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North Carolina's Textile and Apparel Industry: Recent Survey Results

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ABSTRACT

The article investigates the characteristics of North Carolina textile and apparel companies based on the results of a survey regarding different business management areas. This research investigates the process of internationalization of the sales and production capabilities and analyzes the geography of global suppliers for the North Carolina companies as well as the impacts of internationalization on local activities and employment. The article also highlights firms' innovation strategies and their attitudes toward information technologies as well as the role of institutions in shaping North Carolina companies' competitiveness.

Keywords: Textiles, North Carolina, Internationalization, Innovation, Value Chain.

INTRODUCTION

Over the past few years, the economies of the developed countries underwent dramatic changes that modified the shape of their industries. Most of these changes are related to globalization: new competitors that entered the global arena, such as China and other Asian countries, are exporting large quantities of products that are penetrating global markets, challenging the dominance of European and American firms.

But not all industries have experienced the effects of globalization in the same way; industries composed of commodity or undifferentiated products and industries where labor costs make up a significant portion of final product costs have been hit the hardest. The traditional textile and apparel industry is an example of such an industry whose products garner distribution and market entry with relative ease, especially due to recent changes in the legislative environment regarding the removal of the Multi-Fiber Agreement

(MFA) quotas. These changes have been the subject of many reports and papers by researchers from all over the world (Adhikari & Yamamoto, 2007).

However, recent studies concentrate mostly on developing countries. The focus of this paper, a collaboration of the Center on Globalization, Governance & Competitiveness at Duke University and the Center for Studies on Technologies in Distributed Intelligence Systems (TeDIS) at Venice International University, is to analyze this industry within a developed country, the United States and, in particular, the state of North Carolina, to identify its business characteristics in order to better understand how it can compete with other global players. Furthermore, the methodology used will allow for a comparison with other developed countries and to analyze the strategies of companies of different nations that are working to address the same challenges of globalization in the future.

North Carolina is interesting to examine because the textile and apparel industry has deep roots in this state, dating back to 1815 when the first textile mill opened (http://historync.org). Moreover, the companies in North Carolina have been affected drastically by the new competitive dynamics of globalization: by 2005, there had been a 37% decline in the number of plants, and a 61% decrease in employment compared to 1990 (http://www.soc.duke.edu/NC_GlobalEconomy, section on Textiles and Apparel). It is therefore vital to look at the key characteristics of North Carolina companies, an understanding of which could help identify the policies needed to support firms as they confront the new global challenges.

The purposes of this research paper are to:

- provide an overview of the internationalization of the sales and production capabilities in North Carolina textile and apparel companies;
- analyze the geography of global suppliers for these North Carolina companies;
- provide an overview of the role of public institutions in the effort to support internationalization efforts; and
- explore the use of technologies as instruments to improve the coordination of the respective value chains.

SETTING

North Carolina is the largest textile mill employer and fourth largest apparel production employer in the United States (North Carolina Department of Commerce, 2006). One of the most complete reports regarding the North Carolina textile and apparel industry was written in 2006 (Cassill, Godfrey, Little, & Frederick, 2006). This paper examines the textile complex in North Carolina, including a market analysis of existing companies and identification of needed assistance for them. In the same year, a paper regarding the usage of e-business by the North Carolina textile manufacturing industry was published (Cagle, 2006). More recently, a website was created to provide a *warehouse* of information about textile products and markets from various government, industry, and academic sources to connect North Carolina textile companies to available information, resources, and to each other (Frederick, Cassill, Little, & Godfrey, 2007).

This study builds on previous research with survey data to complete the picture of the companies' business activities and strategies, especially regarding the internationalization process.

METHODOLOGY

The survey methodology is based on quantitative, in-depth phone interviews with the owner, CEO or sales manager of the selected companies. The questionnaire for this study was adapted from a survey originally developed in 1999 by Micelli and Chiarvesio at the TeDIS research centre to study the local manufacturing system (see: http://www.univiu.org/research/tedis/research/tedissurvey/). The survey consisted of 75 questions divided into six sections with the following headings: company data, supplier relations, commercial area, innovation and intellectual property, technological equipment, and investments in technologies. The survey was administered from April 2, 2007 to May 6, 2007.

The population for this research project consisted of 1,256 North Carolina firms. All of the companies belong to the textile complex value chain, (see: http://www.soc.duke.edu/NC_GlobalEconomy/ and www.textileconnect.com) and own at least one facility in North Carolina, according to the *Reference USA* database. In order to identify which companies were part of this industry, all the companies within the database that have a primary North American Industry Classification System (NAICS) code listed in Table 1 were selected. NAICS is a production-oriented schema for business establishments (defined as a single physical location at which economic activity occurs) *in which economic units that use similar processes to produce goods or services are grouped together*.

Stratified random sampling was used to identify the companies included in the sample for the survey. The 1,256 companies in the population were divided into a value chain stage based on the primary NAIC code for the establishment. Next, the percentage of the total number of companies for each stage of the value chain was determined. Companies were then randomly selected based on these percentages from the population of each value chain stage for a total of 250 companies in the sample. The response rate for the survey was 27.6% with a total of 69 participants.

Table 1: *Population and sample of the survey*

NAICS Code	**Value Chain Step**	**Population**	**%**	**Sample**	**Respondent**
333292	Machinery	95	7.6	18	8
325221-222	Fiber	3	0.2	0	0
3131	Yarn	99	7.9	20	4
3132	Fabric	160	12.7	32	5
3161-3109	Leather	29	2.3	7	1
3133	Fabric Finishing	264	21.0	52	16
3151	Hosiery	137	10.9	26	6
3152	Apparel	80	6.4	17	5
3159	Accessories	48	3.8	10	3
314	Home & Interiors	341	27.1	68	21
	TOTAL	**1256**	**100.00**	**250**	**69**

RESULTS

DEMOGRAPHIC PROFILE

Respondents answers to the questions on company data provided a profile of the study's sample. A significant number of the firms maintain more than one location in North Carolina, with 1.36 as the average number of locations within the state. Furthermore, the average number of locations per firm within the United States was 5.27 locations. Roughly 44% of the locations in North Carolina report having fewer than 50 employees.

The companies produce mostly *final products for the market* (30.9%) or *final products for other companies* (29.4%). Only 8.8% of firms interviewed were considered manufacturers without factories in which the company does not engage in the manufacturing process but rather focuses on logistics, marketing, or managing activities.

Regarding the nature of production, 72% of respondents *make to order*, whereas a smaller group, 19.3%, carry out a *made to stock* kind of production. Moreover, 31.9% of the companies consider themselves a *leader in the industry* and 36.2% consider themselves to have a *relevant position* in the industry.

The most important clients of the interviewed firms are *production companies* (43.5%) or *commercial customers* (34.8%), only 21.7% of firms *sell directly to end customers.* This indicates that a majority of the interviewed firms are upstream producers in the value chain in which few have developed their own distribution or retail operation: 68.1% of them claimed not to own any distribution channels. When the companies *do* have their own distribution channel, they use it mostly to sell in the US (20.3%), whereas only 11.6% have developed distribution to sell both domestically and abroad. The most common types of owned distribution channels are commercial subsidiaries or branch offices, mostly located in Canada (44.4%), Mexico (22.2%) or in the Far East (33.3%). North Carolina textile and apparel companies do not heavily utilize franchising sales outlets and services.

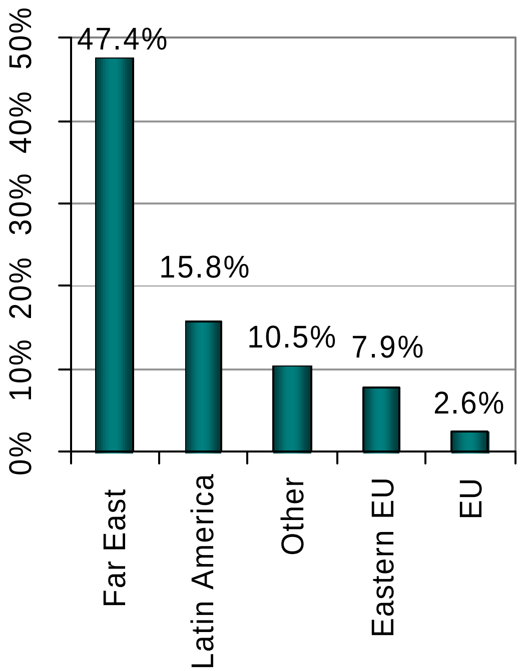
INTERNATIONALIZATION PROCESSES

The first area covered in the analysis deals with internationalization. On average, the interviewed companies export only 9.1% of their total sales. Beyond normal logistical considerations, this relatively small figure is explained by pointing to the utilization of *domestic* strategic suppliers over *foreign* strategic suppliers. In the survey, strategic supplier was defined as *a supplier that is working with the company in a partnership relationship that is important for the competitive strength of the company itself*. Of the 64% of companies that reported using a strategic supplier, 77.9% of the suppliers were within the US and only 22.1% were located abroad.

However, despite the lower percentage of foreign strategic suppliers, this is still the preferred means of establishing a relationship with foreign countries. Of the 33% of companies that have established a manufacturing internationalization process, 85.7% use a foreign strategic supplier compared to 26.1% with foreign direct investments (FDI). In the majority of the cases, these two strategies did not coexist; rather they were considered as alternatives to one another.

The location of foreign strategic suppliers provides information about the strategy that textile and apparel firms are implementing through this internationalization process. Figure 1 shows that these suppliers are located mostly in countries where companies can take advantage of lower labor costs, with the Far East (47.4%) and Latin America (15.8%) being the main locations.

Figure 1: *Strategic suppliers' location abroad*



The same issues can be considered regarding FDI. Foreign direct investment occurring within North Carolina textile and apparel companies is found mostly in Latin America (60.0%) or in the Far East (40.0%). Through foreign direct investments, textile and apparel firms are looking for a reduction in production costs but also for the ability to have more direct control over facilities (especially regarding the Latin American-based FDI). The firms also use FDI as a way to open new markets; seventy-five percent of the interviewed companies sell directly in the countries where they have FDI for every product and in every market.

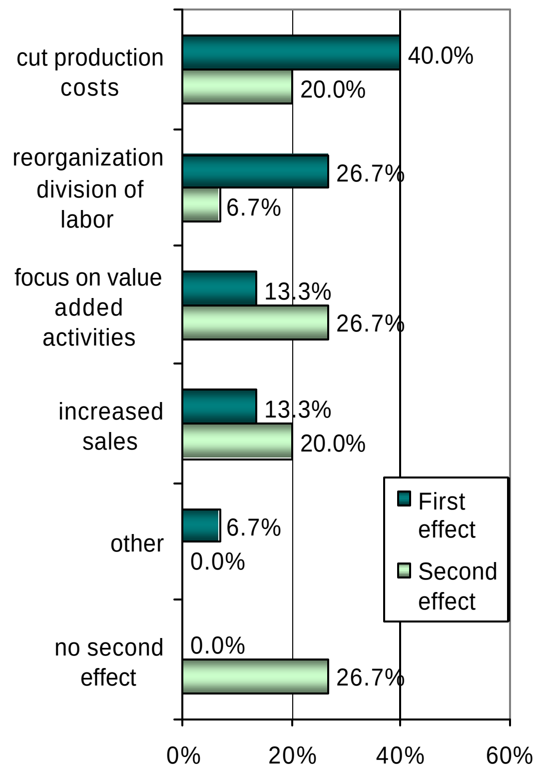
What emerges from the comparison of these two forms of internationalization is that they are used by different companies but for the same purpose: efficiency in global sourcing. This result confirms what the companies declared to be the *most important area the company has invested in to develop competitive advantage*: *cutting production costs* (34.8%). This area far surpassed the next two areas: *product innovation* (14.5%) and *customer service* (13.0%).

THE IMPACT OF INTERNATIONALIZATION ON LOCAL OPERATIONS

To better understand the internationalization strategies of North Carolina firms, it is important to analyze the effects of this process on local activities. For half of the companies, internationalization is a growth strategy. On the other hand, 35.7% of the participants stated that foreign investments or supplier relationships were implemented as a *replacement* for activities done inside the company.

One interesting result that helps to better understand this feature is the degree of vertical integration. Only 26.9% of the firms outsource some of their manufacturing activities, whereas more than half (52.2%) conduct all of the main production activities in-house. Figure 2 illustrates the main effects of partnership with foreign strategic suppliers or FDI on North Carolina operations. The first effect has been to *cut production costs.* But the *reorganization of the division of labor* on a global scale and the *focus on value-added activities* also take on important roles. As happens in other industries and in other developed countries, internationalization brings about a new division of labor that allows the firms to focus only on the relatively high value-added activities and to outsource the other activities to countries with lower labor costs.

Figure 2: *Effects of internationalization on local activities*



In order to understand the effect of internationalization on local employment,, the companies were asked for information regarding the number of employees in manufacturing versus non-manufacturing positions. According to the responses, the number of manufacturing workers has decreased for more than half the companies (56.2%). Yet, 43.8% of the companies said the number of non-manufacturing employees has stayed the same, and 25.0% declared the number has increased.

According to the survey responses, logistical and infrastructural weaknesses (30.8%) are the main problems that occur in the internationalization processes. Following internationalization, the companies perceived the need to strengthen their *logistical and commercial abilities* (60.0% of the respondents), but also *marketing* (53.3%) and *finance* (46.6%). Although firms noticed several problems in their internationalization efforts, they have not asked public agencies for help: only 7.0% participate in projects developed by public institutes. Instead, North Carolina firms rely mostly on *national trade/industry associations* (60.0%) and on *banks or financial institutions* (both local, 57.1% and national, 50.0%). Less important as partners in internationalization are *regional trade/ industry associations* (35.7%) and other *US companies* (26.7%).

INNOVATION STRATEGIES

Many researchers and policy makers argue that the best way to escape from the current "race to the bottom" between the North American and European countries and the rapidly developing economies such as China and India, is to invest in innovation. How often and to what extent do textile and apparel companies adopt this suggestion? To answer this question, the companies were asked about their innovation strategies and their attitudes toward design. According to the survey responses, 53.6% of North Carolina textile and apparel firms have made product innovations over the last three years. Of these companies, the innovative component of the product innovation was mostly in the area of *design* (for 83.3% of the firms) or in the *materials used* (66.7%). To a lesser degree the focus of product innovation was in the *functionality* of the product (52.8%) and the *technology* incorporated (44.4%).

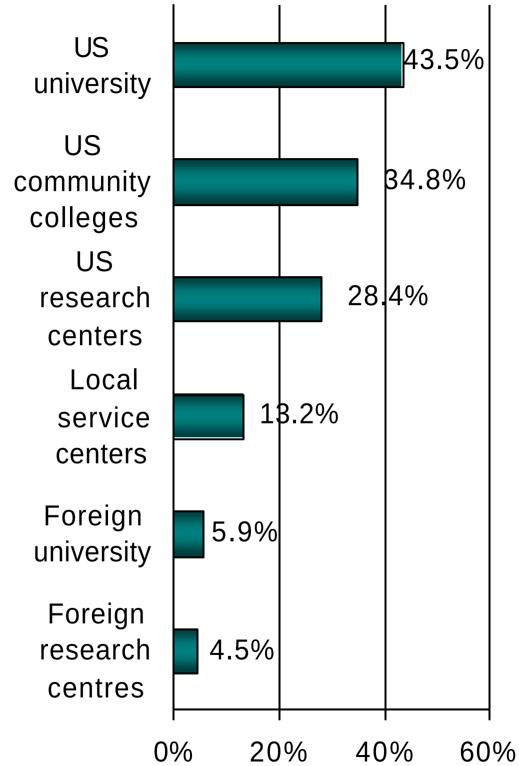
What have been the most important factors that stimulated product innovation? There is not a unique driver that has been critical for all the companies. *Customers' suggestions* (29.7%) and *market analysis* (21.6%) have been the most important drivers for interviewed companies, with *internal R&D* (18.9%) being a close third.

Although design is the most important innovative component in most firms, only 46.4% of the respondents said it has a relevant role for the competitiveness of their products. Furthermore, North Carolina textile and apparel companies do not invest strongly in aesthetic design. In fact, no more than 37.7% of the firms that participated in the survey have an in-house design department. This picture of design investments is completed by the information regarding potential collaboration with external designers. Only 10.3% of the firms work continuously with an external designer; the majority of firms (67.6%) still do not have *any* external partner to develop design.

North Carolina textile and apparel firms stress *technical* design based on research and development (R&D) initiatives. The survey found that 36.2% of companies have an internal R&D department. The average number of employees in the R&D department is 7.8; however, for 66.7% of the firms, fewer than three people are in this department. Nevertheless, 28.4% of the firms have registered a patent over the last three years.

How can North Carolina companies innovate through R&D if few have a department dedicated to this task? The answer to this question is found in exploring their relationship with research centers and universities. Figure 3 shows that a large percentage of companies cooperate with one or more institutions, especially US universities and community colleges. The high percentage of companies that cooperate with these research institutions is one of the most remarkable results of the survey. Firms consider these institutions so important, that in many cases they rely on them as an external R&D department. The presence of many prestigious universities within North Carolina, both specialized in the textile and apparel industry and in other tangential industries and activities, creates a unique environment where innovation can be developed.

Figure 3: *Collaborations with research centers and universities*



TECHNOLOGY

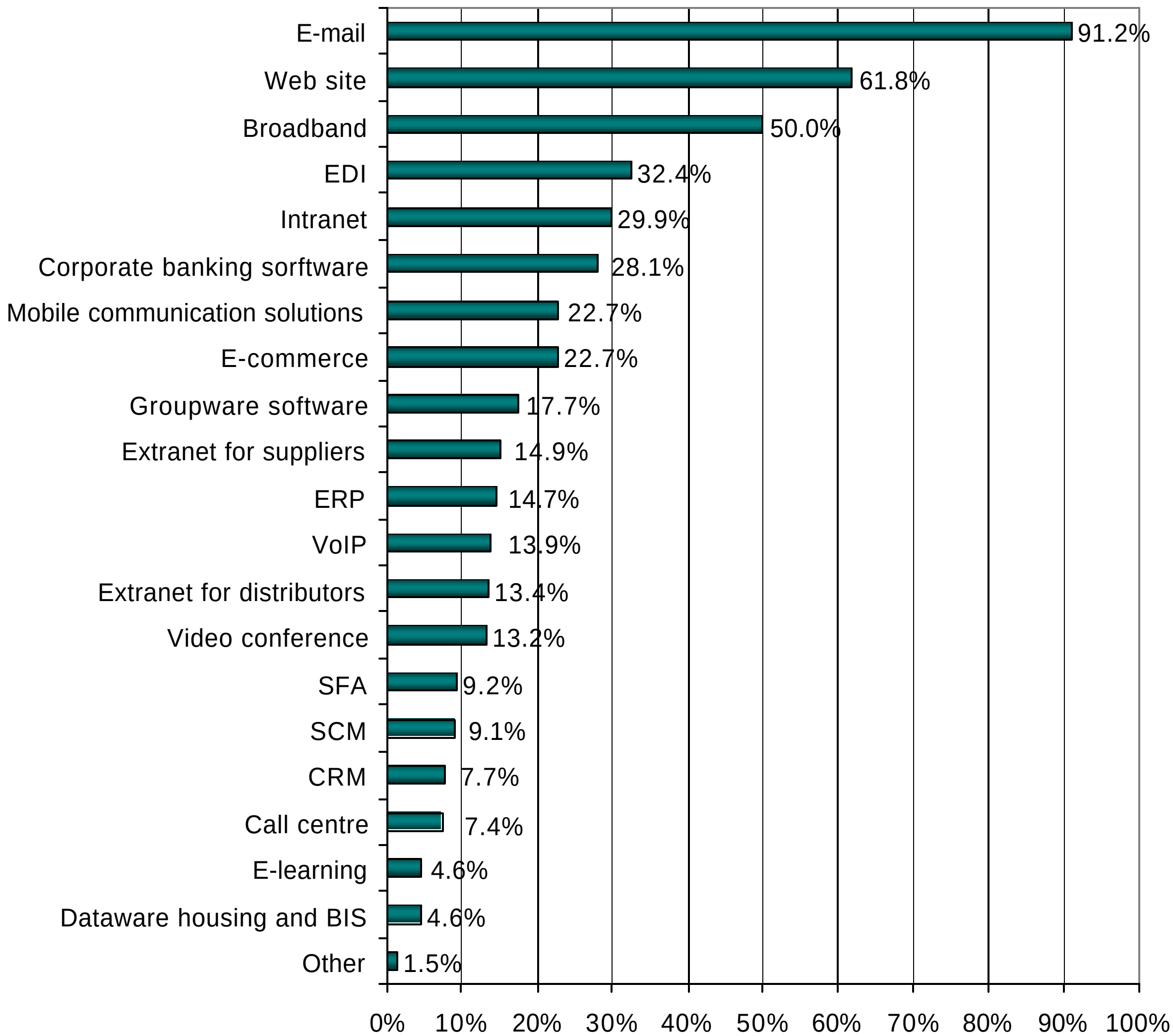
The last two sections of the questionnaire were used to determine how textile and apparel companies are currently using technologies, especially websites, to facilitate business activities.

On the whole, firms do not devote a significant amount of company resources to information technology (IT). Actually, 62.3% of the respondents to this question stated that the IT budget is less than 1% of the company's sales. Only 7.5% of the companies are considered 'heavy investors in IT,' defined as dedicating more than 5% of the company's sales to the IT budget. In addition, 71.9% of the firms said that this figure has not changed compared with three years ago. Furthermore, this budget is mostly used for maintaining existing software and infrastructure (for 71% of the companies) rather than investing in new areas of IT.

Very few North Carolina firms outsource their IT activities, thus confirming their vertically integrated organizational structure, even with regard to their IT investments. *Software maintenance* is the most outsourced activity (44.6% of respondents outsource it), followed by *hardware maintenance* (37.5%) and *website management* (31.7%). A smaller group outsources the *management of the website contents* (23.3%).

Figure 4 shows the different technologies that companies bought or developed. The analysis of the pattern of technological diffusion by North Carolina companies allows one to understand the attitude these firms have toward new technologies and the different implications that IT could have for their strategies. The most common technologies adopted by textile and apparel companies are Internet-based: almost all the textile and apparel firms utilize e-mail and greater than 60% of the respondents have a website. Broadband and electronic data interchange (EDI) are also commonly used, with adoption by 50.0% and 32.4% respectively. The high usage of EDI also reflects the vertically integrated organizational model that characterizes North Carolina textile and apparel companies. The more complex and innovative technologies, such as customer relationship management (CRM), enterprise resource planning (ERP), data warehousing, and business intelligence solutions, are not significantly used among North Carolina firms. Textile and apparel firms seem to prefer the adoption of technologies for codified processes, such as EDI and e-commerce. Additionally, very few firms use communication technologies such as videoconferencing, groupware software, extranet or intranet, to interact with partners.

Figure 4: *IT adoption*



WEBSITE

According to the survey results, the most important functions of the company website are to: *present information about the company* (for 95.2% of respondents), *provide information on the products* (92.9%), *provide a catalogue* (46.3%) or *collect clients' information* (34.2%). A large percentage of textile and apparel firms also use their websites to: *take on-line orders* (46.3%), and *on-line payments* (30.0%). Subsequently, it is not surprising that company websites have had a strong effect on business management. According to the questionnaire responses, only 23.1% of textile and apparel firms feel that the website had no effect on company business management, whereas 60.5% of the companies said the website caused an increase in *overall sales*. Other important effects have been the growth of the *customer base* (55.3%) and an improvement in the *interaction with the customers* (56.4%).

These strong impacts are linked to the use of the web as a platform to sell on-line.

Although only 35.7% of companies that have a website sell on-line, the most important reason why companies are selling their products on-line is to *widen the market* (76.5%) rather than *reduce distribution costs* or to offer better *customer service* (both important for only 11.8% of respondents). The firms that use online retailing mostly sell their *entire product range* (56.3%), whereas a smaller percentage only sell *niche products* (25.0%) or *exclusive products* (18.8%). The refusal of the others to enter the web market is principally because these companies feel this distribution channel is *inadequate for their products or processes* (for 46.9% of respondents).

Not only do North Carolina textile and apparel companies consider the website very important for their overall marketing strategy, but they also want to improve it. Of the companies surveyed, 65.8% feel the need to improve the *contents* and 47.4% of them want to upgrade the *graphics* of their website. *Integration* with suppliers, customers, or other partners is another area where many companies (42.1%) believe it is important to invest more in the future.

CONCLUSIONS

This survey has portrayed the North Carolina textile and apparel industry as a complex that is facing new challenges due to the dynamics of globalization. These companies have developed strategies to gain internal efficiency through global sourcing, but also to open the door to new markets. Partnership with strategic suppliers located abroad was the most important form of internationalization. Furthermore, internationalization is viewed as a growth strategy to help reduce production costs by reorganizing the division of labor on a global scale to take advantage of lower labor costs in less developed economies.

Despite the interviewed firms' recognition of the role of design in product innovation, these firms do not appear to be heavily investing in aesthetic design as a strategy to upgrade their position in today's global economy. Rather, they stress research and development-based innovation processes. The high percentage of companies that have registered patents confirms this effort, which has been achieved more through collaborations with universities and research centers than through internal R&D departments. Overall, it can be concluded that the presence of many universities and research centers that create usable knowledge and provide relevant services is an important competitive advantage of North Carolina as a whole.

North Carolina textile and apparel companies' attitude toward technologies stresses the role of the Internet to enhance business activities. The Internet strategies developed by these firms are focused primarily on market expansion through e-commerce, which has important effects on business management. However, the Internet is an additional channel to traditional distribution, which has been developed by some companies to reach new and different customers. On the whole, North Carolina companies have adopted technologies primarily for codified processes, to be used within the firm rather than to interact with other actors of the value chain.

FUTURE RESEARCH

This survey represents the initial step in a research process that needs to be further expanded. The first area that could be further analyzed is internationalization, with a characterization of different firm models that identify diverse strategic behaviors of companies concerning internationalization, such as the one already created by the TeDIS center for the Italian industrial districts (Chiarvesio, Di Maria & Micelli, 2006). This analysis could be very helpful for researchers and policy makers to locate the different features and needs of companies regarding their presence in the global markets.

Moreover, the global value chain approach could be used to investigate the strategies of firms belonging to different stages of the value chain (e.g., yarn versus fabric versus machinery) in terms of the form and impact of internationalization, innovation strategies, the path of upgrading and attitudes toward technologies. Along these lines, another area for further research could be the identification of the governance structures most common to each stage of the value chain (Gereffi, Humphrey & Sturgeon, 2005).

Lastly, the global value chain approach enables an analysis of industries that can identify strengths and weaknesses by country. In order to better understand the trends and the characteristics of the textile and apparel industry from a global point of view, an international comparison between North Carolina and other countries with an equally strong tradition in this industry would be desirable.

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