Michigan Apparel and Textile Manufacturing Industry: Characterization and Needs Assessment

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ABSTRACT

The purpose of this study was to (a) identify characteristics of the Michigan apparel and textile industry; (b) determine the manufacturers' perceived needs with respect to making their firms more competitive than at present; and (c) provide criteria for action, i.e., for the identification of strategies that universities can employ to help firms succeed and remain competitive. Data from County Business Patterns, Michigan 1999 were used to characterize the Michigan apparel and textile industry. The largest segment of the industry was North American Industry Classification System (NAICS) 314 Textile Product Mills, followed by 315 Apparel Manufacturing, and 313 Textile Mills. Many firms were located in the southern region of Michigan, especially in the southeast, had less than 20 employees, and produced a wide variety of products. Using two rounds of a needs assessment survey, questionnaires were sent to Michigan manufacturers listed in directories and classified under Standard Industrial Classification (SIC) 22 and SIC 23 (the system used by publishers at that time). The industry subsectors analyzed were based on the new NAICS. Descriptive statistics and qualitative analysis of open-ended responses were used to analyze the data collected in this study. Firms have been facing various internal and external challenges with regard to production technology, labor and management, marketing, and finance. Six main needs categories in order of rated importance were: (a) product development, (b) organization and management, (c) technology and communication, (d) marketing and international trade, (e) human resources, and (f) environmental issues and sustainability. The important specific needs in each main category and the important criteria for the identification of strategies are discussed. The impact of transition from the SIC system to NAICS on the characterization of the apparel and textile industry in Michigan and future research needs are also discussed.

KEYWORDS: apparel and textile industry, needs assessment, North American Industry Classification System (NAICS), Standardized Industrial Classification (SIC), Michigan

Introduction

Industry, government, and academic institutions have formed cooperative partnerships to develop and implement broad-based strategies to increase the competitive strength of the apparel and textile manufacturing industry (The AMTEX Partnership, 1997b). One strategy is to link the entire textile manufacturing and supply chain together by using contemporary electronic communications technologies to connect fiber, yarn, fabric, and other apparel and textile product manufacturers with each other as well as with markets around the world. One industry–government–academic consortium has built an electronic marketplace that virtually makes U. S. products available world-wide in global markets (The AMTEX Partnership, 1997a). *SourcingMall.com*, one product of the AMTEX partnership, provides firms globally with access to apparel, fabric and other textile products, equipment, findings, and other useful services of the U.S. integrated textile complex (http://www.sourcingmall.com). Initial efforts of the National Sourcing Database have focused on bringing in manufacturers primarily from the southern United States (The AMTEX Partnership, 1997b).

While Michigan is not a major textile fiber producer, the state does have a significant number of apparel, textile, and other softgoods design and production firms. According to the *County Business Patterns, Michigan 1997*, there were 342 apparel and 55 textile manufacturers located in 23 counties (Bureau of the Census, 1999). During the same year, 18,579 people were employed in firms within the single Standard Industrial Classification (SIC) code 23 covering the diverse category of Apparel and Other Textile Products. Firms in the Textile Mill Products sector (SIC 22) employed 1,108 people (Bureau of the Census, 1999).

In order to remain competitive in both the

U.S. and world economies, the Michigan apparel and textile industry, as well as the industry in other states of the country, could position itself within the larger apparel and textile design and manufacturing complex to take advantage of national and global markets. At the same time, there could also be opportunities to strengthen networks within the Michigan industry if common needs could be identified. However, there may not be an adequate support system to aid Michigan apparel and textile manufacturers in sourcing domestic apparel and textile products and product intermediates.

<u>Objectives of the Study and Research Questions</u>

The objectives of this study were to: (1) identify characteristics of the Michigan apparel and textile industry using the North American Industry Classification System (NAICS) 313 (Textile Mills), 314 (Textile Product Mills), and 315 (Apparel Manufacturing) in terms of number of establishments, size and location of firms, and annual payroll, (2) determine the Michigan apparel and textile manufacturers' perceived needs with respect to making their firms more viable or competitive than at present, and (3) provide criteria for action, i.e., for the identification of strategies that universities can employ to help firms succeed and remain competitive.

Based on the objectives of the study, the following research questions included: (a) What are the characteristics of the Michigan apparel and textile industry classified by NAICS 313, 314, and 315? (b) What are the visions for the future of owners/managers in the Michigan apparel and textile industry? (c) What are major internal/external challenges that Michigan firms face? (d) What are the broad categories of needs identified by the Michigan apparel and textile industry? For each broad category, what specific needs are important to the Michigan apparel and textile industry? (e) What are the kinds of electronic

technologies used? (f) What resources does the industry system rely upon to meet needs? and (g) What university linkages may be helpful to the Michigan apparel and textile industry?

Industry Classification

The NAICS replaced the SIC system in 1997 and is used by North American Free Trade Agreement (NAFTA) partners (Office of Management and Budget, 1998). This study shows a comparison from SIC 22 Textile Product Mills and SIC 23 Apparel and Other Textile Products to NAICS codes. Applicable subsectors of the apparel and textile industry, within NAICS sector 31-33 Manufacturing, are (a) NAICS 313 Textile Mills, (b) NAICS 314 Textile Product Mills, and (c) NAICS 315 Apparel Manufacturing.

Review of the Literature

By 1973, the U.S. apparel and textile industry reached its peak after several decades of positive productive growth. Since 1973, the industry has experienced stable or declining production (Dickerson, 1999). In recent years, there has been considerable debate on how to assist U.S. apparel and textile manufacturers, but few studies were found that focus specifically on the needs of the small firm which represents the majority in this sector.

McDowell and Hester (1986) of Cornell University conducted a study of New York State's small apparel and textile manufacturers to determine information and assistance needs, which might be provided through university extension networks. Of the 850 firms selected for the sample, 89 manufacturers responded. The researchers attributed the low response rate to the high concentration of non-response in New York City, the center of the fashion industry. The most important sources of information for the 89 firms from upstate New York who responded to the survey came from trade journals, followed by trade shows and associations. When manufacturers were asked what types of information or assistance they believed they needed, marketing was identified as the major need by participating firms; other needs related to technology, labor, and trade. In addition, these researchers found that manufacturers considered existing assistance programs to be too broad and too time consuming. The authors suggested developing, under the aegis of the Cooperative Extension Service, newsletters and a telephone hotline system to provide information and assistance to narrowly defined industry segments.

According to Anderson, Warfield, and Barry (1987) of Auburn University, a cooperative approach was necessary to bring the textile, apparel, and retailing sectors together to work for the common good; that is, the welfare of the family. The Auburn University Apparel Sourcing Fair was set for February 1986 to assist the Auburn textile and apparel industry. To be successful, the fair needed the cooperation of a large number of people from all over the state, thus the development of the Auburn Model. The industry was chosen because of concerns about unemployment resulting from plant closings. The intent of the fair was to provide a link between retail buying offices, apparel manufacturers, apparel contractors and textile manufacturers. The two-day event attracted 250 people and allowed retail representatives to explain what was necessary in order to do business with them, and for manufacturers to exhibit products. As a result of the event, a mutual working relationship developed between the university and the apparel and textile industry.

The *Iowa Textile and Apparel Industry Directory* illustrates a different approach to providing information (Textiles and Clothing Department & Iowa Textile & Apparel Association, 1994). The directory was based on the Standard Industrial Classification system. Faculty in Iowa State University Extension (1996) also prepared the *Iowa Textile and Apparel Industry News* to facilitate communication.

Concerned about the worsening rural economy in Missouri, Dickerson, Dalecki, and Meyer (1991) studied apparel manufacturers in the state, because apparel manufacturing was often the only industry offering off-farm employment in rural communities. A needs assessment survey was mailed to all of the state's apparel manufacturers who employed more than five people. Seventy percent of the apparel manufacturers responded to a survey designed to assess their perceived needs in making their firms more viable and competitive and to analyze how the university might be of assistance to such firms. When manufacturers were asked to rank the three most important areas that they believed their companies should focus on in order to improve their competitiveness, marketing was identified as the first priority, followed by increased productivity and government policy. The authors noted that while productivity involves many aspects of a company's operation, technology was often seen as the primary means of increasing productivity. In follow-up activities, university personnel formed a steering committee of apparel manufacturers.

One exploratory study in the late 1960s was conducted to determine the status of the Michigan apparel industry as to structure and organization, types of apparel produced, and marketing facilities, as well as to identify factors affecting its development (Mason, 1968). Although Mason's study was conducted to assess perceived needs, limited recent work has been done.

Research Design

To present a current picture of the characteristics of the apparel and textile industry in Michigan, the *County Business Patterns, Michigan 1999* was used (Bureau of the Census, 2001) in conjunction with data from survey participants. The needs assessment survey method, employing a modified Delphi technique, was used to analyze the current situation for apparel and

textile manufacturers in Michigan, to identify their perceived needs, and to recommend criteria for action, i.e., for identification of possible university strategies for addressing the specific needs. Methodological Model

This study used the Needs Assessment (NA) Model identified by Altschuld and Witkin (2000) to analyze the current situation for apparel and textile manufacturers in the state and to consider appropriate responses to their expressed needs. This model consists of three phases: Phase 1–Preassessment, Phase 2–Assessment, and Phase 3–Postassessment.

This study reported here is limited to Phase 1–Preassessment and Phase 2-Assessment. Each phase requires decision making that affects the conduct of subsequent phases. Phase 1–Preassessment – included: University Committee on Research Involving Human Subjects (UCRIHS) approval, selection of population, impacts and consequences of the transition from SIC system to NAICS, focus group interviews, first instrument design, pretest and instrument revision, and outcome activities that serve as input for Phase 2 (assessment). Phase 2–Assessment – included two rounds of survey administration using a modified Delphi technique. The first round included a mailed survey, follow-up activities and calculation of adjusted response rate. The second round included a mailed survey using a short questionnaire, follow-up activities and calculation of adjusted response rate. One of the follow-up activities was the analysis of the *County Business Patterns, Michigan 1999* (Bureau of Census, 2001). Then, criteria for action, i.e., for identification of response strategies, were identified.

Preassessment

Selection of Population
The target population of this study was the population of Michigan apparel and textile manufacturers listed in the *D & B Regional*

Business Directory (1998) and *Michigan Manufacturers Directory* (1998) classified by SIC 22 Textile Mill Products and 23 Apparel and Other Textile Products. These directories did not list manufacturers by NAICS codes at that time.

SIC System to NAICS Transition: Impacts and Consequences

To follow the current industry trend, this study used the new industry classification system, NAICS, even though the initially obtained population was collected from the directories based on the SIC system. When we examined 1997 census data from two sources, the *1997 Economic Census* and the *County Business Patterns, Michigan 1997*, the number of establishments was similar, but number of employees was very different between these two industry classification systems. The *1997 Economic Census* showed that the number of employees for Michigan was 4,634 for NAICS 313, 314, and 315. The comparable number of employees by SIC 22 and 23 was 19,687 (Bureau of the Census, 2000). To understand this discrepancy, the first author personally communicated with Karen Harshbarger, a survey statistician in the Textiles and Apparel Section of the Manufacturing and Construction Division within the Bureau of the Census regarding the SIC system to NAICS transition.

According to Harshbarger (personal communication, July 11, 2001), the incoming industries under NAICS 314 and 315 were custom curtains (previously SIC 5714) and custom tailoring and dressmaking (previously SIC 5699), respectively. These industries increased the number of establishments, but have low employment. The outgoing industries under NAICS were automobile trimmings (now NAICS 336360, formerly SIC 2396) and screen printing of apparel and textile products (now NAICS 323113, formerly SIC 2396) which have large employment. It is important to note, however, that production and printing of *fabric* (as distinct from *fabric articles or products*) remains in NAICS 313 (Office of

Management and Budget, 1998). Since Michigan is the center for U.S. automotive manufacturing including seating and interior trims, this change in industry classification systems had a major impact on the size of the Michigan apparel and textile manufacturing industry based on number of employees. Other states may find similar impacts.

Assessment

Data Collection – First Round

During March 2000 the questionnaire was sent to the entire population of Michigan's apparel and textile manufacturers (SIC 22 and 23) after the pretest. After subtracting out the firms for which an incorrect address was given, those that were returned as undeliverable by the U.S. Postal Service, those no longer in business, and those who indicated their firms were not related to apparel and textile manufacturing under NAICS 313, 314, and 315, the number of firms was finally narrowed down to 257. Of that number, 22 firms returned the questionnaire. The adjusted response rate was 8.6 percent.

A first round questionnaire contained questions related to participant and firm characteristics, current situation, needs and resources, and university linkages. Specially, the first round included the opportunity for an open-ended response to eleven needs categories which were technology, developing codes of conduct for labor practices, marketing, organization and management, human resources, occupational safety and health, international trade, recycling or reusing wastes, environmental regulations, networking, and electronic communication.

A second round Delphi questionnaire was constructed based on the needs content of the first round survey and the two focus group interviews. The focus group interviews were conducted with selected manufacturers of the Michigan apparel and textile industry for providing the input to

conduct the needs assessment. Needs categories were collapsed from eleven to six and 30 specific needs statements were constructed, 4-6 statements per category. Categories included technology and communication, product development, environmental issues and sustainability, marketing and international trade, organization and management, and human resources. Five-point Likert-type scales were used for asking respondents to rate the importance of the needs categories and specific needs by circling the appropriate response: "1" - *no importance*, "2" - *little importance*, "3" - *some importance*, "4" - *high importance*, "5" - *very high importance*, and "NA" - *not applicable to my company*. The pretest was sent to two specialists in apparel and textiles for review.

Data Collection – Second Round
Using the Delphi technique, the research team mailed this second survey to 257 Michigan apparel and textile manufacturers in October 2000 in order to obtain consensus on the needs assessment. Twenty-four firms completed and returned the questionnaire ($n_2=24$). Of these 24 firms, 9 had also responded to Round 1 survey ($n_1=22$) and 15 were new participants. For variables common to both Round 1 and 2 surveys, this permitted analysis of 37 different firms, i.e., 22 from Round 1 survey and the 15 nonduplicate respondents from Round 2 survey. The final number of firms contacted was 241. The adjusted response rate was 10 percent for Round 2 survey. The adjusted response rate for the R1 and R2 surveys (combined nonduplicates) was 15.4 percent.

Data Analysis Procedures
In this study, data analysis was primarily for descriptive purposes and for insights into relationships to be examined in future studies. Survey data were computer-analyzed using the Statistical Package for the Social Sciences (SPSS) version 10.0.

Open-ended responses for internal and external challenges and vision were analyzed qualitatively by identifying themes as coding categories. Descriptive statistics were calculated for characterization variables, specific needs and other selected variables as appropriate. For size of firm, location of firm, and vision, comparison is made based on NAICS subsectors.

Finally, use of multiple methods helps to achieve reliability and validity. Data analysis using the *County Business Patterns, Michigan 1999* produced by the Bureau of the Census (2001) was conducted to more accurately characterize the industry than could be achieved with the nonduplicate 37 firms that responded to the first and second round surveys. To compare geographical location of the entire Michigan apparel and textile manufacturing firms from census data and the combined nonduplicate responding firms from R1 and R2 surveys, two Michigan maps were generated using MapViewer 1998 (see Figure 1 and Figure 2).

Outcomes
Criteria for action were developed on the basis of examining the responses to the surveys and results of the data analysis, especially, the importance of the specific needs to responding firms. In addition, the review of literature and mission and resources of the land grant university served as guides.

Results and Discussion

Characteristics of the Industry
According to the *County Business Patterns, Michigan1999* (Bureau of the Census, 2001), for the entire Manufacturing sector (NAICS 31-33) in Michigan, the number of establishments was 15,790, the number of employees was 816,625, and annual payroll was 37.2 billion dollars. Based on the entire Michigan manufacturing industry, the apparel and textile industry accounts for 2.51 percent (N=396) of number of establishments, 0.64 percent (N=5,194) of number of employees, and 0.35 percent ($130,985,000) of annual payroll. Therefore, one may conclude that the apparel and

textile manufacturing industry, classified by NAICS 313, 314, and 315, comprises merely a small portion of the entire Michigan manufacturing industry.

The largest segment of the Michigan apparel and textile industry is NAICS 314 Textile Product Mills (n=183; n=2,577), in terms of number of establishments and number of employees, respectively followed by NAICS 315 Apparel Manufacturing (n=158; n=1,592), and NAICS 313 Textile Mills (n=55; n=1,025). However, in terms of annual payroll, Textile Product Mills has the largest ($67,708,000), followed by Textile Mills ($32,484,000), and Apparel Manufacturing ($30,793,000) (Bureau of Census, 2001). Eighty-six percent of Michigan firms (341/396) had less than 20 employees. Across the three sectors many establishments were located in southern parts of Michigan with heavy concentration in Oakland, Macomb, Wayne, Kent, and Ottawa counties. However, there is considerable dispersion of establishments across the entire state of Michigan (see Figure 1).
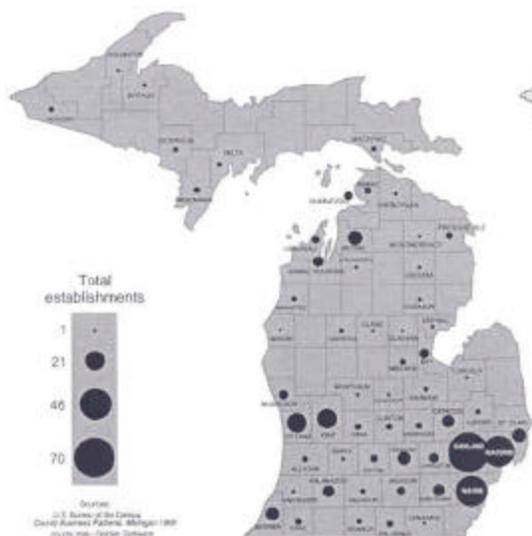

Figure 1. Total number of establishments by county in Michigan (N_{MI}=393) for NAICS 313, 314, and 315 in 1999. Source. (Bureau of the Census, 2001).

Figure 2. Number of responding firms by county in Michigan (N_c=37) for NAICS 313, 314, and 315 in 2000.

Of those firms responding to the surveys of this study (n_C=37), the largest portion, fifty-seven percent of firms (n=21), are within the Textile Product Mills subsector (NAICS 314). Eighty-six percent of the responding firms were located in urban areas in the southern region of Michigan, especially in the southeast (i.e., Macomb, Oakland, Genesee, and Wayne counties). The size of the typical firm was small, with 62 percent of these firms having less than 20 employees. The Michigan apparel and textile manufacturers surveyed produced a wide variety of products, ranging from pet beds to automotive fabrics.

Visions for the Future and Internal/External Challenges

The vision for the future of the manufacturers ranged from growth to uncertainty in this industry. They were facing various internal and external challenges. Several specific challenges were related to (a) product development, pricing of products, advertising and promotional strategies, identification of target markets; (b) training of employees, wages, labor

supply and productivity; (c) new equipment and machinery, maintenance of equipment, organization of production facilities, computer use; and (d) taxes.

Needs Categories and Specific Needs
With respect to the main needs categories, the grand mean scores of rated importance in decreasing order were (a) product development, (b) organization and management, (c) technology and communication, (d) marketing and international trade, (e) human resources, and (f) environmental issues and sustainability. Table 1 shows a summary of six main needs categories including number of respondents (n_2), grand mean score, standard deviation, and minimum and maximum mean score of the specific needs included within the main needs categories.

A unique feature of this study was the identification of specific needs within each main needs category. Manufacturers have many different specific needs facing their firms. The most important specific need of the Michigan apparel and textile firms in each main category above, respectively, was to: (a) locate sources of consistent quality textile inputs, (b) optimize functional roles in a small firm, (c) keep current with new developments in technology and communication, (d) find new domestic markets, (e) attract and train qualified workers, and (f) improve safe working environments. Table 2 shows the highest two important specific needs under each six main needs category.

Table 1. Descriptive Statistics: Summary of Six Main Needs Categories

Categories	n_2	Grand mean	*SD*	Min. mean	Max. mean
PD	22	3.74	.699	2.67	5.00
OM	21	3.38	.823	1.50	4.75
TC	21	3.36	.708	2.33	5.00
MI	19	3.29	1.039	1.00	5.00
HR	21	3.11	.615	2.00	4.75
ES	20	3.04	.880	1.50	4.50

Note. The possible mean range is "1" for *no importance* to "5" for *very high importance*. Maximum n_2 = 24. PD (product development); OM (organization and management); TC (technology and communication); MI (marketing and international trade); HR (human resources); ES (environmental issues and sustainability). Min./max. mean = minimum/maximum mean score of the specific needs within each main needs category.

Usage of Electronic Technologies, Information Resources, and University Linkages
Firms were asked to indicate the use of technology in terms of *currently use*, *don't use but plan to use*, and *not applicable to the business.* E-mail was most frequently used, followed by computerized inventory tracking, computer web site, CAD (computer-aided design), EDI (electronic data interchange), automated cutting equipment, CAM (computer-aided manufacturing), E-commerce, and robotics.

Table 2. Two Most Important Specific Needs within Main Needs Categories

Main needs category/specific needs (Mean)
PD Locate sources of consistent quality textile inputs (4.15)
Match product uniqueness with appropriate target markets (4.04)
OM Optimize functional roles in a small firm (4.00)
Organize and train effective teams (3.67)
TC Keep abreast of new developments in the industry (4.05)
Develop a web site to promote our company and products (3.38)
MI Extend product sales into new domestic markets (4.05)
Increase export sales (3.32)
HR Attract and train qualified workers (3.96)

	Acquire information about current government regulations with respect to labor practices (3.27)
ES	Develop improved safety training programs for workers (3.32)
	Increase innovation in product development to use recycled materials (3.25)

Note. The possible mean range is "1" for *no importance* to "5" for *very high importance*.

With respect to using technology, the firms who were not currently using a computer web site or E-commerce were planning to use them in the future. As a group, they were not very familiar with new online sources related to the industry. It is safe to say that the use of electronic technology is only in its initial stage today but shows potential as a growing trend for future use in the Michigan apparel and textile industry. In the future, successful firms may have more exposure to information and greater access to resources for investment in new technology and information; on the other hand, smaller firms may find new technology and information too expensive or perhaps they will have a difficult time keeping abreast of new technology and information or their benefits.

In this current situation, Michigan universities may be able to offer new industry information to the Michigan apparel and textile manufacturers who have limited resources. This would help small-size firms in Michigan remain competitive.

Implications and Recommendations

The findings of this study have implications for apparel and textile manufacturers, academicians, and university students. Currently, Michigan apparel and textile manufacturers face several challenges and needs that require specific strategies to address them. Based on the responses from the manufacturers surveyed, a specific targeted approach in terms of scale of firms and products may be needed to assist the apparel and textile manufacturers in Michigan. An assistance program has little

impact if there are no interested firms to assist. It was found by the low response rate to this study that the firms in this sector do not readily seek out and participate in assistance programs, even though they may have the needs for such services and may receive incentives for participation.

To assist the manufacturers, government–industry–firm should interact with one another. The university may be an appropriate bridge to interconnect each subsector as well as link Textile Mills, Textile Product Mills, and Apparel Manufacturing together in the hope of stimulating the Michigan apparel and textile industry. Providing information from the universities could be important to growth in economic activity, and new information technology should provide manufacturers with a specifically competitive advantage.

The important and feasible criteria for the identification of strategies that Michigan universities can employ to help firms succeed and remain competitive are to: (a) address top most specific needs of each main needs category, (b) adopt a specific targeted approach, (c) take leadership in knowledge management and transfer, and (d) engage in mutually beneficial activities. These criteria for action are based on the results of the needs assessment survey and the mission of a land grant university, i.e., teaching, research, and service.

Through these activities, students would have the opportunity to develop working relationships with industry leaders, gain experience with and form a realistic view of industry, and enter mentoring relationships. Faculty would also have the opportunity to interact with industry people and see the current industry situation. Such activities are ongoing and must change over time after an evaluative process. Input from manufacturers will also continue to be important as plans are developed and implemented.

Through the variety of research questions and data analyses, several improvements and methodological considerations, and recommendations for future studies in this area are suggested as follows: (1) an initial personal contact before sending a survey is suggested when future researchers do this kind of research. This may increase response rate; (2) the case study approach may be another way to understand in more depth specific characteristics of the apparel and textile manufacturers and their perceived needs; (3) since the transition from the SIC system to NAICS had such a great impact on the characterization of the apparel and textile industry in Michigan, further research with the NAICS is needed to understand impacts and consequences of this transition for the apparel and textile manufacturing industry in Canada, the U.S., and Mexico in terms of incoming and outgoing industries; (4) a comprehensive picture of the production of a variety of textile products, such as automotive seating and interior trim and upholstered furniture, requires research inclusive of other NAICS subsectors in addition to 313, 314, and 315; and (5) identification of specific needs was unique to this research. A similar approach should be extended to other states to determine the extent of variation and importance of specific needs. These efforts can contribute to the survival and growth of apparel and textile manufacturing firms in today's competitive environment if appropriate bridging strategies are used by the university.

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