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MICHIGAN APPAREL AND TEXTILE INDUSTRY: CHARACTERIZATION AND NEEDS ASSESSMENT

By

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ABSTRACT

MICHIGAN APPAREL AND TEXTILE INDUSTRY:
CHARACTERIZATION AND NEEDS ASSESSMENT

By

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The purpose of this study is to (a) identify characteristics of the Michigan apparel and textile industry; (b) determine the manufacturers' perceived needs with respect to making their firms more viable or 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. The County Business Patterns, Michigan 1999 was used to characterize the entire apparel and textile industry in Michigan. Two rounds of a needs assessment survey, using a modified Delphi technique, were conducted to analyze the current situation and needs of apparel and textile manufacturers in Michigan and to consider appropriate responses to their expressed needs. The results of the study are that:

1. Many firms are located in the southern region of Michigan, especially in the southeast and have less than 20 employees. They produce a wide variety of products.
2. Six main needs categories in order of rated importance are product development, organization and management, technology and communication, marketing and international trade, human resources, and environmental issues and sustainability.
3. Most important specific needs are: (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.

DEDICATION

This thesis is dedicated to my dad:

Shin-Wong Lee

I learned from you, I grew my dream from you, I admire you

and I love you.

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During completion of my Master's program many individuals have had a role in helping me finish this study. I would like to thank them all. In particular, however, the following individuals have played a special role in the completion of this thesis and to them I am especially grateful and beholden.

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Special thanks to Dr. Judy M. Olson, Department of Geography. She shared her busy time with me and helped to generate the visual maps of the Michigan apparel and textile industry.

I extend my grateful appreciation and love to my family for their support far away in my country, South Korea. I wish to thank my mother and father who started me on the road to my education, and believed that I could accomplish this task.

Finally, and most importantly, thanks again to my advisor for not only advising my study but also guiding my professional life.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

This exploratory and descriptive study of the Michigan apparel and textile industry is part of a larger research project (MAES Research Project No. 3357–Needs of the Michigan Apparel/Textile Industry: Characterization, Assessment and Response Strategies) supported by the Michigan Agricultural Experimentation Station, Michigan State University. This study is under the direction of Dr. M. Suzanne Sontag and Dr. Ann C. Slocum, members of the research and teaching faculty in the Department of Human Environment and Design, Michigan State University.

The purpose of the larger project is to: (a) characterize the Michigan apparel and textile industry in terms of size, location, labor, communications technology, nature and dollar value of products, and markets; (b) conduct a needs assessment of apparel and textile designers/producers and manufacturers in Michigan with respect to continuing education and electronics communication and networking; and (c) identify effective ways to increase economic viability and employment potential, and thus support sustainable community development for entrepreneurs in the textile complex through access to emerging technologies and "growth-from-within" policies.

Statement of the Problem

Industry, government, and academic institutions are forming 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 utilizing 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 is actively working to build 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, textile and fabric 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 from the southern United States. Advertised advantages of participation in this database include a reduction in (a) nonvalue added costs for apparel and home furnishings, (b) current time to market, (c) clearance markdowns, and (d) inventory size, as well as (e) an improvement of product development through use of concurrent engineering techniques, (f) the creation of new markets such as semi-custom apparel, and (g) the establishment of new markets and strategic alliances that create business opportunities (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.

At the time the present study was planned, available census data were limited to the SIC system. According to the County Business Patterns, Michigan 1997, there were 342 apparel and 55 textile manufacturers located in 23 known 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 the 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, including small entrepreneurs, could position itself within the larger apparel and textile design and manufacturing complex to take advantage of national markets as well as to open global markets. At the same time, there could also be opportunities to strengthen networks and promote cooperative efficiencies within the Michigan industry if common needs could be identified (Sontag & Slocum, 1997). 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.

Objectives of the Study

The overall goal of the MAES project is to characterize the nature, scope and structure of the apparel and textile industry in Michigan and to assess perceived needs. The knowledge gained will then provide input for designing strategies to position apparel and textile entrepreneurs in Michigan for the global economy (Sontag & Slocum, 1997).

The objectives of the study reported here are:

- To identify characteristics of the Michigan apparel and textile industry [North American Industry Classification System (NAICS) 313, 314, and 315] in terms of number of establishments, size and location of firms, and annual payroll.
- To determine the Michigan apparel and textile manufacturers' perceived needs with respect to making their firms more viable or competitive than at present.
- To provide the criteria for action, i.e., for the identification of strategies that universities can employ to help firms succeed and remain competitive.

Research Questions

Based on the objectives of the study reported here, the following research questions include:

1. What are the characteristics of the Michigan apparel and textile industry classified by NAICS 313, 314, and 315?
2. What are the visions for the future of owners/managers in the Michigan apparel and textile industry?
3. What are major internal/external challenges that Michigan firms face?
4. 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?
5. What are the kinds of electronic technologies used by the Michigan apparel and textile industry?
6. What resources does the industry system rely upon to meet needs?

7. What university linkages may be helpful to the Michigan apparel and textile industry? What are the industry's expressed interests in student involvement?

Methodological Model

A needs assessment model is a useful tool for organizing this study. Mosier (1985) defined a needs assessment as "an investigation process that results in a proposal or recommendations for solving a problem" (p. 2). She developed a model and shared strategies for teaching groups to perform needs assessment studies. According to Mosier, a needs assessment must ask and answer three questions: (a) What is the current situation? (b) What is the model situation? And (c) what are the recommendations for solving the problem? Mosier contended that a variety of techniques may be used to answer these questions and that each assessment must be tailored to characteristics of the particular problem to be studied.

Several researchers have used a needs assessment approach for identifying ways in which education can work closely with business, industry, and labor. Nasman (1981) developed the BIL model which focuses on assessing the education and training needs of business, industry, and labor. The approach provides useful guidance for a much broader usage. Carlos (1983), Messelear (1982), and Moock (1983) provided other useful examples of needs assessment investigations that mesh the interests of industry and education.

Needs assessment is useful in this study to analyze the current situation for apparel and textile manufacturers in the state and to consider appropriate responses to their expressed needs. This study uses the Needs Assessment (NA) Model identified by

Altschuld and Witkin (2000) and illustrated in Figure 1. NA is a systematic approach that progresses through a defined series of phases. This model consists of three phases: Phase 1 – Preassessment, Phase 2 – Assessment, and Phase 3 – Postassessment.

In Phase 1 – Preassessment, the initial set of tasks to be accomplished is to focus the effort and obtain information that is already available about the area of concern. Thus, the preassessment phase is occupied with simply starting the process and determining if enough information is on hand to preclude expending resources. Figure 1 suggests that this is a research design phase. Phase 2 – Assessment is concerned with the methods for collecting data about needs, setting preliminary needs-based priorities, analyzing and synthesizing all data, and, when feasible, determining the causes that underlay needs. Phase 2 sets the stage for Phase 3 – Postassessment, in which final needs-based priorities are set, solution strategies are selected, and action plans are developed and implemented.

Data are gathered by means of established procedures and methods designed for specific purposes. The kinds and scope of methods are selected to fit the purposes and context of the NA. NA sets priorities and determines criteria for solutions so that planners and managers can make defensible decisions. NA leads to action that will improve programs, services, organizational structure and operations, or a combination of these elements. NA sets criteria for determining how best to allocate available money, people, facilities, and other resources (Witkin & Altschuld, 1995). This study is limited to Phase 1 – Preassessment and Phase 2 – Assessment.

PHASE 1 Preassessment (exploration)	*PHASE 2* Assessment (data gathering)	*PHASE 3* Postassessment (utilization)
Set up management plan for NA	Determine context, scope, and boundaries of the NA	Set priorities on needs at all applicable levels
Define general purpose of the NA	Gather data on needs	Consider alternative solutions
Identify major need areas and/ or issues	Set preliminary priorities on needs--Level 1	Develop action plan to implement solutions
Identify existing information regarding need areas	Perform causal analyses at Levels 1, 2, and 3	Evaluate the NA
Determine • Data to collect •Sources •Methods •Potential uses of data	Analyze and synthesize all data	Communicate results
Outcomes: Preliminary plan for Phase 2 and 3 and plan for evaluation of the NA	**Outcomes:** Criteria for action based on high-priority needs	**Outcomes:** Action plan(s), written and oral briefings, and reports

Figure 1. Needs Assessment Model of Altschuld and Witkin.
Note. From J. W. Altschuld & B. R. Witkin, From needs assessment to action: Transforming needs into solution strategies p. 11, copyright (c) 2000 by Sage Publications, Inc. Reprinted by Permission of Sage Publications, Inc.

Definitions

Terms of the Needs Assessment Model

Several terms in the NA model (Altschuld & Witkin, 2000) are defined below.

Need, when used as a noun, refers to the gap or measurable discrepancy between a present state (what is) and a desired end state, future state, or condition (what should be). A need is not a thing in itself but, rather, an inference drawn from examining a present state and comparing it with a vision of a future state or condition. Need, when used as a verb, points to resources required or desired to fill the discrepancy.

Level 1 needs are those of individuals who would be the direct recipients of services designed to alleviate the discrepancies. (Sometimes these are referred to as recipients' needs, primary needs, or performance needs.)

Level 2 needs are those of individuals or groups who deliver services or implement programs designed to alleviate Level 1 needs. (Sometimes these are referred to as implementers', treatment, or secondary needs.)

Level 3 needs are those of organizations (materials, facilities, support services, etc.). By determining Level 3 needs, the organization gains an understanding of what should be provided to service deliverers (Level 2) to assist them in implementing programs to alleviate Level 1 needs.

Needs Assessment (NA) is the process of determining, analyzing, and prioritizing needs and, in turn, identifying and implementing solution strategies to resolve high-priority needs.

Phase 1 NA – Preassessment – is the initial phase in needs assessment, consisting of numerous steps to focus the needs assessment and to collect existing data in regard to

what is already known about the area of interest (usually leads to decisions about Phases 2 and 3 of the needs assessment process).

Phase 2 NA – Assessment – is the second phase of needs assessment, consisting of numerous steps designed to formally collect, analyze, interpret, and prioritize needs assessment data. This phase, which may include a causal analysis of Level 1, 2, and 3 needs, sets the stage for Phase 3 of the needs assessment process.

Phase 3 NA – Postassessment – is the third phase of needs assessment, consisting of numerous steps primarily designed to select solution strategies for high-priority needs and to develop action plans for the implementation of the best solution strategy or strategies.

Characterization Variables

The following variables are used to characterize the apparel and textile industry.

Annual payroll includes the gross earnings of all employees on the payrolls of operating manufacturing establishments paid in the calendar year (Bureau of the Census, 2001a).

Establishment is a single productive unit. More specifically,

> An establishment is a single physical location at which business is conducted or services or industrial operations are performed. It is not necessarily identical with a company or enterprise, which may consist of one or more establishments. When two or more activities are carried on at a single location under a single ownership, all activities generally are grouped together as a single establishment. The entire establishment is classified on the basis of its major activity and all data are included in that classification (Bureau of the Census, 2001a).

Firm (or facility of a company), as used in the surveys of this study, refers to the physical unit that received the survey. In the study reported here, firm and establishment are equivalent and are used interchangeably.

Location of firm is the geographical area in which the firm is situated, indicated by (a) rural area (population – 2,499 or less) or urban area (population – 2,500 or greater) and (b) county.

North American Industry Classification System (NAICS) is the system used to classify North American businesses into groupings on the basis of their primary economic activity (Office of Management and Budget, 1998). The NAICS replaced the SIC system in 1997 and is used by North American Free Trade Agreement (NAFTA) partners. NAICS uses a six-digit coding system. The digits are as follows:

First two digits = NAICS industry sector
Third digit = subsector
Fourth digit = industry group
Fifth digit = NAICS industry
Sixth digit = national industry (if applicable)

Applicable subsectors of the apparel and textile industry, within sector 31-33 Manufacturing, are the following three:

NAICS 313 Textile Mills
NAICS 314 Textile Product Mills
NAICS 315 Apparel Manufacturing

Number of employees comprises "all full-time and part-time employees on the payrolls of manufacturing establishments, who worked or received pay for any part of the pay period including the 12th of March, May, August, and November, *divided by 4* [italic added]" (Bureau of the Census, 2001a; K. E. Harshbarger, personal communication, July 6, 2001).

Size of firm is indicated by the number of employees in the firm in Michigan.

Standard Industrial Classification (SIC) system is the U.S. system used to classify U.S. establishments into industry groupings on the basis of their primary economic

activity prior to 1997 (Executive Office of the President, Office of Management and Budget, 1987). Applicable sectors of the apparel and textile industry include:

SIC 2200 Textile Mill Products
SIC 2300 Apparel and Other Textile Products

CHAPTER 2

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 have been found that focus specifically on the needs of the small firm which represents the majority in this sector. The review of literature presents an overview of recent trends in the U. S. apparel and textile industry, university and industry linkages, needs assessment studies, and studies to identify needs of the apparel and textile industry.

Recent Trends in U. S. Apparel and Textile Industry

The U.S. textile mill sector has undergone significant changes over the last forty years, including a steady decline in the relative scale of domestic production, employment reduction, and increased competition from imported products. Cline (1987) noted the apparel industry's decline in employment, limited productivity gains, depressed wage gains for workers, and reluctance to reinvest profits during the 1980s. Cline's study was designed to provide data on the domestic apparel and textile industry for use in trade policy decisions.

A study by Shu (1998) provided economic reasoning with empirical evidence as to how and why the changes have happened and utilized the translog demand system to evaluate structural change and relationships in the textile mill sector. The textile mill sector has gone through significant structural change due to technological change. Technological change was also known as the capital deepening process in the U.S. textile industry. The new technology has been labor-saving and capital-using. A significant shift in the demand for materials was characterized by substantial movement in the market share from natural fibers toward synthetic fibers. The textile mill sector was closely related to the apparel sector. Apparel production has also undergone structural change due to rising imports and intense competition. Shu applied a cost function approach to modeling import demand in the aggregated textile and apparel production. The results suggested that imports were strong substitutes for other inputs in apparel and textile production. Given the competitive pressure of foreign producers who rely on advantageous labor cost, the U.S. textile mills have introduced labor-saving technology and capital-intensive operations. The Multi Fiber Arrangement (MFA) was brought about by increasing imports, and it was phased out as a result of intense foreign competition.

Quick Response (QR) was proposed by the American Apparel Manufacturers Association (AAMA) in 1987 as a strategy to assist apparel manufacturers in achieving a competitive position in a changing business environment. The Textiles Apparel Linkage Council (1988) defined QR as "a state of responsiveness in which a manufacturer seeks to provide a product to a customer in the precise quantity, quality, and time frame required. In doing so, lead times and expenditures for labor, materials, and inventories are minimized; flexibility is emphasized in order to meet the changing requirements of a

competitive marketplace" (p. 7). The QR strategy is a broad concept, often described as an umbrella strategy, that combines new technologies, modular layouts, process reengineering, total quality management, and employee involvement (Kincade, 1995). A series of pilot tests and case studies have shown that QR is a profitable strategy (AAMA, 1987).

The Demand Activated Manufacturing Architecture (DAMA) project was created in 1993 to help the Integrated Textile Complex (ITC) manage supply chain partnerships that would support quick response strategies (DAMA, 1996). However, despite the potential of QR to increase financial profitability and competitiveness, less than 40 percent of U.S. apparel manufacturers had implemented QR by 1993 (Kurt Salmon Association [KSA], 1992). Kincade and Cassill (1993) also stated that QR has proven financial benefits, but less than one half of U.S. apparel manufacturers have implemented it.

Another study reported on the use of advanced manufacturing technology by small apparel and textile manufacturing firms. The increased adoption of advanced, computer-controlled technology in small manufacturing firms was evident (Rishel & Maxie-Burns, 1997).

Sheldon (1988) studied the current and projected use of computerized design and production equipment in the apparel industry assessed by surveying designers working for apparel manufacturers. The purpose of this study was to determine if there was an accelerated acceptance of technology and what the implications were for apparel design education given changes in the industry. Sheldon concluded that educators must update curriculum and facilities to keep up with the accelerated computerization of the apparel

industry.

In summary, changes in the industry environment such as increased imports, rivalry among existing competitors, and an increase in bargaining power of buyers have increased the difficulties in operating within the apparel and textile industry. To remain competitive, apparel and textile manufacturers must notice changes in their environment, interpret the changes, decide how these changes will impact their organization's strategy, and take appropriate action.

University and Industry Linkages

It is important to integrate the partners – industry, government, and universities – to enhance the competitiveness of the U.S. apparel and textile industry (The AMTEX Partnership, 1997b). According to Fournet, Dugas, and Guarino (1996), the two university components fostering relationships with business/industry were advisory committees and undergraduate internships. The focus of this article was on mutual benefits derived from fostering partnerships. It presented a model by which others can measure their success in creating and maintaining ties with business/industry leaders. Through advisory committees and internships, university faculty formulated a vision of the future with business/industry leaders. Students gained work experiences, enriched academic knowledge, and secured employment in specialized areas. Business/industry leaders participated in shaping the work force and hired employees from a pool of qualified applicants.

Dickerson, Dillard, and Froke (1994) described one land-grant university's response to the decline of the apparel industry in rural areas. The University of Missouri-

Columbia Textile and Apparel Management Department and the Human Environmental Sciences Extension led the cooperative effort in Missouri that resulted in the establishment of the Missouri Textile and Apparel Center and a new paradigm for textile, apparel, and extension programs that support industry in rural America. The center draws upon the multidisciplinary expertise of the University of Missouri, as well as related agencies, to coordinate access to technical assistance for manufacturers and retailers, conduct innovative research and development, and facilitate communication among manufacturers for mutual support.

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 Auburn University Apparel Fair has demonstrated the ability of a land-grant university to bring its resources-research, teaching, and extension-to bear on meeting one of its state's pressing economic needs.... (Anderson, Warfield, & Barry, 1987, p. 9).

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 developed to facilitate communication among businesses within Iowa and to assist firms in finding vendors and sourcing products. The directory was developed through the cooperation of faculty and graduate students in the Textiles and Clothing Department at Iowa State University and the Iowa Textile and Apparel Association. Firms on the Association's mailing list were contacted by telephone to develop the database. After receiving a print-out of the information pertaining to their companies, firms could choose to either grant permission to publish the information or to withhold part of it. 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.

Needs Assessment Studies

Needs assessment can be thought of as an investigative process that results in a proposal or recommendations for solving a problem. A problem might be defined broadly as "how some situation deviates from a model situation" (Harless, 1975). When conducting needs assessment, the following three questions must be asked and answered:

- Where are we now? (What is the current situation?)
- Where do we want to be? (What is the model situation?)
- How do we get there? (What are the recommendations for solving the problem?)

Mosier (1985) argued that training in business and industry was a rapidly growing field. Universities were responding to this growth by offering more courses and degrees

in such areas as industrial education and industrial relations, as well as training and development. Typically, courses covered such areas as design, development, delivery, and evaluation of training programs, and techniques for organizational development. One area that was usually not included was needs assessment. Therefore, a "learning by doing" class was offered by the University of Minnesota to teach needs assessment concepts and approaches. The needs assessment was conducted at the Onan Corporation, which produces industrial engines and other equipment. The class was composed of nine graduate students in industrial or vocational education and was organized as a consulting group with the instructor serving as manager. After becoming familiar with the concept and methods of needs assessment, the students developed specific plans for the 11-week project: (a) interviews to determine the current usage and available hardware and software, (b) questionnaire development and administration, and (c) report preparation. The interviews with the employees, who were computer users or trainers, focused on: uses for personal computers and fourth-generation languages, current and desired competencies in computer technology, type of computer-related training that had been conducted at Onan, and type of training that was needed. The questionnaire obtained information on: employees, basic skills, computer access and usage, and future expectations. One suggestion for planning and conducting needs assessment was that the project should answer an immediate, real need for the company.

Continuous interaction between business/industry and postsecondary institutions is vital if institutions are to adequately serve the changing needs of their community. After realizing this fact, Nasman (1981) outlined a systematic approach to the process of reviewing employer and employee training needs so that postsecondary institutions can

work closely with business, industry, and labor (BIL) to meet these needs. The BIL needs assessment model was meant to fill the need for a cost-effective, locally focused data collection system that would provide a basis for a postsecondary institution to make decisions relative to pre- and post-employment education and training programs.

In conducting needs assessment, researchers or trainers used a variety of techniques to find the current situation, the model situation, and the method for solving the problem. Each situation was unique in terms of such things as time, budget, and available resources. Individuals who conduct needs assessment needed to be familiar with a variety of information gathering and analysis techniques. They must also learn the necessity of flexibility in such things as defining the nature and scope of a problem and the timelines for completing steps of the process. There was no single method or process for doing needs assessment (Zemke & Kramlinger, 1982).

In summary, a needs assessment approach is helpful to identify the ways in which educational institutions can work closely with business, industry, and labor. Exploring the current situation, the model situation, and making recommendations for solving the problem is truly beneficial. This approach is useful in this study to analyze the current situation for apparel and textile manufacturers in the state and to consider appropriate responses to their expressed needs.

Studies to Identify Needs of the Apparel and Textile Industry

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. This study provides information for comparison to this Michigan study.

A team of Georgia State researchers conducted two in-depth studies of the U.S. apparel industry. In the first study, de la Torre, Jedel, Arpan, Ogram, and Toyne (1978) used case studies of 10 apparel firms to identify characteristics that appeared to separate competitive companies from those that were not. The team's second study, a more comprehensive analysis based on data for the total U.S. industry, identified problems and potential solutions for the industry in responding to international competition (Arpan, et al., 1982). The research team traced the historical development of each firm and analyzed its functions related to marketing, production, management and organization, financial control, and labor. Findings of both studies reinforced the importance of controlling manufacturing costs and of having products and marketing strategies aimed at the leading edge of the fashion market. At the time of their study, this market was believed to be less

vulnerable to import competition. The methods and results were useful to the design and implementation of this study because the aforementioned studies focused on firms of all sizes and on a variety of management problems as well.

In 1984, the American Apparel Manufacturers Association (AAMA), in conjunction with three management consulting firms, conducted an analysis of assistance needs of American apparel manufacturers. Its primary objective was "to identify programs and projects which might make effective contributions towards improving the U.S. apparel fabrication industry's ability to compete with imports" (AAMA, 1984a, p. 2). The study was limited to production-related techniques that would make domestic manufacturing a viable option of sourcing. It did not address other competitive strategies pertaining to marketing or finance. Recommendations were made for programs which would help the apparel industry become technologically efficient. These included government tax incentive programs for high technology equipment and basic research efforts for the joining, positioning, and handling of limp fabrics. However, it was conceded that the recommendations made were not equally beneficial to all segments and firms that produce apparel. In fact, the firms which would have the most to gain were the few large enterprises that have the capital available to invest in state-of-the-art machinery as well as in research and development activities.

A second study by AAMA examined another method in which apparel manufacturers could remain viable in light of steadily increasing imports. This strategy was based on the premise that apparel firms "need not be limited to defending their position as domestic manufacturers" (AAMA, 1984b, p. 7). They could, instead, make use of a variety of alternatives to obtain or source their products. In short, the purpose of

the report was to notify members that the time had come to give sourcing options careful consideration.

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 Missouri's 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. The authors noted that while productivity involves many aspects of a company's operation, technology is often seen as the primary means of increasing productivity. In follow-up activities, university personnel formed a steering committee of apparel manufacturers to discuss findings and plan further steps.

In summary, this researcher has focused the literature review on the recent trends in the U. S. apparel and textile industry, university and industry linkages, needs assessment studies, and studies to identify the needs of the apparel and textile industry. Studies of apparel and textile manufacturers to determine information and assistance needs that might be provided through university extension networks found that marketing and technology were needs of high priority in order to remain competitive. Although relationships between the variables of the manufacturing company and technology have

been investigated, further study is needed to assess the specific needs of the Michigan apparel and textile industry.

One exploratory study 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). Seventy firms were identified by using the Directory of Michigan Manufacturers and telephone book yellow pages. A mailed questionnaire, pretested in Texas, was sent to the head of each manufacturing firm. After two follow-up letters, 27 responses were received, yielding a 38 percent response rate. The survey asked the year the firm was established, type of ownership (individual, partnership, open corporation, closed corporation), reason for location, nature of production, basis of pay, source of materials, sources of designs, and marketing. With respect to the respondents, most firms were located in cities. A majority were "closed corporations;" they operated just one plant and used inside-shop method of production. Most were relatively small, with less than 100 employees. Over half of the firms also dealt directly with retail outlets for sale of apparel. Factors cited most often as favorable to expansion of the industry in Michigan included regional market for products, suitable labor supply, transportation facilities and availability of financing. Factors unfavorable to expansion included lack of availability of raw materials or a suitable labor supply, the strong presence of unions, and the existing tax system. A broader and more detailed investigation was recommended in order to replicate the study and determine needs of the industry. Although Mason's study has been performed to assess perceived needs, limited work has been done on the interrelationships among preassessment, assessment, and postassessment of needs for

ensuring survival and improving manufacturing entities' positions in a competitive economy.

CHAPTER 3

RESEARCH METHODS

Research Design

To present a current picture of the characteristics of the apparel and textile industry in Michigan, the County Business Patterns, Michigan 1999 is used (Bureau of the Census, 2001b) in conjunction with data from survey participants. The needs assessment survey method, using a modified Delphi technique, is used to analyze the current situation for apparel and textile manufacturers in Michigan, to find their perceived needs, and to recommend criteria for action, i.e., for identification of possible university strategies for addressing the specific needs.

Delphi Technique – Description

"The Delphi technique is a method used to systematically combine expert knowledge and opinion in order to arrive at an informed group consensus about the likely occurrence of future events" (Moeller & Shafer, 1994, p. 475). According to Helmer and Rescher (1960), the original proponents of the Delphi technique, "the technique derives its importance from the realization that projections of future events, on which decisions must often be based, are formed largely through the insight of informed individuals, rather than through predictions derived from well-established theory" (as quoted in Moeller & Shafer, 1994, p. 476).

In Greek mythology, the oracle at Delphi was blessed with the power to see the future. The Delphi technique was originally developed to predict the future. In NA, the Delphi technique is a set of procedures characterized by the iterative use of a survey over time with the same panel of respondents. This technique is used not only to determine consensus but also to enhance consensus building (Witkin & Altschuld, 1995).

According to Linstone and Turoff (1975), it is difficult to find one definition of the Delphi technique because it has been applied in such varying situations. However, below are several definitions that have been developed by experts using and writing about the technique.

> Delphi may be characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem .... To accomplish this structured communication there is provided: some feedback of individual contributions of information and knowledge; some assessment of the group judgment or view; some opportunity for individuals to revise views; and some degree of anonymity for individual responses (Linstone & Turoff, 1975, p. 3).

> Delphi is a group process which utilizes written responses as opposed to bringing individuals together .... it is a means for aggregating the judgments of a number of individuals in order to improve the quality of decision making .... Delphi is essentially a series of questionnaires (Delbecq, Van de Ven, & Gustafson, 1975, p. 83).

> The Delphi technique...replaces direct debate by a carefully designed program of sequential individual interrogations (best conducted by questionnaire) interspersed with information and opinion feedback derived by computed consensus from the earlier parts of the program (Helmer, 1966, p. 17).

> Delphi...operates on the principle that several heads are better than one in making subjective conjectures...and that experts...will make conjectures based upon rational judgment and shared information rather than merely guessing, and will separate their own hopes and personal motivation from considered judgment in the process (Weaver, 1972, p. 6).

> Delphi is a survey approach that pools judgments without discussion [and].... is somewhat whimsically drawn from the methodological Greek oracle of Delphi. A delphi survey systematically solicits and collates judgments to form a synthetic group. A series of questionnaires is used (Nutt, 1984, p. 106).

From these definitions, some common elements of a Delphi study can be extrapolated. First of all, (a) it is a group process; (b) it is a communication process; (c) there is a feedback loop; (d) there is usually some degree of anonymity for individual members; and (e) it is a decision making process by consensus.

The research team decided to use a modified Delphi technique for the NA. Although the Delphi technique is normally three rounds, two rounds were chosen by researchers because of the response rate and budget. Focus group interviews were, in part, initially conducted to obtain initial needs categories; therefore, focus groups could be considered a substitute for one of the typical three rounds.

Using the Needs Assessment Model Altschuld and Witkin provided (Figure 1), this study is limited to Phase1 – Preassessment and Phase 2 – Assessment. Each phase requires decision making that affects the conduct of subsequent phases. Phase 1 – Preassessment – includes: 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 for Phase 2 (assessment). Phase 2 – Assessment – includes two rounds of survey administration using a modified Delphi technique. The first round includes a mailed survey, follow-up activities and calculation of adjusted response rate. The second round includes a mailed survey using a short questionnaire, follow-up activities and calculation of adjusted response rate. One of the follow-up activities is the analysis of the County Business Patterns, Michigan 1999 (Bureau of Census, 2001b). In the last chapter of this thesis, criteria for action, i.e., for identification of response strategies, will be identified.

Preassessment

UCRIHS Approval

The University Committee on Research Involving Human Subjects (UCRIHS) approved the procedures for protecting human subjects used by this research project (MAES Project MICLO 3357 Needs of the Michigan Textile/Apparel Industry: Characterization, Assessment and Response Strategies) in April 1997. Reapprovals were obtained in subsequent years for the duration of the project. The UCRIHS agreed that the rights and welfare of the human subjects were protected, that the confidentiality of data from voluntary participants was assured, that any possible risks to the subjects were avoided, and that the data of this study were obtained by appropriate procedures of informed consent.

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. A list was compiled by previous research assistants using Microsoft Access. The database organized firms by major SIC codes, number of employees, and distribution by size within Michigan counties. It also included company address and phone number, name of principal executive and product manufactured. Verification of the list included reviewing and eliminating duplication across directories.

SIC System to NAICS Transition: Impacts and Consequences

The North American Industry Classification System (NAICS) replaced the Standard Industrial Classification (SIC) system in 1997. Therefore, census data prior to 1997 are based on the SIC system. To follow the current industry trend, this study uses the new system even though the initially obtained samples were collected from the directories based on the SIC system. This industry classification transition had a major impact on the characteristics of the Michigan apparel and textile manufacturing industry examined in this study.

Initially, this researcher attempted to conduct a trend analysis of the Michigan apparel and textile industry using published census data. The concern was whether the data were comparable based on SIC 22 and 23 and NAICS 313, 314, and 315. When the researcher looked at 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, this researcher 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. To understand clearly this industry classification transition, several quotes from e-mail correspondence are as follows:

> The reason for this difference is that some codes moved out of the textile and apparel area for the NAICS basis. Specifically, automotive trimmings, part of SIC 2396 was moved to NAICS 336360. Also, screen printing, which was part of 2396 was moved to NAICS 323113. The largest cases...accounted for 95% of this difference (K. E. Harshbarger, personal communication, June 12, 2001).
>
> The companies that were in the tabs (totals) for textiles and apparel under the SIC basis were not included in the textiles and apparel numbers under the NAICS basis because of the industry changes...(K. E. Harshbarger, personal communication, June 25, 2001).
>
> If the old SIC 2396 had remained in NAICS sectors 313, 314, and 315, the numbers would be comparable. Those employees that were part of SIC 2396 are now classified in NAICS 336360 and 323113. So, by the SIC basis, the employees remain in SIC 2396 and the tabbed employees number is 19,687. Tabbing the numbers by the NAICS basis means that those employees who were under SIC 2396 are now no longer in the textiles and apparel sector. When you add the employees still in NAICS 313, 314, and 315 sectors, the number is 4,634. The numbers for SIC and NAICS are using the exact same database, they are just being added based on different industry codes (K. E. Harshbarger, personal communication, July 6, 2001).

According to K. E. 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) and screen printing of apparel and textile products (now NAICS 323113) 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). Table 1 shows the incoming and outgoing industries based on the NAICS relevant to this study.

Table 1.

Incoming and Outgoing Industries Pertinent to Apparel and Textiles

	SIC	moves to	NAICS
Incoming industries	SIC 5714 Drapery, Curtain, and Upholstery Stores (custom drapes)		NAICS 314121 Curtain and Drapery Mills
	SIC 5699 Miscellaneous Apparel and Accessory Stores (custom tailors)		NAICS 315222 Men's and Boys' Cut and Sew Suit, Coat, and Overcoat Manufacturing
	SIC 5699 Miscellaneous Apparel and Accessory Stores (custom dressmakers)		NAICS 315233 Women's and Girls' Cut and Sew Dress Manufacturing
Outgoing industries	SIC 2396 Printing and Embossing on Fabric Articles		NAICS 323113 Commercial Screen Printing (pt)
	SIC 2396 Textile Automotive Trimmings		NAICS 336360 Motor Vehicle Seating and Interior Trim Manufacturing (pt) [a]
	SIC 2399 Fabricated Textile Products, NEC [a] (seat belts, and seat tire covers)		NAICS 336360 Motor Vehicle Seating and Interior Trim Manufacturing (pt) [a]

Source. North American Industry Classification System: United States, 1997. (1998). Office of Management and Budget. Lanham, MD: Bernan Press.
Note. The number of incoming establishments was 92 with 305 employees and the number of outgoing establishments was 106 with 15,881 employees (K. E. Harshbarger, personal communication, July 11, 2001). Parts of SIC 2396, which are Apparel Findings and Trimmings and Other Apparel Products, are still in the apparel and textile manufacturing industries for NAICS (now NAICS 315999 and 314999).
[a] NEC–Not Elsewhere Classified; pt–Part of.

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.

With this clarification of considerable movement into and out of the pertinent subsectors within the two classification systems, there are three major consequences for this study:

1. A trend analysis over time using different industry classification systems is not reasonable to describe the entire Michigan apparel and textile industry.
2. A decision was made to characterize the Michigan apparel and textile industry using census data published in 1999 for NAICS 313, 314, and 315.
3. It became apparent that any analysis of nonrespondents in the R1 and R2 surveys (which were originally selected by SIC codes) was inappropriate.

Focus Group Interviews

Two focus group interviews with selected manufacturers/entrepreneurs of the Michigan apparel and textile industry were conducted by the project directors and an undergraduate professorial assistant during Spring 1999. Subsequent analysis of the interviews provided input to a survey instrument design used to further characterize the industry and conduct the needs assessment. Although not referred to as one of the Delphi rounds, the input obtained helped to construct the initial version of the needs assessment.

First Instrument Design

The first round (R1) questionnaire was developed based on focus group results from this study and surveys previously conducted in New York by Hester (n.d.) and in Missouri by Dickerson (n.d.).[1] The R1 questionnaire of this study contained questions related to participant and firm characteristics, current situation, needs and resources, and

[1] The research team gratefully acknowledges the cooperation of Dr. Suzanne Loker, Cornell University and Dr. Kitty Dickerson, University of Missouri – Columbia for sharing these surveys with the research team.

university linkages. Variables included, together with reference to R1 survey and item number(s), are listed in Table 2.

Table 2.

Description of the Variables

Variable	Indicator (questions related to each variable)
Characteristics	
Annual payroll	Statewide information from the County Business Patterns, Michigan 1999
Number of Establishments	Statewide & county level information from the County Business Patterns, Michigan 1999
Location of firm	Statewide information from the County Business Patterns, Michigan 1999 Response to question 8 in R1 & 1 in R2: a) In what Michigan county is this company or operation located? b) What population category below best describes the company's location? Rural – 2,499 or less / Urban – 2,500 or greater
NAICS subsector	Three subsectors related to apparel and textiles are used: - 313 Textile Mills - 314 Textile Product Mills - 315 Apparel Manufacturing a) Statewide information from the County Business Patterns, Michigan 1999 b) Response to question 10 in R1: On the line to the left, list the major textile products that your company manufactures. On the lines to the right, indicate the corresponding NAICS codes from the list on the left. c) Response to question 3 in R2: What does your company make or how does it process textile materials?

(table continues)

Size of firm	It is indicated by the number of employees in the firms. a) Response to question 9a in R1 & 2 in R2: How many employees, whose work is directly associated with textiles or apparel (including production and management), are in the company? at this facility _____ total in Michigan _____
Sex	Response to question 5 in R1: Are you [ ] Male? [ ] Female?
Title of the respondents	Response to questions 3 & 4 in R1: What is your title in the company? What are your primary responsibilities in this company?
Type of firm	Response to question 1 in R1: Check the categories below that describe your company (independent public, privately owned, division of a larger, or subsidiary of a larger company).
Year founded	Response to question 7 in R1: In what year was the company founded?
<u>Current situation</u>	
Technology	Response to question 14 in R1: Does your company currently use or plan to use any of the following technologies? (computer web site, CAD, CAM, automated cutting equipment, computerized inventory tracking, EDI, robotics, e-commerce, and e-mail). Possible responses: currently use, don't use but plan to use, or not applicable to the business.
Vision	Response to question 16 in R1: What is your vision for the company in 2005?
Internal challenges	Response to question 17 in R1: In your judgment, what are two major internal challenges that your company faces?
External challenges	Response to question 18 in R1: What are two major external challenges facing your company today?
<u>Needs assessment</u>	
Needs – R1 survey	Response to question 19 in R1: In order to succeed and remain competitive, what needs does your company have with respect to the following broad areas?

(table continues)

Needs – R2 survey	Response to major question in R2 survey: Manufacturers rate the importance of the specific needs within each category: "1" is *no importance*, "2" is *little importance*, "3" is *some importance*, "4" is *high importance*, "5" is *very high importance*, and "NA" is *not applicable to our company*.
- Technology and communication	1. Develop a web site to promote our company and products. 2. Expand into business-to-business (B-2-B) e-commerce. 3. Create innovative strategies for investment in new production and communication technologies. 4. Improve internal communication through computer networking. 5. Develop vertically integrated computerized system for communicating and exchanging data with our suppliers and customers. 6. Keep abreast of new developments in the industry.
- Product development	1. Match product uniqueness with appropriate target markets. 2. Change from long-run standardized to short-run customized production. 3. Adjust product mix to compete in domestic and overseas markets. 4. Locate sources of consistent quality textile inputs. 5. Respond more quickly to customer requests. 6. Strengthen the relationships between design and marketing teams.
- Environmental issues and sustainability	1. Increase innovation in product development to use recycled materials. 2. Locate buyers of waste materials. 3. Acquire resources to redesign workstations according to ergonomic principles. 4. Find non-toxic substitutes for hazardous chemicals. 5. Develop improved safety training programs for workers.
- Marketing and international trade	1. Understand and respond to issues related to international trade (e.g., language, customs, legal requirements). 2. Increase export sales. 3. Extend product sales into new domestic markets. 4. Develop an organizational structure to facilitate production in other countries.

(table continues)

- Organization and management	1. Organize and train effective teams. 2. Adjust workforce to production and sales trends. 3. Optimize functional roles in a small firm. 4. Use professional recruitment organizations.
- Human resources	1. Communicate needs for and support occupational training in secondary schools. 2. Provide a flexible work environment to encourage employee retention. 3. Acquire information about current government regulations with respect to labor practices. 4. Consolidate labor issues and practices under a human resources director. 5. Attract and train qualified workers.

Resources

Source of information	Response to question 20 in R1: rank in order from one (higher) to three (lower) the most valuable sources of information on trends, changes and new technology in the industry. List of sources: professional and trade association meetings, professional and trade journals, industry newspapers and newsletters, trade shows, colleagues and business associates, educational seminars or workshops, Internet, and other.
Familiarity with information sources/programs	Response to question 21 in R1: Check the following industry information sources and programs with which you are familiar. (see R1 survey instrument in Appendix B)
Means of information delivery	Response to question 23 in R1: Which of the following means of information delivery would be of interest? List of means: a printed newsletter, an online newsletter , an e-mail newsgroup via listserve, seminars or short courses held regionally, a World Wide Web page.

University linkages

	Response to question 25 in R1: If Michigan State University could assist the textile and apparel industry in Michigan in some way, what would be most helpful to your company?

(table continues)

Choices are:
involve your company with pre-professional student projects, inform your company of educational resources, facilitate the linkage of your company with national or international sourcing databases, develop an online network of textile and apparel manufacturers in Michigan, conduct research, and other.

Response to question 26 in R1: Contact with industry is a valuable experience for our students' preprofessional preparation. Please check if you would be interested in any of the following.

Choices are:
employ students for a limited time on defined projects, consult with one or more students on class or independent student projects, be a guest speaker in a class or for the Student Apparel Design Association, offer a tour of your facilities to student groups, involve your company with student internships, sponsor corporate scholarships or awards, support faculty development activities related to industry, donate equipment for instructional purposes, and other.

Note. R1 questions are located in Appendix B. R2 questions are located in Appendix E.

Specially, the R1 questionnaire 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 waste, environmental regulations, networking, and electronic communication. To provide the input for constructing the second round (R2) questionnaire, respondents were asked to describe the specific needs of their firms in all categories that apply. Respondents were also asked to explain what university linkages may be helpful to the Michigan apparel and textile industry as well as to define the industry's expressed interests in student involvement.

Pretest and Instrument Revision

The first survey instrument was pretested with a small group of the Michigan apparel and textile manufacturers who had taken part in the focus groups. Researchers asked the manufacturers to comment on the following: (a) are the questions clearly stated so that you know how to respond? (b) are there any questions that you would have difficulty answering? (c) are there important areas missing that would describe a company or assess its needs? and (d) are there any other issues or comments? (see Appendix A). After pretesting the questionnaire, minor format and content revisions to the survey instrument were made. The cover letter and final version of the questionnaire for Round 1 survey is included in Appendix B.

Assessment

This part includes Round 1 and Round 2 Delphi surveys, data analysis procedures, and outcomes.

Data Collection – First Round

First round mailed survey. During March 2000 the questionnaire was sent to the entire population of Michigan's apparel and textile manufacturers (SIC 22 and 23) as listed in the directories previously discussed in the section, Selection of Population. A letter of introduction explaining the purpose of the study, a copy of the questionnaire, and a stamped return envelope were submitted to the heads of the 440 manufacturing firms included in the database, previously described (see Appendix B). Follow-up postcards were sent to all non-respondents two weeks after the initial mailing to encourage those

who had not yet responded (see Appendix C).

Outcomes. Response rate was low. 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 second round Delphi questionnaire was constructed based on the needs content of the first round survey and the two focus group interviews. Researchers compiled a list of specific needs identified by the executives of the firms who responded to the survey. This researcher reviewed the focus group audio and video tapes, took notes, made categories and constructed specific needs statements from them as well. One of the project directors also reviewed the researcher's notes taken during the interviews. Needs categories were collapsed from eleven to six and 30 specific needs statements were constructed, 4-6 statements per category.

Researchers listed and edited the specific needs statements identified. Categories included technology and communication, product development, environmental issues and sustainability, marketing and international trade, organization and management, and human resources. As indicated above, the instrument included four to six specific needs statements below each needs category. 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. Variables included, together with reference to R2 survey and item number(s), are listed in Table 2.

The pretest was sent to two specialists in apparel and textiles: one was a member of one focus group, the other was a member of the Department's Advisory Board. They were asked to comment on (a) the clarity of directions, and (b) whether the needs statements within each category were clear and understandable (see Appendix D). Based on this review, minor format changes were then made.

Data Collection – Second Round

Second round mailed survey. Using the Delphi technique, the research team mailed this survey to 257 Michigan apparel and textile manufacturers in October 2000 in order to obtain consensus on the needs assessment. An introductory cover letter explaining the study, a copy of the questionnaire (see Appendix E), and a stamped return envelope were sent to the head of each manufacturing firm. Twenty-four firms completed and returned the questionnaire. 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.

Thank you letters and packets containing information about services provided by Textile Clothing Technology Corporation $[TC]^2$ were sent to the respondents who indicated that they would like to receive the packet which was offered in the cover letter as an incentive to participants.[2] Four weeks after mailing the questionnaire and after deducting questionnaires returned by the U.S. Post Office as non-deliverable and out of

[2] The research team gratefully acknowledges the contribution of $[TC]^2$ to this project.

business, 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.

Because of the low response rate to the second round survey, the research team decided to try to increase the response rate by contacting a sample of non-respondents by telephone. The University Committee on Research Involving Human Subjects (UCRIHS) approved the revised protocol for protection of the rights of human subjects. The survey instrument was modified to include only the rated importance of each major needs category: technology and communication, product development, environmental issues and sustainability, marketing and international trade, organization and management, and human resources. Specific needs statements were omitted. The same response scale was used as in the second round mailed survey. A stratified random sampling procedure based on size of firm and SIC codes was used for the telephone follow-up survey. After 109 phone calls, only ten companies cooperated by completing the telephone survey. At this point, the research directors decided to terminate this approach. No further attempt to collect or analyze these data was initiated.

Data Analysis Procedures

In this study, data analysis is 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, including frequency distribution, relative frequency, range, mean and standard deviation

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 (2001b) 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. These 37 firms were obtained from the 22 respondents from Round 1 survey and the 15 nonduplicate respondents from Round 2 survey. This study analyzes the data and presents the findings according to each research question (Table 3).

Table 3.

Data Sources Used for Each Research Question

Research Question	Round Number: Item Number or County Business Patterns, Michigan 1999
1. What are the characteristics of the Michigan apparel and textile industry classified by NAICS 313, 314, and 315?	R1: Q 1, 3, 4, 5, 7, 8, 9, 10 R2: Q 1, 2, 3 County Business Patterns, Michigan 1999
2. What are the visions for the future of owners/managers in the Michigan apparel and textile industry?	R1: Q 16
3. What are major internal/external challenges that Michigan companies face?	R1: Q 17, 18

(table continues)

4. 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?	R1: Q19 R2: Each needs category & specific needs statements
5. What are the kinds of electronic technologies used by the Michigan apparel and textile industry?	R1: Q 14
6. What resources does the industry system rely upon to meet needs?	R1: Q 20, 21, 23
7. What university linkages may be helpful to the Michigan apparel and textile industry? What are the industry's expressed interests in student involvement?	R1: Q25, 26

Note. R1 = Round 1 questionnaire. R2 = Round 2 questionnaire. Q# = Question number. R1 questions are located in Appendix B. R2 questions are located in Appendix E.

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.[3] One map shows the distribution of entire Michigan establishments by county for NAICS 313, 314, and 315 in 1999. The other shows the distribution of responding firms by county for NAICS 313, 314, and 315. Tabular data for the maps and figures will be presented in Chapter 4. Lyon and Jackson (1997) argued that geodemographic technologies could be powerful resources for enhancing and understanding issues related to where things were located and the implications of location for human activities.

Outcomes

Criteria for action were developed on the basis of examining the response to the

[3] The research team gratefully acknowledges the contribution of Dr. Judy Olson, Professor of Geography, Michigan State University, for generating the Michigan maps from data provided by this researcher.

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. Criteria for action, i.e., for identification of response strategies, will be identified in Chapter 5.

Limitations of the Study

There are several potential limitations to internal validity in this study: loss of subjects (mortality), instrumentation, and transition from SIC system to NAICS. A major limitation of this study is its relatively low response rate. Loss of subjects not only limits generalizability but also can introduce bias if those subjects who are lost would have responded differently from those from whom data were obtained. To control the problem of mortality, follow-up mailings and telephone solicitation were employed to increase response rates. Full characterization of the industry based on survey responses is incomplete; therefore, analysis of selected characterization variables from County Business Patterns, Michigan 1999 (Bureau of the Census, 2001b) is included to augment the data obtained from the surveys. As explained previously in the Preassessment section of this Chapter, because of the transition from the SIC system to the NAICS, an analysis of nonrespondents would not be appropriate for understanding characteristics of the apparel and textile industry defined as NAICS 313, 314, and 315.

Several threats to the validity of the instrumentation process in surveys can cause individuals to respond differently than they might otherwise. There is also the possibility of an unconscious bias on the part of the data collector. To increase validity, researchers conducted two focus group interviews prior to survey development, and pretested the

questionnaires prior to mailing. In the pretest for Round 1 survey, selected focus group participants made several suggestions for revision, identifying portions of the instrument that were ambiguous, unclear, or inappropriately stated. In retrospect, it would have been beneficial to ask explicitly that all pretest participants fill out the questionnaire in order to develop a more accurate instrument. By doing so, the researchers may determine whether or not the directions of the questionnaire are clearly described while minimizing ambiguity for future respondents. Survey respondents misunderstood several questions of the R1 survey in this study and did not respond to many of the open-ended questions. Pretest participants, as prior members of the focus groups, may have been more motivated to complete the questionnaire than those who had no previous involvement with the project.

Another limitation of this study comes from using NAICS instead of SIC system. During this industry classification transition, some industries for SIC system moved out of the apparel and textile manufacturing subsectors into different manufacturing subsectors for NAICS. Specifically, automotive trimmings, originally part of SIC 2396 was moved to NAICS 336360. Screen printing, also part of 2396, was moved to NAICS 323113. These industries had comprised a large part of the Michigan apparel and textile manufacturing industry in terms of larger employment in the SIC system but are not currently included in the NAICS 313, 314, and 315.[4] If the firms under these subsectors thought that they were no longer involved in the apparel and textile manufacturing subsectors, this may have also contributed to the low response rate. Additionally, 92

[4] The questionnaires in this study were sent to the firms classified by SIC codes. Two respondents were deleted when analyzing the data because their firms were not within the apparel and textile manufacturing subsectors under NAICS 313, 314, or 315 even though they were sector 23 under the SIC system.

incoming establishments did not receive survey forms so their needs are not represented in this analysis.

CHAPTER 4

RESULTS AND DISCUSSION

This chapter includes a description of the new industry classification system as well as the results of each research question. The seven research questions are stated, the data are analyzed, and the findings are presented and discussed.

Industry Classification

NAICS is a new industry classification system that groups establishments into industries based on the activities in which they are primarily engaged. It is a comprehensive system covering the entire field of economic activities. It replaces the SIC system. Using North American Industry Classification System: United States, 1997 (1998), this study shows a comparison of NAICS 313, 314, and 315 to SIC 22 and 23.

The NAICS is used for data analysis in this study. Therefore, a 3-digit NAICS code was assigned to each responding firm by following these coding decisions:

- If the firm gave the exact NAICS code, the researcher assigned that code.
- If the firm described what it made but didn't give the exact code, the researcher assigned the code based on the description.
- If the firm responded but did not give any information, the researcher used previous SIC code obtained from the firm's listing in the directory from which it was selected and matched that code with current 6-digit NAICS code.

- → When SIC code had only one equivalent NAICS code, the researcher assigned that NAICS code.
- → When SIC code had various possible equivalent 4-6 digit NAICS codes, the researcher assigned a three-digit NAICS code.

Finally, each 4-6 digit NAICS code was truncated to a three-digit NAICS code. This level of specificity was deemed sufficient for the sample size.

313 Textile Mills
314 Textile Product Mills
315 Apparel Manufacturing

According to North American Industry Classification System: United States, 1997 (1998), brief descriptions are given for each subsector.

NAICS 313. Industries in the Textile Mills subsector include

> establishments that transform a basic fiber (natural or synthetic) into a product, such as yarn or fabric, that is further manufactured into usable items, such as apparel, sheets, towels, and textile bags for individual or industrial consumption. The further manufacturing may be performed in the same establishment and classified in this sector, or it may be performed at a separate establishment and be classified elsewhere in manufacturing. The main processes include preparation and spinning of fiber, knitting or weaving of fabric, and the finishing of the textile. The NAICS structure follows and captures this process flow. Major industries in this flow, such as preparation of fibers, weaving of fabric, knitting of fabric, and fiber and fabric finishing, are uniquely identified. Texturizing, throwing, twisting, and winding of yarn contains aspects of both fiber preparation and fiber finishing and is classified with preparation of fibers rather than with finishing of fiber (Office of Management and Budget, 1998, p. 139).

NAICS 314. Industries in the Textile Product Mills subsector include "establishments that make textile products (except apparel). With a few exceptions, processes used in these industries are generally cut and sew (i.e., purchasing and cutting and sewing to make nonapparel textile products, such as sheets and towels)" (Office of Management and Budget, 1998, p. 144).

NAICS 315. Industries in the Apparel Manufacturing subsector include

> establishments with two distinct manufacturing processes: (1) cut and sew (i.e., purchasing fabric and cutting and sewing to make a garment); and (2) the manufacture of garments in establishments that first knit fabric and then cut and sew the fabric into a garment. The Apparel Manufacturing subsector includes a diverse range of establishments manufacturing full lines of ready-to-wear apparel and custom apparel: apparel contractors, performing cutting and sewing operations on materials owned by others; jobbers performing entrepreneurial functions involved in apparel manufacture; and tailors, manufacturing custom garments for individual clients are all included. Knitting, when done alone, is classified in the Textile Mills subsector, but when knitting is combined with the production of complete garments, the activity is classified in Apparel Manufacturing (Office of Management and Budget, 1998, p. 148).

In summary, the NAICS separates the manufacturing of primary textiles (subsector 313, Textile Mills) and the manufacturing of textile products (except apparel) when the textile product is produced from purchased primary textiles, such as fabric. The manufacturing of textile products (except apparel) from purchased fabric is classified in subsector 314, Textile Product Mills, and apparel from purchased fabric is classified in subsector 315, Apparel Manufacturing.

A comparison of NAICS with the former SIC system of responding firms is shown in Table 4. Through assigning each responding firm to a NAICS subsector following the previously mentioned coding decision process, a diversity of manufacturing activities in Michigan was discovered from the small sample alone. Manufacturers produced a wide variety of products, ranging from pet beds to automotive fabrics. Some samples of respondent descriptions include:

process polyester fiber.
make fish nets.
pet beds, traps [sic], cat furniture, embroidery.
screen printing and embroidery decoration (of fabric).
vests and tailored [sic].
make working gloves, cotton, & leather.
manufacture design and engineer seating (auto) fabric

Table 4.

NAICS Matched to SIC System Based on Respondents' Self-reported Manufacturing Activity

NAICS	SIC System
313 Textile Mills	2211 Broadwoven Fabric Mills, Cotton
	2221 Broadwoven Fabric Mills, Manmade Fiber and Silk
	2261 Finishers of Broadwoven Fabrics of Cotton
	2299 Textile Goods, NEC: Nonwoven Felt
314 Textile Product Mills	2391 Curtains and Draperies
	2393 Textile Bags
	2394 Canvas and Related Products
	2395 Pleating, Decorative and Novelty Stitching, and Tucking for the Trade: Pleating and Stitching, Except Apparel Contractors
	2399 Fabricated Textile Products, NEC: Other Fabricated Textile Products
315 Apparel Manufacturing	2252 Hosiery, NEC
	2311 Men's and Boys' Suits, Coats, and Overcoats
	2339 Women's, Misses', and Juniors' Outerwear, NEC
	2371 Fur Goods
	2381 Dress and Work Gloves, Except Knit and All-Leather
	2386 Leather and Sheep-Lined Clothing
	2395 Pleating, Decorative and Novelty Stitching, and Tucking for the Trade

Results by Questions

As the reader can see from Table 3 in Chapter 3, the answers to the seven research questions are based on three different samples which are Round 1, Round 2, and R1 and R2 surveys (combined nonduplicates). The total number of firms in the R1 survey is twenty-two ($N_1 = 22$). The number of firms that responded to the R2 survey is twenty-four ($N_2 = 24$). Nine firms responded to both the R1 and R2 surveys; therefore, the total number of the combined nonduplicate responding firms amounts to thirty-seven, i.e., 22 from R1 survey and 15 nonduplicates from R2 survey ($N_C = 37$). Table 5 characterizes the size of firm by NAICS subsector, and Table 6 summarizes the characterization of the location of firm by NAICS subsector in each combined R1 and R2, R1, and R2 surveys.

Table 5.

Characterization of Responding Firms: Size of Firm by NAICS Subsector

NAICS subsector	Size of firm in each round								
	Combined nonduplicates ($N_C = 37$)[a]			Round 1 ($N_1 = 22$)			Round 2 ($N_2 = 24$)		
	< 20 [b]	≥ 20 [c]	Total	< 20	≥ 20	Total	< 20	≥ 20	Total
313	4	4	8	3	3	6	3	2	5
314	14	7	21	9	2	11	10	5	15
315	4	4	8	3	2	5	2	2	4
Total	22	15	37	15	7	22	15	9	24

[a] Of the 24 firms in Round 2 survey, 9 had also responded to the Round 1 survey ($N_1 = 22$) and 15 were new participants. For variables common to both Rounds 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.

[b] < 20 means that the firm has less than 20 employees.

[c] ≥ 20 means that the firm has 20 or more than 20 employees.

Table 6.

Characterization of Responding Firms: Location of Firm by NAICS Subsector

NAICS subsector	Firm location in each round								
	Combined nonduplicates ($N_C = 37$)[a]			Round 1 ($N_1 = 22$)			Round 2 ($N_2 = 24$)		
	Rural [a]	Urban [b]	Total	Rural	Urban	Total	Rural	Urban	Total
313	1	7	8	1	5	6	0	5	5
314	3	18	21	1	10	11	4	11	15
315	1	7	8	1	4	5	1	3	4
Total	5	32	37	3	19	22	5	19	24

[a] Of the 24 firms in Round 2 survey, 9 had also responded to the Round 1 survey (N_1 = 22) and 15 were new participants. For variables common to both Rounds 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 surveys.
[b] Rural – 2,499 or less population.
[c] Urban – 2,500 or greater population.

Question 1: Characteristics of the Industry

What are the characteristics of the Michigan apparel and textile industry classified by NAICS 313, 314, and 315?

This part uses the statewide census data and the obtained data from the R1 and R2 surveys. Because one aim of this study was to characterize the entire apparel and textile industry in Michigan, it seemed pertinent to present a picture of the total industry. The statewide census data are useful to understand the overall picture of the Michigan apparel and textile industry, in terms of selected characterization variables. Comparing these data with the obtained data is helpful to accurately depict a current picture of the industry. The available variables from the County Business Patterns, Michigan 1999, R1 survey, and

the combined R1 and R2 surveys (nonduplicate responding firms) used to characterize the apparel and textile industry are presented in Table 7.

Table 7.

Characterization Variables for the Michigan Apparel and Textile Industry from Three Data Sources

County Business Patterns, Michigan 1999	R1 & R2 surveys (combined nonduplicate responding firms)	R1 survey (only)
Number of establishments	Size of firm (indicated by number of employees)	Sex of respondents
Number of employees		Title of respondents
Annual payroll		Type of firm
County location	Location of firm – rural or urban – county	Year founded

Note. Establishment is a single productive unit (Bureau of the Census, 2001a). Firm refers to the physical unit that received the survey. Therefore, in this study, firm and establishment are equivalent and used interchangeably.

Characterization of the apparel and textile industry based on statewide census data. The data categorized by NAICS 313, 314, and 315 are available on the statewide level and for location of firm by county in the County Business Patterns, Michigan 1999 (Bureau of the Census, 2001b); therefore, these data are helpful to summarize the Michigan apparel and textile industry. The sources of these data are described as follows:

> The annual Company Organization Survey provides individual establishment data for multiestablishment companies. Data for single establishment companies are obtained from various Census Bureau programs, such as the Annual Survey of Manufactures and Current Business Surveys, as well as from administrative records of the Internal Revenue Service and the Social Security Administration (Bureau of the Census, 2001a).

> County Business Patterns uses administrative record data for small establishments...Some large companies report different activities at the same location as separate profit centers. County Business Patterns treats each profit center as a separate establishment (Bureau of the Census, 2001a).

The statewide data include information about the number of establishments by employment-size class, number of employees, and annual payroll (Table 8, Table 9, and Figure 2) and number of establishments by county location (to be discussed in the next section).

According to the County Business Patterns, Michigan 1999 (Bureau of the Census, 2001b), 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 (Table 8). Around 64 percent of those establishments (n=10,126) each had less than 20 employees and 26 percent (n=4,030) each had within 20 to 99 employees (Table 9). 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 (Table 8). Therefore, one may conclude that the apparel and textile manufacturing industry comprises merely a small portion of the entire Michigan manufacturing industry.

Table 9 shows that in terms of the number of establishments by employment-size class in 1999 census data, 86 percent (n=341) of the apparel and textile establishments were within the less than 20 employee-size class and 11 percent (n=45) had 20 to 99 employees. Therefore, 97 percent of the establishments each have less than 100 employees in Michigan.

Table 8.

1999 Michigan Apparel and Textile Industry by NAICS 313, 314, and 315

NAICS sector & subsector	1999 Michigan apparel and textile industry		
	Number of establishments	Number of employees	Annual payroll ($1,000)
31 – 33 Manufacturing (All)	15,790	816,625	37,205,538
313 Textile Mills	55	1,025	32,484
314 Textile Product Mills	183	2,577	67,708
315 Apparel Manufacturing	158	1,592	30,793
Total	396	5,194	130,985

Source. County Business Patterns, Michigan 1999. (2001b, May). Bureau of the Census. Washington, DC: GPO.

Table 9.

Distribution of the Number of Establishments by Employment-size Class in Michigan, 1999

NAICS sector & subsector	Number of establishments	Employment-size class			
		1 – 19	20 – 99	100 – 499	> 499
31 – 33 Manufacturing (All)	15,790	10,126	4,030	1,431	203
313 Textile Mills	55	44	9	2	0
314 Textile Product Mills	183	155	24	4	0
315 Apparel Manufacturing	158	142	12	4	0
Total	396	341	45	10	0

Source. County Business Patterns, Michigan 1999. (2001b, May). Bureau of the Census. Washington, DC: GPO.

As shown in Figure 2, within the apparel and textile manufacturing industry in Michigan, NAICS 314 (Textile Product Mills) comprises around half of this manufacturing industry in terms of number of establishments and number of employees, followed by NAICS 315 (Apparel Manufacturing), and NAICS 313 (Textile Mills). The Textile Product Mills subsector also comprises over half of this manufacturing industry in terms of annual payroll. However, the Textile Mills subsector has a somewhat greater proportion of annual payroll than the Apparel Manufacturing subsector, likely reflecting typically lower wages paid to apparel workers than to textile mill workers.

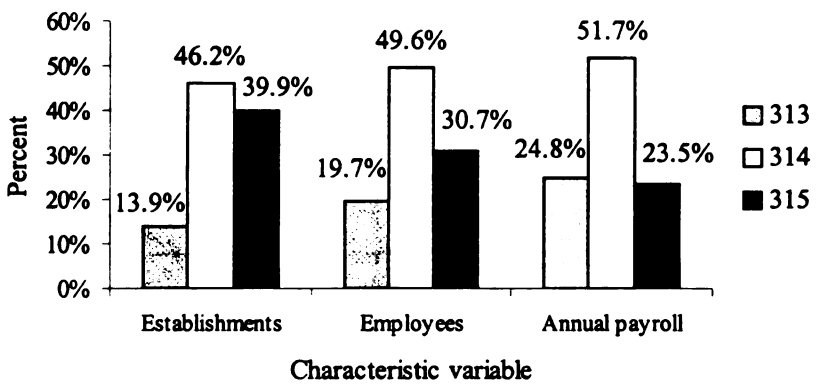

Figure 2. Percentage of establishments, employees, and annual payroll by each NAICS subsector based on the total number of apparel and textile manufacturing firms (N = 396) in Michigan, 1999.
Source. County Business Patterns, Michigan 1999. (2001b, May). Bureau of the Census. Washington, DC: GPO.

Characterization of the apparel and textile industry based on the obtained samples.

The data from combined R1 and R2 surveys (nonduplicate responding firms) are used to explain the characteristics of the firms in terms of NAICS subsectors for size of each firm indicated by the number of employees and location of firm grouped by rural or urban and by county. A summary is shown in Tables 10, 11, and 12, respectively. Table

12 also includes the location of establishments by county as obtained from 1999 census data.

Table 10.

Size of Firm Categorized by NAICS Subsector from R1 and R2 Surveys, Combined Nonduplicate Responding Firms in 2000

Size of firm	NAICS subsector 313	314	315	Total	Percent (%)
1 – 9 employees	1	10	2	13	35.1
10 – 19 employees	3	5	2	10	27.0
20 – 29 employees	1	2	1	4	10.8
30 – 39 employees	0	0	2	2	5.4
40 – 49 employees	0	0	1	1	2.7
50 – 99 employees	0	3	0	3	8.1
100 – 199 employees	2	1	0	3	8.1
over 200 employees	1	0	0	1	2.7
Total	8	21	8	37	100.0
Percent (%)	21.6	56.8	21.6		100.0
Median = 13 Mean = 36.8 Standard deviation = 62.84					

Note. $N_C = 37$.

Computed from the totals in Table 10, fifty-seven percent of 37 firms are within the Textiles Product Mills subsector. About 22 percent each of responding firms were from the Textile Mills subsector and Apparel Manufacturing subsector. Also from Table 10, over all three subsectors, 62.1 percent of 37 firms each had less than 20 employees, 18.9 percent had between 20 to 49 employees, and 18.9 percent of firms had 50 or more

employees. In the Textile Product Mills subsector, 71.4 percent of 21 firms had less than 20 employees. Also, all responding firms for NAICS 315 had less than 50 employees. The Textile Mills subsector was split with 62.5 percent of firms having less than 30 employees and 37.5 percent having 100 or more employees. Median, mean, and standard deviation for size of firm of respondents by number of employees were 13, 36.8, and 62.84, respectively.

Most responding firms (86.5%) are located in urban areas and 13.5 percent of the firms are in rural areas (Table 11).

Table 11.

Location of Firm Categorized by NAICS Subector from R1 and R2 Surveys, Combined Nonduplicate Responding Firms in 2000

	NAICS subsector				
Location of firm	313	314	315	Total	Percent (%)
Rural-2,499 or less	1	3	1	5	13.5
Urban-2,500 or greater	7	18	7	32	86.5
Total	8	21	8	37	100.0

Note. $N_C = 37$.

Firms were asked their location by county in order to determine if apparel and textile manufacturing firms were grouped in any specific area of the state. Responses revealed that six firms are located in Macomb, five firms in Genesee, four firms in Oakland, four firms in Wayne, three firms in Kent, and 15 are located in other various counties in Michigan (Table 12).

Table 12.

Number of Nonduplicate Responding Firms, by NAICS Subsector and County (N_C = 37) in 2000 and Total Number of Michigan Firms by County in 1999

County	NAICS 313	NAICS 314	NAICS 315	N_C	N_{MI}
Allegan		1		1	3
Alpena				0	4
Antrim				0	13
Arenac				0	1
Baraga				0	1
Barry				0	1
Bay				0	7
Berrien				0	11
Branch	1			1	2
Calhoun				0	2
Cass		1		1	3
Charlevoix				0	5
Cheboygan				0	1
Clare				0	1
Clinton				0	3
Delta				0	2
Dickinson				0	2
Eaton	1			1	4
Emmet		1		1	3
Genesee	1	2	2	5	10
Gladwin				0	1
Gogebic		1		1	2
Grand Traverse				0	7
Gratiot				0	1
Hillsdale				0	3
Houghton				0	1
Ingham	1			1	11
Ionia				0	3
Jackson	1			1	5
Kalamazoo				0	9
Kalkaska				0	1
Kent		3		3	21
Lapeer				0	2
Leelanau		2		2	4
Lenawee				0	1
Livingston			1	1	6

(table continues)

Mackinac				0	2
Macomb		4	2	6	46
Manistee		1		1	2
Mason				0	1
Menominee				0	3
Midland		1		1	3
Montcalm				0	1
Montmorency				0	1
Muskegon			1	1	6
Oakland	2	2		4	70
Ogemaw				0	1
Osceola				0	2
Oscoda				0	1
Ottawa				0	21
Presque Isle				0	1
Saginaw				0	2
St. Clair				0	12
St. Joseph				0	2
Shiawassee				0	3
Tuscola				0	1
Van Buren				0	1
Washtenaw	1			1	8
Wayne		2	2	4	46
Total	8	21	8	37	393[a]

Source. Statewide data are from County Business Patterns, Michigan 1999 (Bureau of the Census, 2001b). Data from nonduplicate responding firms are from R1 and R2 surveys.
Note. N_C = combined nonduplicate responding firms; N_{MI} = number of establishments in Michigan by county.
[a] Establishments known by county location are 393 of 396. Three establishments unknown by county location are included under a statewide geographical classification (Bureau of the Census, 2001a).

Table 12 also shows the number of establishments of the entire Michigan apparel and textile industry for NAICS 313, 314, and 315 by county. Of the establishments whose locations are known, 393 of 396 establishments in 1999 were located in 59 of 83 counties, a sizable dispersion; and 52 percent (n=204) of these establishments were located in Oakland, Macomb, Wayne, Kent, and Ottawa counties. These counties are

located in the southern part of Michigan (Figure 3). Compared to the geographical location of firms by county for the entire state, most of the responding apparel and textile manufacturing firms also are located in the southern part of Michigan, especially in the southeast (Figure 4). In comparison to the entire Michigan apparel and textile industry, Genesee County is overrepresented by responding firms, i.e., there is a greater than 10 percent difference between the proportion of responding firms in this county to the total in the R1 and R2 surveys (combined nonduplicates) (13.5%) and the proportion of all establishments in this county to the total number of establishments reported by the 1999 census in Michigan (2.5%) (Bureau of the Census, 2001b).

This paragraph compares survey responding firms with the entire Michigan apparel and textile industry for size of firm and number of establishments. The reader should note that survey data are from 2000 whereas census data for the entire industry is from 1999. Twenty-three of 37 responding firms (62.2%) have less than 20 employees (Table 10). This is a somewhat lower proportion than for Michigan's apparel and textile industry as a whole (86.1%) (Table 9). Fifty-seven percent of responding firms were within the Textile Product Mills subsector (NAICS 314) (see Total in Table 10) compared to 46 percent for all Michigan (Table 8). About 22 percent of responding firms each were in NAICS 313 and 315 whereas 14 percent and 40 percent of establishments in Michigan were within the Textile Mills subsector and the Apparel Manufacturing subsector, respectively (Table 9). NAICS 315 is underrepresented by responding firms surveyed in comparison to the entire Michigan apparel and textile manufacturing industry.

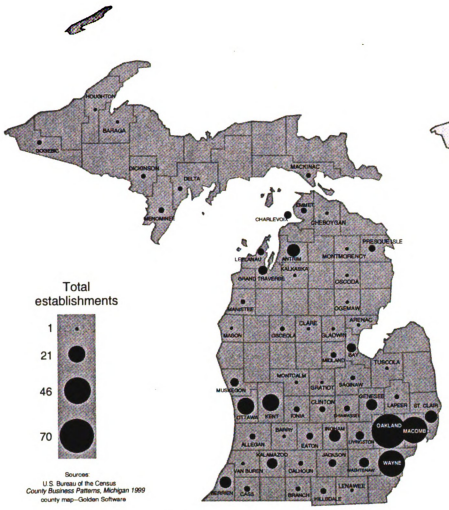

Figure 3. Total number of establishments by county in Michigan (N_{MI}=393) for NAICS 313, 314, and 315 in 1999. Source. (Bureau of the Census, 2001b).

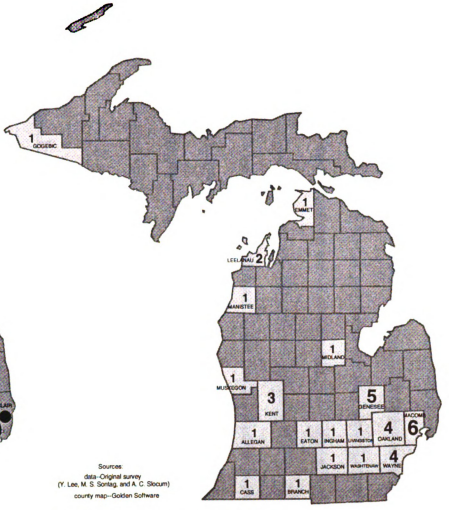

Figure 4. Number of responding firms by county in Michigan (N_C=37) for NAICS 313, 314, and 315 in 2000.

Based on the results from the R1 survey, the type of firm, title of respondents, and sex are represented in Table 13. The 16 male respondents participating in this survey round represented thirteen firms that were privately owned companies, one was an independent public company, and two were a division of a larger company. Of the six firms represented by female respondents, four of these women were either the owner or president, whereas two were managers of firms. In this study, a manager includes both program and office manager as well as accountant. In total, 86.4 percent of the firms were privately owned companies. Seventy-seven percent of all respondents were either the owner, the president, or CEO of the solicited company.

Table 13.

Title of Respondents by Sex and Type of Firm

		Title of respondents			
Sex	Type of firm	Owner, President, & CEO	Vice President	Manager	Total
Male	An independent public company	1	0	0	1
	A privately owned company	11	1	1	13
	A division of a larger company	1	1	0	2
	$Total_M$	13	2	1	16
Female	A privately owned company	4	0	2	6
	$Total_F$	4	0	2	6
Total		17	2	3	22

Note. $N_1 = 22$; Total
$Total_M$ refers to male respondents and $Total_F$ refers to female respondents.

The year of foundation is presented in Figure 5 to show the trends of development of the apparel and textile industry in the state based on the R1 responding firms. The apparel and textile manufacturers in Michigan were asked to indicate the year of the firm's establishment. Figure 5 indicates that three-fourths of the firms were founded before 1980. This figure also shows that for responding firms, the Textile Product Mills subsector has been a larger subsector than the Textile Mills and Apparel Manufacturing subsectors in terms of startups in Michigan with the exception of the 20-year period between 1960 – 1979.

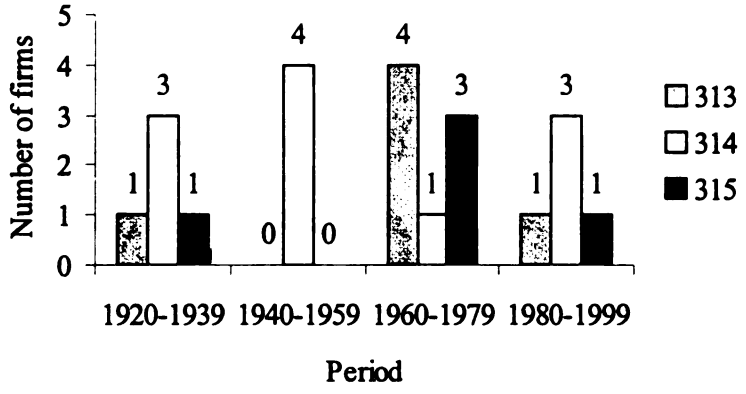

Figure 5. Number of firms in R1 ($N_1 = 22$) in each NAICS subsector founded during each twenty year period, 1920-1999.

To summarize, the characteristics of the Michigan apparel and textile industry, as depicted through statewide census data and the nonduplicate responding firms obtained from R1 and R2 surveys, are as follows:

- In the County Business Patterns, Michigan 1999, the Textile Product Mills subsector comprises around half of the Michigan apparel and textiles manufacturing industry in terms of number of establishments and number of employees, followed by the

Apparel Manufacturing subsector, and the Textile Mills subsector. In terms of annual payroll, the Textile Product Mills subsector accounts for the largest proportion, followed by the Textile Mills subsector, and the Apparel Manufacturing subsector. Eighty-six percent of the establishments are within the less than 20 employment-size class. Across the three subsectors many establishments are 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.

- Among the 37 nonduplicate responding firms in 2000, fifty-seven percent of firms (n=21) are within the Textile Product Mills subsector (NAICS 314). Eighty-six percent of responding firms are located in urban areas and 62 percent of firms have less than 20 employees. Most responding firms are located in southern Michigan, especially in the southeast (i.e., Macomb, Oakland, Genesee, and Wayne counties). These 37 Michigan manufacturers produce a wide variety of products.

Question 2: Visions for the Future

What are the visions for the future of owners/managers in the Michigan apparel and textile industry?

In the Round 1 survey, each manufacturer was asked the vision for the firm in 2005, using an open-ended question. From their responses, four broad categories were coded in terms of growth, maintenance, survival, and uncertainty. The summary of the categories and subcategories is shown in Table 14. Of the 16 firms that responded to this question, five indicated growth, three indicated maintenance, one indicated both growth

and maintenance, three indicated survival, and four were uncertain about their future. Fifty-six percent of the firms chose growth, maintenance, or both growth and maintenance, while the other forty-four percent of the firms selected survival and uncertainty.

Table 14.

Visions for the Future of Owners/Managers in the Michigan Apparel and Textile Industry

Vision for the future	
Category	Sub-category
Growth	- Improving sales - Leading technology and design - Adding value - Globalizing
Maintenance	- Reputation - Customer base
Survival	- Surviving - Changing structure
Uncertainty	- Possible closure - Buy-out - Not sure

A more specific breakdown of vision in terms of firms differentiated by NAICS subsectors is shown in Table 15. Three of five manufacturers within the Textile Mills subsector (NAICS 313) indicated survival or uncertainty as their vision for the future. Five of eight manufacturers within the Textile Product Mills subsector (NAICS 314) indicated growth or maintenance. Two of three respondents within the Apparel Manufacturing subsector (NAICS 315) also indicated growth or growth and maintenance. According to the respondents from this study, the manufacturers within the Textile Mills subsector seem to perceive more future difficulty in the industry than other two

subsectors (NAICS 314 and 315) in Michigan.

Table 15.

Number of Respondents Differentiated by Each Vision Category with Respect to NAICS Subector

NAICS subsector	Vision of the firm					Total
	Growth	Maintenance	Growth & maintenance	Survival	Uncertainty	
313	2	0	0	2	1	5
314	2	3	0	1	2	8
315	1	0	1	0	1	3
Total	5	3	1	3	4	16

Note. $N_1 = 22$. Of these, 16 responded to the question. One person responded for both growth and maintenance.

Therefore, the overall vision of these firms within the Michigan apparel and textile manufacturing industry lies on a continuum from uncertainty to growth. However, many of the 16 firms indicated either growth or uncertainty in their future. Two firms have quite diverse directions for their vision as indicated by their individual responses:

> *To be one of three major U.S. based textile manufacturers through leading technology and design process.*
>
> *Maybe (sic) not be alive.*

Question 3: Internal/External Challenges

What are major internal/external challenges that Michigan companies face?

Manufacturers were asked to identify the current internal and external challenges of their firms. Respondents' challenges are grouped into several categories. Results are summarized in Table 16. Internal challenges are related to labor, finance, and technology,

as well as management and systems development. The most often mentioned challenge firms faced was to locate skilled or qualified workers, and to hire and retain employees. A second challenge was related to finance. This involved cost of materials, wages, and taxes. Other important internal challenges included keeping up with current technology or new computer systems, restructuring the firms, balancing production and sales, and systems development to react quickly to ever changing customer needs. For example, a few respondents indicated the following internal challenges.

> *Sales are not high enough to affect new technology.*
>
> *Need money to update our tools and equipment to be able to handle the wide variety of materials...*
>
> *Keep up with new technology.*

Table 16.

Internal/External Challenges of Michigan Apparel and Textile Firms

Internal challenges	External challenges
Labor - Skilled labor - Lack of employee	Competition - Price - Labor/wages - Imports
Finance - Taxes - Wages - Material costs	Location (transportation)
Technology development - Computer technology - Keeping current	Finance - Advertising costs - Material costs - Taxes
Management and systems development - General management - Production development - Structural change	Customer identification Quality control and production Global sourcing

External challenges were grouped by competition, location, finance, customer identification, quality control and production, and global sourcing. Competition was a general challenge that most of the respondents faced. The majority of firms indicated that they had been negatively affected by imports. Competition varied in terms of price, labor wages, and offshore production as indicated by the three following responses:

Price pressure from imported goods.

Asian wages of $45.00/month vs. American wages of $8.00~$9.00/hour.

Competing with overseas manufacturing.

Finance posed another external challenge to these firms. It included advertising cost, material costs, and taxes. Other external challenges involved finding customers for a new product, product development to meet customer demand, and finding global sources. One respondent mentioned the geographical location of the firm:

Our remote location...mainly problems in shipping and receiving.

To summarize, it is unclear whether or not to separate internal and external challenges. These challenges are interrelated. Common challenges the firms face include: (a) labor as related to wage competition with overseas labor, obtaining qualified labor, and retaining long-term employees; (b) technology and the challenge of staying technologically up-to-date; (c) finance in the form of advertising and material costs as well as taxes; and finally, (d) product development to meet both growth and customer demand.

Question 4: Needs Categories and Specific Needs

> 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?

In the R1 survey, respondents were asked an open-ended question about what needs the firm has with respect to given broad areas in order to succeed and remain competitive. The broad categories included technology, developing codes of conduct for labor practices, marketing, human resources, organization and management, occupational safety and health, international trade, recycling or reusing waste, environmental regulations, networking, and electronics communication. After grouping the results from both the R1 survey and the focus group interviews, six main needs categories were compiled. These included TC (technology and communication), PD (product development), ES (environmental issues and sustainability), MI (marketing and international trade), OM (organization and management), and HR (human resources). Each needs category includes 4 to 6 specific needs (see Appendix E).

In the R2 survey, manufacturers' responses to the needs of their firms were obtained using a 5-point Likert-type scale. The level of importance ranged from "1" for *no importance*, "2" for *little importance*, "3" for *some importance*, "4" for *high importance*, "5" for *very high importance*, and "NA" for *not applicable to the firm*.

Most respondents did not reply to the six main needs categories; therefore, it was no longer possible to use these category ratings. To see the importance of the main needs categories, a mean of each main needs category was created by totaling the score of each specific need within the category and then averaging them for each respondent. Then a grand mean was computed by averaging the respondents' means. When computing the

grand mean of each needs category, the minimum number of variables that must have nonmissing values was specified. At least three of the four specific needs in each of the broad categories of marketing and international trade and organization and management must have nonmissing values for the function to return a nonmissing result. For the other four broad needs categories, at least four of the five or six specific needs must have nonmissing values.

Table 17 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. The grand mean score for product development (PD) is the highest, followed by organization and management (OM), technology and communication (TC), marketing and international trade (MI), human resources (HR), and environmental issues and sustainability (ES), in decreasing mean importance.

According to the summary of six main needs categories, the standard deviation of each needs category is relatively high. In particular, the mean for marketing and international trade is lower than for product development but the standard deviation is quite large. Because the standard deviation is relatively high for each category, one would not likely find significant differences in a one-way analysis of variance. (The number of respondents is too low to conduct an ANOVA.) Another factor contributing to high variability may be small sample size.

Next, specific needs under each main needs category were analyzed to gain additional insight about the needs of this industry. The results of this analysis are summarized in Tables 18 through 23.

Table 17.

Descriptive Statistics: Summary of Six Main Needs Categories

Descriptive statistics of six main needs					
Main needs Categories	N	Grand mean	Std. Deviation	Minimum mean	Maximum mean
PD[a]	22	3.74	.699	2.67	5.00
OM[b]	21	3.38	.823	1.50	4.75
TC[c]	21	3.36	.708	2.33	5.00
MI[d]	19	3.29	1.039	1.00	5.00
HR[e]	21	3.11	.615	2.00	4.75
ES[f]	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 $N_2 = 24$.
[a] PD = Product Development; at least four of six specific needs must have nonmissing values.
[b] OM = Organization and Management; at least three of four specific needs must have nonmissing values.
[c] TC = Technology and Communication; at least four of six specific needs must have nonmissing values.
[d] MI = Marketing and International Trade; at least three of four specific needs must have nonmissing values.
[e] HR = Human Resources; at least four of five specific needs must have nonmissing values.
[f] ES = Environmental Issues and Sustainability; at least four of five specific needs must have nonmissing values.

Product development. The results of analysis of these specific needs are summarized in Table 18. Respondents gave product development the highest importance rating of the six main needs categories. With respect to the specific needs, the important needs were locating sources of consistent quality textile inputs, followed by matching product uniqueness with appropriate target markets and responding more quickly to customer requests. Strengthening the relationships between design and marketing teams was not rated as important when compared with other specific needs.

Table 18.

Means and Standard Deviations for Specific Product Development Needs

Product development: Specific needs	N_2[a]	Mean	Std. deviation
1. Match product uniqueness with appropriate target markets.	23	4.04	.72
2. Change from long-run standardized to short-run customized production.	21	3.57	1.25
3. Adjust production mix to compete in domestic and overseas markets.	20	3.40	1.35
4. Locate sources of consistent quality textile inputs.	20	4.15	.88
5. Respond more quickly to customer requests.	23	4.04	1.02
6. Strengthen the relationships between design and marketing teams.	19	3.26	.93

[a] Maximum $N_2 = 24$.

Organization and management. A summary of specific needs in organization and management is shown in Table 19. Organization and management is perceived as the second most important needs category by the Michigan apparel and textile manufacturers in this study. Respondents indicated that optimizing functional roles in a small firm was the most important need, followed by organizing and training effective teams, and adjusting workforce to production and sales trends. The lowest need involved using professional recruitment organizations.

Technology and communication. A summary of the specific needs in this category is shown in Table 20. Technology and communication is perceived as the third most important needs category by the Michigan apparel and textile manufacturers in the study. The most important specific need was keeping abreast of new developments in the industry. Manufacturers also perceived as important the needs regarding developing a web site in order to promote the firm and its products and creating innovative strategies

for investment in new production and communication technologies. The lowest rated need within this category involved improving internal communication through computer networking.

Table 19.

Means and Standard Deviations for Specific Organization and Management Needs

Organization and management: Specific needs	N_2[a]	Mean	Std. deviation
1. Organize and train effective teams.	21	3.67	1.06
2. Adjust workforce to production and sales trends.	22	3.50	1.10
3. Optimize functional roles in a small firm.	22	4.00	1.02
4. Use professional recruitment organizations.	23	2.39	1.08

[a] Maximum $N_2 = 24$.

Table 20.

Means and Standard Deviations for Specific Technology and Communication Needs

Technology and communication: Specific needs	N_2[a]	Mean	Std. deviation
1. Develop a web site to promote our company and products.	21	3.38	1.16
2. Expand into business-to-business (B-2-B) e-commerce.	21	3.14	1.20
3. Create innovative strategies for investment in new production and communication technologies.	21	3.33	1.02
4. Improve internal communication through computer networking.	18	3.00	1.03
5. Development vertically integrated computerized system for communicating and exchanging data with our suppliers and customers.	22	3.23	.92
6. Keep abreast of new developments in the industry.	22	4.05	.79

[a] Maximum $N_2 = 24$.

Marketing and international trade. Results of the analysis of specific needs for marketing and international trade are summarized in Table 21. Extending product sales into new domestic markets was the most important perceived specific need by the Michigan apparel and textile manufacturers in the study. Mean score was 4.05. Respondents indicated that increasing export sales was less important than extending product sales into new domestic markets. Developing an organizational structure to facilitate production in other countries ranked the lowest in level of importance with a mean score of 2.50. It seems possible to conclude that the Michigan apparel and textile manufacturers in this study are more concerned about retaining or finding new domestic markets than expanding international trade.

Table 21.

Means and Standard Deviations for Specific Marketing and International Trade Needs

Marketing and international trade: Specific needs	N_2[a]	Mean	Std. deviation
1. Understand and respond to issues related to international trade (e.g., language, customs, legal requirements).	19	3.21	1.27
2. Increase export sales.	19	3.32	1.38
3. Extend product sales into new domestic markets.	20	4.05	1.05
4. Develop an organizational structure to facilitate production in other countries.	18	2.50	1.38

[a] Maximum $N_2 = 24$.

Human resources. Table 22 summarizes the specific needs in human resources. Respondents perceived this main category as lower in importance than the previous four main categories. However, attracting and training qualified workers was given the highest score of 3.96 within this category. As indicated in Table 16, manufacturers

mentioned that they faced internal challenges to locate skilled or qualified workers. Therefore, this is an important need of the Michigan apparel and textile manufacturers in this study at the present time. Manufacturers indicated that communicating needs and support for occupational training in secondary schools and consolidating labor issues and practices under a human resources director were not very important to them.

Table 22.

Means and Standard Deviations for Specific Human Resources Needs

Human resources: Specific needs	N_2[a]	Mean	Std. deviation
1. Communicate needs for and support occupational training in secondary schools.	20	2.60	.82
2. Provide a flexible work environment to encourage employee retention.	22	3.18	.80
3. Acquire information about current government regulations with respect to labor practices.	22	3.27	.83
4. Consolidate labor issues and practices under a human resources director.	22	2.50	1.10
5. Attract and train qualified workers.	23	3.96	.88

[a] Maximum $N_2 = 24$.

Environmental issues and sustainability. Table 23 summarizes the analysis of specific needs in the environmental issues and sustainability category. The grand mean of this category was 3.04. The highest average score within this category was 3.32, which related to developing improved safety training programs for workers. The Michigan manufacturers show some concerns about environment. They indicated that increasing innovation in product development to use recycled materials was second in perceived importance within this category. Of some importance, too, is finding non-toxic substitutes for hazardous chemicals and locating buyers of waste materials. The low importance

rating on redesigning workstations according to ergonomic principles may reflect the new White House administration's attitude on this proposed standard.

Table 23.

Means and Standard Deviations for Specific Environmental Issues and Sustainability Needs

Environmental issues and sustainability: Specific needs	N_2[a]	Mean	Std. deviation
1. Increase innovation in product development to use recycled materials.	20	3.25	1.21
2. Locate buyers of waste materials.	19	3.00	1.25
3. Acquire resources to redesign workstations according to ergonomic principles.	21	2.43	1.08
4. Find non-toxic substitutes for hazardous chemicals.	20	3.20	1.20
5. Develop improved safety training programs for workers.	22	3.32	.78

[a] Maximum $N_2 = 24$.

To summarize, manufacturers have many different needs facing their firms. The needs categories identified, listed in order of rated importance, include (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 most important specific need within each parallel broad category above is 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, and (e) attract and train qualified workers, and (f) improve safe working environments.

Question 5: Usage of Electronic Technologies

What are the kinds of electronic technologies used by the Michigan apparel and textile industry?

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*. The results are summarized in Figure 6. 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. For E-commerce and web site, the figure indicates that six firms do not currently use these particular technologies but are willing to adopt them in the future. EDI and Robotics are seldom used by the responding Michigan apparel and textile manufacturing firms.

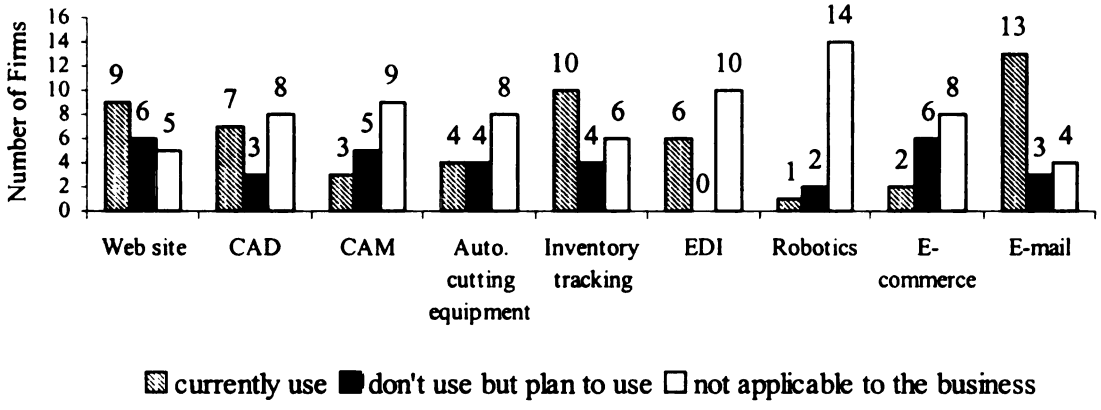

Figure 6. Current stage of technology usage in and intentions for future usage by responding firms, total $N_1 = 22$.

When asked what technology the New York firms currently had in place in the 1999 New York apparel industry survey, the most common response was bar coding,

followed by computer inventory tracking, EDI, label scanning, CAD system, automated cutting equipment, WWW site, and automated labeling (Kozen & Loker, 1997). The results are similar between New York study and this study; however, Michigan manufacturers seem to perceive more importance about using World Wide Web. One may conclude from Figure 6 that the use of electronic technology is only in its initial stages today in the responding firms but shows potential as a growing trend in the Michigan apparel and textile industry.

Manufacturers were asked the functions for which the firms used the Internet. The results are summarized in Table 24.

Table 24.

Functions of Internet for Firms Using the Internet

Functions of Internet	Number of respondents	Percent (%)
Communicating externally	12	70.6
Advertising /Marketing	9	52.9
Sourcing for raw materials or product intermediates	6	35.3
Communicating internally	6	35.3
Keeping abreast of industry information	5	29.4
Ordering supplies	5	29.4
Direct sales	2	11.8
Other	3	17.6

Note. $N_1 = 22$. Of these, 17 responded to this question. Multiple responses were permitted.

With respect to functions of the Internet, communicating externally is the highest, followed by advertising or marketing, sourcing for raw materials or product

intermediates, communicating internally, keeping abreast of industry information, and ordering supplies. Based on the respondents, direct sales through the Internet were still in their initial stages in the Michigan apparel and textile industry. Other functions that the respondents specified were searching for geographical maps and developing and placing the company's web page on the Internet. Firms have used the Internet to communicate more externally than internally.

Question 6: Information Resources

What resources does the industry system rely upon to meet needs?

To assess the needs of the apparel and textile industry, it is important to know the sources from which the firms retrieve valuable information, the familiarity of information sources and programs for the Michigan manufacturers, perceived importance of participating in a state-wide network, and the preference of delivery means to gain that information.

When participants were told to rank in order from one (higher) to three (lower) the most valuable sources of information trends, changes, and new technology in the industry, most of them apparently misunderstood the ranking direction in question 20 of R1 survey (see Appendix B). Table 25 is not based on ranking order but rather is based on the respondents who merely checked each given item that they viewed as valuable to them.

With respect to Table 25, the respondents indicated that trade shows were the most valuable source, followed by colleagues and business associates, industry newspapers and newsletters, professional and trade journals, educational seminars or

workshops, and professional and trade association meetings. Internet was the lowest valuable source from which to gain information about trends, changes, and new technology. Other valuable information sources that respondents indicated included customer requirements, as well as dealers or retail sales entities.

Table 25.

Valuable Sources of Information on Trends, Changes, and New Technology

Information sources	Number of respondents	Percent (%)
Trade shows	18	81.8
Colleagues and business associates	15	68.2
Industry newspapers and newsletters	14	63.6
Professional and trade journals	14	63.6
Educational seminars or workshops	11	50.0
Professional and trade association meetings	11	50.0
Internet	10	45.5
Other	3	13.6

Note. $N_1 = 22$. Multiple responses were permitted.
Each item is based on 22 respondents and could total 100 percent.

At the end of the R1 survey, respondents were asked to complete the firm information if they would like to receive notice about activities resulting from the research. Researchers asked for an e-mail address and company web address if the respondents had either of them (see Appendix B). One-third of the respondents had an e-mail address; on the other hand, only one-eighth actually had a web address. One may assume that the Internet availability in this industry is currently quite low. Therefore, these data help explain why the Internet is the lowest valuable source among respondents

in Michigan.

When asking the industry about 13 information sources and programs with which any given firm was familiar, very limited responses were obtained. The sources and programs included in the R1 questionnaire are shown in Table 26. This summary table includes the number of firms that were familiar with given sources, most of which are available on the Internet.

Table 26.

Familiarity with Information Sources and Programs

Information Sources and Programs	Number of respondents
American Apparel Products Network (AAPN)	1
The American Textile Partnership (AMTEX)	2
Apparel Industry Partnership Agreement and No Sweat Program, U.S. Department of Labor	0
Apparel.net	2
Consortium on Competitiveness of Apparel, Carpet, and Textile Industries (CCACTI)	0
Demand Activated Manufacturing Architecture (DAMA) project	0
Encouraging Environmental Excellence (E^3)	0
European Textile Network online	0
Fiber Source	1
Global Textile Network online	0
National Apparel Technology Center	1
Office of Textiles and Apparel (OTEXA), U.S. Dept. of Commerce, International Trade Administration	1
SourcingMall.com	0

Note. $N_1 = 22$. Multiple responses were permitted. Only 4 of 22 respondents checked any of the above categories. One can assume that those who did not check any category were not familiar with any of these information sources and programs.

Based on the four respondents, two were familiar with AMTEX (The American Textile Partnership) and Apparel.net, and one with AAPN (American Apparel Products Network), Fiber Source, National Apparel Technology Center, and OTEXA (Office of Textiles and Apparel). As shown in Table 25, the Internet was the lowest valuable source for retrieving information. Based on these results, it may be possible to assume that the Michigan apparel and textile manufacturers are not familiar with new online sources. The given list of sources and programs came primarily from current online sources. If manufacturers do not have access to the Internet, there may be no way to know, let alone to learn, about these information sources and programs.

Respondents were asked to indicate their degree of interest in participating in a state-wide network of apparel and textile firms which would collaborate to explore methods of strengthening the Michigan apparel and textile industry. Using a 5-point Likert-type scale, in which "1" is *not at all* to "5" is *very much,* the results are summarized in Table 27.

Table 27.

Degree of Interest in a State-wide Network

	Not at all	Little	Somewhat	Much	Very much
Number of respondents	7	3	4	1	4
Percent (%)	36.8	15.8	21.1	5.3	21.1

Note. $N_1 = 22$. Of these, 19 responded to this question.

Of the 19 firms represented by respondents, 10 marked *not at all* or *little* interest, 4 indicated *somewhat* interested, and 5 indicated *much* or *very much* interest in

participating in the state-wide network. The degree of interest in participating in a state-wide network is spread throughout the scale with only weak support for participation in a state-wide network. If one couples this response to the overall low response rate to the survey, it does not appear that this approach would be viewed as beneficial.

Manufacturers were asked about which means of information delivery would be of interest if the network were to offer relevant information (Figure 7). The following means of information delivery was the list given in the R1 survey.

- A printed newsletter (PN)
- An online newsletter (ON)
- An e-mail newsgroup via listserve (LS)
- Seminars or short courses held regionally (SEM)
- A World Wide Web page that offers links to the national and global apparel and textile industry (WWW)

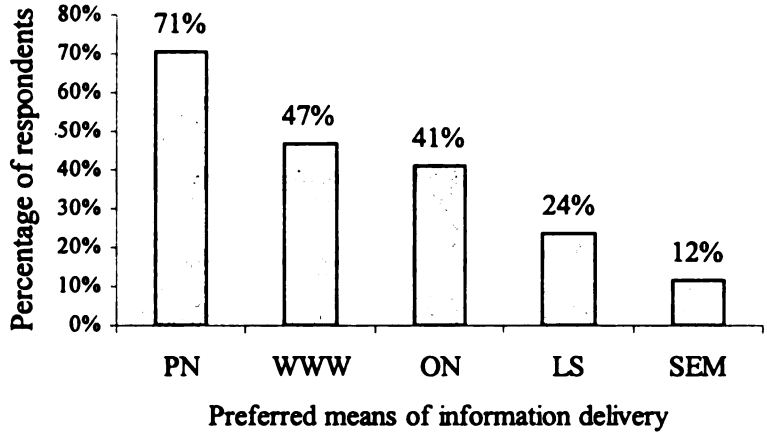

Figure 7. Respondent preferences about the means of information delivery, in percent.
Note. $N_1 = 22$. Of these, 17 responded to this question. Multiple responses were permitted. The number of respondents for each item: PN (n=12), WWW (n=8), ON (n=7), LS (n=4), and SEM (n=2).
PN = A printed newsletter
WWW = A World Wide Web page
ON = An online newsletter
LS = An e-mail newsgroup via listserve
SEM = Seminars or short courses held regionally

When asked for preferences about the means of information delivery, 17 of 22 firms responded to this question. A printed newsletter was the most popular, followed by World-Wide Web, online newsletter, and e-mail newsgroup. The lowest means of information delivery was seminars or short courses, held regionally. In the 1997 New York apparel industry survey, the printed newsletter was the most popular source of information delivery, followed by regional courses or seminars, e-mail newsletter, and web page (Kozen & Loker, 1997). These results were somewhat different from those in the Michigan study, although some findings are similar.

To summarize, educational programs and informational sources specified by the researchers were unfamiliar to responding firms in the Michigan apparel and textile industry. The Michigan industry appears to be currently in the initial stages of Internet use, although it is apparent that more attempts will be made in the future to rely on it or other new electronic technologies. Lack of familiarity with new sourcing information or programs related to this industry through the Internet may pose potential problems in such a competitive environment. To provide the industry new information as a means to assist the Michigan apparel and textile manufacturing firms, the University may very well serve as an essential channel to interconnect the manufacturers with new industry sources.

Question 7: University Linkages

> What university linkages may be helpful to the Michigan apparel and textile industry? What are the industry's expressed interests in student involvement?

Respondents were asked what would be most helpful to the company if the University could assist the apparel and textile industry in Michigan by the methods indicated by the following list. The results are summarized in Figure 8.

- Involve them with student projects (A)
- Inform them of educational resources such as conferences, programs, publications, industry trends, new technologies, new products (B)
- Facilitate their linkage with national or international sourcing databases (C)
- Develop an online network of textile and apparel manufacturers in Michigan (D)
- Conduct research (E)

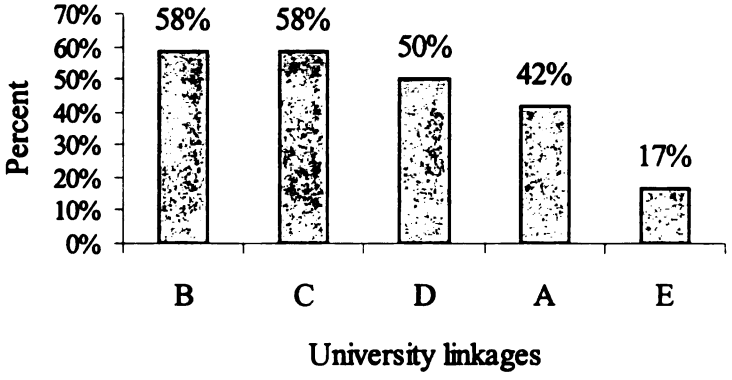

Figure 8. University linkages perceived as potentially helpful to firms, in percent.
Note. $N_1 = 22$. Of these, 12 responded to this question. Multiple responses were permitted. Number of respondents: B (n=7), C (n=7), D (n=6), A (n=5), and E (n=2).
B = Inform them of educational resources such as conferences, programs, publications industry trends, new technologies, new products
C = Facilitate their linkage with national or international sourcing databases
D = Develop an online network of textile and apparel manufacturers in Michigan
A = Involve them with student projects
E = Conduct research

The respondents perceived that facilitating the linkage with national or international sourcing databases and informing them about educational resources would be the most helpful to their firms, followed by developing an online network of textile and apparel manufacturers in Michigan, and involving them with student projects.

Manufacturers, on the other hand, did not appear interested in research performed at the University.

Manufacturers were also asked to indicate their interest in activities that would involve them with the University. Figure 9 shows the percentage for eight types of activities. Given activities included:

- Employ students on defined projects (A)
- Consult with students on projects (B)
- Be a guest speaker in a class or for the Student Apparel Design Association (C)
- Offer a tour of the facilities to student groups (D)
- Involve the company with student internships (E)
- Sponsor corporate scholarships or awards (F)
- Support faculty development activities related to industry (G)
- Donate equipment for instructional purposes (H)

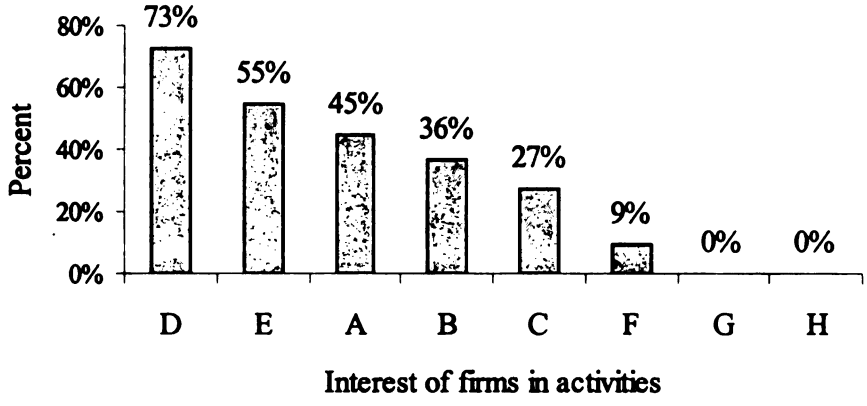

Figure 9. Interest of firms in activities with the University, in percent.
Note. $N_1 = 22$. Of these, 11 responded to this question. Multiple responses were permitted. The number of respondents: D (n=8), E (n=6), A (n=5), B (n=4), C (n=3), F (n=1), G (n=0), and H (n=0).
D = Offer a tour of the facilities to student groups
E = Involve the company with student internships
A = Employ students on defined projects
B = Consult with students on projects
C = Be a guest speaker in a class or for the Student Apparel Design Association
F = Sponsor corporate scholarships or awards
G = Support faculty development activities related to industry
H = Donate equipment for instructional purposes

The eleven respondents to this question were willing to interact with the students to some degree. The most interest pointed towards offering a tour of the facilities to student groups, followed by involving the company with student internships, employing students on defined projects, and consulting with students on projects, followed by serving as a guest speaker in a class or for the Student Apparel Design Association. On the other hand, respondents preferred not to interact with the University with respect to supporting faculty development activities or donating equipment for instructional purposes.

CHAPTER 5

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

This chapter concludes the thesis with a summary of the findings of this study and addresses objective 3 by identifying criteria for action. Further, implications of the research and recommendations for future research are discussed.

Summary

The purpose of this study was to (a) identify characteristics of the Michigan apparel and textile industry; (b) determine the Michigan apparel and textile manufacturers' perceived needs with respect to making their firms more viable or 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.

The unit of analysis was the apparel and textile manufacturing firm. Using the Delphi technique, R1 and R2 questionnaires were sent to the Michigan apparel and textile manufacturers that were listed in two major directories under SIC 22 Textile Mill Products and SIC 23 Apparel and Other Textile Products. The final estimate of the population contacted for this study conducted in 2000 was 257 and 241 Michigan apparel and textile manufacturers for Round 1 and Round 2, respectively. The industry subsectors analyzed based on the new NAICS included 313 Textile Mills, 314 Textile Product Mills,

and 315 Apparel Manufacturing. The adjusted response rates of R1, R2, and R1 and R2 combined nonduplicates are 8.6 percent, 10.0 percent, and 15.4 percent, respectively. Descriptive statistics and qualitative analysis of open-ended responses were used to analyze the data collected in this study. Census data were also used to understand the total Michigan apparel and textile manufacturing industry.

According to the County Business Patterns, Michigan1999 (Bureau of the Census, 2001b), the largest segment of the Michigan apparel and textile industry is NAICS 314, which is the Textile Product Mills subsector in terms of number of establishments (n=183) and number of employees, followed by the Apparel Manufacturing subsector (n=158), and the Textile Mills subsector (n=55). However, in terms of annual payroll, the Textile Product Mills subsector has the largest ($67,708,000), followed by the Textile Mills subsector ($32,484,000), and the Apparel Manufacturing subsector ($30,793,000). Eighty-six percent of Michigan firms each have less than 20 employees. Across the three sectors many establishments are 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.

Of those firms responding to the surveys of this study, the largest portion is also NAICS 314, which is the Textile Product Mills subsector. Eighty-seven percent of the responding firms are located in urban areas in the southern region of Michigan, especially in the southeast. The size of the typical firm is small, with 62 percent of these firms having less than 20 employees. The Michigan apparel and textile manufacturers surveyed produce a wide variety of products, ranging from pet beds to automotive fabrics.

The vision for the future of the manufacturers ranges from growth to uncertainty

in this industry. They have been facing various internal and external challenges with regard to production technology, labor and management, marketing, finance, organization and management, and international trade. Several specific challenges are 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; (d) taxes, wages; (e) structure of firm, ownership, management training; and (f) adjustment to foreign competition and imports.

The needs assessment approach provided useful information to understand the current situation of the Michigan apparel and textile manufacturers, to discover their perceived needs, and to explore ways for the University to assist them. Researchers compiled a list of six main needs categories and four to six specific needs statements within each needs category based on the needs content of the first round survey and two focus group interviews. In the second round survey, respondents rated the importance of these needs. With respect to the main needs categories, the grand mean score of rated importance in decreasing order are (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.

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, is 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.

With respect to using technology, the firms who are not currently using a computer web site or E-commerce are planning to use them in the future. As a group, they are 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 access 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 are just not aware 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.

In summary, the firms go in and out of business every day; others reorient, relocate, and redefine their positions in the competitive marketplace. The firms are small and make everything from pet beds to automotive seating fabrics. The firms want to keep up with new technology and develop marketing strategies by acquiring useful information. Few apparel and textile firms have access to the Internet; therefore, the opportunity of getting new industry information via this medium has been limited. At this point in time, the University may be the bridge between these manufacturers and new sources.

Implications

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 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. A model, developed by this researcher, for involvement of the university in assisting the Michigan apparel and textile industry in the present-day competitive market is shown in Figure 10.

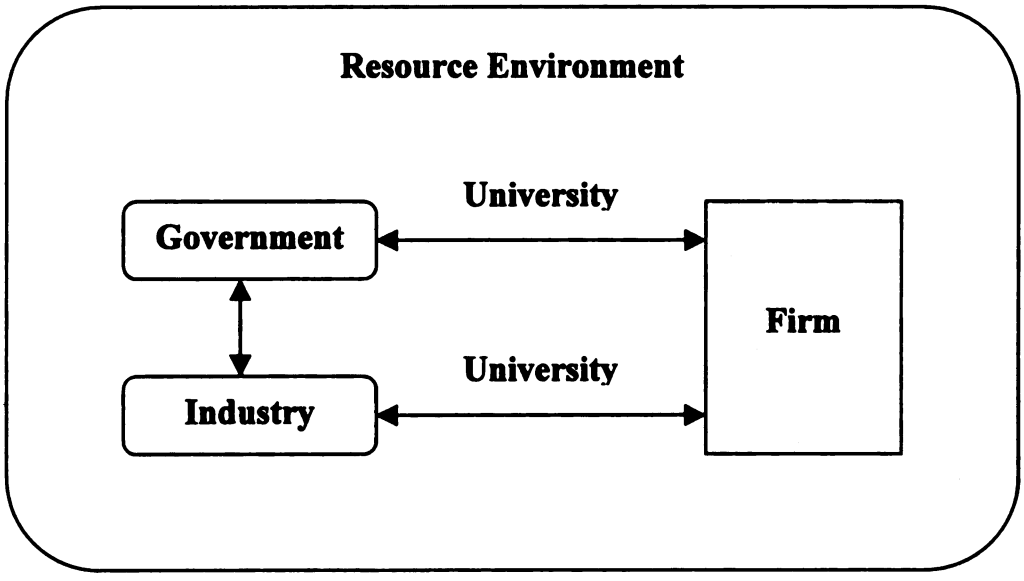

Figure 10. Model for assisting the Michigan apparel and textile industry.

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 land grant universities can employ to help firms succeed and remain competitive are following:

1. Address top most specific needs of each main needs category.
2. Adopt a specific targeted approach.
3. Take leadership in knowledge management and transfer.
4. 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. It is important to address top most specific needs of each main needs category because these reflect the immediate needs of responding apparel and textile firms in Michigan. These specific needs are 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) attract and train qualified workers, and (e) improve safe working environments. However, the rating of the importance of needs varied somewhat in each firm. At the same time, the university cannot address all these needs in terms of

feasibility. Therefore, a specific targeted approach is another criterion for action.

Another criterion is to take leadership in knowledge management and transfer. According to Mitstifer (2001), knowledge management is basic to one's work in light of the massive knowledge bases available in this era when information multiplies rapidly. Knowledge management is valuable in this day and age of team work in organizations and business. Specifically, this concept is important for the Michigan apparel and textile manufacturers to manage themselves, facilitate their work, and increase their competence. Universities have a long history in knowledge creation and delivery.

Mutually beneficial activities are another criterion for action. Firms noted that informing them of educational resources, linking them with sourcing databases and developing an online network of the Michigan apparel and textile manufacturers would be beneficial to them. The university conducts research and can transfer knowledge gained to firms. Manufacturers can also provide expert knowledge to the university and provide enriching experiences for students. Students are and should be the most direct beneficiary of university activities, including liaisons with industry.

Initial approaches for interacting with the apparel and textile industry in Michigan begun by the research team are:

- Construction of a Michigan Apparel and Textile Industry Outreach web site that provides links to trade organizations, U.S. government agencies pertinent to apparel and textiles, and sourcing sites (Lee, Sontag, & Slocum, 2000). It offers a way to build linkages for delivery of new industry information to the manufacturers to help them compete in this industry.
- Compilation of an initial list of the apparel and textile firms who submitted their

names and contact information and indicated an interest in creating linkages between Michigan State University and the Michigan industry. This may lead to mutually beneficial activities, such as student internships and projects for both this industry and the University.

Additional strategies might include:

- Offering one-day seminars or workshops to share information and exchange knowledge reciprocally for mutual benefit. Then, apparel and textile manufacturers may learn market trends and consumer characteristics and learn ways to change production methods and materials through new technology and communication.
- On-site visits by university faculty and students to nearby firms. This specific targeted approach may help to determine how the firms' needs and goals can be addressed by the university in a manner consistent with the university's mission and goals.
- Facilitating formation of a trade organization for the Michigan apparel and textile manufacturers. Several states have had organizations on the state level. For competing within this industry, it may be beneficial for firms to organize an apparel and textiles association in Michigan.

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.

Recommendations

This study and its findings contribute to the goals of the larger Michigan apparel and textile industry research project. However, due to the low response rate, the results of this study are limited and are not generalizable to the entire apparel and textile industry in Michigan. No piece of research is ever conducted perfectly or is ever complete. 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 help communicate the importance of the research and motivate firms to participate.
2. The survey instrument should be more thoroughly tested in future research. Then, researchers can learn whether or not the directions for the questionnaire are clear and easy to understand for potential participants.
3. 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. It also may help explain the reason for the low response rate. A qualitative study may also enable a researcher to understand the dynamics of how needs are or can be met.
4. 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.

5. 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.
6. 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.

APPENDICES

Appendix A

Pretest Letter for Round 1 Questionnaire

MICHIGAN STATE
UNIVERSITY

February 3, 2000

[Inside Address]

Dear _____:

Thank you for agreeing to participate in the pretest of the questionnaire to be sent to Michigan textile and apparel manufacturers. Enclosed is a copy of the questionnaire.

Please read each question and write down any concerns or comments next to the item keeping the following questions in mind:

1. Are the questions clearly stated so that you know how to respond?
2. Are there any questions that you would have difficulty answering? For example, are there any missing response categories?
3. Are there important areas missing that would describe a company or assess its needs?
4. Any other issues or comments?

A member of our research team will phone you next week and review your comments at that time.

Once again, thank you for your assistance.

Sincerely,

M. Suzanne Sontag
Project Director

Ann C. Slocum
Project Director

Enclosure

COLLEGE OF
HUMAN ECOLOGY
Department of Human Environment and Design
Michigan State University
204 Human Ecology Building
East Lansing, Michigan
48824-1030
(517) 355-7712
FAX (517) 432-1058

Appendix B

Round 1 Cover Letter and Questionnaire

MICHIGAN STATE
UNIVERSITY

March 2000

Dear

As faculty members at Michigan State University, we are conducting a survey of textile and apparel manufacturers to characterize the nature and scope of the industry in Michigan and to determine industry needs. Your assistance is very important to help us obtain a comprehensive view of the contribution of this industry to the Michigan economy and to gain an assessment of needs from a broad range of manufacturers.

In the United States, industry, government and academic institutions are working cooperatively to increase the global competitive strength of the textile and apparel manufacturing industry. One outcome is an electronic marketplace that virtually makes U. S. products available worldwide. As a result of our research, we hope to discover ways that will strengthen the Michigan industry.

Enclosed is a survey questionnaire that we ask you to complete. It will take you approximately 20 to 25 minutes to answer the questions. The information you provide will remain confidential. Your name and company will not be reported or made public. Research data will be aggregated for any presentation or publication. **Please return the questionnaire to us in the return business reply envelope within the next two weeks.**

COLLEGE OF
HUMAN ECOLOGY
Department of Human Environment and Design
Michigan State University
204 Human Ecology Building
East Lansing, Michigan
48824-1030
(517) 355-7712
FAX: (517) 432-1058

If you have any questions, please contact the project investigators, Dr. M. Suzanne Sontag at 517-353-2939/e-mail: sontag@msu.edu or Dr. Ann C. Slocum at 517-355-3779/e-mail: aslocum@msu.edu or FAX at 517-432-1058. For a preliminary report on the size and geographic distribution of the industry, see <http://www.msu.edu/user/sontag/maes-miclo3357prelimreport.htm>.

We thank you for your time and cooperation in completing this questionnaire and contributing to this research.

Sincerely,

M. Suzanne Sontag. Ph.D.
Professor and Project Director

Ann C. Slocum, Ph.D.
Associate Professor and Project Director

Enclosures

MICHIGAN STATE
UNIVERSITY

Michigan Apparel and Textile Industry Survey

Human Environment and Design
204 Human Ecology
Michigan State University
East Lansing, MI 48824-1030

For Item #10

North American Industry Classification System (NAICS) Description

NAICS[1] is a new industry classification system that groups establishments into industries based on the activities in which they are primarily engaged. It is a comprehensive system covering the entire field of economic activities. It replaces the Standard Industrial Classification (SIC) system.

NAICS uses a six-digit coding system to identify particular industries and their placement in this hierarchical structure of the classification system. The first two digits of the code designate the sector, the third designates the subsector, the fourth digit designates the industry group, the fifth digit designates the NAICS industry, and the six digit designates the national industry.

A general description of the implementation process is provided on the NAICS web site maintained by the Bureau of the Census www.census.gov/naics. If you have questions about the NAICS code(s) applicable to your company, contact the Census Bureau by telephone at 1-888-75NAICS or by E-mail at naics@census.gov.

♦ 313 Textile Mills ♦
313111 Yarn Spinning Mills
313112 Yarn Texturizing, Throwing, and Twisting Mills
313113 Thread Mills
313210 Broadwoven Fabric Mills
313221 Narrow Fabric Mills
313222 Schiffli Machine Embroidery
313230 Nonwoven Fabric Mills
313241 Weft Knit Fabric Mills
313249 Other Knit Fabric and Lace Mills
313311 Broadwoven Fabric Finishing Mills
313312 Textile and Fabric Finishing (except Broadwoven Fabric) Mills
313320 Fabric Coating Mills

♦ 314 Textile Product Mills ♦
314110 Carpet and Rug Mills
314121 Curtain and Drapery Mills
314129 Other Household Textile Product Mills
314911 Textile Bag Mills
314912 Canvas and Related Product Mills
314991 Rope, Cordage, and Twine Mills
314992 Tire Cord and Tire Fabric Mills
314999 All Other Miscellaneous Textile Product Mills

♦ 315 Apparel Manufacturing ♦
315111 Sheer Hosiery Mills
315119 Other Hosiery and Sock Mills
315191 Outerwear Knitting Mills
315192 Underwear and Nightwear Knitting Mills
315211 Men's and Boys' Cut and Sew Apparel Contractors
315212 Women's, Girls', and Infants' Cut and Sew Apparel Contractors
315221 Men's and Boys' Cut and Sew Underwear and Nightwear Manufacturing
315222 Men's and Boys' Cut and Sew Suit, Coat, and Overcoat Manufacturing
315223 Men's and Boys' Cut and Sew Shirt (except work Shirt) Manufacturing
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
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
315233 Women's and Girls' Cut and Sew Dress Manufacturing
315234 Women's and Girls' Cut and Sew Suit, Coat, Tailored Jacket, and Skirt Manufacturing
315239 Women's and Girls' Cut and Sew Other Outerwear Manufacturing
315291 Infants' Cut and Sew Apparel Manufacturing
315292 Fur and Leather Apparel Manufacturing
315299 All Other Cut and Sew Apparel Manufacturing
315991 Hat, Cap, and Millinery Manufacturing
315992 Glove and Mitten Manufacturing
315993 Men's and Boys' Neckwear Manufacturing
315999 Other Apparel Accessories and Other Apparel Manufacturing

[1] Office of Management and Budget. (1998). *North American Industry Classification System-United States, 1997.* Lanham, MD: Bernan Press.

START HERE

Michigan Apparel and Textile Industry Survey

Directions: To be completed by the owner, president or CEO, or designated representative of the company, subsidiary, or division as listed on the mailing label.

A. Participant and Company Information

1. Check the categories below that describe your company.
   - [ ] an independent public company
   - [ ] a privately owned company
   - [ ] a division of a larger company. Name of larger company _____
   - [ ] a subsidiary of a larger company. Name of larger company _____

Please respond to the remaining questions with regard to the category(ies) just checked.

2. In what state is your company headquartered? [ ] MI [ ] Other, specify _____
3. What is your title in the company? _____
4. What are your primary responsibilities in this company? _____
   _____
5. Are you [ ] Male? [ ] Female?
6. What is your age? _____Years
7. In what year was the company founded? _____

8.a. In what Michigan county is this company or operation located? _____

b. What population category below best describes the company's location?
[ ] Rural – 2,499 or less [ ] Urban – 2,500 or greater

9.a. How many employees, whose work is directly associated with textiles or apparel (including production and management), are in the company?

at this facility _____ total in Michigan _____

b. Of the employees *at this facility*, what percentage is:
_____% Male (M)
_____% Female (F)
_____% Minority U.S. citizens (M & F, i.e., African-, Hispanic-, Native-, and Asian-American)
_____% Non U.S. citizens (M & F, i.e., Permanent resident, J-1 or H-1B Visa Status)

10. On the lines to the left, list the major textile products (including yarn, fabric, apparel and other softgoods) that your company manufactures. On the lines to the right, indicate the corresponding NAICS codes from the list on the left.

Manufactured Textile Products	*NAICS Code*
_____	_____
_____	_____
_____	_____

11. For the calendar year ***1999***, what was the dollar value of all sales for all the textile products manufactured by your company? $_____

Continue to the next page

12. Does your company ***import*** raw materials or product intermediates for use in manufacturing textile products?

[ ] Yes → If yes, ***from*** what countries? _____

[ ] No → Why? _____

13. Does your company ***export*** textile products or product intermediates to other countries?

[ ] Yes → If yes, ***to*** what countries? _____

[ ] No → Why? _____

14. Does your company currently use or plan to use any of the following technologies? Check the column that applies to your company's situation.

	Currently Use	Don't use But plan to	Not applicable to the business
Computer Web site	_____	_____	_____
Computer-aided design	_____	_____	_____
Computer-aided manufacturing	_____	_____	_____
Automated cutting equipment	_____	_____	_____
Computerized inventory tracking	_____	_____	_____
EDI (electronic data interchange)	_____	_____	_____
Robotics	_____	_____	_____
E-commerce	_____	_____	_____
E-mail	_____	_____	_____
Other _____ (Please specify)	_____	_____	_____

15. For what functions does your company use the Internet? Check as many as apply.

[ ] Communicating internally (within the company)
[ ] Communicating externally (outside the company)
[ ] Advertising/Marketing
[ ] Direct sales
[ ] Sourcing for raw materials or product intermediates
[ ] Keeping abreast of industry information
[ ] Ordering supplies
[ ] Other, please specify _____

16. What is your vision for the company in 2005?

_____

_____

17. In your judgment, what are two major ***internal challenges*** that your company faces?

a) _____

b) _____

18. What are two major ***external challenges*** facing your company today?

a) _____

b) _____

Continue to the next page

B. Needs and Resources

19. In order to succeed and remain competitive, what needs does your company have with respect to the following broad areas? Please describe the specific needs in all the areas that apply.

Technology:
Developing codes of conduct for labor practices:
Marketing:
Human resources:
Organization and management:
Occupational safety and health:
International trade:
Recycling or reusing waste:
Environmental regulations:
Networking:
Electronics communication:
Other, please specify:

Continue to the next page

20. Rank in order from one (higher) to three (lower) the most valuable sources of information on trends, changes and new technology in the industry.

[ ] Professional and trade association meetings
[ ] Professional and trade journals
[ ] Industry newspapers and newsletters
[ ] Trade shows
[ ] Colleagues and business associates
[ ] Educational seminars or workshops
[ ] Internet
[ ] Other, please specify _____

21. Check the following industry information sources and programs with which you are familiar.

[ ] American Apparel Products Network (AAPN)
[ ] The American Textile Partnership (AMTEX) – A collaborative research and development program including industry, the Department of Energy, other federal agencies, and universities
[ ] Apparel Industry Partnership Agreement and No Sweat Program, U.S. Department of Labor
[ ] Apparel.net – Online guide for the apparel industry published by ApparelNet, Inc.
[ ] Consortium on Competitiveness of the Apparel, Carpet, and Textile Industries (CCACTI)
[ ] Demand Activated Manufacturing Architecture (DAMA) project – National Sourcing Database for fiber, fabric, apparel, and home furnishings
[ ] Encouraging Environmental Excellence (E^3) – Sponsored by American Textile Manufacturing Institute (ATMI)
[ ] European Textile Network online
[ ] Fiber Source – The manufactured fiber industry information source published online by the American Fiber Manufacturers Association and the Fiber Economics Bureau
[ ] Global Textile Network online
[ ] National Apparel Technology Center – A demonstration and education training facility for leading-edge technology with seminars, workshops and training programs provided by the Textile/Clothing Technology Corporation $[TC]^2$, a not-for-profit consortium
[ ] Office of Textiles and Apparel (OTEXA), U.S. Dept. of Commerce, International Trade Admin.
[ ] SourcingMall.com – Online business gateway into softgoods industry resources

22. How interested would you be in participating in a state-wide network of apparel and textile companies which would collaborate to explore methods of strengthening the Michigan textile and apparel industry? Circle the number.

Not at all		Somewhat		Very much
1	2	3	4	5

23. If the network were to offer relevant information, which of the following means of information delivery would be of interest? Please indicate all acceptable formats.

[ ] A printed newsletter
[ ] An online newsletter
[ ] An e-mail newsgroup via listserve
[ ] Seminars or short courses held regionally
[ ] A World Wide Web page that offers links to the national and global apparel and textile industry
[ ] Other, please specify_____

24. Is there anything else you would like to tell us about your company and its needs, e.g., your present perceptions and your outlook for the future?

Continue to the next page

C. University Linkages

25. If Michigan State University could assist the textile and apparel industry in Michigan in some way, what would be most helpful to your company? Check as many as apply.
    [ ] Involve your company with pre-professional student projects
    [ ] Inform your company of educational resources such as conferences, programs, publications, industry trends, new technologies, new products
    [ ] Facilitate the linkage of your company with national or international sourcing databases
    [ ] Develop an online network of textile and apparel manufacturers in Michigan
    [ ] Conduct research on _____
    (Please specify topic)
    [ ] Other, please specify _____

26. Contact with industry is a valuable experience for our students' preprofessional preparation. Please check if you would be interested in any of the following.
    [ ] Employ students for a limited time on defined projects
    [ ] Consult with one or more students on class or independent student projects
    [ ] Be a guest speaker in a class or for the Student Apparel Design Association
    [ ] Offer a tour of your facilities to student groups
    [ ] Involve your company with student internships
    [ ] Sponsor corporate scholarships or awards
    [ ] Support faculty development activities related to industry
    [ ] Donate equipment for instructional purposes
    [ ] Other, please specify _____

27. For what kinds of professional positions, if any, would your company consider employing Michigan State University graduates who have: a
    Bachelor's degree in Apparel and Textile Design?_____
    _____
    Master's degree in Apparel and Textiles? _____
    _____

28. What impediments, if any, are there to hiring these MSU graduates?

If you would like to receive notice about activities resulting from this research project or if you answered questions 25, 26, 27, or 28, please complete the following information.

Company name _____

Owner or president _____

Name of person completing the questionnaire if different from above _____

Address _____
Street City Zipcode

Phone Number (___) _____ FAX Number (___) _____

E-mail _____ Company Web address _____

Your contribution to this research is greatly appreciated. Please return the questionnaire in the enclosed business reply envelope within two weeks of receipt of the questionnaire.

Appendix C

Follow-up Postcard for Round 1

During the first week of March 5, you should have received a Michigan Apparel and Textile Industry Survey. If you have not yet completed and returned this survey, please do so now. Your company's response is crucial for a complete picture of the Michigan industry.

On the attached postcard, please check the appropriate boxes that describe your situation. Return the card in the mail to us today.

Thank you for your cooperation and participation.

Sincerely,

M. Suzanne Sontag, Ph.D.
Professor and Project Director

Ann C. Slocum, Ph.D.
Associate Professor and Project Director

Michigan State University

[ ] I have already returned the questionnaire.
[ ] The questionnaire is misplaced or lost.
[ ] We do not manufacture apparel or textiles.
[ ] The company is no longer in business.
[ ] The division or subsidiary that uses textiles is at another location.
The address is:

[ ] Other, explain:

Company name:

Contact Person:

Phone: Email:

Appendix D

Pretest Letter for Round 2 Questionnaire

October 2000

[Inside address]

Dear _____:

Our research team is preparing to send a survey to apparel and textile manufacturers in Michigan. This is actually the second survey and the content is based on responses from the first survey. Would you be willing to review this short questionnaire for two things:

1) Are the directions clear?
2) Are the needs statements within each category clear and understandable? Mark anything that is not clear and tell us why if you can.

Thank you so much!

Sincerely,

M. Suzanne Sontag
Project Director

Ann C. Slocum
Project Director

Young-A Lee
Graduate Assistant

Enclosures

FAX Transmission

Appendix E

Round 2 Cover Letter and Questionnaire

MICHIGAN STATE
UNIVERSITY

October 2000

Dear

As researchers at Michigan State University, we sent a questionnaire to all manufacturers of textiles and apparel in Michigan in March 2000. You may have received this survey. We have compiled a list of needs identified by the executives of the companies who responded to the first survey. In order to arrive at industry-wide consensus, we are asking you to review these needs and rate the importance of these to *your* company. The industry is composed of diverse segments of which you are a part. It is important that we hear from all facets of the industry, no matter how large or small.

Enclosed is a brief questionnaire that will take approximately 5-10 minutes for you to complete. **Return the questionnaire to us in the business reply envelope within the next two weeks, and we will send you a packet containing information about services provided by Textile Clothing Technology Corporation [TC]^2,** a not-for-profit consortium of fiber, textile, sewn products, retail, labor and government organizations dedicated to "increasing the long term competitiveness of the U.S. soft goods industry."

You indicate your voluntary agreement to participate by completing and returning this questionnaire. The information you provide will remain confidential. Your name and company will not be reported or made public. Your privacy will be protected to the maximum extent legally allowable. Research data will be aggregated for any presentation or publication.

If you have any questions about the research, please contact Dr. M. Suzanne Sontag at 517-353-2939/e-mail: sontag@msu.edu or FAX at 517-432-1058. If you have any questions about your rights as a research participant, please contact Dr. David Wright, Chair, University Committee on Research Involving Human Subjects at 517-355-2180.

Thank you for your time and cooperation in completing this questionnaire.

Sincerely,

M. Suzanne Sontag, Ph.D.
Project Director

Ann C. Slocum, Ph.D.
Project Director

Young-A Lee, B.S.
Graduate Research Assistant

Enclosures

COLLEGE OF
HUMAN ECOLOGY
Department of Human Environment and Design
Michigan State University
204 Human Ecology Building
East Lansing, Michigan
48824-1030
(517) 355-7712
FAX (517) 432-1058

Needs Assessment of the Michigan Apparel and Textile Industry

Directions: Below is a list of needs sorted by category identified by a group of Michigan apparel and textiles industry representatives. First, rate the importance to your company of each category (bold type). Then rate the importance of the specific needs within each category by circling the appropriate response:

1 = no importance
2 = little importance
3 = some importance
4 = high importance
5 = very high importance
NA = not applicable to our company

Technology and Communication	1	2	3	4	5	NA
1. Develop a web site to promote our company and products.	1	2	3	4	5	NA
2. Expand into business-to-business (B-2-B) e-commerce.	1	2	3	4	5	NA
3. Create innovative strategies for investment in new production and communication technologies.	1	2	3	4	5	NA
4. Improve internal communication through computer networking.	1	2	3	4	5	NA
5. Develop vertically integrated computerized system for communicating and exchanging data with our suppliers and customers.	1	2	3	4	5	NA
6. Keep abreast of new developments in the industry.	1	2	3	4	5	NA

List other needs you have in this category._____

_____

Product Development	1	2	3	4	5	NA
1. Match product uniqueness with appropriate target markets.	1	2	3	4	5	NA
2. Change from long-run standardized to short-run customized production.	1	2	3	4	5	NA
3. Adjust product mix to compete in domestic and overseas markets.	1	2	3	4	5	NA
4. Locate sources of consistent quality textile inputs.	1	2	3	4	5	NA
5. Respond more quickly to customer requests.	1	2	3	4	5	NA
6. Strengthen the relationships between design and marketing teams.	1	2	3	4	5	NA

List other needs you have in this category._____

_____

Environmental Issues and Sustainability	1	2	3	4	5	NA
1. Increase innovation in product development to use recycled materials.	1	2	3	4	5	NA
2. Locate buyers of waste materials.	1	2	3	4	5	NA
3. Acquire resources to redesign workstations according to ergonomic principles.	1	2	3	4	5	NA
4. Find non-toxic substitutes for hazardous chemicals.	1	2	3	4	5	NA
5. Develop improved safety training programs for workers.	1	2	3	4	5	NA

List other needs you have in this category._____

_____

(Continue on back)

Marketing and International Trade	1	2	3	4	5	NA
1. Understand and respond to issues related to international trade (e.g., language, customs, legal requirements).	1	2	3	4	5	NA
2. Increase export sales.	1	2	3	4	5	NA
3. Extend product sales into new domestic markets.	1	2	3	4	5	NA
4. Develop an organizational structure to facilitate production in other countries.	1	2	3	4	5	NA

List other needs you have in this category._____

_____

Organization and Management	1	2	3	4	5	NA
1. Organize and train effective teams.	1	2	3	4	5	NA
2. Adjust workforce to production and sales trends.	1	2	3	4	5	NA
3. Optimize functional roles in a small firm.	1	2	3	4	5	NA
4. Use professional recruitment organizations.	1	2	3	4	5	NA

List other needs you have in this category._____

_____

Human Resources	1	2	3	4	5	NA
1. Communicate needs for and support occupational training in secondary schools.	1	2	3	4	5	NA
2. Provide a flexible work environment to encourage employee retention.	1	2	3	4	5	NA
3. Acquire information about current government regulations with respect to labor practices.	1	2	3	4	5	NA
4. Consolidate labor issues and practices under a human resources director.	1	2	3	4	5	NA
5. Attract and train qualified workers.	1	2	3	4	5	NA

List other needs you have in this category._____

_____

Company Characteristics

Directions: Please complete the following information.

1. a. In what Michigan county is your company or operation located? _____

   b. What population category below best describes the company's location?
   [ ] Rural - 2,499 or less [ ] Urban - 2,500 or greater

2. How many employees, whose work is directly associated with textiles or apparel (including production and management), are in your company?
   At this facility _____ Total in Michigan _____

3. What does your company make or how does it process textile materials?

   _____

   _____

Your contribution to this research is greatly appreciated.

If you wish to receive the packet containing information about services provided by Textile Clothing Technology Corporation $[TC]^2$, a not-for-profit consortium of fiber, textile, sewn products, retail, labor and government organizations, please complete the following information and return it with your completed questionnaire in the enclosed return envelope.

Name of person to whom packet should be sent: _____

Company Name: _____

Address: _____
Street

_____
City State Zip Code

Optional:

Phone number: (____)_____

FAX number: (____)_____

E-mail address: _____

Web site address: _____

Your contribution to this research is greatly appreciated.

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