparel Contractors
315212	Women's, Girls' and Infants' Cut and Sew Apparel Contractors
315224	Men's and Boys' Cut and Sew Trouser, Slack, and Jean Manufacturing
315225	Men's and Boys' Cut and Sew Work Clothing Manufacturing
315228	Men's and Boys' Cut and Sew Other Outerwear Manufacturing
315239	Women's and Girls' Cut and Sew Other Outerwear Manufacturing
315291	Infants' Cut and Sew Apparel Manufacturing
Retail	
NAICS Code	**Description**
448110	Men's Clothing Stores
448120	Women's Clothing Stores
448130	Children's and Infants' Clothing Stores
448140	Family Clothing Stores
448190	Other Clothing Stores
812331	Linen Supply
812332	Industrial Launderers

Source: Adapted by Allen, R. (2005) from www.naics.com

Table 2: NAICS Codes: Performance Apparel

Textile	
NAICS Code	**Decription**
313241	Weft Knit Fabric Mill
313249	Other Knit Fabrics and Lace Mills
313312	Textile and Fabric Finishing (excluding broadwoven) and other finished textiles
Apparel	
NAICS Code	**Description**
315191	Outerwear Knitting Mills
315192	Underwear and Nightwerar Knitting Mills
315221	Men's and Boys' Cut and Sew Underwear and Nightwear Manufacturing
315231	Women's and Girls' Cut and Sew Lingerie, Loungewear, and Nightwear Manufacturing
315232	Women's and Girls' Cut and Sew Blouse and Shirt Manufacturing
315299	All Other Cut and Sew Apparel Manufacturing

Source: Adapted by Berdine, M. (2007) from www.naics.com

Based on the sample selection criteria, an initial sample was compiled [Table 3].

Table 3: Research Sample

	Cotton Bottom Weights	Performance
Fiber/Yarn	n=6	n=5
Textiles	n=11	n=14
Apparel	n=23	n=12
Retail	n=19	

Data Collection

The research sample consisted of 90 companies involved in the fiber/yarn, textile, apparel or retail segments of cotton bottom weights and performance apparel. All 90 companies were contacted via phone or email. A letter was sent to all companies identified. The letter explained the purpose of the study, the type of respondent desired as well as requesting the company's participation in the research. Follow up emails and phone calls were made in attempt to set up visits or conference calls.

Out of the 90 firms contacted, 13 choose to participate in this research study. Table 4 summarizes the companies that participated in this research study. Overall, 20 executives were interviewed from 13 companies. Table 4 highlights each company's location (South-East or California), product category, executive's title as well as the company's position in the supply chain.

Table 4: Sample Description

Company Code	Product Category	Segment	Code	Location	Respondent	Title
Company A	Performance Apparel	Fiber/Yarn	1	Southeast	Executive A	Director of Supply Chain Management
Company B	Performance Apparel	Textile	2	Southeast	Executive B1	Business Manager- Workwear
	"			"	Executive B2	Director of Sales & Marketing - CBI
Company C	Performance Apparel	Textile	2,3	Southeast	Executive C	Product Development Manager - Men's Apparel
Company D	Performance Apparel	Textile	2	California	Executive D	Owner
Company E	Performance Apparel	Apparel	3	California	Executive E1	Men's Product Line Manager
	"			"	Executive E2	Director of Marketing
	"			"	Executive E3	Director of Operations
Company F	Performance Apparel	Apparel	2,3,4	California	Plant Tour	n/a
				"	Executive F	Brand Manager
Company G	Performance Apparel	Apparel	2,3	Southeast	Executive G1	Vice President of Customer Operations
				"	Executive G2	Manager Global Sourcing
Company H	Performance Apparel	Apparel	3	California	Executive H	Senior Director of Marketing & Merchandising
Company I	Performance Apparel/ Cotton Bottom Weights	Retail	4	Other	Executive I	Sourcing Director - Swim & Sweaters
Company J	Cotton Bottom Weights	Fiber/Yarn	1	Southeast	Executive J	Vice President of Logistics
Company K	Cotton Bottom Weights	Textile	2	Southeast	Executive K1	Director of Product Development
				"	Executive K2	Senior Merchandise Manager
				"	Executive K3	Senior Merchandise Manager
Company L	Cotton Bottom Weights	Textile	2	Southeast	Executive L1	Vice President of Manufacturing
					Executive L2	Owner
Company M	Cotton Bottom Weights	Apparel	3	Southeast	Executive M	Merchandise Manager

After setting up visits and conference calls, both qualitative and quantitative data were collected using a questionnaire developed by the researchers.

Instrument Development

A questionnaire in interview form was developed to gather primary data based on the mixed methods approach. A mixed methods approach is appropriate in that both structured, closed-ended and non-structured, open-ended questions were used. The information obtained by the research provided qualitative data as well as quantitative data that were statistically analyzed. A questionnaire was developed for data collection that translated the research objectives directly into specific questions that could be answered; thus providing insight into the research objectives (Malhotra, 2004). Deductive logic was used to gather quantitative data and inductive logic was used to collect qualitative data (Creswell, 2003).

Deductive Questions

Deductive logic was used to test the competitive advantage variables outlined in Porter's *Determinants of National Competitive Advantage* (1998). According to Michael Porter, the presence or absence of these variables influences individual firm competitiveness. These variables were determined as relevant in terms of the research conducted in a review of the relevant literature; specifically "*The future of the apparel and textile industries: Prospects and choices for public and private actors*" (2005) and *Textiles & apparel: Assessment of the competitiveness of certain foreign suppliers to the U.S. market* (2004). Research questions were developed to test the following *Competitive Advantage variables*:

1) Marketing
2) Location
3) Customer service
4) Relationship with suppliers
5) Research & Development
6) Production efficiency

In order to determine that key factors driving the competitiveness of key regions, research questions related to sourcing decision criteria. The variables were determined as relevant based on the findings of the literature review:

1) Cost
2) Reliability of delivery
3) Product quality
4) Full-package sourcing
5) Lead-time
6) Flexibility

The questionnaire developed by the researchers to test these variables utilized comparative and non-comparative scaling techniques. In rank order scaling, respondents are presented with several items simultaneously and asked to order or rank them according to some criterion. Rank order scaling forces respondents to discriminate among the selected items (Malhorta, 2004). The *Competitive Advantage Variables* were listed and the respondents were asked to rank these variables in terms of the importance to the success of their firm. This strategy was also used to rank the *Sourcing Criteria Variables.*

Likert scales were used to obtain non-comparative information. Non-comparative scaling techniques do not compare the object being rated either to another object or to some specified standard; they evaluate only one object at a time. Likert scales require respondents to indicate a degree of agreement or disagreement with each series of statements about specific attributes (Malhorta, 2004). A five point scale was used to test the *Competitive Advantage and Sourcing Variables.*

Inductive Questions

Inductive logic was used to provide insight into each component of competitive advantage. In addition, respondents were given a map to indicate the flow of goods from both their suppliers and to their customers. This provided insight into the supply chain of the companies interviews. Open-ended questions were used to gain qualitative data in regard to the subject of investigation. Open-ended questions require respondents to answer in their own words. These unstructured questions have a much less biasing influence on responses when compared to close-ended type questions. Respondents are free to express any view. Their comments and

explanations can help bring insight into the data collected from closed-ended type questions (Malhorta, 2004). Table 5 shows those questions relevant to the research objectives.

Table 5: Research Questionnaire—Research Objectives Cross Reference

Questions	Questions Type	Variables	RO
What strategies does your organization use to compete in your respective market? How does your organization compete?	Open-ended	N/A	RO1
What role does research and development play in your organization?	Open-ended	N/A	RO1
How would you describe the management style of your organization?	Open-ended	N/A	RO1
What role does marketing play in your organization?	Open-ended	N/A	RO1
How does competition (rivalry) with other companies in _____ influence your business?	Open-ended	N/A	RO1
How does being located in _____ influence your company's products?	Open-ended	N/A	RO1
How does the local consumption of product from your respective market in _____ influence your business strategy?	Open-ended	N/A	RO1
How often do you interact with suppliers? How would you describe your suppliers? Where are your suppliers located? How would you describe your relationship with your suppliers? How would you describe your interaction with suppliers?	Open-ended	N/A	RO1
How often do you interact with your customers? How would you describe your customers? Where are your customers located? How would you describe your relationship with your customers? How would you describe your interaction with your customers?	Open-ended	N/A	RO1
How does your organization manage capital & labor?	Open-ended	N/A	RO1
Does your organization outsource? What criteria does your organization use in terms of making sourcing decisions? Where and what aspects of production do you outsource?	Open-ended	N/A	RO3
Please use the map on the following page to indicate your supply chain to show the flow of goods. Please use the codes listed below the map to indicate each segment of your supply chain and use arrows to show the flow of goods. Please indicate the flow of goods from suppliers to your organization. In addition, please indicate the flow to your customers. Only indicate the components that are relevant to your organization's supply chain.	Open-ended	N/A	RO3
Please rank the following in order of importance in terms of the successes of your business. 1 being the most important. 6 being the least important	Rank-order	Competitive Advantage variables	RO1
Please rate the following on the level of importance to your business:	Likert scale	Competitive Advantage variables	RO1
Please rank the following in order of importance in terms of your sourcing decision criteria. 1 being the most important. 6 being the least important	Rank-order	Sourcing variables	RO3
Please rate the following on the level of importance to your sourcing decisions:	Likert scale	Sourcing variables	RO3

Data Analysis

First, quantitative data was transcribed and coded. Next, the data was grouped according to sector category (Fiber/Yarn, Textile, Apparel, and Retail). In addition, data was grouped by location (Southeast or California) and product category (Cotton Bottom Weight or Performance Apparel). The mode was calculated for the rank order question which produced ordinal data. The mean was for the Likert scale question because it provided interval data (Malhotra, 2004). Analysis of the statistics generated occurred in aggregate as well as between sector, location and product category.

In terms of open-ended responses, the researchers developed templates to contain open-ended responses in relation to each variable of competitive advantage: Firm strategy, structure, & rivalry; Demand conditions; Related and supporting industries; and Factor conditions.

Data collected using deductive and inductive logic was analyzed in the following stages:

1. Interview results were transcribed;
2. Data was grouped according to sector category;
3. Data was grouped by location; and
4. Qualitative and quantitative data were analyzed in tandem (concurrent triangulation) to determine US firm's competitive advantages.

Results

Interview Results: Deductive Logic

The first step in gathering quantitative data was to ask respondents to rank order variables which provided comparative data (1=most important variable and 6=the least important variable). Respondents were not allowed to assign the same ranking to the importance of different variables. The second step was to ask the respondents to determine how important each variable was using a five-point Likert scale which provided non-comparative data and looked at each variable individually (1=not important at all, 2=somewhat not important, 3=neither important not unimportant, 4=somewhat important, 5=very important). The sector of each company is shown in the results: 1=Fiber/Yarn Manufacturers, 2=Fabric Manufacturers, 3=Apparel manufacturers and 4=Retailers. The product category of each company is also shown in the results: P=Performance Apparel and B=Cotton Bottom Weights. In addition, the location of each company is also shown: S=Southeast and C=California. In rank order questions (Comparative scaling), the mode of each of these demographic variables was examined. In terms of the Likert and constant sum scaling questions (non-comparative) the mean of each of the demographic variables was examined.

Competitive Advantage Variables

The variables investigated were strategies outlined by Michael Porter in the *Determinants of National Competitive Advantage* (1990) as competitive advantage variables. To avoid confusion in regards to the definition of each component respondents were given a copy of the operational definitions to use in terms of their responses. Table 6 shows the rankings that were assigned. In general, respondents ranked *customer service* as the most important competitive advantage variable to their business. *Production efficiency* was ranked second in terms of competitive advantage variables. *Relationship with Suppliers* and *Marketing* were tied at third. *Location* of the business headquarters was ranked last across the board.
In looking specifically at the location of the firms interviewed there was a noticeable difference in

terms of the importance of *marketing* as a competitive advantage variable. Firms in California ranked *marketing* as more important to their competitive advantage in comparison to firms in the southeast. The mode in terms of California based firms was two in relation to *marketing* and five for firms located in the southeast. There was a distinct difference when looking at marketing as a competitive advantage variable when comparing down-stream (apparel & retail) and up-stream (fiber/yarn & textile) companies. The mode of both up-stream segments in terms of *marketing* as a business success variable was five, where down-stream companies (apparel & retail) both ranked *marketing* as more important with a mode of one for apparel manufacturers and a mode of two for retailers.

When looking specifically at product category, there was a noticeable difference in terms of the top competitive advantage variables for each product category. *Production efficiency* was ranked number one in terms of companies competing in cotton bottom weights. In terms of companies competing in performance apparel, *customer service* was ranked as the most important competitive advantage variable. Again, *location* across the board was ranked last by respondents.

Table 6: Competitive Advantage Variables: Rank Order (Mode)

														Category			**Sector**			**Location**		**Overall**
Company	A	B	C	D	E	F	G	H	I	J	K	L	M									
Category	P	P	P	P	P	P	P	P	P/B	B	B	B	B	P	B							
Sector	1	1,2	2,3	2	3	2,3.4	2,3	3	4	1	2	2	3			1	2	3	4			
Location	S	S	S	C	C	C	S	C	O	S	S	S	S							S	C	
Marketing	5	5	4	1	2	2	1	3	2	3	2	5	1	2	2	5	5	1	2	5	2	3
Location	6	4	5	6	6	5	6	6	6	5	3	4	6	6	6	5	5	6	6	6	6	6
Customer Service	1	1	3	2	1	1	4	2	1	4	4	2	2	1	3	1	1	2	1	1	2	1
Relationship W/ Suppliers	3	6	1	4	5	6	5	4	3	6	6	3	3	5	4	6	6	5	5	3	4	3
Research & Development	4	2	6	5	3	3	3	5	4	2	1	6	4	3	4	2	4	3	3	3	4	4
Production Efficiency	2	3	2	3	4	4	2	1	5	1	5	1	5	2	1	2	2	3	4	2	4	2

P=Performance Apparel, B=Cotton Bottom Weights, 1= Fiber/Yarn, 2=Textile, 3=Apparel, 4=Retailer, S=South East, C=California

Respondents were also asked to assign a level of importance of the competitive advantage variables. The level of importance indicated by each respondent is shown in Table 7. In aggregate, *marketing* and *customer service* were ranked the highest with a mean of 4.8. *Research & development* and *production efficiency* were ranked third in terms of the level of importance with a mean of 4.5. The lowest rating was 2.5 for the *location* of the firms interviewed. There were no noticeable difference when looking at the mean score in terms of firms located in California versus firms in the Southeast (.6 was the largest differential in terms of ratings). The same can be deduced when comparing the various sectors and product categories.

Table 7: Competitive Advantage Variables: Level of Importance (Mean)

														Category		Sector				Location		Overall
Company	A	B	C	D	E	F	G	H	I	J	K	L	M									
Category	P	P	P	P	P	P	P	P	P/B	B	B	B	B	P	B							
Sector	1	2	2,3	2	3	2,3.4	2,3	3	4	1	2	2	3			1	2	3	4			
Location	S	S	S	C	C	C	S	C	O	S	S	S	S							S	C	
Marketing	5	4	5	5	5	5	5	5	5	5	5	3	5	4.9	4.6	4.7	4.6	5	5	4.6	5	4.8
Location	1	4	3	3	3	3	1	4	1	3	1	3	3	2.5	2.2	2.7	2.6	2.8	1	2.4	3	2.5
Customer Service	5	5	5	4	5	4	5	5	5	5	5	4	5	4.7	4.8	5	4.6	4.8	5	4.9	4.5	4.8
Relationship W/ Suppliers	5	4	4	4	4	3	4	5	4	5	4	5	5	4.1	4.6	4.7	4	4.2	4	4.5	4	4.3
Research & Development	5	5	5	4	5	4	4	4	4	5	5	3	5	4.4	4.4	5	4.3	4.5	4	4.6	4.3	4.5
Production Efficiency	5	5	4	4	4	4	5	5	4	5	4	5	5	4.4	4.6	5	4.4	4.5	4	4.8	4.3	4.5

P=Performance Apparel, B=Cotton Bottom Weights, 1= Fiber/Yarn, 2=Textile, 3=Apparel, 4=Retailer, S=South East, C=California

Sourcing Variables

Respondents were asked to rank a set of variables related to sourcing decision criteria. As shown in Table 8, *Product quality* was ranked as most important in terms of the sourcing criteria used by the companies interviewed. *Cost* was ranked second. *Reliability of delivery* was ranked third. It was mentioned by many respondents that those three criteria (*Product quality, cost, & reliability*) go hand-in- hand; all three are equally essential. *Full-package sourcing* was ranked last in terms of importance with many respondents saying that they prefer to align the supply chain and have other companies follow up in terms of procuring the actual inputs to production. *Lead time* and *flexibility* were both ranked on the lower end of the spectrum. It was mentioned that these components could be worked around in terms of procuring the outsourced goods. When comparing across location, sector, and product category there was no notable distinction in terms of the rankings provided by respondents.

Table 8: Sourcing Variables: Rank Order (Mode)

														Category		Sector				Location		Overall
Company	A	B	C	D	E	F	G	H	I	J	K	L	M									
Category	P	P	P	P	P	P	P	P	P/B	B	B	B	B	P	B							
Sector	1	1,2	2,3	2	3	2,3.4	2,3	3	4	1	2	2	3			1	2	3	4			
Location	S	S	S	C	C	C	S	C	O	S	S	S	S							S	C	
Cost	1	1	2	1	2	X	2	3	2	2	3	1	2	2	2	1	1	2	2	2	2	2
Reliability of delivery	3	3	4	3	3	X	3	1	3	3	2	4	3	3	3	3	3	3	3	3	3	3
Product quality	2	2	1	2	4	X	1	4	1	1	1	2	1	1	1	2	2	1	1	1	1	1
Full-package sourcing	6	6	6	6	6	X	6	2	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Lead-time	4	5	3	5	1	X	4	5	4	5	4	3	4	4	4	5	4	4	4	4	4	4
Flexibility	5	4	5	4	5	X	5	6	5	4	5	5	5	5	5	4	5	5	5	5		5

P=Performance Apparel, B=Cotton Bottom Weights, 1= Fiber/Yarn, 2=Textile, 3=Apparel, 4=Retailer, S=South East, C=California

Respondents were also asked to assign the level of importance to each of the sourcing criteria listed. The level of importance indicated by each respondent is shown in Table 9. As shown in the rank-order question, *product quality* was rated by respondents as the most important factor in sourcing criteria. *Product cost* had the second highest rating overall with a mean score of 4.8. *Reliability of delivery* was ranked third by respondents with a mean score of 4.7. Again, many respondents indicated these three components were all essential in terms of their

sourcing criteria. *Full-package sourcing* had the lowest mean score at 2.6 (Neither important, nor unimportant). There was no notable distinction between the ratings given by firms in different categories or location. When looking at the scoring by sector there is a distinct difference shown in the scoring of sector 4=retailer. The one retailer interviewed made the case that none of the components could be measured in isolation and must all be present in terms of product sourcing. This respondent did say that *product quality* was the most important factor overall.

Table 9: Sourcing Variables: Level of Importance (Mean)

														Category		Sector				Location		Overall
Company	A	B	C	D	E	F	G	H	I	J	K	L	M									
Category	P	P	P	P	P	P	P	P	P/B	B	B	B	B	P	B							
Sector	1	2	2,3	2	3	2,3.4	2,3	3	4	1	2	2	3			1	2	3	4			
Location	S	S	S	C	C	C	S	C	O	S	S	S	S							S	C	
Cost	5	5	5	4.5	5	X	5	5	3	5	5	5	5	4.7	4.6	5	4.9	5	3	5	4.8	4.8
Reliability of delivery	4	5	5	4.5	5	X	5	5	3	5	5	5	5	4.6	5	4.7	4.9	5	3	4.9	4.8	4.7
Product quality	5	5	5	4.5	5	X	5	5	5	5	5	5	5	4.9	5	5	4.9	5	5	5	4.8	4.9
Full-package sourcing	1	3	4	3	2	X	3	4	2	1	2	1	5	2.8	4	1.7	2.7	3.6	2	2.5	3	2.6
Lead-time	4	4	5	4	5	X	4	5	3	4	4	5	4	4.3	4	4	4.3	4.6	3	4.3	4.7	4.3
Flexibility	3	4	5	3.5	4	X	4	4	3	4	5	3	5	3.8	4	3.7	4.1	4.4	3	4.1	3.9	3.9

P=Performance Apparel, B=Cotton Bottom Weights, 1= Fiber/Yarn, 2=Textile, 3=Apparel, 4=Retailer, S=South East, C=California

Interview Results: Inductive Logic

Respondents were asked open-ended questions that were developed using inductive logic. The questions asked about various business success variables as indicated by each component of Porter's *Determinants of National Competitive Advantage* (Factor Conditions; Demand Conditions; Firm Strategy, Structure & Rivalry; and Related & Supporting Industries) as well as the sourcing criteria used by firms. In addition, respondents were asked to map out their supply chains.

Factor Conditions

Factor conditions dealt specifically with the deployment of factors of production such as capital and labor. In addition, this set of questions sought to measure how organizations measure their productivity. When asked how their organization manages capital and labor, respondents mentioned automation, keeping inventories down, running smaller lots, and requiring customer minimums. One respondent discussed that sewers form micro-businesses, which are evaluated in totality rather than individually. Bonuses are awarded based on the productivity of the micro-business. When asked about productivity measures, respondents answered metrics such as working capital, accounts receivable and inventory levels, efficiency and utilization metrics, $ per sales units, capacity utilization, gross margins, initial mark-up, and the amount of off-quality. Measuring productivity helps the firm to measure competitive advantage.

Demand Conditions

Demand questions dealt specifically with how the location of a company as well as how the local consumption of a product in their respective market influences their competitive advantage.

Respondents in California pointed out that being in Los Angeles is an advantage in the contemporary market because there is easy access to market trends. Also, if the product is geared toward warm weather (i.e. the surf market), it helps to be located in warm weather in terms of product direction. Being in California also helps in terms of licensing agreements and brand image. Being located in the Southeast relates to competitive advantage because of access to raw materials such as cotton. However in relation to marketing, being located in the Southeast does not directly relate to competitive advantage. In order to account for this, these firms tend to have a sales presence in key markets which filter ideas and trends back to headquarters. Also, because the internet and globalization have created a global consumer culture location is not a disadvantage anymore when developing a product. Being in the US does offer advantages in terms of regulatory legislation when shipping to CAFTA and Mexico in addition to the speed to market advantages offered by being in the western hemisphere.

When asked about how local consumption affects competitive advantage, firms in California stated that proximity to the consumer market keeps them informed about trends and style acceptance. As for companies located in the Southeast, respondents stated that very little textile product is consumed in the Southeast because apparel/industrial/ home manufacturers (i.e. their customers) are located in other parts of the country and world.

Firm Strategy, Structure & Rivalry

Firm strategy, structure and rivalry questions dealt specifically with the companies' corporate strategies. These questions gauged the role of research and development and marketing as competitive strategies. In addition, the management style of organizations was inquired. Finally, the role of competition with other local firms was included in the set of questions.

Corporate Strategy

In terms of how corporate strategy contributed to a firm's competitive advantage, responses seemed to be categorized into four main areas. The first was customer service. Respondents explained that "assisting the customer's customer" and servicing customers across multiple manufacturing locations were important in terms of differentiation. It was also revealed that relationship based selling, customer service websites, and data mining in order to understand the customer were strategies used. More focused and consistent customer service has the ability to give US textile and apparel firms a competitive advantage.

The second corporate strategy that emerged was related to the product. Whereas US firms have difficult time competing on price, respondents stated that by offering a high quality product and a consistent product, they were able to create a competitive advantage. Also, offering a differentiated product, either through technology and research and development, price/quality ratios, or through niche marketing have been successful. One firm specifically discussed the introduction of an organic cotton line. This is a differentiated product that can earn higher margins by taking advantage of the ethical consumer market. Other product strategies firms used were introducing a product through multiple channels of distribution in order to compete in multiple markets with products at different quality and cost levels.

The third corporate strategy related to competitive advantage was supply chain management. Respondents stated that by offering speed to market they were able to gain ground over the competition. Also, by taking advantage of the proximity US firms have to cut and sew in CAFTA and Mexico, firms were able to develop a competitive advantage over some Asian products. Others strategies included vertical integration, purchasing raw materials at competitive prices,

and leveraging the scale of the total business to get cost savings. Respondents also explained that by forming strategic partnerships with cut and sew operations in East Asia, but still using a blended sourcing strategy, US firms were able to leverage a competitive advantage.

The final corporate strategy related to competitive advantage was marketing. Some strategies that respondents discussed included licensing agreements, lifestyle brands, integrated multi-faceting marketing, and having a market-driven orientation rather than a manufacturing mind-set. Also, using brands to create niche markets and to differentiate their products have contributed to developing a competitive advantage.

Research and Development

The respondents were also asked questions on how research and development contributed to a firm's competitive advantage. One respondent discussed the strategy of increasing the amount of PhDs on staff in order to ramp up R&D efforts. Other strategies that emerged were:

- differentiating commodity products through R&D so much so that it becomes a new product for a new market,
- developing exclusive products for customers,
- focusing on R&D efforts that increase value throughout the supply chain instead of just throwing a finish on the product at the end,
- focusing on new fabric and knitting techniques, and
- using trickle-down in terms of fabric innovation from main brands found in department stores to sub-brands developed for mass merchants the following season.

Research and development strategies also related to marketing strategies, such as researching fashion trends, consumer research, and testing products in select stores and then rolling out to more stores.

Management Styles and Corporate Structure

The main trends that emerged when asked how management style and corporate structure contributed to a firm's competitive advantage were the use of flexibility, employee autonomy and transparency of management. One respondent specifically discussed the importance of having the work lifestyle tied into the lifestyle of the product. Other management strategies were combining operations on the back end to leverage cost savings across brands and developing a flexible manufacturing program. By doing this, companies are able to evolve into a business model that is better able to serve niche markets in addition to allowing them the capability of manufacturing smaller runs which has been a consistent complaint of US companies.

Marketing

Marketing prowess has become a core of the US's competitive advantage in the textile and apparel industry, particularly on the apparel side. When asked how a firm's marketing strategies contributed to competitive advantage respondents again discussed the importance of branding. Others discussed how important it is to market 2 to 3 layers deep in the supply chain to your customer's customer including retailers and business to business marketing. Other specific strategies mentioned were in-store marketing, television, celebrity endorsements, and using hyper-sexual tones to differentiate brands. One respondent emphasized the importance of speaking with one voice in terms of each brand, but adapting to the needs of each region.

Competition with Local Firms

One interesting trend that emerged when respondents were asked how competition in that region contributed to competitive advantage was the lack of other domestic manufacturers of certain products in the Southeastern US. Most competitors had moved overseas or had gone out of business. Another issue contributing to a lack of regional competition is consolidation. For other firms, competition is key to driving research and development, and it influences price, product technology, and positioning. By being located near competitors, firms are easily able to monitor the competition's product direction and have the ability to cross-hire good talent. Also, the more similar companies that are located in a region, the more likely suppliers will locate there also, shortening the supply chain and increasing communication between members. One respondent pointed out that there is now no longer regional competition. It is now global due to globalization and the internet.

Related and Supporting Industries

Related and supporting industry questions sought to define interactions with both suppliers and customers. These questions also sought to understand competitiveness as a result of being located within a cluster. In addition, these questions sought to understand customer/supplier interactions as well as the customer service orientation of the firms interviewed.

When asked about how relationships with suppliers contribute to a firm's competitive advantage, respondents emphasized that variety of suppliers based on desired input was important in addition to negotiating with them in terms of cost as well as the level of quality for the cost. Again, respondents mentioned the importance of using a blended sourcing strategy. Strategies described were the use of sourcing offices in key areas, to handle dealings with factories and coordinating the supply chain within the firm and then having vendors follow up on procuring inputs. One interesting trend that emerged was the declining use of full package sourcing in order to enhance competitive advantage. Some respondents preferred not to use full-package sourcing wanting to control all aspects of the product. The reason for this was because of the key aspect of quality to brand positioning. Also, respondents indicated that textile manufacturers drive most innovation.

Respondents were also asked how relationships with customers contribute to competitive advantage. Developing strategic partnerships were seen as a key component of competitive advantage. This enables firms to share in the supply chain costs, develop products together with the customer, share in consumer data, and develop exclusivity agreements. Respondents emphasized the importance of building relationships beyond purchasing. In terms of partnerships across the supply chain, for downstream companies, domestic textile firms are often asked to bring their innovation and ideas to the table because innovation is essential in competing against commodity products. However, retailers are not driving innovation in the supply chain because of fear of end-of-season markdowns.

Sourcing Strategies

When asked what criteria were used in making outsourcing decision, the majority of respondents stated that cost and quality are the main drivers in terms of analysis. After those factors, firms source in accordance with the competencies of certain regions. Other important factors are capacity, type of fabric, and lead time. However, some respondents felt that lead time was less of a concern because it could be built into the time and action calendars. One interesting trend, which corroborates the quantitative findings, was the decreasing importance of

full package sourcing. Respondents preferred to have more say in the fabric quality and selection because of the significant role that quality plays in brand positioning. Overall, when making supply chain decisions, margins are extremely important, however, multiples criteria are used in the analysis process.

Sourcing strategy questions sought to understand what components of manufacturing were outsourced and what the criteria were in terms of location and vendor placement. In addition, these questions sought to understand the effect that location had on a company's supply chain strategy.

When asked what component of manufacturing is outsourced, the more upstream companies (i.e. fiber/yarn; textile) outsourced specific products, such as chemicals to make partially oriented yarn (POY) and synthetic yarn, or certain process, such as the sourcing of wool. For these companies, those products and/or processes that are outsourced are mainly those outside of the firm's core competencies. Some textile companies are starting to form joint ventures with cut-and-sew facilities in East Asia with the goal of creating vertically integrated supply chain cities or cluster.

Apparel companies, on the other hand, were much for diversified. One of the firms in the study is vertically integrated and only sources yarn. The majority, however, sourced "high-make" or fashionable, low replenishment goods in East Asia, and "low-make" or basic, replenishable goods in the Western Hemisphere. The apparel and retail firms in the study use limited full-package sourcing. One noticeable trend was that the majority of firms use a blended sourcing strategy; meaning they sourced in a variety of locations. Reasons given were that it minimizes risk; leverages the manufacturing competencies of different regions; minimizes labor costs; and allows for the ability to position brands differently in terms of quality. Also apparent was that, despite the supply chain advantages offered by East Asia, companies were utilizing with increasing focus the cost and speed-to-market advantages offered by Mexico, Central America and the Caribbean region. The majority of firms interviewed also have regional sourcing offices in key markets. These facilities handle vendor communication and the logistics of getting the product into the U.S.

Table 10 displays where each firm interviewed has their goods manufactured. China was observed as the most frequent location in terms of outsourced manufacturing. The U.S. was observed as the most frequent location in terms of owned manufacturing.

Table 10: Location of Respondent's Manufacturing - Owned & Outsourced

				U.S.	Mexico	South America	Caribbean	East Asia	South Asia	China
Company A	Performance Apparel	Fiber/Yarn	Southeast	O						
Company B	Performance Apparel	Textile	Southeast	O						
Company C	Performance Apparel	Textile	Southeast	O	O		O	O		O
Company D	Performance Apparel	Textile	California			X				X
Company E	Performance Apparel	Apparel	California	O						
Company F	Performance Apparel	Apparel	California	O						
Company G	Performance Apparel	Apparel	Southeast			X	X	X	X	X
Company H	Performance Apparel	Apparel	California		X		X			X

Company I	Performance Apparel/ Cotton Bottom Weights	Retail	Other	X	X	X	X	X	X	X
Company J	Cotton Bottom Weights	Fiber/Yarn	Southeast	O	O		O			
Company K	Cotton Bottom Weights	Textile	Southeast	O	O		O			O
Company L	Cotton Bottom Weights	Textile	Southeast	O						
Company M	Cotton Bottom Weights	Apparel	Southeast	X	O		X	X	X	X

O=Owned manufacturing facility X=Outsourced manufacturing facility

Conclusions

Based on the research findings, the US textile and apparel industry is not competitive when looking at cost in isolation. Figure 4 illustrates the current competitive advantages of the US industry.

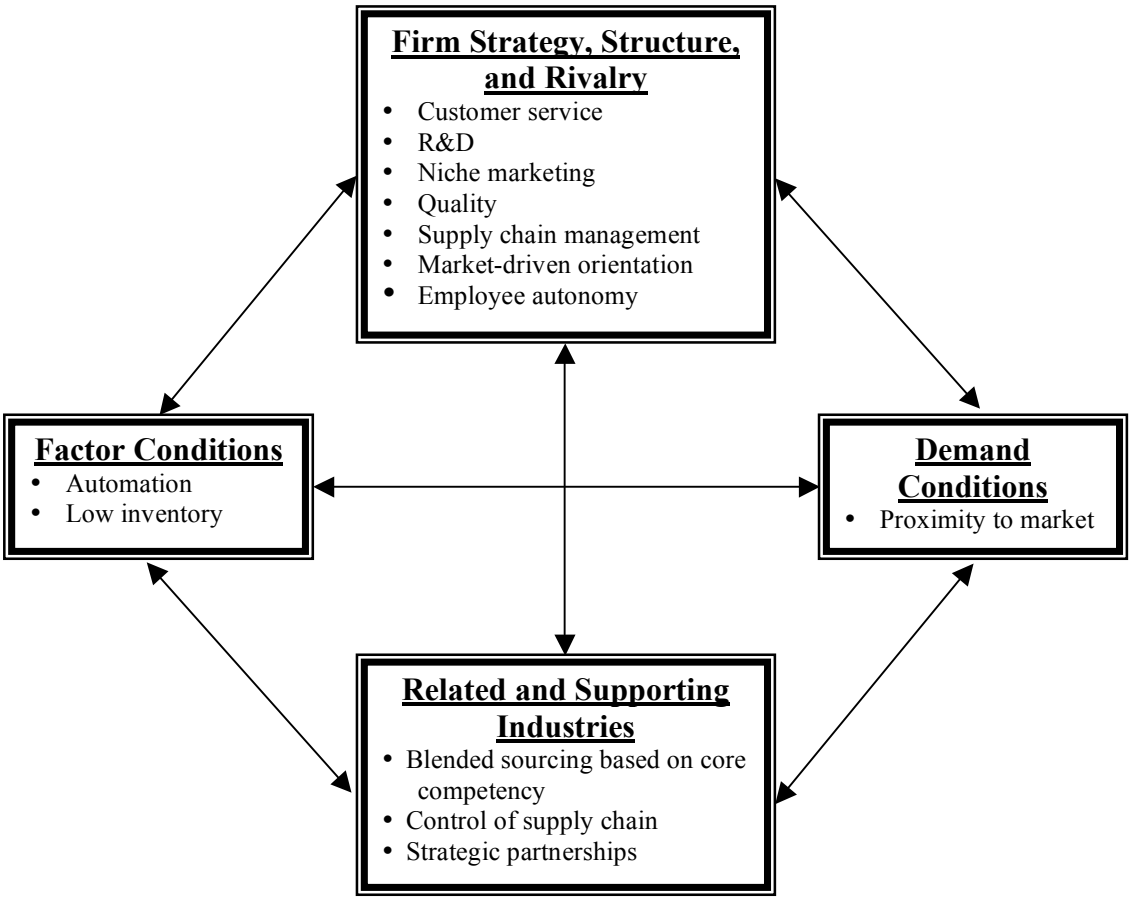

Figure 4: Competitive Advantage of the US Textile and Apparel Industry.

It was observed however through research that certain business strategies create competitive advantages and differentiate the product offering of U.S. textile and apparel companies. Differentiation allows a firm to command a premium price, which leads to increased productivity (Porter, 1990). These business strategies that differentiate U.S companies' products provide unique and superior value in terms of product qualities and service. These strategies observed through primary interviews were customer service, research and development, marketing, and strategic partnerships.

Customer service

1. Align the supply chain for apparel companies & retailers in terms of the various nodes of the supply chain.
2. Relationship based selling – providing service beyond the initial sale.
3. Consistency in terms of product quality.
4. Adapt to the blended sourcing strategy of apparel manufacturers and retailers by servicing customers in multiple supply chains with the same or different product.
5. Customer service web-site for customers to check status of orders, order sample yardage, etc.
6. Educate customers to look at total product lifecycle costs rather then just initial markup – having the right SKU and the ability to minimize inventory by sourcing in the western hemisphere.

Research & Development

1. Create value throughout the product supply chain; not just by applying a finish after the product is made.
2. Develop exclusive product for select high volume customers.
3. Front-end collaboration with up-stream companies in terms of developing product for their needs

Marketing

1. Create identifiable brands.
2. Compete in multiple markets with product at different quality/cost levels.
3. Market research & awareness of market trends.
4. Licensing agreements with well known brands.
5. Introduce organic product lines.
6. Service niche markets through product targeted to these segments.
7. Market 2-3 layers deep in the supply chain; Marketing directly to the retailer or apparel manufacturer to create demand.

Strategic partnerships

1. Leverage proximity to cut-&-sew facilities in terms of speed-to-market advantages.
2. Vertical strategic partnerships with cut & sew operations in East Asia.
3. Partner with other members of the supply chain to bring research and development efforts to the consumer.

Competitive Advantage of Different Regions

The firms in the sample used other regions for manufacturing mainly because of quality and cost. Also, different regions specialized in certain processes and have a greater capacity when compared to US manufacturers. Also, some respondents felt that products from Asia were more fashion-oriented than products from the Western Hemisphere, including the US. With the

proximity to the US consumer market that US firms enjoy, they can leverage that advantage to increase competitive advantage in terms of fashionability, marketing and speed-to-market.

Limitations of Research

This research focused on only two product categories: cotton bottom weights and performance apparel. Therefore, results cannon be generalized to other product categories. Also, a non-probability convenience sample was used in this study. Results cannot be generalized to the entire population. There was also potential for respondent bias depending on the willingness of respondents to disclose information in regards to actual and accurate business strategies. In addition, the researchers acknowledge the limited sample size. However, the sample was chosen as representative of the industry and consisted of the top industry leaders in the cotton bottom weights and performance apparel markets.

Significance of Research

Despite the limitation, this research is significant because it examined the competitive advantages that increase a firm's productivity outside of the traditional manufacturing environment, such as research and development, customer service, as well as marketing strategies. Further, one of the differentiating components of this study was that both quantitative and qualitative measures were considered in evaluating competitive advantage. These qualitative components that cannot be measured contribute to a firm's success or failure in an economy that now defines the competitive environment of the global textile and apparel complex.

Acknowledgements

The researchers would like to thank the Institute of Textile Technology for funding this research project.

References

Abernathy, F., Volpe, A., & Weil, D. (2005). *The future of the apparel and textile industries: Prospects and choices for public and private actors*. Cambridge, MA: Harvard Center for Textile Research.

Creswell, J. (2003). *Research design: Qualitative, quantitative and mixed methods approaches* (2nd ed.). Thousand Oaks: Sage Publications.

Gereffi, G. (2005). *North Carolina in the Global Economy*. Retrived December 6, 2005 from http://www.soc.duke.edu/NC_GlobalEconomy/textiles/overview.php

Malhotra, N. (2004). *Marketing research: An applied orientation* (4th Edition ed.). Upper Saddle River, NJ: Prentice Hall.

National Council of Textile Organizations. (n.d.). Retrieved April 3, 2007 from http://www.ncto.org

Plunkett Research. (2007). *Apparel and Textiles Industry Almanac*. Houston, TX: Plunkett Research, LTD.

Porter, M. (1985). *Competitive advantage: Creating and sustaining superior performance*. New York, New York: Macmillan.

Porter, M. (1998). *The Competitive Advantage of Nations*. New York: The Free Press.

Porter, M. (1998). Clusters and the new economics of competition. *Harvard Business Review,* (November-December).

Rucker, M. (2004). *A model for optimizing the textile complex value chain* (Research Proposal No. S02-CD02). California: UC Davis.

U.S. International Trade Commission. (2004). *Textiles & apparel: Assessment of the competitiveness of certain foreign suppliers to the U.S. market*. Washington D.C.: USITC.