ABSTRACT

PATIL AARTI. Cluster Analysis: Examining Economic Benefits of Cluster Membership for Creative/Innovative Textile and Apparel Companies in the State of North Carolina. (Under the direction of Michelle Jones.)

The textile and apparel industry historically has been an important part of North Carolina’s economy. In recent years, discussions have revolved around the existence and implications of the textile and apparel clusters that remain within the state. Michael Porter, credited with being a leading researcher in the area of competitive advantage and economic cluster analysis, suggests that the existence of clusters brings many benefits to the industries of the region, one of which is driving the pace of innovation. The purpose of this study was to examine whether the benefits as stated by Porter are being realized by the creative-innovative cluster that exists in the state. A three phase methodology was used to examine clusters in the state. In Phase I, a taxonomy of existing literature was collected to understand the cluster theory in general, and the various benefits as put forth by Michael Porter. In Phase II, industry interviews were conducted with company, government/auxiliary and university representatives to understand benefits, if any, that are being realized by being part of the creative/innovative cluster. Phase II was instrumental in understanding what the various textile and apparel firms, auxiliaries, government, and university personnel felt about being part of the ‘cluster.’ Phase III included the creation of a conceptual model that depicts the relationship between each of the above mentioned groups, the benefits that are being realized by the cluster entities and how a synergy can exist between them in order to sustain and foster the development of the cluster.

by
Aarti Patil

A thesis submitted to the Graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the degree of Master of Science

Textiles

Raleigh, NC
May 7, 2010

APPROVED BY:

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Member of Advisory Committee       Member of Advisory Committee

______________________
Dr. Michelle Jones
Chair of Advisory Committee
DEDICATION

To my family- my strength...
Aarti Patil was born on April 26, 1987 in Bhopal, India. Her parents are Mahesh and Shaila Patil and she has an elder brother Vinay, and a beautiful sister-in-law, Payal. Aarti grew up in different parts of India, as her father served as an officer in the Indian Air Force. She graduated with a Bachelor of Technology in Fibers and Textile Processing from Institute of Chemical Technology (ICT), Mumbai, India. She moved to Raleigh, North Carolina in Fall 2008 to pursue a Masters degree in Textile and Apparel Technology and Management from the College of Textiles, NC State University. She maintained an overall GPA of 4.0 during her Master’s degree, and studied courses related to management, technology and design. Apart from academics, Aarti is also interested in sports, music, dancing and reading. She also held important posts in student organizations at the university. She is currently completing the requirements for her graduate degree and looks forward to a career in the textile and apparel industry where she can offer her analytical and technical skills to work effectively and gain hands-on experience in the industry.
I would like to extend my sincere gratitude to my advisor Dr. Michelle Jones, for giving me an opportunity to work with her to pursue my research. I am highly indebted to her for her kind advice and encouraging words throughout the duration of my thesis. Her calm, composed and systematic approach is something I really admire. Thank you for guiding me at each step, my work could not have been completed without your support and motivation.

I would like to express my heartfelt gratitude to Dr. Nancy Cassill, for her continued guidance and support, and for providing the funding for my studies here at the College of Textiles. Without her, this learning experience would not have been as wonderful as it has been. Thank you for your help and support throughout.

I would also like to extend my gratitude to Dr. Nancy Powell, for her willingness to serve on my committee. Her cheerful encouragement and feedback throughout this research have been invaluable.

I was lucky to have the opportunity to work under Ms. Fay Gibson as a Teaching Assistant for two semesters. I would like to thank her for guidance and support throughout the study.

I would like to extend my gratitude to Teresa Langley from the Academic programs (TATM) for giving me this opportunity to work as a Teaching Assistant with funding in my last two semesters. I would also like to thank Mr. Rob Cooper for his help and patience with all the questions I had.
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I would like to thank my family for their love and undying faith and on me. I would like to express my heartfelt gratitude to my parents, who are my pillar of strength. Any milestone in life is incomplete without them. My brother Vinay, who has been my guide throughout my life, at each step. I would like to thank my entire family for their care, encouragement and blessings. I stand here today because of you.

Thanks to my friends for their continued encouragement and support throughout my stay at NC State, and for all the wonderful memories we have shared. Your friendship will be treasured forever!
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CHAPTER 1

Introduction

North Carolina has been considered as the global leader in textile production and marketing, and is recognized as the headquarters for major global textile and apparel companies (VF Corporation, Unifi, Glen Raven). Historically, North Carolina has currently ranks as the fourth largest apparel state in the nation in terms of employment behind Alabama, Georgia and South Carolina (U.S Department of Labor, 2005; National Council of Textile Organizations, 2006).

Business/Industry clusters, a term popularized by Michael Porter as part of his study of competitive advantage, are a variation on a much older theme of the importance of location in industries (Porter, 1998). According to Porter, clusters are “geographic concentrations of interconnected companies and institutions in a particular field” and they encompass an array of linked industries and other entities important to competition. He says that one of the most important advantages arising out of the existence of geographical clusters is that they help in “driving the direction and pace of innovation” (Porter, 1998, p. 78).

Past research has identified major clusters in the textile and apparel industry in North Carolina, one of which is the creative-innovative cluster (Cassill, Godfrey, Little, & Frederick, 2006). Historically, North Carolina’s focus has been on manufacturing; however, new clusters are emerging comprised of firms who focus on pre-production (dyeing, printing, finishing) and post-production processes (marketing, branding, distribution). Prior research
has established that these emerging clusters, especially in the Triangle/Triad regions, are expected to increase the productivity and innovation, and stimulate new business opportunities for North Carolina. Table 1 and Figure 1 show the Triangle and Triad regions of North Carolina.

Table 1. Regions of North Carolina

<table>
<thead>
<tr>
<th>TRIANGLE REGION (PIEDMONT)</th>
<th>TRIAD REGION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raleigh</td>
<td>Greensboro</td>
</tr>
<tr>
<td>Durham</td>
<td>Winston-Salem</td>
</tr>
<tr>
<td>Chapel Hill</td>
<td>High Point</td>
</tr>
</tbody>
</table>

Source: United States Department of Labor (Regions & States: Piedmont Triad North Carolina)

Figure 1. Map showing Triangle/Triad Regions

(PTP) is the economic development and marketing organization representing the 12-county Piedmont Triad Region surrounding the cities of Greensboro, Winston-Salem and
High Point. The counties in PTP included Alamance, Caswell, Davidson, Davie, Forsyth, Guilford, Montgomery, Randolph, Rockingham, Stokes, Surry and Yadkin. This region is known to be economically diverse, with a population of 1.5 million residents approximately, and an available workforce exceeding 800,000 (Piedmont Triad Partnership, 2010). It has emerged as a primary location for continually growing global companies in every industry sector; it is home to headquarters of many big brands (Wrangler, Unifi, Culp). High Point Market, the largest home furnishings market in the world, is also located in the Piedmont Triad (Piedmont Triad Partnership, 2010). Thus, it would be interesting to identify and define a ‘creative-innovative’ cluster (comprised of textile and apparel companies) in this region, and examine how companies in this cluster benefit from being part of the identified cluster. However, in order to define the creative/innovative firms, it is important to define the terms creativity and innovation.

Creativity involves the generation of ideas, and innovation refers to the implementation of the generated ideas as a result of a firm’s creativity-supporting culture and structure (Goel & Singh, 1998). Globalization has brought advanced and developing economies into closer competition with each other, making innovation and creativity an increasingly vital competitive advantage. Thus, innovation and creative resources in the state may contribute to the future growth and competitiveness in textile and apparel products (Cassill, et al., 2006).

The Institute for Strategy and Competitiveness, based at Harvard Business School, is dedicated to the study of competition and its implications for a company’s strategy and the competitiveness of nations, regions and cities. A major part of this study comprises that of
cluster and cluster development. The institute has two cluster-related projects currently under way: the cluster mapping project and the cluster meta-study. The cluster mapping project comprises of a detailed picture of the location and performance of industries in the United States, with a special focus on the external linkages across industries that give rise to clusters (Institute of Strategic Competitiveness, 2009). The Cluster Meta Study, aggregates data from existing cluster publications to learn more about the economic, and competitive characteristics of industry clusters, the reasons behind their competitiveness, and their patterns of evolution over time. These studies are based on data gathered from various secondary sources; data was analyzed in order to establish certain characteristic patterns of evolution (Institute of Strategic Competitiveness, 2009).

According to Porter (1998), clusters offer three main advantages. First, clusters increase the productivity of companies based in the area. Second, clusters drive the direction and pace of innovation. Third, clusters stimulate the formation of new businesses. While a large number of initiatives have been taken recently in order to foster the development of the design cluster in the state of North Carolina, not much research has been done to assess whether the cluster companies are receiving the economic benefits as reported by Porter, particularly with respect to driving the pace of innovation. This study, therefore, will help in determining if cluster entities are receiving the economic benefits from being in a cluster as stated by Porter’s Cluster Theory.

Purpose of study

The purpose of the study was to define and examine the creative-innovative textile and apparel cluster in North Carolina, identify the economic benefits which are being
realized by being part of the cluster, and to determine what can be done in order to sustain this cluster in the state.

Research Questions

RQ1: Are firms in the cluster receiving the economic benefits proposed by Porter’s Cluster Theory?

Research Objectives

RO1.a: To understand the Cluster Theory.

RO1.b: To define the creative-innovative cluster in North Carolina (Piedmont Triad).

RO2: Identify major players in the creative/innovative community in the Piedmont Triad region, including companies, university and auxiliaries.

RO3: To understand the economic benefits being realized by firms in the creative-innovative cluster

RO3.a: To examine whether being part of the cluster increases productivity as suggested by Porter

RO3.b: To examine whether being part of the cluster drives the pace of innovation as suggested by Porter

RO3.c: To examine whether being part of the cluster stimulates the formation of new businesses as suggested by Porter
RO4: Develop a preliminary conceptual model to depict the inter-relationships and benefits, if any, which firms of the creative/innovative cluster are receiving.

Significance

With the historic importance of the textile and apparel industry in the state, it is important to understand the opportunities for competitive advantage in the North Carolina textile and apparel complex. The existence of industrial clusters is known to provide a region with competitive advantage. This research is beneficial to the textile and apparel industry because no previous research exists that examines the benefits being realized by the cluster entities in this region. Prior research on the North Carolina clusters has been based on secondary data, and no primary research has been done on the same, especially with respect to the new/emerging creative-innovative cluster. Textile and apparel firms of the region can gain valuable insight from the analysis of the creative-innovative cluster, as it will establish whether or not the benefits, as stated by Michael Porter in his theory, are being realized by the cluster entities. The knowledge gained from this research will not only benefit industry personnel, but also other entities that are part of the creative/innovative cluster like the government, university and auxiliaries. It will also provide an insight into how a synergy can exist between the various cluster entities in order to further sustain the existence of the cluster.
Scope

This research focuses on the economic benefits found in clusters as put forward by “Porter’s Cluster Theory” as applied to the creative/innovative textile and apparel cluster identified in the Piedmont Triad region of North Carolina. The firms in this study are fiber, textile and apparel companies in the Piedmont Triad region which have design and new product development activities located in the state of North Carolina. Production-only and distribution-only firms were included.

Limitations

1. This study uses a qualitative research design. Due to the qualitative nature, this study is fundamentally interpretive (Creswell, 2003), and may include personal interpretation by the author. However, qualitative studies avoid sampling error and bias normally associated with quantitative studies (Malhotra, 1999). In addition such a study provides an opportunity to observe and collect data not readily available through quantitative measures. Most quantitative studies do not allow the researcher to gain clarification or further insight into the answers given by respondents, which is also overcome by using qualitative methods.

2. This methodology of this study includes industry interviews. Industry representatives might be limited in the information they can publicly disclose. However, this study will not rely solely on one industry representative, and therefore less dependency on one individual increases the opportunity to gain information that is not private. However, there will be one individual per chosen firm. The limitation with this decision includes the risk of having one individual speak on behalf of the entire firm.
3. This study investigates creativity and innovation, which are subjective terms, and do not have a standard definition. Identifying the creative-innovative cluster firms was dependent entirely on the researcher, since the companies/entities comprising this cluster are not defined. However, a standard for defining these creative-innovative firms was developed by the researcher, and companies were selected according to a fixed pattern. The definition of the creative-innovative cluster provides a foundation which future researchers can use as a framework for further research.

Table 2. Conceptual Definitions

<table>
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<tr>
<th>Concept</th>
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<tr>
<td>Cluster</td>
<td>Geographic concentrations of interconnected companies and institutions in a particular field (Porter, 1998).</td>
</tr>
<tr>
<td>Competitive Advantage</td>
<td>The strategies, skills, knowledge, resources or competencies that differentiate an organization or indeed country from its competitors (Irish Times Business2000, 2008).</td>
</tr>
<tr>
<td>Creativity</td>
<td>The production of novel and useful ideas in any domain (Amabile, Conti, Coon, Lazenby &amp; Herron, 1996).</td>
</tr>
<tr>
<td>Innovation</td>
<td>An idea, practice, or object that is perceived as new by an individual or other unit of adoption (Rogers, 1995).</td>
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CHAPTER 2

Review of Literature

The aim of this study was to define and examine the textile and apparel creative-innovative cluster in the state of North Carolina, and determine if the entities which are part of this cluster, are gaining any benefits, as put forward by Michael Porter’s Cluster Theory. The literature review includes information that will aid in understanding the Cluster Theory, creativity and innovation. This chapter concludes with examining the previous studies which have been carried out on the NC textile and apparel cluster.

The Cluster Theory

*What are clusters?*

The location of an entity has played an important role in the global economy in recent years. Globalization has led to an increase in the importance of location, by promoting greater regional economic distinctiveness. Regional economies have replaced national economies as centers of wealth creation and world trade (O’Brien, 1992; Cairncross, 1997; Gray, 1998).

Clusters can be said to be a common feature in today’s economy. For much of the twentieth century, this phenomenon has been an object of attention from a number of social scientists. According to the UK Department of Trade and Industry, clusters are defined as a geographic ‘concentration of competing, collaborating and interdependent companies and institutions which are connected by a system of market and non-market links’ (DTI, 1999).
Clusters are essentially defined as a geographical agglomeration of competing and related industries, with favorable factors such as improved performance, growth and profitability arising from the agglomeration of these firms in the region (Kuah, A.T.H, 2002).

Today’s fast paced world is characterized by companies sourcing for goods, capital and technology globally, with the click of a mouse and the Internet. With such an easy access to information and faster transportation, the role of location in business might be said to be minimal. However, it is interesting to note that the economic map the world over is being dominated by growing clusters of economic activities (Kuah, A.T.H, 2002). Why?

The answer lies in examining the interrelationship that exists between clusters, innovation and competitive advantage. According to Garelli (1997), the economy of globility and proximity is one of the forces influencing the competitive environment of any country. While globility assumes that production does not have to be necessarily located close to the end-user, the economy of proximity, which is characteristic of a cluster, provides value-added services close to the end-user. With the advancement of the transport and telecommunications, the world is becoming smaller, where distances and geographical locations are no longer a barrier to international business relations. However, Porter (1998a) argued that the global economy’s competitive advantage lies in local virtues - knowledge, relationships, motivation – that distant rivals cannot match. The importance of the entire value system to competitive advantage is manifested by the prevalence of clustering (Porter, 1990). According to Porter, the strongest competitive advantages often emerge from clusters that are geographically localized. Porter (1998) defined clusters being “groups of interconnected firms, suppliers, related industries and specialized institutions in particular
fields that are present in particular locations” (p. 78) and they encompass an array of linked industries and other entities important to competition. Clusters also include other institutions such as universities, think tanks, vocational training centers and trade associations that provide training, education and information, research and technical support (Porter, 1998). Clusters promote both competition and cooperation amongst the member firms. Cooperation exists in clusters, especially vertical, involving companies in related industries and local institutions. Clusters can be said to be alternative ways of organizing the value chain (Porter, 1998).

Theory and History of Clusters

The importance of geographical concentration of production has been noted since the time of Alfred Marshall (1920, 1927), who, in his Principles of Economics (1920), identifies locational benefits to industries. These include availability of skilled work and intermediate goods, easy transmission of new ideas and improvements of products, technologies, and organization.

The past couple of decades have been marked by a widespread interest in the economics of industrial location; the issue of industrial clusters. Work by Michael Porter (1990) and Paul Krugman (1991) have generated substantial research and debate on industrial and geographic clusters. According to them, nations succeed not due to isolated industries, but the presence of clusters connected through vertical and horizontal relationships. The existence of this group of clusters provides the nation with a source of competitive advantage.
Cluster Definitions

Clusters, according to Porter (1998b) are said to be critical masses in one place of unusual economic success in particular fields. He defined them as ‘geographical concentration of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions in particular fields that competes but also cooperates’ (Porter, 1998a).

According to Rosenfield (1997), clusters are a ‘concentration of firms that are able to produce synergy because of their geographical proximity and interdependence’ (p.4). Roelandt and den Hertog (1999) characterized clustering as ‘networks of producers of strongly interdependent firms linked to each other in a value-adding production chain’ (p.9). Swann (1998) defines clusters as ‘a large group of firms in related industries at a particular location’ (p.1). Feser (1998) said that ‘economic clusters are not just related and supporting industries, but rather related and supporting institutions that are competitive by virtue of their relationships’ (p.26).

The various definitions of clusters by different authors have been summarized in Table 3.
Table 3. Cluster Definitions

<table>
<thead>
<tr>
<th>Author</th>
<th>Definition</th>
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<tr>
<td>Porter (1998)</td>
<td>‘A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities.’</td>
</tr>
<tr>
<td>Crouch and Farrell (2001)</td>
<td>‘The more general concept of “cluster” suggests something looser: a tendency for firms in similar types of business to locate close together, though without having a particularly important presence in the region.’</td>
</tr>
<tr>
<td>Rosenfeld (1997)</td>
<td>‘A cluster is very simply is used to represent concentrations of firms that are able to produce synergy because of their geographical proximity and interdependence, even though their scale of employment may not be pronounced or prominent.’</td>
</tr>
<tr>
<td>Feser (1998)</td>
<td>‘Economic clusters are not just related and supporting industries and institutions, but rather related and supporting institutions that are more competitive by virtue of their relationships.’</td>
</tr>
<tr>
<td>Swann and Prevezer (1998)</td>
<td>‘Clusters are here defined as groups of firms within one industry based in one geographical area.’</td>
</tr>
<tr>
<td>Simmie and Sennett (1999)</td>
<td>‘We define an innovative cluster as a large number of interconnected industrial and/or service companies having a high degree of collaboration, typically through a supply chain, and operating under the same market conditions.’</td>
</tr>
<tr>
<td>Roelandt and den Hertog (1999)</td>
<td>‘Clusters can be characterized as networks of producers of strongly interdependent firms (including specialized suppliers) linked to each other in a value adding production chain.’</td>
</tr>
<tr>
<td>Van den Berg (2001)</td>
<td>‘The popular term cluster is most closely related to this local or regional dimension of networks…Most definitions share the notion of clusters as localized networks of specialized organizations, whose production processes are closely linked through the exchange of goods, services and/or knowledge.’</td>
</tr>
<tr>
<td>Enright (1996)</td>
<td>‘A regional cluster in an industrial cluster in which member firms are in close proximity to each other.’</td>
</tr>
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</table>

Thus, it can be seen that definitions of clusters by different authors revolve around the common idea of the close geographical proximity, and the synergy that these firms can share.
by being part of the cluster. While some definitions speak about the interrelationships that exist among cluster firms and how these collaborations make a region more competitive economically, some talk about clusters being the storehouse of innovation by virtue of existence of a high degree of collaboration. However, all definitions are centered around the common idea of mutual benefits arising out of close geographical proximity.

*Clusters, Innovation and Competitive Advantage*

Innovation is seen to be pivotal to creating a competitive advantage by perceiving or discovering new and better ways to compete in an industry and bringing them to market (Porter, 1990). Improvement, innovation and change are important to the growth of competitive advantage. Better linkages, knowledge spillovers and innovation can help firms in a cluster gain advantage over international rivals. The strongest competitive advantages, according to Porter, emerge from geographically localized clusters. Baptista and Swann (1999) said that geographical concentration indeed is important for organizational improvement and technological innovation. Clusters lead to concentration and accumulation of knowledge in the cluster, which in turn, will attract increased human capital to the cluster. Baptista (1996) suggested that innovation is the heart of the dynamic process of cluster growth. Arthur (1990) noted that strong clusters tend to attract more firms, and regions with a strong innovative record have an advantage in achieving more innovation. Swann et al. (1998) stated in their work that innovative activity and output have a positive correlation with new firm entry and productivity growth.
In the Competitive Advantage of Nations, Michael Porter (1990), establishes a framework that defines the determinants of a nation’s competitiveness. He considers two factors, namely domestic rivalry and geographical concentration, responsible for the dynamics of the system. These two elements together increase the intensity of interactions within the system, and also lead to the overall upgrading of the system. Geographical concentration is of utmost importance for organizational improvement and technological innovation. In industrial research, universities and other research centers, along with customers and suppliers in the region are best placed to exchange ideas and to co-operate in the industrial research (Baptista, 1996).

Porter (1998) stated that competitive advantage is affected by clusters in the following three ways:

1. By increasing the productivity of companies based in the cluster
2. By driving the direction and pace of innovation
3. By stimulating the formation of new businesses
Clusters and Agglomeration Externalities

Externalities are generally defined as impacts, side-effects or spillovers, not covered by market mechanism (Evans, 1985). Close locations to one another provide firms with an added advantage of reducing their searching costs and compare prices with quality. A cluster’s reputation helps in drawing customers. For example, Silicon Valley has become an international cluster, with a worldwide reputation for its design and innovation ability (Saxenian, 1994). Sometimes, firms may concentrate in a particular location to take advantage of the proximity to customers, which could be other firms. According to Kuah
(2002), specialized and experienced personnel from clustered industries, are readily available within the cluster. In addition to this, infrastructure benefits tend to attract personnel to work in the cluster.

**Clusters and Linkages, and Positive Feedback**

Porter (1998) suggested that another important aspect of clusters is the linkages that exist across industries and institutions that are most important to competition. He has described clusters as a kind of ‘new spatial organization’ form. Clusters are said to encompass an array of linked industries and other entities important to competition. Many clusters are also characterized by linkages to governmental and other institutions-such as universities, think tanks and trade associations. These help in providing essential training, education, information research, legal advice and technical support to entities within the cluster.

Porter (1998) also acknowledged that clusters are marked by the presence of the positive feedback loop, which amplifies the benefits of clustering. According to Henderson (1986), other effects from this feedback loop include a higher rate of productivity growth, and more prolific innovation (Baptista & Swann, 1999).

Swann’s (1998) positive feedback model shows how the clustering phenomenon leads to a positive feedback loop, which in turn induces further growth within the cluster. The main findings by Swann are:

- firms in clusters grow faster than average
- clusters attract new entry
- firms in clusters are more innovative

Source: Adapted from Swann (1998)

Figure 3. Cluster Benefits II

Thus, we can see that various authors like Porter and Swann have re-iterated the drive for innovation as the main benefit arising out of being part of a cluster. Figure 4 combines the ideas by Porter and Swann.
Clusters, Productivity and Growth

Being part of a cluster allows companies to productively source for inputs; access information, technology and institutions. It is also possible to coordinate horizontally and vertically with other firms. Clusters are said to raise endogenous innovation and productivity growth (Porter, 1998).

Porter (1990) also suggested that a nation’s most globally competitive industries are likely to be ‘geographically clustered’ within the nation. The interaction between these industries is characterized by four sets of factor conditions namely firm strategy, structure and rivalry; factor conditions; demand conditions; and related and supporting industries.
Companies in a cluster can utilize the existing pool of specialised and experienced capital resources. Vibrant clusters like Silicon Valley are able to attract specialists to the cluster, who feel they actually work for the cluster, rather than for a single firm (Saxenian, 1994). As local rivals share similar or general circumstances, benchmarking against other players in the same industry becomes easier. Companies have intimate knowledge about their suppliers’ costs and managers are able to compare costs and employees’ performance with other local firms. Porter (1998) observed that a well developed cluster provides an efficient means of forming important linkages such as deep and specialized supplier base located within the proximity.

Clusters in Action

According to Swann’s (1998) study of 650 computing companies in the US, over half of the firms are located mainly in three states (California, Massachusetts and New York). Although some new clusters may be forming and playing an increasingly important role, the earliest clusters like Silicon Valley (California) and Route 128 (Massachusetts) still dominate today’s economic map.

Pandit, Cook and Swann (2000) found many positive clustering effects in the British financial services industry. Companies located in the sub-sector show strong tendency to grow faster than average. Oakey (1985) observed that clustering phenomenon of high-technology industries in Silicon Glen (Scotland) and South East England. In Southeast Asia, Singapore has become a bustling electronics industry since the mid seventies and is one of the leaders in growth and GDP output.
Factors influencing cluster power

According to Rosenfeld (1997), there are a few key factors that determine the economic efficiency of a cluster.

1. R&D Capacity

It is important that specialized public or private centers of research, or expert individuals, be available and accessible to the cluster in order to provide solutions to problems. Collaborations with universities and colleges, or other centers of research, provide channels for dissemination, with a continuous diffusion of ideas and technologies.

2. Knowledge and Skills

In mature and successful clusters, a tacit knowledge of the industry, along with formal education, builds a large pool of labor that drives the cluster and leads to attraction of new firms from outside. According to business leaders, in North Carolina, the considerable knowledge possessed by the mill workers and managers are one of the drivers of the industry’s leadership and success. Tacit knowledge of the machinery repair and dyeing lies in the heads of the employees. Therefore, the expertise of employees and workers in the industries of a cluster play a pivotal role in its survival.

3. Human Resource Development

According to Rosenfeld (1997), specialized skills are vital to the development of any cluster. For example, in order to provide for special skills in the Silicon Valley, Stanford University, University of California at Berkeley, and San Jose University greatly expanded
their graduate level engineering programs in the 1970s. Thus, the region slowly developed a skilled labor force to satisfy the technical needs of the cluster.

4. Proximity of Suppliers

Nearby location of primary and secondary sources of raw materials are important for the success of a cluster. For instance, North Carolina, which has about 300 hosiery establishments, and represents 60% of the US production, is also home to a large number of the industry’s suppliers of yarns, needles, dyestuffs, and packaging materials. Suppliers also contribute to the competitiveness of the cluster by organizing social events that bring companies’ owners and employees together, and are active members of the hosiery associations.

5. Access to Specialized Services

Specialized services help provide functions specially suited to the cluster’s needs, and generally operate in cooperation with the industry. In the US, more emphasis is laid on cluster-specific centers and services dealing with training or technology. The Hosiery Technology Centre at Catawba Valley Community College for training technicians is an example of service centers that help in providing specialized services to the cluster industries.
6. Intensity of Networking

Networks are a characteristic of clusters, and the rate of networking reflects the degree of social capital and trust that exists within the cluster. In nearly all clusters, firms depend on their trusted counterparts to share orders, technology and information. A local saying in North Carolina, “there are no secrets in hosiery”, substantiates this matter.

7. Social Infrastructure

Another important aspect of clusters is the existence of local and civic associations in the region. Clusters rely on networks and mechanisms by which business people can regularly interact with their peers. The economic value of any cluster is deeply related to the functions of these business associations. For example, Silicon Valley owes much of its success to its social infrastructure (Saxenian, 1994).

8. Innovation

The rate of conceiving new and enhanced technologies, their development and adoption, play a key role in the success of a cluster. Clusters need to be innovative in order to stay competitive. The clusters most closely linked to primary sources of new technologies and techniques, research laboratories and machine builders are most likely to innovate the soonest.

9. Shared Vision and Leadership

Planning and sharing of goals by clusters is a crucial factor in determining its competitiveness. Presence of leaders who can maintain the cluster’s competitiveness and
keep them together is very important. In 1995, when the state of North Carolina adopted cluster strategies and offered grants to help the clusters formulate strategic plans, the hosiery industry benefited manifold and became the first cluster to request and receive support. The trade association helped the members in formulating plans, establishing goals, and strategies for achieving these goals. The cluster’s strategic plan (Catawba Valley Hosiery Association, 1995) recommends emphasis on training, creating production networks, marketing cooperatives and improving mechanisms to scan new markets and technologies. As a beginning step, a group of firm leaders involved in the plan travelled to Italy to learn about exporting and innovation.

The Innovative Process

According to Baptista (1996), the innovative process essentially consists of two dimensions: internal and external. The internal dimension includes the knowledge sources available within the firm, while the external one includes the sources which cost, level of specialization or other types of constraints prevent the firm from locking in. These would include the various types of formal and informal strategic arrangements. The traditional linear view of innovation depicts innovation as the straightforward process consisting of stages among which scientific research can be said to be the only source of innovation.

Source: Adapted from Baptista (1996)

Figure 5. The Innovation Process (I)
Kline and Rosenberg (1986) presented an alternative formulation of the above model, inserting interdependencies between the various stages of the process.

According to this model, innovation can be said to initiate at any stage. Each of these stages of the innovative process receives inputs from external sources, formally or informally. The external sources in question here are available easily when there is a geographic proximity to these sources, and therefore, location matters for innovation (Baptista, 1996).

Feldman (1994) notes that these sources of knowledge inputs make for a technological infrastructure that support innovative activity. In clusters, innovation tends to geographically gravitate to concentrations of this infrastructure, which is immobile and place-specific. Therefore, a region with a developed set of specialized resources for innovation has a competitive advantage in achieving innovation. According to Dosi (1988) the close proximity of other innovators sharing similar experiences, and presence of suppliers
and users of the new products, makes regional networking a pivotal factor for realizing benefits for a company.

Innovation, Creativity and New Product Development

What is creativity and innovation?

Innovation and creativity are subjects that have attracted many researchers from different academic disciplines, because of the sheer nature of these topics—they are highly subjective, relative terms to a certain degree, and also, many factors affect its progress and end results.

In ‘Diffusion of Innovations’, Rogers defines innovation as an ‘idea, practice, or object that is perceived as new by an individual or other unit of adoption’ (Rogers, 1995, p.11). According to Amabile et. al (1996), all innovation begins with creative ideas. They define creativity as the production of novel and useful ideas in any domain. Innovation in turn, is the successful implementation of creative ideas within an organization. Tang (1998) in his paper talks about an integrative model of innovation, which would be helpful for managers and researchers, as it would provide integration of a vast amount of knowledge into a compact model. According to Tang (1998), creativity is the personal ability to recognize unusual patterns, relations and produce novel ideas. In organizations, creative tasks are usually in the form of projects, where the main aim is to commercialize the new product, service or process. According to Cohen and Levinthal (1990), it is very important for an organization to recognize the value of new external information, assimilate and apply it. He
calls this as the absorptive capacity of the organization. This capacity is a very integral part of an organization’s creative ability.

Innovation and creativity have long been recognized as the creator and sustainer of an enterprise. Any time a company comes out with a new product, its fortunes are renewed. This drives other competitors in the industry to quickly snap up and keep pace with the new innovation (Harvard Business Essentials, 2003).

Creativity and Innovation in organizations

According to Pselk (1997) Organizations should foster creativity and innovation because of three main factors:

1. Superior long term financial performance is associated with innovation

Pselk (1997) says that the largest and most successful companies in the world today recognize innovation and new ideas are essential requisites for a company’s success. According to the CEO’s of the top three corporations in the world on Fortune magazine’s 1995 ranking, it is very important to think out of the box, and bring improvements in the way the organization has been functioning conventionally.

2. Customers are increasingly demanding innovation

Customer’s today experience innovation all around them. This, in turn, drives them to further expect innovation. Customers today know that someone will come along someday and cater to just the concept they have been looking for. When this happens, they do not feel
the need to be loyal to their old producer. Thus, innovation at a continuous pace for companies is of utmost importance in order to retain their customers.

3. Competitors are getting increasingly better at copying past innovations

Today, many organizations have adapted to the strategy of “following the leader”; letting someone else be the innovator, and then quickly replicating the new idea. Sometimes, this also works for the company that follows, as they are able to make improvements or modifications to the innovation, which might be better suited to the customer needs. Thus, the presence of such innovation copiers in the marketplace further increases the need for innovation (Pselk, 1997).

The Innovation Process

Many managers, technical professionals, and scholars see innovation as a process shown in the Figure 7. Idea generation and opportunity recognition are the two creative acts which act as starters to this process.

Idea Generation → Opportunity Recognition → Development → Commercialization

(Idea evaluation)

Source: Adapted from Tang (1998)

Figure 7. Innovation flow

Once the opportunity is recognized, the next step is for it to be evaluated by the decision makers to assess the feasibility of the idea. Ideas that produce affirmative answers
and receive support from the organization are moved towards idea development and then through the process of commercialization. Creativity thus plays an important role in the innovation process; perhaps the most important role. Creativity sparks the initial idea, and also helps to improve the idea as we move forward in the innovation process.

Tang (1998) identifies six constructs of innovation:

(1) information and communication
(2) behavior and integration
(3) knowledge and skills
(4) project raising and doing
(5) guidance and support
(6) external environment

Figure 8 depicts the relationships between these constructs.
The organization interacts with its external environment through exchange of information, goods, services and people. At the center of innovation is the process of raising and doing the project, the results of which are new products, processes or services. This core process is enabled by two factors: knowledge and skills, and behavior and integration of people. The external and internal environments provide inputs for the core process of project raising and doing. The availability of information, knowledge and skills, together with
creative behavior and the integration of people in the organization determine the ability of the staff to raise projects and find innovative solutions. The guidance and support are defined in terms of mission, tasks, strategy, systems and resources of the organization. Finally, the top management, in response to the external environment, provides proper guidance and support to the whole innovative process (Tang, 1998).

It can be seen, therefore, that the external environment of an organization plays a very important role in the innovation process. Examining this from the point of view of clusters, we can see that the close proximity of resources is indispensable for the innovation process. This reinforces Porter’s idea of clusters fostering the pace of innovation.

North Carolina Cluster Analysis

The North Carolina Economy

Over the past few years, substantial amount of research has been done to assess the potential of clusters in different regions of the world. The Institute of Strategy and Competitiveness, led by Michael E. Porter, is solely dedicated to the cause of studying competition and its implications for company strategy; the competitiveness of nations, regions and cities; and solutions to social problems. The Institute’s Cluster Mapping Project (CMP) tool synthesizes vast amounts of changing economic data and measures of innovation for every region in the U.S to produce detailed profiles of the overall performance of regions and the strengths and weaknesses of the regions’ clusters of industries.

A look at the economic profile of the state of NC shows the importance of the textile and apparel industry in the state. Studies conducted at the ISC indicate that NC ranks second
both in the textiles, as well as the apparel clusters of the country (Institute of Strategic Competitiveness, 2009). According to Michael Porter, a state’s economy can be divided into traded clusters, local clusters and natural resource industries. *Traded clusters* include the industries that operate across regions, and are not restricted to the local regions. They tend to contribute most to the state’s economic competitiveness. *Local Clusters* include activities and industries that serve local markets. These industries are present in every region in roughly the same proportions. Their efficiency is critical to the region's prosperity. *Natural-resource industries* concentrate at natural resource sites. They account for a very small share of national employment. Thus, the overall economic performance of the state can be decomposed into contributions of these three different types of industry clusters.

The textile and apparel industry is considered a part of the traded cluster, and is one of the most important contributors to the state’s economy. The following chart shows the specialization of the state economy by traded clusters. The chart is divided into 4 quadrants, based on the state’s average share of traded employment, and whether the cluster is growing or losing share. The upper-right hand quarter contains the region’s strongest clusters, while the lower one consists of industries in which the state is gaining employment share but do not have a very strong position. The lower right-left hand quadrant includes industries with limited competitiveness. The upper left-hand corner includes clusters that are very strong, but are losing relative position. However, they are essentially important pillars of the state economy traditionally and need revitalization (National Governors Association- Winter Meeting, 2002).
Creativity and Innovation in Competitiveness

A part of the cluster-mapping project by the ISC also studied the role of creativity and innovation in a state/region’s development. According to Porter, innovation leads to increased productivity, which in turn leads to prosperity.

![Diagram showing the relationship between innovation, productivity, and prosperity leading to competitiveness.]


Figure 9. Creativity and innovation in competitiveness

Productivity and Innovation can also directly tie in with the diamond theory suggested by Porter as shown in Figure 10.
The factor conditions in clusters include presence of high quality inputs such as human resources, capital, physical, administrative and information infrastructure and natural resources. The open and vigorous competition among local rivals also drives the pace of innovation. The demand conditions created by local customers also contribute to the cluster dynamics. Lastly, access to capable, local suppliers and firms in related fields and the existence of clusters as a whole instead of isolated industries helps the overall business environment of the region.
Porter (2003) also suggests that there should be collaboration between various entities of the region in order to realize maximum benefits.

Source: Adapted from Porter (2003)

Figure 11. Institutions for Collaboration

Industry associations, specialized professional associations and societies, alumni groups and incubators are among the many institutes that can collaborate. These institutions, termed by Porter as Institutes for Collaboration (IFC), can improve the business environment in many ways as shown above.
The past few years have been marked by the recognition of arts as a contributor to cities, states, and regions’ economic development. In light of such developments taking place in different parts of the world, many important studies have been carried out recently in order to assess the creative potential of North Carolina. Apart from the cluster studies conducted by the ISC under the leadership of Michael Porter, many other studies have been undertaken by various organizations in order to assess the creative potential of the state. Although these studies were carried out keeping in mind the entire gamut of creative industries (design industries) in the state, textiles and apparel industries were an important part of those examined, and therefore, it will be interesting to get an insight into their findings. One of the major studies was “The Design Center Study”, carried out for the Northwest Piedmont Council of Governments, with information and recommendations to assist in the creation of a “Design Incubator” in Winston-Salem, NC. Similarly, the Piedmont Triangle Partnership (PTP) is the economic development and marketing organization representing the 12-county Piedmont Triad region surrounding the cities of Greensboro, Winston-Salem and High Point. The PTP teams with the local economic development offices and the NC Department of Commerce to market the Piedmont Triad domestically and internationally in order to assist companies considering establishing operations in the region. Thus, it can be seen that many attempts are being made to establish the existence of important clusters in the state, especially with respect to creativity and innovation.
“Clusters of creativity”, which was submitted to the NC Arts Council by Regional Technology Services in April 2007, sheds light on the role of arts and design in the North Carolina economy. The report had many findings related to the creative cluster in NC:

- Creative enterprises include a wide range of industries, many of which are not usually considered artistic.
- Commonly available data sources miss much significant creative and artistic activity.
- Nearly 47,000 people are employed in the core creative enterprise cluster, 159,000 in the full cluster.
- The income generated by these jobs totals $3.9 billion.
- Creative enterprises are highly concentrated in some areas of the state thought to lack economic vitality.
- Among the factors examined, only the number of arts and design workers has a significant impact on tourist spending.
- The presence of these workers is also strongly associated with rising household incomes.
- Original creative content in products is a major competitive edge for some (Regional Technology Services, 2007).

The Institute for Emerging Issues (IEI), North Carolina State University, is another organization that has looked at creativity to bring about economic change in the state. The ‘Emerging Issues Forum’, held in February 2010, addressed the issue of building a creative network in the state of North Carolina. Although this initiative includes a realm of industries,
which are essentially creative-innovative in nature, textiles and apparel form an important part of this population. Four broad strategies were recognized to help North Carolina achieve its creative potential and boost its economy. These were:

- **Fostering Connectivity**

To encourage exchange of ideas, increase efficiency and build important partnerships

- **Enhancing Education**

To incorporate creative practices into the curriculum and offer more cross-disciplinary collaboration

- **Transferring ideas to Market**

To transform creative-innovative ideas into marketable products and services

- **Cultivating Creative Ideas**

To promote and sustain positive economic development in the state

(Institute for Emerging Issues, 2010).

Thus, it can be seen that various initiatives are being taken by different organizations in order to realize the creative-innovative potential of the state, and channelize it in order to achieve economic development for the state.
The creative enterprise is a relatively new and different way of classifying businesses and defining economies, because of its continually evolving and intuitive parameters. There are no universally accepted criteria or standards for what constitutes a creative enterprise, and therefore a creative economy. In order to identify and define the creative enterprise economy, the repost by RTS looked at

1. Industries whose members have sufficient artistic training or value to be considered creative enterprise.

2. Data sets that capture the entire gamut of enterprises from part time, self employment through multi-national branches

3. A way to identify firms that have a distinctive creative dimension that is secondary and not primary dimension.

It is important to note here that not all workers in the creative industries are artists or designers, yet their jobs are critical to the successful functioning of the industries. Thus, the study also included other employee roles like secretaries, production workers, salespeople as well as furniture designers or web designers. By the cluster perspective, it is not only art-producing industries that are of interest, but all the industries which help in their functioning, including industries that supply materials and equipment, reproduce their goods, distribute or sell their goods and services, and support them in a variety of ways. Capturing the
connections and relationships among these enterprises is therefore pivotal to understanding the cluster dynamics.

Also, in order to understand the creative industry better, the cluster was divided into 3 sub clusters namely the arts, entertainment and new media, and design. The sub cluster pertaining to the textile and apparel industry was that of design, as it included categories such as architects, interior designers, web designers, and fashion apparel.

The “Design Center Study” also carried out a detailed analysis of the design cluster in North Carolina. According to this study, furniture design and textile design have always been staples of the local economy, employing hundreds of skilled designers. It focused on promoting the Center for Design and Innovation (CDI) as a means for bringing recognition to the Triad region in terms of the creative potential of the region. It put forward the idea of developing this center as a place of networking for various creative industries like the design, architecture and service firms.

Existence of geographical clusters in NC

Apart from the various efforts being taken in this respect, as can be seen from above, a research team from the College of Textiles carried out a study for the NC Department of Commerce which highlighted the geographical clusters present within the textile and apparel complex in the state.
The recent growth in global consumption and production of textile related materials has provided opportunities and challenges for the North Carolina Textile Complex (Cassill et al., 2006). The North Carolina textile industry consists of all production, marketing and services of textile products, from fiber to the ultimate consumer, along with auxiliary services needed to manufacture, finish, market and distribute the product. The end-use markets for these products are diverse: apparel, home textiles, industrial/technical, automotive and medical (Cassill, et al., 2006).

North Carolina has continued to play a significant role in the global textile complex. As mentioned before, it has consistently led the other 50 United States in textile production and currently ranks as the fourth largest apparel state in terms of employment (U.S Department of Labor, 2005; National Council of Textile Organizations, 2006). Recently, much has been talked about the existence of clusters in the state. These clusters are grouped according to geographic location of companies and industries. Apart from the traditional manufacturing cluster, five new or emerging clusters have been identified to provide global competitiveness to the state’s textile and apparel industry. These are:

- Textile and Apparel Trade cluster
- Textile and Apparel Distribution cluster
- Textile and Apparel Creative Innovative cluster
- Textile and Apparel Post-Assembly Customization cluster
- Textile and Apparel Financial cluster
These new/emerging clusters can provide opportunities for creative programs to be shared by companies in the NC textile complex. These programs include supply chain management, global business strategy, design, product development, marketing, etc. Therefore, the state can still be considered as having a wealth of resources which can be utilized to build and sustain the textile and apparel complex in the state (Cassill et al., 2006). Mainly, four geographic clusters have been identified in North Carolina based on geographic distribution of companies and other entities.

1. **Charlotte Area Cluster**: This cluster consists of the Mecklenburg, Union, Gaston and Cabarrus counties. It has 290 companies and employs more than 15000 workers. Companies in the cluster include Parkdale Mills, R.L.Stowe, Clariant, etc.

![Charlotte Area Cluster](image)

Figure 12. Charlotte Area Cluster

2. **Triad Cluster**: This cluster consists of the Guilford, Forsyth, Alamance, Davidson and Randolph counties. It has 328 companies, and more than 24,600 employees. The companies in the cluster include Glen Raven, Guilford, Unifi, Sara Lee,
Gold Toe, VF Corp, Kayser Roth, ITG, etc. These companies are mainly into yarn, hosiery, screen printing, fabric, finishing and cut/sew operations.

Figure 13. Triad Cluster

3. Hickory area cluster: This cluster includes the counties of Catawba, Iredell and Rowan. There are 159 companies and more than 12,700 employees, and a sample of the companies in the cluster are Shuford Mills, Valdese Weavers, Thorlo socks Inc., etc.

Figure 14. Hickory Area Cluster
4. **Triangle cluster**: This cluster includes the Wake and Durham counties. There are 67 companies and more than 5,800 employees. The cluster mainly consists of research and trade activities, and the companies present include INDA, NCRC, AATCC, TC². (Cassill et al., 2006)

![Figure 15. Triangle Cluster](image)

Thus it can be seen that North Carolina has a huge number of companies concentrated in specific geographic locations, and the development of these clusters can indeed provide the state with a competitive advantage.

**Conclusion: Collaborative efforts**

The review of literature has given insight into the cluster theory, its relationship to creativity and innovation, as well as the existence of clusters in the North Carolina textile and apparel complex. Porter (2003, Indiana summit) suggests that in order to realize maximum benefits, there should exist a synergy between the various cluster entities like the companies, trade associations, government and universities. These entities together can be a source of competitive advantage.
CHAPTER 3

Methodology

The aim of this study was to analyze the creative-innovative cluster of North Carolina, and examine whether the entities which are part of this cluster are realizing the economic benefits as stated by Porter’s (1998) Cluster Theory. This study represents an attempt of using primary data by talking to industry representatives in order to analyze the Cluster Theory.

Purpose of Study

The purpose of the study was to define and examine the creative-innovative textile and apparel cluster in North Carolina, and identify the economic benefits which are being realized by being part of the cluster, and to determine what can be done in order to sustain this cluster in the state.

Existing literature (Baptista, 1996; Porter, 1998; Kuah, 2002; Schoales, 2006) confirms that clusters have an important role to play in the economic development of a nation. No previous research has been done that examines the creative-innovative cluster in the state of North Carolina with respect to the textile and apparel industry, and how these firms can benefit by being part of a cluster. This study, thus looked at how the various firms located in the state can benefit from being part of a recognized cluster, along with existing auxiliaries that can prove to be a source of economic synergy.
Research Questions

RQ1: Are firms in the cluster receiving the economic benefits proposed by Porter’s Cluster Theory?

Research Objectives

RO1.a: To understand the cluster theory.

RO1.b: To define the creative-innovative cluster in North Carolina (Piedmont Triad).

RO2: Identify major players in the creative/innovative community in the Piedmont Triad region, including companies, university and auxiliaries.

RO3: To understand the economic benefits being realized by firms in the creative-innovative cluster

RO3.a: To examine whether being part of the cluster drives the pace of innovation as suggested by Porter

RO3.b: To examine whether being part of the cluster increases productivity as suggested by Porter

RO3.c: To examine whether being part of the cluster stimulates the formation of new businesses as suggested by Porter

RO4: Develop a preliminary conceptual model to depict the inter-relationships and benefits, if any, which firms of the creative/innovative cluster, are receiving.
Research Design

The research design chosen for this exploratory study was a combination of ‘The Deductive Logic of Research in a Quantitative Study’ and ‘The Inductive Logic of Research in a Qualitative Study’ (Creswell, 2003). The diagrammatic representation of both these designs is shown in Figure 16.

Deductive Logic

1. Researcher Tests or Verifies a Theory
2. Researcher Tests Hypotheses or Research Questions from the Theory
3. Researcher Defines and Operationalizes Variables Derived from the Theory
4. Researcher Measures or Observes Variables Using an Instrument to Obtain Scores

Inductive Logic

1. Generalizations or Theories to Past Experiences and Literature
2. Researcher Collects Data to Form Theories or Categorizes
3. Researcher Analyzes Data to Form Theories or Categorizes
4. Researcher Asks Open-Ended Questions of Participants or Records Fieldnotes
5. Researcher Gathers Information (e.g., interviews, observations)

Source: Creswell (2003)

Figure 16. Creswell’s Deductive and Inductive Logic of Research

The Deductive approach is generally used in quantitative research, and starts with testing hypotheses and research questions from the theory which is being tested. The variables are then defined and operationalized, and finally the variables are measured to obtain scores. In the Inductive Logic, the theory becomes the end point for the study. It is an
inductive process of building the data to broad themes to a generalized model or theory. Researcher gathers detailed information from participants and forms categories or themes, which are then developed into broad patterns, theories, or generalizations that are then compared with personal experience or with existing literature.

The research design for this study starts with the Deductive Model and aims to test a theory. For this study, the selected theory is Porter’s Cluster Theory. However, for the subsequent steps of the research, the Inductive Model was deemed most appropriate due to the limited size of the population which did not lend itself to be quantified in or defined in quantitative terms and also due to the exploratory nature of the study, with the yet to be defined creative-innovative cluster in North Carolina. Therefore, the first three steps of the deductive model and the entire inductive model was blended to best reflect the nature of the study. Figure 17 shows the blended research design.
Research Methodology

The methodology for this study consisted of three phases as shown in Figure 18. Phases I, II and III followed the format provided by Yin (2003) for conducting case studies. Phase II also employed Dillman’s Model for Tailored Design in order to conduct industry interviews.

Source: Adapted from Creswell (2003)

Figure 17. Blended Research Design
Figure 18. Research Methodology

Description of Methodology Phases

Phase I consisted of the collection of secondary data (e.g., journal, trade articles) on the Cluster Theory. This data included scholarly articles as well as trade articles which pertain to the Cluster Theory. Using Yin’s (2003) Multiple-Case Design, the three benefits as stated by Porter were examined as individual cases.

- Increase in productivity
- Increase in pace of innovation
- Start of new businesses
Phase I was integral in the development of Phase II, as it provided a framework in terms of understanding clusters. This was important for providing a reference for the analysis of the creative-innovative textile and apparel cluster in North Carolina.

Phase II consisted of interviews with firms in clusters along with representatives from auxiliary organizations (e.g., Piedmont Triangle Partnership, NC Department of Commerce), which were used to gain information regarding the existence of the creative cluster, how is the cluster viewed by these entities, and what are the benefits, if any, being realized owing to being part of the cluster. The results from Phase II were compared with those from Phase I to identify whether the benefits of clusters as stated by Porter are being realized from the industry perspective. It also helped in assessing what needs to be done in order to sustain the creative cluster that has been recognized.

Phase III utilized information from Phase I and II in the creation of a theoretical model that depicts the benefits being realized by the cluster entities, and how a synergy can exist between them for the further sustenance of the creative-innovative cluster.

Phase I

Phase I consisted of a comprehensive collection and analysis of existing research relating to the Cluster Theory, and used a Multiple-Case Design (Yin, 2003) as a framework. Yin’s Multiple-Case (holistic) Design essentially is a study that contains more than a single case. The holistic design is advantageous when no logical subunits can be identified or when the relevant theory underlying the case study is itself of holistic nature. As applied to this study, the Cluster Theory can be said to be holistic in nature, and therefore, the three benefits
as stated before were considered as separate cases. As shown in Figure 19, this design includes the desire to analyze contextual conditions in relation to the “case” (Yin, 2003). According to Yin, within a multi-case design, every case serves a specific purpose within the overall scope of inquiry. Each case is to be carefully selected so that it can either predict similar results (a literal replication) or predict contrasting results but for predictable reasons (a theoretical replication). The evidence from multiple case designs is often considered more compelling than single case designs, and the overall study is therefore regarded as being more robust (Yin, 2003).

Source: Adapted from Yin (2003)

Figure 19. Multiple Case Design (Holistic)

Yin’s Multiple Case Study Method has been used as a methodology in many studies including the INLEI (The Impact of Networked Learning on Education Institutions) Project in which they used 20 case studies to examine the impact of the introduction of large-scale network learning on the administration and management of educational institutions.
(Bricheno, Higgison & Weedon, 2004). It was also used to link farmer organizations to dynamic markets in South Africa (Hopkins, Neven & Reardon, 2005), and to examine the nature of the role of design on the new product development process (Perks, Cooper & Jones, 2005).

Previous apparel related studies utilizing Yin’s (2003) Multiple Case Study method include a study by Sheridan, Moore and Nobbs (2006), which “examined the contribution of category management in the development of a fast fashion positioning within the retail fashion sector” (Sheridan, et al, 2006, p. 313). “A multiple case study was adopted, comprised of three companies, Retailer A, a department store reliant on brand manufacturers for fast fashion. Retailer B and C, both own brand fashion retailers aiming to deliver fast fashion positioning (Sheridan, et al, 2006, p 313)”. Buyers from each of the three retailers were interviewed. Therefore, the retailers were considered as separate cases. The results of the study provided evidence that there were collaborative relationships between case study companies and suppliers in the adoption of a CM (Category Management) approach. In the development of own brand merchandise this relationship was particularly important, as it explains the need to form close relationships in order to exploit market opportunities in efficient and cost effective ways within an area pivotal to the achievement of differentiation and profitability. The study found applications of category management to be very limited within the fashion industry as fashion companies adopted collaborative structures in order to implement a category management approach.

For the purpose of Phase I, the three benefits as stated by Porter(1998) were analyzed as three separate cases in order to classify the data according to specific benefits. Similar to
the study mentioned above, the case study approach would be important to see if there are interlinking forces between the different benefits, which would help to understand the Cluster Theory.

Figure 20 depicts a modified version of the Multiple Case Design (2003) as it relates to this work. In this study each case has been chosen to understand the economic benefits that Porter has identified for entities in a cluster. In his work, Porter identifies the three advantages arising out of clusters, and how all the benefits lead to a region’s competitive advantage. Each of these has thus been depicted as a case to fit into Yin’s model.

Source: Adapted from Yin (2003) and Porter (1998)

Figure 20. Modified Case Study Model using Porter’s Cluster theory
In order to assess ROI, taxonomy of existing literature was compiled by the author. Articles were included in Phase I according to certain criteria. First, articles were reviewed for their relevance to the Cluster Theory. Select articles which were included examined the cluster theory from the aspect of gaining the benefits as defined by Porter (i.e., increase in productivity of companies in a cluster, driving the pace of innovation and stimulating formation of new business practices).

This taxonomy was used to gain insight into the cluster by reviewing existing research and findings. Although the works studied were not necessarily textile and apparel industry specific, observational knowledge was gained through the analysis of these. Phase II built upon the foundation put forward in Phase I with existing literature that examines the cluster theory.

Phase II

Phase II, conceptually, followed the Deductive-Inductive Logic of Research in a Qualitative Study (Creswell, 2003) seen in the Figure 20. Operationally, this Phase followed Yin’s (2003) Case Study Approach (Case Study Protocol) for the purpose of developing the questionnaire. According to this approach, there are two main parts to developing questions for interviews. The orientation of the questions needs to be a reminder regarding the information that needs to be collected and why. In some instances, specific questions may serve as prompts while conducting interviews. For this study, the researcher used certain questions while interviewing in order to gain more information. Secondly, the Case Study Approach states that the questions in the case study should reflect the full set of concerns.
from the initial design. The questions should follow different levels as suited to the case. In this study, questions were asked specific to the cases, that is, questions were designed around the three benefits: increase in productivity, driving pace of innovation and help in start of new businesses. The full set of questions is attached as Appendix B. Operationally, Phase II employed industry interviews using Dillman’s (2000) Model to answer Research Objectives 1.b, 2 and 3. This model has been explained in the subsequent pages.

Sampling

The operational approach to gathering information about clusters was done solely through industry interviews. For this, companies which are part of the cluster were to be selected. However, the challenge that was faced was defining the ‘creative-innovative cluster’. Though previous research (Cassill et al., 2006) has identified the existence of clusters in the state, no classification of companies/firms exists in the creative-innovative community. Therefore, the first task was to define a method of selecting companies which can be considered ‘creative/innovative’. As discussed before, creativity and innovation are subjective terms, and a wide number of definitions exist for these. The following definition by Amabile, Conti, Coon, Lazenby & Herron (1996) was chosen to define creativity and innovation in organizations (for the purpose of selecting companies).

‘We define creativity as the production of novel and useful ideas in any domain. We define innovation as the successful implementation of creative ideas within an organization. In this view, creativity by individuals and teams is a starting point for innovation; the first is a necessary but not sufficient
condition for the second. Successful innovation depends on other factors as well, and it can stem not only from creative ideas that originate within an organization but also from ideas that originate elsewhere’ (Amabile, Conti, Coon, Lazenby & Herron, 1996, p.1154).

Considering the above definition, it can be said that creativity and innovation exist in every company to a certain extent. For the purpose of this study, it was required that a list of companies be complied, which can be said to represent the creative-innovative cluster in the state of North Carolina. The Piedmont Triangle Partnership (PTP) has identified 12 counties in the state of North Carolina as forming a cluster of creativity and innovation (across all NC industries). Therefore, textile and apparel companies which are part of these counties were selected. The selection of companies was not restricted to garment and apparel companies which have design-related activities, but also included fiber and textile companies which may have design and innovation in their organization in the form of product development.

However, many companies also outsource innovation activities; the creative/innovative process is not done in-house. Outsourcing here implies sourcing one or more design/product development activities from outside the state of NC, or 100% sourcing of design/product development activities outside of the company (regardless of location of outsourced activities). Therefore, it was not appropriate to consider such companies as a part of the cluster, as one of the main aims of this study was to find out how being part of the creative/innovative cluster fosters the pace of innovation in the state of North Carolina. For this purpose, the methodology was to first identify companies that are part of the 12 counties
as recognized by PTP. The next step was to shortlist those companies that have in-house innovative/creative activities. The third step was to verify this listing of companies.

A company was, therefore, included if it satisfied one or more of the following criteria:

- They have in-house design/product development activities
- They source design/product development activities from within the geographical cluster
- They source design/product development activities from within the state of NC

The selection of companies followed a step-by-step procedure of listing out companies within the 12 counties according to the NC Department of Commerce, and then short listing the companies according to the above mentioned criteria. The final step was the validation of the short listed companies by faculty experts, Department of Commerce and industry experts. A total of 50 companies were identified during this process and the list was narrowed down to 30 after validation.

The selection process has been depicted in the flow chart in Figure 21.
Figure 21. Flowchart for selection of companies
Interview Questions

A list of questions to be asked in interviews was compiled. These questions were developed in order to understand the perception of cluster existence in the state of North Carolina. The questions aimed to address specific research objectives, and included open-ended questions. The interviews were conducted for three separate groups of interviewees: Companies, Government and Auxiliaries, and University Representatives. Separate questions were therefore developed and designed for the different groups. However, the questions centered around the benefits of Michael Porters Theory on Clustering. The list of questions has been attached as Appendix B. The list of questions received approval from the North Carolina State Institutional Review Board.

Gaining Access to key organizations and interviewees

The Tailored Design Method of Dillman (2000) was followed for conducting interviews. This framework suggests that mail surveys make five contacts with respondents:

- A brief prenotice letter sent to interviewees a few days prior to the mailing of the interview questions
- The interview questions with a detailed cover letter explaining why a response is important
- A thank-you note sent a few days to a week after the first mailing of the interview questions, expressing appreciation for responding and indicating that if the questionnaire has not yet been mailed, it is hoped that it will be returned soon
• A replacement survey sent to nonrespondents 2 to 4 weeks after the first email, indicating that the person’s completed response has not yet been received and urges the participant to respond.

• A final contact may be made by telephone a week or so after the fourth contact (if telephone numbers are available).

Key individuals were identified through industry contacts and listings of employees via company websites. Industry representatives that visited the College of Textiles were also used. The targeted individuals in companies were those in the higher management level, for example, the Chief Executive Officer, President, Vice-President of Merchandising, Director of Design, etc. These profiles were thought to be appropriate as these individuals would be able to respond to the questions keeping in mind the creative-innovative aspect with relation to the strategies and economics of the company. These individuals were contacted via email to confirm and set up a telephone interview. If the key individuals were not available for an interview, the researcher asked to interview someone with a position most relevant to creativity/innovation within the company. After the interviewees identified and expressed their consent, the consent form was mailed, faxed, or emailed to them so they could provide their signature.

The interview consisted of 9-10 major questions to be asked of each interviewee, and will lasted approximately 15 to 50 minutes. Once the interview was conducted and summarized, all relevant data was stored in a locked file cabinet in the researcher’s campus office. The information in the study records was kept strictly confidential. While company
names and publicly available information about companies has been included in the report, no reference has been made which could link individual participants to the study. In addition, answers provided during the interview have been reported as coded information in the report.

**Draw Cross Case Conclusions**

Since this study employed a multiple case design, cross case synthesis was deemed to be relevant (Yin, 2003). In order to draw cross case conclusions word tables were used to display the data from the individual interviews according to the cluster benefits framework. Since each firm included was a part of the cluster, data collected was analyzed according to the benefits realized by the cluster entities by being part of the cluster.

**Address Specific Research Objectives**

The responses from interviewees were analyzed according to specific Research Objectives and written in Chapter 4. These were recorded as findings and any recommendations by interviewees were also included. Table 4 gives a summary of the interview questions, along with specific Research Objectives.

**Table 4. Interview Question Summary**

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Research Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a,2a, 1b,2b,1c,2c,3c</td>
<td>RO1b</td>
</tr>
<tr>
<td>3a, 10a, 3b,4b</td>
<td>RO2</td>
</tr>
<tr>
<td>4a,5a</td>
<td>RO3</td>
</tr>
<tr>
<td>6a,5b,4c</td>
<td>RO3.a</td>
</tr>
<tr>
<td>7a,6b,5c</td>
<td>RO3.b</td>
</tr>
<tr>
<td>8a,7b,6c</td>
<td>RO3.c</td>
</tr>
</tbody>
</table>
Phase III

Modify and develop preliminary model

Phase III included the use of results from Phases I and II in the modifying of the conceptual model developed earlier in Chapter 2. Phase I provided data about existence and functioning of clusters (studies by various researchers), whereas Phase II provided primary data in the form of industry interviews from different cluster entities. The answers from respondents and their perception of the clustering phenomenon in the textile and apparel industry of North Carolina were instrumental in modifying the preliminary model into a conceptual model which summed up the cluster entities, their mutual relationships and benefits, if any. Thus, data was analyzed for overall patterns, generalizations, and themes in order to create the final model.
CHAPTER 4

Data Analysis

The aim of this study was to examine the benefits as stated by Michael Porter (1998) in his cluster theory are being realized by firms in the textile and apparel creative-innovative cluster in the state of North Carolina. In Phase I, a taxonomy of existing literature on cluster theory was compiled to understand the phenomenon and benefits of cluster in general as stated by various researchers (Baptista, 1996; Porter, 1998; Kuah, 2002; Schoales, 2006). In Phase II, industry interviews were conducted with three groups of people to understand their perception on the theory of clustering with respect to the state of North Carolina, and to find out whether being part of this cluster had any benefits for them. Phase III comprised of creation of a conceptual model depicting the cluster entities, the relationship between the various entities, and the benefits being realized by them.

**PHASE I: Survey of Cluster Analysis Studies**

Phase I consisted of the collection of secondary data as well as existing literature on the cluster theory. This data included scholarly articles as well as trade articles which pertain to the cluster theory. The aim of Phase I was to address Research Objective 1.a.

**RO1.a: To understand the cluster theory**

The data was analyzed and examined to classify the studies done on the cluster theory by various researchers with relation to Porter’s Cluster Theory.
Data Analysis

The following taxonomy in Table 6 provides a listing of studies that have been conducted that examine the concept of clustering. The table provides the study’s contribution to the field of research as well as the related benefit from Porter’s theory. While none of these studies focus specifically on the textile and apparel industry, the phenomenon of clustering that is addressed is applicable to this industry as well. Yin’s (2003) Case Study approach was used for studying the benefits as individual cases. The benefits (as cases) have been listed below.

- Case A: Increase in productivity of companies
- Case B: Driving the pace of innovation
- Case C: Stimulate the formation of new businesses

Table 5. Results for Phase I

<table>
<thead>
<tr>
<th>Author, Date</th>
<th>Study</th>
<th>Research Contribution</th>
<th>Case</th>
<th>Benefit (Michael Porter’s theory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doeringer &amp; Terkla (1995)</td>
<td>Business Strategy and Cross Industry Clusters</td>
<td>Study investigates external economies that contribute to clustering across industries-collaboration economies, transfers of knowledge and relationships with non-business institutions. Study concludes by suggesting certain development policies to attract these external economies.</td>
<td>Case C</td>
<td>Start of new businesses</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Title</td>
<td>Study investigation</td>
<td>Case(s)</td>
<td>Findings</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------</td>
<td>---------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Baptista (1996)</td>
<td>Research Round Up: Industrial Clusters and Technological Innovation</td>
<td>Study investigates the role of clusters in the context of innovation. Study concludes by saying that innovation in clusters becomes a ‘collective social endeavor’, where there is a combined effort by network of regional participants: work force, suppliers, customers, universities, research institutes, government, and the companies.</td>
<td>Case B</td>
<td>Drives the pace of innovation</td>
</tr>
<tr>
<td>Kuah (2002)</td>
<td>Cluster Theory and Practice: Advantages for the Small Business Locating in a Vibrant Cluster</td>
<td>Study investigates the role of clusters in the advantages offered to small businesses. It examines geographical clusters located across the world, and how whether or not they enhance the productivity and growth of firms, and concludes by stating that relationships and linkages are important for managing the value chain and competitive success.</td>
<td>Case A, Case C</td>
<td>Increases productivity of company and drives the pace of innovation</td>
</tr>
<tr>
<td>Moreno, Paci &amp; Usai (2005)</td>
<td>Geographical and Sectoral Clusters of Innovation in Europe</td>
<td>This study examines the phenomenon of cluster agglomeration of innovation activities through European regions. It concludes by saying that innovation tends to cluster more in sectors in which neighboring regions are also technologically specialized.</td>
<td>Case B</td>
<td>Drives the pace of innovation</td>
</tr>
<tr>
<td>Schoales (2006)</td>
<td>Alpha Clusters: Creative Innovation in Local Economies</td>
<td>This study researches certain creative industries in cities of US and UK and concludes by saying that such creative industries are very cluster dependent due to the high pace of product innovation.</td>
<td>Case A, Case B</td>
<td>Increases productivity and drives the pace of innovation in a company</td>
</tr>
</tbody>
</table>
Summary: Thus, it can be seen that many researchers have studied the topic of clustering across different industries. The main characteristics of clusters can be said to be the transfer of knowledge, relationships with non-business institutions, combined effort between the network of regional participants, such as suppliers, customers, universities, research institutes, government and companies. Some of the studies also examine the idea of fostering of innovation in clusters due to technological specialization in neighboring regions. The studies also state that clusters enhance the birth and growth of new industries due to the support in the form of linkages that are prevalent in the clusters. Although these studies were not specific to the textile and apparel industry, the issues that have been addressed are applicable to the textile and apparel industry. These studies confirmed the benefits stated by Michael Porter as they stated the advantages like help to new businesses, increase in productivity, and growth in innovation.

PHASE II: Industry Interviews

Phase II employed industry interviews to address the next set of research objectives. Overall, the sample of interviewees was divided into three groups, namely the Companies, Government and Auxiliaries, and University Representatives. These groups were named Group 1, Group 2 and Group 3 respectively for the purpose of simplicity. The sampling and data analysis for each group has been reported separately.
GROUP 1: COMPANIES

Sampling Procedure

A total of 50 companies were identified to be in the 12 county region of the Piedmont Triad Partnership. This list was compiled from various sources:

1. Nctextileconnect.com
2. Chambers of Commerce for all the 12 counties
3. Company listing from the NC Department of Commerce
4. Faculty recommendations (College of Textiles, NC State University)

The listing was made keeping in mind the criteria mentioned above, and therefore, whenever it was known that the company did not have in-house product development/design activities (by making phone calls to the companies), it was excluded at that point. Also, the list was not exhaustive as it was difficult to find counties’ listing of textile and apparel companies for all the 12 regions. However, the list was narrowed down to 30 after talking with faculty experts and government personnel for validation of the listing according to their knowledge and expertise in the industry. A total of ten companies agreed to participate in the study and responded to requests for interviews. However, there were a total of 10 interviews, as two people from one of the companies sent responses to the questionnaire. The remaining 20 companies who did not fulfill the request for interview either declined to participate, did not respond to the request and subsequent follow-up requests, or did not have in-house product development/design activities.
Many of the sample companies who agreed to participate requested to complete the questionnaire by e-mail rather than telephone and attributed their request to convenience and time availability. Of the 10 completed interviews, one interview was excluded due to unwillingness to participate in the study due to narrowed geographical constraints. The interviewee agreed to participate if the scope of the study was broadened to include other counties in the state. Therefore, finally, nine interviews were included. The companies were coded to maintain the confidentiality of the firms and their employees. The two respondents from the same company were labeled Respondent A and Respondent A’.

Sample Description

The resulting sample consisted of n=8 companies (9 interviews) who had in-house product development/design activities in the state of North Carolina. The companies along with their alphabetical codes, activities, location and respective counties are listed in Table 6.

Table 6. Sample Description for Group 1

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Company Code</th>
<th>Industry category (Activity)</th>
<th>Location</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A</td>
<td>Automotive Textiles</td>
<td>Rural Hall</td>
<td>Forsyth</td>
</tr>
<tr>
<td>2.</td>
<td>B</td>
<td>Legwear, Socks</td>
<td>Asheboro</td>
<td>Randolph</td>
</tr>
<tr>
<td>3.</td>
<td>C</td>
<td>Upholstery Fabric</td>
<td>High Point</td>
<td>Guilford</td>
</tr>
<tr>
<td>4.</td>
<td>D</td>
<td>Custom Made T-Shirts</td>
<td>Burlington</td>
<td>Alamance</td>
</tr>
<tr>
<td>5.</td>
<td>E</td>
<td>Hosiery</td>
<td>Winston-Salem</td>
<td>Forsyth</td>
</tr>
<tr>
<td>6.</td>
<td>F</td>
<td>Apparel</td>
<td>Greensboro</td>
<td>Guilford</td>
</tr>
<tr>
<td>7.</td>
<td>G</td>
<td>Fiber and yarns</td>
<td>Greensboro</td>
<td>Guilford</td>
</tr>
<tr>
<td>8.</td>
<td>H</td>
<td>Upholstery Fabrics</td>
<td>High Point</td>
<td>Guilford</td>
</tr>
</tbody>
</table>
Data Collection

Formal interviews were conducted over a five-week period of time during Spring 2010. Dillman’s (2000) Tailored Model was used to conducting industry interviews. Industry representatives from the top management level at the companies were selected for the sample. These included titles like President, Chief Executive Officer, Vice President of Merchandising, and Design Director. They were all contacted via email as a starting point, which gave them a background about the research study. Follow up phone calls were then made in order to establish contact with them. In some cases, the top management levels were reached directly, while in others, executives directed the interviewer to the appropriate company representatives. Reaching the top management representatives in the companies was a challenge due to the busy schedules of the executives, as well as the necessity to contact a number of different people before the most appropriate person was reached. However, many attempts were made to reach them (emails, telephone, voicemails, messages with executive assistants). Many of the interviewees requested to respond via email and then conduct follow up questions over the phone. Out of the nine respondents in companies, four were conducted on the phone, while the other five were via a combination of email and questions on the telephone.

Telephone interviews ranged from 15-50 minutes. Questions were asked in order as outlined in the interview questionnaire (Appendix B). The researcher also made modifications to questions while interviewing in order to get a wholesome perspective from the interviewee. For example, if the answers were too short, the respondents were prodded with questions like
“How?” and “Why?” in order to get more depth to the answers.

Data Analysis Overview

Data analysis was completed in three stages. First, the interviews were transcribed into paragraph form. Second, the data was organized into groupings according to individual questions and research objectives to identify similar patterns. These groupings were then compared for similarities and differences in perception about the cluster theory. Cross case conclusions were then drawn after analyzing the data.

Data Analysis

The interviewee responses were recorded and tabulated according to specific Research Objectives (corresponding to respective questions in the questionnaire) identified in Chapter 3. Each research objective has been reported separately with a summary of findings. Table 8 summarizes the responses given by industry representatives according to specific Research Objectives.

RO1.b: To define the creative-innovative cluster in North Carolina

Introduction

In order to address RO1.b, researchers were asked how they would define the ‘creative-innovative’ cluster in the state of North Carolina. Table 7 summarizes the interviewees’ responses to Questions 1 and 2 of the questionnaire.
Table 7. Data Analysis 1

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
</table>
| RO1.b              | Q.1 & Q.2       | Understand and define the ‘Creative-Innovative’ Cluster in NC from industry perspective | Respondent A: ■ No specific definition as less creativity in company due to customer’s specific demands  
Respondent A': ■ No collaboration experienced before, therefore, difficult to define cluster  
Respondent B: ■ ‘Cluster’ definitely exists in Piedmont region  
■ Cluster includes yarn producers, dye & chemical suppliers, NCSU.  
Respondent C: ■ Not sure of definition, as change in industry seen over past few years  
■ Textiles and furniture industries form cluster in NC  
Respondent D: ■ People in industry interacting together defines cluster  
■ Consumer groups, universities form cluster  
Respondent E: ■ Bringing different pieces of supply chain together.  
Respondent F: ■ Cluster includes Product Development, design, R&D, marketing, brand management  
■ Universities, Government also part of cluster  
Respondent G: ■ Defined cluster within the company due to close location of their facilities in the state  
Respondent H: ■ Being connected to the center of the business and having a common sense of business acumen among professionals |
Summary: Overall, there seemed to be no fixed definition of a ‘creative-innovative cluster’ in the textile and apparel industry of North Carolina. Of those who offered to define it, the responses centered around defining the cluster in terms of other companies in the same segment of the company, for example, transportation textiles. A few also defined clusters in terms of creative-innovative activities in the company like brand management, product development, design, marketing, etc. When prompted, some companies also agreed that universities, the government and auxiliaries in the state like AATCC, Cotton Inc., etc. have an important role to play in cluster dynamics. Some of the responses have been quoted below:

- “In view of the textile and apparel cluster, I would say people interacting together in a mutually beneficial way.”
- “I’m not familiar with Michael Porter’s book. I will assume that it means geographically locating your business in a location where one can get the services and or the people needed to fill certain needs.”
- “The creative-innovative cluster would include product development, textile research and development, design, technical specifications, marketing and brand management.”

RO2: Identify major players in the creative/innovative community in the Piedmont Triad region, including companies, university and auxiliaries.
**Introduction:** In order to address RO2, researchers were asked to identify whether they considered their company to be a part of the cluster along with identifying who according to them are major players in the textile and apparel creative-innovative cluster.

Table 8. Data Analysis 2

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>RO 2</td>
<td>Q.3, Q.10</td>
<td>Major players in ‘creative-innovative cluster’ of NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent A: ●Considered company as part of cluster, collaboration with universities will help. Action needed by government about importing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent A’: ● No, not a part of cluster. Government and education can help in innovation by financial help and access to information</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent B: ●Yes, company part of cluster with good relationships with other companies. Government and universities can contribute.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent C: ●Yes, company at the heart of innovative upholstery industry. Textile programs like at NCSU are great help</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent D: ●Can say loosely a part of cluster. Government not of much help for small companies like theirs, universities can help by creating forums for discussion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent E: ● Collaboration with College of Textiles, government, etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent F: ●Yes, part of cluster. Colleges and government can help by sponsoring and helping start ups</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent G: ●Yes, part of ‘cluster’ of</td>
</tr>
</tbody>
</table>
Table 8 Continued

|       |       | Respondent H: • NC Board of Textiles, High Point Furniture Council, and industry organizations like WITHIT and ITMA |

**Summary:** Overall, nearly 70% of the respondents agreed to their company being a part of the cluster. However, it is important to note that there was a difference in responses within the same company from two different executives (Respondents A and A’), as one considered the company as a part of the cluster while the other did not. When asked to identify the major players in the cluster, most of the respondents agreed to the importance of help from the government in the form of finance and universities in the form of knowledge and resources. One of the respondents also noted that organizations like the NC Board of Textiles, High Point Furniture Council, along with professional industry organizations like ITMA and WITHIT could definitely be said to be major players in the cluster.

**RO3:** To understand the economic benefits being realized by firms in the creative-innovative cluster

**RO3.a:** To examine whether being part of the cluster increases productivity as suggested by Porter

**RO3.b:** To examine whether being part of the cluster drives the pace of innovation as suggested by Porter

75
RO3.c: To examine whether being part of the cluster stimulates the formation of new businesses as suggested by Porter

Introduction: These set of research objectives were the most important and formed the core of the data analysis, as they examine the benefits of clustering for the companies. The three sub-parts of RO3 (RO3.a, b & c) were reported separately as they relate to Michael Porter’s cluster theory and formed the basis of the entire study. These have been represented in separate tables followed by an overall summary.

Table 9. Data Analysis 3

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>RO 3</td>
<td>Q.4, Q.5</td>
<td>Economic benefits of being part of cluster</td>
<td>Respondent A: ●20% of company’s activities are creative. Occasional sharing of resources like dyeing, weaving, etc. ● About 30% of company’s activities are creative ● Product Development core of the company’s mission. ● Pooling of efforts and resources within group of similar companies is biggest benefit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent A*: ●In house design and innovation are creative activities of company ● Benefit to sales and marketing due to closeness to customers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent B: ●External entities make up cluster ● Mutual cooperation among local community is benefit ● Benefit not as much in NC. All aspects of supply chain are creative-innovative. ● Biggest benefit is with R&amp;D</td>
</tr>
</tbody>
</table>
Table 9 Continued

| Respondent F: | as timing matters as compared to anywhere else in the US  
Roughly 30% of companies activities are creative  
Mutual sharing of new ideas definite benefit of clustering  
Product development, marketing, manufacturing are creative activities of company, percentage varies from 10-80%  
Synergies within departments is benefit  
65% of companies operations are creative-innovative  
Being close to the end user, highly collaborative and productive work environment are main benefits |

| Respondent G: |  |

<p>| Respondent H: |  |</p>
<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>RO 3.a</td>
<td>Q.6</td>
<td>Does Cluster help in increasing productivity</td>
<td><strong>Respondent A:</strong> Doesn’t think clustering helps increase productivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Respondent A’:</strong> Doesn’t think clustering helps increase productivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Respondent B:</strong> Productivity increased due to help from local competitors and suppliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Respondent C:</strong> Doesn’t think clustering helps increase productivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Respondent D:</strong> Long time productivity might increase due to clustering</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Respondent E:</strong> Minimal with respect to NC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Respondent F:</strong> Clustering has helped increase productivity w.r.t global services.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Respondent G:</strong> Does not think clustering helps increase productivity in NC only, as company focuses more on global operations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Respondent H:</strong> Yes, in a way, as being situated close to talent, suppliers, customers has helped</td>
</tr>
</tbody>
</table>
The respondents were also asked to define the “pace of innovation” according to them, and these definitions have been recorded in Table 11.a.
Table 11.a. Definitions for “Pace of Innovation”

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>RO 3.b</td>
<td>Q.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Definition of pace of innovation</td>
<td>Respondent A: ● “To be able to do more product development and develop with customers.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent A`: ● No definition</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent B: ● “The pace of innovation is extremely fast. It has to be. I would say that the cluster does not drive that innovation - the marketplace does.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent C: ● “The pace of innovation is becoming faster and faster. As companies from across the globe compete for shrinking US market share, they have to produce new and better products.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent D: ● “Pace of innovation is erratic, especially for small companies.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent E: ● “Coming up with new innovative products faster than competitors.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent F: ● “It is very slow.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent G: ● “Innovation needs to come from top down and is driven by many factors, including competition, which is global. The pace is determined by many factors like product vs. technology, degree of difficulty, product adoption, etc.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respondent H: ● “The pace is fast, on a weekly basis.”</td>
</tr>
</tbody>
</table>
Table 12. Data Analysis 6

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
</table>
| RO 3.c             | Q.8             | Does Cluster help in start of new businesses | Respondent A: ● Doesn’t think clustering helps in start of new businesses  
Respondent A’: ● Clustering helps in start of new businesses due to technical support in cluster  
Respondent B: ● Clustering partly helps in start of new businesses due to NC’s traditional importance of textile industry  
Respondent C: ● Doesn’t think clustering helps in start of new businesses  
Respondent D: ● Can’t say about start of new businesses  
Respondent E: ● Yes, but only due to already existing resources  
Respondent F: ● Clustering helps start new businesses, not necessarily same industry but others (e.g., advertisement, marketing, etc.)  
Respondent G: ● Does not think clustering helps in start of new businesses  
Respondent H: ● Yes, as new needs arise due to close proximity of industries |

Summary: Overall, the companies agreed that clustering offers certain benefits to the companies. In order to understand the benefits, they were asked to state what percentage of activities in their companies they would attribute to creativity and innovation. Three out of 8 companies stated that roughly 20-30% of the companies’ activities were creative/innovative. These activities included product development, design, marketing, and manufacturing. When asked about whether the companies receive benefits being situated in North Carolina, 90% of them agreed saying that the biggest benefit was the mutual sharing of ideas and resources.
One of the companies stated that this benefit of mutual cooperation is realized due the close proximity of the company’s different units being situated close to each other rather than mutual benefit among separate firms.

The respondents were asked for their views about the three benefits that Michael Porter states in his cluster theory. The respondents’ views have been summarized below:

• Increase in productivity

More than 50% of the respondents believed that clustering does not help in increasing the productivity of the company. One of the respondents believed that clustering is definitely a contributing factor in increasing the productivity due to the close proximity of suppliers and manufacturers. Another respondent stated that clustering would definitely help in long term productivity. According to another respondent, being based in the center of customers, talent, and production has contributed to the company’s success in leading the industry.

• Increase in pace of innovation

About 60% of the respondents did not agree that clustering helps in increasing the pace of innovation in a company. One of the interviewees stated that the pace of innovation is more market-driven than cluster-driven. While one respondent agreed that pace of innovation increases due to close proximity of competitors, another stated that clustering does help in innovation, but to a very limited degree. According to another respondent, the closeness is a major factor in the pace of development, as collaborative meetings with industries and business partners can occur on a daily basis. Also, the definitions of ‘pace of innovation’
from different respondents differed. Many of the respondents replied by saying that the pace of innovation is very fast in today’s scenario. Also, to be able to develop new products at a faster rate than competitors is what defines the pace of innovation, according to one respondent. Another respondent noted that the pace of innovation is also driven by other factors such as the product, technology and degree of difficulty.

- Start of new businesses

This question had mixed responses from different respondents. 4 out of 9 respondents said that clustering does not help in start of new businesses. Among the others, one of them noted that new businesses get attracted due to presence of technical support in the state. Another respondent stated that the state might attract new businesses due to the traditional importance of the textile and apparel industry in the state. One of the respondents also stated that the biggest benefit for start-up companies in the state would be the presence of an already trained labor force. Presence of fiber, yarn and fabric suppliers might also be an attraction for new businesses. Another respondent said that the new businesses might not necessarily be related to the textile and apparel industry, but could be supporting industries to it like marketing and advertising firms, who might get attracted to establish themselves in the state due to the already existing textile industry.

**GROUP 2: AUXILIARIES**

**Sampling Procedure**

A total of 8 auxiliaries (government and textile associations) were included in the sample for Group 2. The method was purposeful sampling and the entities which were included into the
sample mainly were based on recommendations by faculty and through knowledge of existence of these entities in the Piedmont region of North Carolina. This group of representatives was included due to their expertise and experience in the textile and apparel industry. Their thoughts and responses were vital to understand another perspective of the cluster theory in addition to that of the companies. A total of 4 auxiliaries agreed to respond to requests for interviews. The remaining 4 auxiliaries who did not fulfill the request for interview either declined to participate or did not respond to the request and subsequent follow-up requests.

Two of the respondents who agreed to participate requested to complete the questionnaire by e-mail rather than telephone and attributed their request to convenience and time availability. Among the other two, one was conducted in-person whereas the other was conducted over the telephone. The auxiliaries were coded to maintain confidentiality.

Sample Description

The resulting sample consisted of n=4 respondents who have immense experience and expertise in the textile and apparel industry of North Carolina. The auxiliaries along with their alphabetical codes, activities and location are listed in Table 13.
Table 13. Sample Description for Group 2

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Company Code</th>
<th>Auxiliary category (Activity)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I</td>
<td>Organization providing test method development, Quality Control Materials and professional networking for textile professionals</td>
<td>R.T.P, NC</td>
</tr>
<tr>
<td>2.</td>
<td>J</td>
<td>Organization providing technical, information and product trend analysis resources to industry</td>
<td>Cary, NC</td>
</tr>
<tr>
<td>3.</td>
<td>K</td>
<td>Extensive experience in the leading the Home Furnishings Industry</td>
<td>Raleigh, NC</td>
</tr>
<tr>
<td>4.</td>
<td>L</td>
<td>Government (Department of Commerce)</td>
<td>Raleigh, NC</td>
</tr>
</tbody>
</table>

Data Collection

Formal interviews were conducted over a five-week period of time during Spring 2010. The identified representatives were contacted via email as a starting point, which gave them a background about the research study. Follow up phone calls were then made in order to establish contact with them. Two of the interviewees requested to respond via email and then conduct follow up questions over the phone. Among the others, while one interview was conducted over the phone, the other one was carried out in-person.

Questions were asked in order as outlined in the interview questionnaire (Appendix B). The researcher also made modifications to questions while interviewing in order to get a wholesome perspective from the interviewee.
Data Analysis Overview

Data analysis was completed in three stages. First, the interviews were transcribed into paragraph form. Second, the data was organized into groupings according to individual questions and research objectives to identify similar patterns. These groupings were then compared for similarities and differences in perception about the cluster theory. Cross case conclusions were then drawn after analyzing the data.

Data Analysis

The interviewee responses were recorded and tabulated according to specific Research Objectives (corresponding to respective questions in the questionnaire) identified in Chapter 3. Each research objective has been reported separately with a summary of findings. Table 11 summarizes the responses given by industry representatives according to specific Research Objectives.

**RO1.b: To define the creative-innovative cluster in North Carolina**

*Introduction:* In order to define and understand the creative-innovative cluster in North Carolina, respondents were asked if they thought the state of NC had enough creative potential to be considered as a cluster, and whether developing this cluster could be a source of economic advantage for the state. The respondents’ answers to questions 1 and 2 have been recorded and summarized Table 14.
### Table 14. Data Analysis 7

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
</table>
| RO1.b              | Q.1 & Q.2      | Understand and define the ‘Creative-Innovative’ Cluster in NC from auxiliary perspective | **Respondent I:** ● Yes, NC does have enough creative potential in the textile and apparel industry  
● Yes, developing the creative cluster can be a source of economic advantage although macro-economic factors can offset advantages of clustering  
**Respondent J:** ● Yes, there is lot of creative energy in the state’s textile and apparel industry  
● Yes, further developing the cluster could help in increasing economic situation of state  
**Respondent K:** ● No, NC is not really known for creativity as outsourcing also taking place which is a big disadvantage  
● Yes, developing the cluster could mean economic advantages for the state but lot of efforts would be needed.  
**Respondent L:** ● Yes, it exists in every industry.  
● Yes, industries are already going in that direction like furniture industry. |

**Summary:** All four of the respondents agreed that NC has enough creative potential in the textile and apparel industry to be considered as a cluster. According to them, the combination of private companies with organizations like AATCC, Cotton Incorporated, INDA, etc. doing innovative work has enough potential to be considered as a cluster. However, one respondent
did not agree that NC is essentially known for creativity. Not having manufacturing and sampling facilities when new ideas are developed in the state is a big disadvantage. Outsourcing of sampling and testing innovations acts as a major slow down for creativity and innovation. However, all the respondents agreed that developing this cluster by taking efforts in the right direction could be a source of economic advantage for the state of North Carolina.

**RO2: Identify major players in the creative/innovative community in the Piedmont Triad region, including companies, university and auxiliaries.**

*Introduction:* In order to address RO2, respondents were asked whether efforts by entities in the state could help in the sustenance of the cluster and whether they thought sufficient efforts were being taken to do so. The responses to questions 3 and 4 have been recorded and summarized in Table 15.
Table 15. Data Analysis 8

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
</table>
| RO2                | Q.3 & Q.4       | Identify major players in the creative/innovative community in the Piedmont Triad Region | **Respondent I:** ● Yes, efforts are being taken but are limited and need more focus  
                                                                             ● Government, colleges and textile associations need to keep working together to promote the idea of clustering  
                                                                             **Respondent J:** ● Not enough is being done to promote the cluster  
                                                                             ● Efforts like advertising and promotional campaigns to showcase the NC textile industry could be done along with more focused efforts from government and industries  
                                                                             **Respondent K:** ● Not enough is being done to promote the cluster  
                                                                             ● Efforts would include partnerships between firms, and possibilities like the lower subsidies from the government which could bring manufacturing back to the state in the long run  
                                                                             **Respondent L:** ● Some initiatives are already being taken in furnishings industry  
                                                                             ● Already a lot is being done, large physical investments and industrial extensions have been made. |

**Summary:** Overall, all respondents agreed that not enough efforts are being taken to promote the textile and apparel cluster in the state. However, one respondent agreed that some efforts are already under way from the government in the form of large financial investments.
Overall, all respondents agreed that entities like the government, colleges and textile organizations like AATCC, INDA, TC2 need to keep working together to promote the cluster and ensure that it is sustained. One of the respondents stated that a centralized advertising and promotional campaign to showcase the creative potential of the textile and apparel industry in the state could be undertaken. Perhaps even a special logo and branding could be developed for the NC textile and apparel cluster. Thus, more focused efforts have to be taken.

**RO3:** To understand the economic benefits being realized by firms in the creative-innovative cluster

**RO3.a:** To examine whether being part of the cluster drives the pace of innovation as suggested by Porter

**RO3.b:** To examine whether being part of the cluster increases productivity as suggested by Porter

**RO3.c:** To examine whether being part of the cluster stimulates the formation of new businesses as suggested by Porter

**Introduction:** The respondents were asked about what they viewed to be the benefits of being part of the cluster, and their views about the benefits as stated by Porter. The answers to questions 5, 6 and 7 have been recorded and summarized in Table 16.
### Table 16. Data Analysis 9

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
</table>
| RO 3.a             | Q.5             | Does Cluster help in increasing productivity | Respondent I: ● Probably, but not sure as no data to support.  
Respondent J: ● Productivity and profits could be increased through clustering.  
Respondent K: ● Yes, increases productivity due to benefits like innovation.  
Respondent L: ● Yes, due to specialized workers. |

### Table 17. Data Analysis 10

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
</table>
| RO 3.b             | Q.6             | Does Cluster help drive the pace of innovation | Respondent I: ● Yes, but to a small degree as other factors come into play.  
Respondent J: ● Yes, as competition from close by industries would push them to be more innovative  
Respondent K: ● Yes, it increases the pace of innovation  
Respondent L: ● Yes, but it is complex and debatable. |

### Table 18. Data Analysis 11

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
</table>
| RO 3.c             | Q.7             | Does Cluster help in start of new businesses | Respondent I: ● Could be a factor but not the decisive one.  
Respondent J: ● Yes, it is a benefit for startups as compared to mature companies.  
Respondent K: ● Yes, especially for start of supporting businesses (e.g. labeling business).  
Respondent L: ● Yes, it definitely does. |
Summary: Overall, all respondents agreed that clustering increases productivity for companies, driving the pace of innovation, and in start of new businesses.

- Increase in productivity

According to one respondent, partnerships and utilization of support organizations in the state could be a very big contributing factor for increasing productivity. According to another respondent, ‘if properly supported and promoted, the employees would begin hearing positive things about their industry instead of weekly announcements of plant closings, layoffs, etc.’; this would increase the potential for sales. Another respondent stated that being part of the cluster offers generation of new ideas as a benefit, and thus, the potential for increasing productivity could be more. According to another respondent, increase in productivity takes place due to the presence of specialized workers.

- Increase in pace of innovation

According to one respondent, although clustering can help in increasing pace of innovation, other factors such as corporate culture of the respective organization, human talent, financial resources are major factors. According to another respondent, higher recognition of being part of a well marketed cluster, the individual member organizations would experience peer pressure by the other members to be the best that they can be, which requires organizations to be innovative. This issue is debatable according to another respondent, as it is complex whether innovative companies would like to work together.
• Start of new businesses

According to respondents, clustering helps in the start of new businesses to a certain extent. One respondent stated that supporting industries in a cluster is a factor for start of new businesses, but is not a decisive factor. Another respondent agreed that being a member of a well marketed cluster would be a way for a company, particularly a new company, to become known. Also, one of the interviewees mentioned that the cluster would give rise to the ‘mushrooming effect’ where opportunities could exist for textile and apparel supporting industries, for example, labeling. This would give rise to other supporting industries and so on.

GROUP 3: UNIVERSITY REPRESENTATIVES

Sampling Procedure

A total of 8 representatives were included in the sample for Group 3. The method was purposeful sampling and the representatives which were included into the sample mainly were based on recommendations by faculty. This group of representatives was included due to their expertise and experience in the textile and apparel industry. Their thoughts and responses were vital to understand another perspective of the cluster theory in addition to that of the companies and auxiliaries. A total of 3 representatives agreed to respond to requests for interviews. The remaining 5 auxiliaries who did not fulfill the request for interview either declined to participate or did not respond to the request and subsequent follow-up requests.
The interviews with both university representatives were conducted in-person. The respondents were coded to maintain confidentiality.

Sample Description

The resulting sample consisted of n=3 respondents who have immense experience and expertise in the education field of textiles and apparel. Having worked in the field of education for several years, their input and responses were deemed to be very vital to the completion of data collection for this study.

Table 19. Sample Description for Group 3

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Respondent Code</th>
<th>Designation</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>M</td>
<td>Professor</td>
<td>Raleigh, NC</td>
</tr>
<tr>
<td>2.</td>
<td>N</td>
<td>Professor</td>
<td>Raleigh, NC</td>
</tr>
<tr>
<td>3.</td>
<td>O</td>
<td>Professor</td>
<td>Raleigh, NC</td>
</tr>
</tbody>
</table>

Data Collection

Formal interviews were conducted over a five-week period of time during Spring 2010. The identified representatives were contacted via email as a starting point, which gave them a background about the research study. All three interviews were conducted in-person at the College of Textiles, NC State University, Raleigh.

Questions were asked in order as outlined in the interview questionnaire (Appendix B). The researcher also made modifications to questions while interviewing in order to get a
Data Analysis Overview

Data analysis was completed in three stages. First, the interviews were transcribed into paragraph form. Second, the data was organized into groupings according to individual questions and research objectives to identify similar patterns. These groupings were then compared for similarities and differences in perception about the cluster theory. Cross case conclusions were then drawn after analyzing the data.

Data Analysis

The interviewee responses were recorded and tabulated according to specific Research Objectives (corresponding to respective questions in the questionnaire) identified in Chapter 3. Each research objective has been reported separately with a summary of findings. RO1 was not included in this group as the questionnaire for this group was more centered on finding out the university personnel’s perspective of the collaborative efforts within the cluster.

RO2: Identify major players in the creative/innovative community in the Piedmont Triad region, including companies, university and auxiliaries.

Introduction: In order to address RO2, respondents were asked whether various universities in the state contributed to the creative textile and apparel cluster in the state, and if so, how the facilities and resources available at the colleges could help industry people in their creative/innovative endeavors. Also, they were asked what they thought could be done by the government to encourage more collaborative efforts between the universities and the industries.
The responses to questions 1, 2 and 3 have been recorded and summarized in Table 20.

Table 20. Data Analysis 12

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
</table>
| RO2                | Q.1, 2 &3       | Identify major players in the creative/innovative community in the Piedmont Triad Region | Respondent M: Yes, university is major part of cluster as college was developed due to presence of textile and apparel industry. Non-wovens industry has grown due to the presence of college.  
Respondent N: Yes, college can help by providing resources, for example labs in Non-wovens department are working on NPD.  
Respondent O: Government should provide more help in the form of university-industry projects.  
Universities can help by providing testing ground for new ideas and concepts.  
Yes, faculty’s breadth and depth of experience, market trends and networking are invaluable.  
Government should provide economic support creativity and innovation |

**Summary:** Overall, both respondents agreed that universities like the College of Textiles contribute in a major way to the clusters functioning. According to one respondent, this has been seen very evidently in the Non Wovens industry, where the college is actively doing product development and testing of new ideas. Other areas still have to be developed.
However, Intellectual Property issues come into play when innovation is involved in many cases. Work is done by the college for industries, but it is limited. Also, universities tend to charge less for carrying out testing/development activities for companies, therefore collaboration always exists between companies and universities in a cluster. The respondents agreed that the government can help by providing more financial resources for collaborative projects between the companies and colleges. The faculty and students can also be instrumental in generating creative ideas and potential prototypes to foster creativity and new products.

**RO3: To understand the economic benefits being realized by firms in the creative-innovative cluster**

**RO3.a: To examine whether being part of the cluster drives the pace of innovation as suggested by Porter**

**RO3.b: To examine whether being part of the cluster increases productivity as suggested by Porter**

**RO3.c: To examine whether being part of the cluster stimulates the formation of new businesses as suggested by Porter**

*Introduction:* The respondents were asked about what they viewed to be the benefits of being part of the cluster, and their views about the benefits as stated by Porter. The answers to questions 4, 5, and 6 have been recorded and summarized in Table 21.
Table 21. Data Analysis 13

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
</table>
| RO 3.a             | Q.4             | Does Cluster help in increasing productivity | Respondent M: ● Yes, clustering should help in increasing productivity  
Respondent N: ● Not sure about productivity but can help people to learn  
Respondent O: ● Yes, due to networking, entire supply chain is leveraged |

Table 22. Data Analysis 14

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
</table>
| RO 3.b             | Q.5             | Does Cluster help drive the pace of innovation | Respondent M: ● Yes, but to a small degree as in textile industry, it is difficult to be innovative  
Respondent N: ● Yes, it does help in innovation due to learning and sharing of ideas  
Respondent O: ● Yes, absolutely |

Table 23. Data Analysis 15

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Question Number</th>
<th>Issue</th>
<th>Interviewee Responses</th>
</tr>
</thead>
</table>
| RO 3.c             | Q.6             | Does Cluster help in start of new businesses | Respondent M: ● Yes, it does, for example non-wovens business  
Respondent N: ● Yes, it is a benefit for startups here as compared to anywhere else in the US  
Respondent O: ● Yes, NC would definitely be a preferred place for start ups. |
Summary: Overall, all respondents agreed that clustering increases productivity for companies, driving the pace of innovation, and in start of new businesses.

- Increase in productivity

According to one respondent, clustering should definitely help in increasing productivity, and the reason for this is the readily available resources. The NCRC is a classic example where clustering has helped in the growth of this industry and its productivity over the past few years. Also, productivity is directly related to the spread of knowledge which does take place inside the cluster due to spread of learning. Networking which increases the efficiency of the supply chain, is a major benefit of clustering, and this directly increases the productivity of companies.

- Increase in pace of innovation

According to one of the interviewees, it is difficult to innovate in the textile industry. Maybe in some niche segments like medical textiles, innovation does take place. Fair bit of innovation done by universities is definitely taken up by companies. Another interviewee added that pace of innovation increases due to the mutual sharing of new concepts and ideas amongst cluster entities. According to another interviewee, one thing that slows down the pace of innovation is not having resources nearby.

- Start of new businesses

According to the respondents, start of new businesses is definitely a benefit of clustering. Many new non-wovens companies have come up due to the already existing cluster in this area. Another interviewee added that it is more probable that new businesses would start here
than anywhere else in the country. This is attributed to the already existing resources, industries and like-minded people in the industries. Also, in terms of economic development, North Carolina would definitely be a preferred place to start a company, according to another interviewee.

**Phase III: Creation of Conceptual Model**

Phase III comprised of creating a conceptual model in order to depict the inter-relationships between the various entities within the ‘creative-innovative’ textile and apparel cluster of North Carolina. This phase utilized data from Phases I and II (all three groups of interviewees), and addressed RO4.

**RO4: Develop a preliminary conceptual model to depict the inter-relationships and benefits, if any, which firms of the creative/innovative cluster, are receiving.**

**Initial Model:** The initial model was developed on the basis of Michael Porter’s Cluster Theory, and stated that a collaboration between various entities within a geographical cluster helps in bringing economic advantages to the cluster. He called these entities ‘Institutes for Collaboration’ (IFC’s) and stated that these IFCs help in a cluster through:

1. Conducting exchange of information and technology
2. Facilitate joint activities
3. Foster the coordination among firms in the cluster
This theory was applied to the textile and apparel cluster and a preliminary model depicting the IFCs for North Carolina, the synergies that could exist between them.

This model has been depicted in Figure 22.

Figure 22. Preliminary conceptual model

This model depicted the idea of inter-relationships existing between various IFCs in the cluster. The entities that were identified at the initial stage of the study were companies/firms, Government, Universities, and Auxiliaries. However, the nature of interrelationships between these entities was not known. Knowledge of cluster theory from Phase I and primary data gathered through Phase II helped in modifying this model. New entities which were brought out through industry interviews and comments as well as suggestions from the respondents were incorporated into the new model.
New Model developed in Phase III

The new model as depicted in Figure 23 was developed after data collection in Phases I and II. The model was developed keeping in mind the responses from different groups of interviewees and their views on the creative-innovative cluster. The result was the idea of a ‘North Carolina Creative-Innovative Textile and Apparel Cluster’ which is a separate and
individual entity, promoted as a centralized organization with the various participants as shown in the model. Majority of the respondents stated that more formal and concrete efforts need to be made to establish and sustain this cluster. The major participants and contributors to the cluster would be the companies, universities (e.g. College of Textiles) government, and textile organizations like AATCC, TC2, Cotton Incorporated, INDA, etc. The government can help by providing financial support to cluster entities (companies, universities) for creative/innovative endeavors. The presence of an ‘incubator’ in this cluster could be very helpful. An incubator would mean an actual physical location which has representation from companies all over the state involved in different stages of the supply chain. This incubator would act as a common location for leveraging innovation.

Another aspect of the cluster would be the development of a design-innovation center, which would be a physical space devoted to university-industry collaborative projects solely dedicated to new product development and innovation.

Textileconnect, which is an initiative by the College of Textiles and the NC Department of Commerce, was recognized as another major component of the cluster, which offers an excellent source of networking for all cluster entities. Networking is the key word for the growth and sustenance of the cluster.

Therefore, although the different cluster entities as shown by surrounding bubbles in the Figure 23 exist, the driving force is essentially the “North Carolina Creative-Innovative Textile and Apparel Cluster”, as shown by the central bubble. Promotion and sustenance of this cluster, according to cluster entities, could prove to be a source of economic advantage for the state.
Thus, this chapter included the data analysis in Phases I and II in order to develop and modify the preliminary model into a conceptual model which summarizes the idea of a creative-innovative textile and apparel cluster in the state of North Carolina. The conclusions, implications and recommendations from the researcher can be found in Chapter 5.
CHAPTER 5

Conclusion Implications and Recommendations

The purpose of this study was to examine whether the benefits as stated by Michael Porter in his Cluster Theory are being realized by firms in the textile and apparel creative-innovative cluster in the state of North Carolina. The study consisted of a three Phase approach in order to address the Research Question and Research Objectives.

Research Questions

RQ1: Are firms in the cluster receiving the economic benefits proposed by Porter?

Research Objectives

RO1.a: To understand the cluster theory.

RO1.b: To define the creative-innovative cluster in North Carolina (Piedmont Triad).

RO2: Identify major players in the creative/innovative community in the Piedmont Triad region, including companies, university and auxiliaries.

RO3: To understand the economic benefits being realized by firms in the creative-innovative cluster
RO3.a: To examine whether being part of the cluster drives the pace of innovation as suggested by Porter

RO3.b: To examine whether being part of the cluster increases productivity as suggested by Porter

RO3.c: To examine whether being part of the cluster stimulates the formation of new businesses as suggested by Porter

RO4: Develop a preliminary conceptual model to depict the inter-relationships and benefits, if any, which firms of the creative/innovative cluster, are receiving.

In Phase I, a taxonomy of existing literature on cluster theory was compiled to understand the phenomenon of clustering as put forth by various researchers. Phase II employed interviews with three groups of representatives: companies, government and auxiliaries and university. This was done to understand their perception on the theory of clustering with respect to the state of North Carolina, and find out their views and suggestions regarding this ideology. Lastly, Phase III developed on Phases I and II in order to create a conceptual model depicting the interrelationships among cluster entities in the textile and apparel cluster. Since the study examined the creative-innovative potential in the textile and apparel industry, companies were chosen based on whether they had in-house design/product development activities. Other study participants were chosen through purposeful sampling and faculty recommendations for appropriateness to be included in the study.

This study was carried out in order to ascertain the validity of Michael Porters theory via conducting primary research. It examined the phenomenon of clustering from three different
perspectives: companies, government and auxiliaries and university, in order to gather a multidimensional perspective of the textile and apparel cluster, as all of these entities were found to be an integral part of the cluster. Most importantly, the study was carried out to find out whether any economic benefits are being realized by sustaining and promoting the idea of a creative-innovative textile and apparel cluster. This research provides a foundation for future research to examine the clustering aspect for other regions of North Carolina, which were not included in the study, but have creative potential in the textile and apparel industry.

Summary of Findings

The findings of the study have been reported to address each Research Objective and have been summarized below.

Research Objective 1.a: To understand the cluster theory

The concept of clustering has been known to exist over many years, and various studies have been carried out by various researchers on clusters throughout the world. It has been known through research that industry-collaborations, transfers of knowledge, and relationships with non-business institutions contribute to the economy of a region (Baptista, 1996; Porter, 1998; Kuah, 2002; Schoales, 2006). With relation to innovation, it was learned through industry interviews that in clusters, it is a collective endeavor with a combined effort by a network of regional participants like suppliers, customers, universities, research institutes, government and the companies. According to industry experts, specialization of neighboring regions in the same technology is a major factor for more innovation in clusters. Clustering also offers many advantages for small businesses, or for the start of new businesses. Researchers across
the world have studied how geographical clusters enhance the productivity and growth of firms. Relationships and linkages are important for managing the value chain and competitive success (Baptista, 1996; Porter, 1998; Kuah, 2002; Schoales, 2006).

Research Objective 1.b: To define the creative-innovative cluster in North Carolina

Since the concept of a creative-innovative textile and apparel cluster in the state is not a fully established one yet, no fixed definition exists for it. The definition can vary from person to person, profession to profession, and from one segment to another in the same industry. Broadly, the activities in companies which can be termed creative or innovative are product development, design, marketing, brand management, research and development. On an average, these activities constitute 20-30% of a company’s activities. Companies which have in-house innovation and creativity like design/product development, can be said to be a part of this creative-innovative cluster.

The cluster however, is not only composed of companies and firms, but other entities in the state which act as auxiliaries. The creative energy in the state is contributed to not only by private companies, but also key textile organizations and colleges having textile and apparel related programs. These include textile organizations like Cotton Incorporated, AATCC, TC2, INDA, ITT and colleges like the College of Textiles at NC State University. The government also has an important role to play due to their textile-related initiatives. The combination of industrial firms, above mentioned textile associations, the government and the College of Textiles can be said to be a textile and apparel cluster within the state of North Carolina.
Research Objective 2: Identify major players in the creative/innovative community in the Piedmont Triad region, including companies, university and auxiliaries

The creative/innovative community in the state includes a wide array of entities including companies, government, textile associations and colleges. With respect to companies, according to respondents, the major players in the community are defined by supporting industries like yarn producers, dye and chemical manufacturers, finishers, etc. One of the important industries in the state is that of home furnishings, with related companies located around High Point, NC. For such an industry, the major players in the community would be other companies in this segment of the industry, along with their suppliers as well as customers.

This concept also depends on the size and nature of the company. Some companies have not been part of or have not experienced any sort of collaboration in the past, and therefore, for such companies, defining major players in the cluster is more theoretical than in practice. Such companies would like to collaborations to take place in the future given the cluster concept. Also, according to some respondents, for small companies, government might not be as useful as government addresses issues for large companies. For such firms, universities and textile associations in the state would prove to be more useful due to presence of R&D, technology and resources.
Research Objective 3: To understand the economic benefits being realized by firms in the creative-innovative cluster

Being part of the creative-innovative textile and apparel cluster in the state of NC has certain benefits. Operating in a community environment can be a source of economic benefits for entities in the region. In the textile and apparel industry, occasional sharing of resources and technology is a big advantage for the companies in the state. The state has been known traditionally for the presence of textile and apparel industry. The entire value chain in the business, from fiber to yarn, is located in the state (recently however, manufacturing has shifted overseas). According to respondents, this location of companies and firms in various segments of the value chain is beneficial for the region due to close proximity to one another. The process of research and development is easier and more efficient due to closer geographical proximity as compared to outside which takes more time. Partnerships between companies and various organizations like AATCC, TC2, Cotton Inc., and INDA can help speed up the process of sharing new ideas.

Healthy competition among firms also aids in the process of innovation in the state. A company’s desire or effort to out-do its competitor would mean keeping itself up to the mark with respect to innovations in the industry. Many companies in the state are also taking efforts to collaborate in order to pool efforts and resources in order to maximize their profits. Another benefit of clustering seems to be the close location of customers for companies, which benefits their marketing and sales segments. For many of the companies, operating units are located at different places in the state, and this internal clustering of departments provides synergies for the company by promoting enhanced communication.
The ease and quick access without much travel time invested is another benefit which companies realize out of clustering. In addition, being close to the end user of the product makes it convenient to obtain real feedback and determine success rate of ideas and new products. The work environment in a cluster is collaborative and highly productive. The regional environment of living and working in a community provides an open and honest path of communication. This especially holds good for the home furnishings industry, which is centered around the Piedmont region.

Textile organizations and colleges are often used as testing grounds for new creative ideas. Certain companies have projects with the College of Textiles which are directly related to design and new product development in these companies.

A good example of clustering benefitting an industry is that of the nonwovens Industry. The growth and success of this industry has been largely driven by the collaborative efforts within the textile and apparel cluster of North Carolina. New patents have been out in the past few years and this has been a result of the industry working together with the university. Thus, the existing clustering of textiles and apparel entities in the state of North Carolina is a source of various benefits to the state.

*Research Objective 3.a: To examine whether being part of the cluster increases productivity as suggested by Porter*

The benefit of increase in productivity is viewed differently by different groups of people. From the point of view of companies, the productivity of companies does not seem to be effected much by the phenomenon of clustering. Productivity of companies, which often
have global services and part of their supply chain located at other places in the world, is really a measure of the sum total of the activities carried out everywhere, and not just in the state of North Carolina. However, long term productivity is could be said to have benefits due to being part of the cluster. According to respondents, productivity help comes from sharing resources and actual employees, equipment and know how. Training facilities in community colleges teach skills that are needed in the industry, which ultimately result in long term growth in productivity for companies.

This idea is agreed to wholeheartedly by the other two groups of representatives, namely auxiliaries and university personnel. The availability of resources, knowledge and technology is a major driver for growth in productivity of companies. Also, having the entire value-chain situated in close proximity helps in terms of saving time and efforts. There is a vision that productivity and profits could be increased for individual companies operating in a well promoted cluster. If properly supported and promoted, the employees would begin hearing positive things about their industry instead of weekly announcements of plant closings, layoffs, etc. The awareness of individual companies and what they offer could be increased in such a cluster, and therefore the potential for new customers and sales could possibly be realized. According to respondents in the study, being based in the center of customers, talent and production can contribute to companies becoming leaders in their segments, thus increasing sales and profitability. Also, networking inside the cluster helps in leveraging different activities all along the supply chain, which helps increase efficiency and therefore increases productivity.
RO3.b: To examine whether being part of the cluster drives the pace of innovation as suggested by Porter

Pace of innovation is different for different entities, and therefore, as for productivity, has mixed responses from different groups of people. The pace of innovation is to be able to do more product development, and come up with new ideas at fast pace. Collaborative efforts within the cluster help in combining ideas from different aspects of the industry.

Also, through higher recognition of being part of a well marketed cluster, the individual member organizations would experience peer pressure by other members to be the best that they can be, which makes them innovative. According to respondents, the other member groups like universities can help by student and faculty support to help with the company’s strategic objectives. They can help generate creative ideas and potential prototypes to foster innovation and new products. For example, NCRC has come up with many new patents and new technologies in the field by virtue of collaboration between the university and industry.

Also, new ideas within the textile organizations like TC2, Cotton Inc. are shared with companies in order to foster and develop the innovation. However, clustering seems to be just one factor for the pace of innovation among many others, such as the corporate culture of the organization, human talent, financial resources, technology, etc. Another factor which drives the pace of innovation is the marketplace.

Therefore, although clustering helps in the growth of the pace of innovation in many ways, it is just one of the factors, among many others. It would be a cumulative result of various different aspects to truly ascertain the pace of innovation.
Research Objective 3.c: To examine whether being part of the cluster stimulates the formation of new businesses as suggested by Porter

The start of new businesses is definitely affected by clustering. North Carolina has traditionally been known for its textile and apparel industry. The machinery, yarn, chemical, dye companies along with the work force is available in the state because the textile business has been here for 150 years. New businesses would benefit as they would not have to completely cross some of the development barriers that are faced by new businesses. Respondents stated that the development of new suppliers, technical supporters, etc. would be met easier with a true innovative cluster. New needs by existing companies might arise due to the close proximity, and new companies might be needed to respond to the request. Also, being close to other companies gives an advantage of knowing when businesses might be available to purchase or acquire, which provides a direct channel to grow ones business.

Clustering helps new businesses more than mature businesses, as being a member of a well marketed cluster would be a way for a company, particularly a new one, to become known. A very important factor which contributes to start of new businesses is the availability of an already trained work force in the state, which is highly specialized in the skills required for various processes in the textile and apparel industry. This would mean that a company would most likely prefer North Carolina as a place to start up as compared to other locations throughout the country. In terms of economic development, the Piedmont region would definitely be a preferred place to start a company. There are established companies from the world over who are looking to open offices and business units in and around the Piedmont region.
Apart from this, many new adjunct businesses have been started up in the state, for example, advertisement and marketing agencies which support the textile and apparel companies. Another example would be that of companies which make labeling for garments and textiles. Thus, the presence of a cluster does provide many advantages which attract new businesses to startup and grow.

*Research Objective 4: Develop a preliminary model to depict the interrelationships between different firms and economic benefits, if any, which firms in the creative/innovative cluster are receiving*

The textile and apparel cluster in the state of North Carolina receives several benefits by virtue of its entities situated in close geographical proximity to one another. A model for ‘textile and apparel creative-innovative cluster’ was developed in chapter 4.

The cluster can receive economics benefits by mutual sharing of resources between cluster participants. These include the companies, textile associations, colleges, and the Department of Commerce. The presence of this industry in the state over several decades, along with world-class facilities in research and development, design and new product development are unparalleled. Joint efforts and partnerships between these entities can bring economic benefits to the region. The government needs to address the needs of industries, big and small, in order to grow and sustain this cluster. Therefore, there seems to be a need for more concrete efforts and steps being taken in this direction to recognize and establish the cluster.
Conclusions

1. The textile and apparel cluster of North Carolina is a mature cluster and can be a source of economic advantage for the state.

2. Being part of the North Carolina Textile and Apparel cluster offers several benefits to the cluster entities.

3. Companies, Textile Associations and universities are major parts of the North Carolina Textile and Apparel Cluster.

4. The views about cluster benefits as put forth by Porter has different responses from different sets of people.

5. Increase in productivity is seen as a benefit by auxiliaries and university representatives but not as much by companies and firms in the state. The reason for this might be that companies place other factors higher than cluster participation for measuring the increase in productivity like marketplace, end consumers, etc. Textile associations and university, however, agree to it as for them, it is seen more as a vision for long term benefit.

6. Increase in pace of innovation is also seen more as a benefit by auxiliaries and university as compared to companies in the cluster. This might be due to the fact that textile associations and university are constantly involved in collaborative efforts for innovations and new product development. However, some companies might not have experienced any collaboration and therefore do not agree to it wholeheartedly. Also, in the textile and apparel industry, innovation is not very easy and does not occur at a fast pace.
7. Start of new businesses is seen as a benefit by all groups of people as over time, the textile and apparel industry in the state has been omnipresent, and also seen new businesses coming into the state due to already existing resources.

8. Government has an important role to play in the growth and sustenance of the cluster by providing financial aid for many types of creative-innovative endeavors and collaborative projects between companies, textile associations and university.

Implications

1. There is a need to advertise and promote the creative-innovative textile and apparel cluster of North Carolina. This could be done by branding and developing a special logo for the cluster, which would promote the region as an independent entity rich in technology, knowledge and resources in the textile and apparel industry.

2. Incubators and independent bodies like a ‘Design and Innovation Center’ need to be set up where universities, companies and textile associations can collaborate to develop new ideas and products.

3. Government should allocate funds for the purpose of sponsoring and promoting collaborative efforts within cluster entities.

4. Government should sponsor industry symposia to enhance cluster networking.

5. Initiatives like a ‘Textile Design and Innovation’ day could be celebrated at regular intervals of time to drive cluster entities to be innovative and creative continuously.
6. More networking initiatives like textileconnect should be promoted in order to enhance effective communication and sharing between cluster entities.

Recommendations

Future Research:

1. This study considered the 12-county region of the Piedmont Triad Partnership for selecting companies. One of the respondents declined to participate in the study due to the narrow scope of the project in terms of locations included. Therefore, this scope could be widened to include the entire state, and examine the clustering phenomenon for the Textile and Apparel companies situated all over the state.

2. Further research could also include quantitative data to support the findings the Michal Porter in his cluster theory, that is, examining numbers, facts and figures for companies in order to assess whether clustering helps in increasing productivity, pace of innovation and start of new businesses.

3. Future research could also extend this study to examine and assess whether and how clustering phenomenon exists in other states known for the textile and apparel industry like South Carolina, Georgia and Virginia.
REFERENCES


Institute for Emerging Issues.(2010). [www.emergingissues.org](http://www.emergingissues.org)


Regional Technology Services. (2007). Clusters of creativity: The role of the art’s and design in North Carolina’s economy.


APPENDICES
APPENDIX A

List of companies identified in the geographical clusters

1. ALAMANCE

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>FIRMS</th>
<th>Description</th>
<th>Location, Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Alexander Fabrics, Llp</td>
<td>Lace &amp; Warp Knit Fabric Mill</td>
<td>Burlington, NC</td>
</tr>
<tr>
<td>2.</td>
<td>Culp Inc</td>
<td>Manufactures broadwoven upholstery fabrics, mattresses and bedsprings</td>
<td>Burlington, NC</td>
</tr>
<tr>
<td>3.</td>
<td>Dynayarn USA LLC</td>
<td>Manufactures Women’s Hosiery; yarn processing mill</td>
<td>Graham, NC</td>
</tr>
<tr>
<td>4.</td>
<td>Elder Hosiery Mills Inc</td>
<td>Manufactures Hosiery</td>
<td>Burlington, NC</td>
</tr>
<tr>
<td>5.</td>
<td>Ferell Mfg Inc</td>
<td>Manufactures Women’s Hosiery</td>
<td>Graham, NC</td>
</tr>
<tr>
<td>6.</td>
<td>Glen Raven Inc</td>
<td>Manufactures spun synthetic &amp; manmade fiber yarns, trimming fabrics, manmade and synthetic fabrics</td>
<td>Burlington, NC</td>
</tr>
<tr>
<td>7.</td>
<td>Jeffries Socks, LLC</td>
<td>Manufactures Men’s, boy’s and girl’s hosiery</td>
<td>Burlington,NC</td>
</tr>
<tr>
<td>8.</td>
<td>Kayser-Roth Corp</td>
<td>Manufactures Women’s Hosiery</td>
<td>Burlington, NC</td>
</tr>
<tr>
<td>9.</td>
<td>Mebane Knitting Mills Inc</td>
<td>Manufactures Lace and Lace products</td>
<td>Burlington, NC</td>
</tr>
<tr>
<td>10.</td>
<td>Monarch Hosiery Mills Inc</td>
<td>Manufactures Men’s, boy’s and girl’s hosiery</td>
<td>Burlington, NC</td>
</tr>
<tr>
<td>11.</td>
<td>Pickett Hosiery Mills Inc</td>
<td>Manufactures Hosiery</td>
<td>Burlington, NC</td>
</tr>
<tr>
<td>12.</td>
<td>Special T Hosiery Mills Inc</td>
<td>Manufactures Socks, Women’s Hosiery</td>
<td>Burlington, NC</td>
</tr>
<tr>
<td>13.</td>
<td>Sue-Lynn Textiles Inc</td>
<td>Manufactures Panty hose</td>
<td>Haw River, NC</td>
</tr>
<tr>
<td>14.</td>
<td>TS Designs</td>
<td>Screen Printing of manmade fiber and silk</td>
<td>Burlington, NC</td>
</tr>
<tr>
<td>S.no</td>
<td>FIRMS</td>
<td>Description</td>
<td>Location, Address</td>
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</tr>
<tr>
<td>15.</td>
<td>Willowbrook Hosiery LLC</td>
<td>Manufactures Socks</td>
<td>Burlington, NC</td>
</tr>
<tr>
<td>16.</td>
<td>Spoonflower</td>
<td>Custom Printing</td>
<td>Mebane, NC</td>
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2. CASWELL

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<tr>
<td>17.</td>
<td>Royal Park Uniforms</td>
<td>Apparel Manufacturer, School Uniforms</td>
<td>Prospect Hill NC</td>
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</tbody>
</table>

3. DAVIDSON (LAKE NORMAN) Chamber

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<th>COUNTY</th>
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4. DAVIE

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<tbody>
<tr>
<td>18.</td>
<td>Avgol America, Inc.</td>
<td>Textile Manufacturing</td>
<td>Mocksville, NC</td>
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</table>

5. FORSYTH

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<th>Description</th>
<th>Location, Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.</td>
<td>Champion, Hanes Brands Inc</td>
<td>Athletic wear</td>
<td>Winston-Salem, NC</td>
</tr>
<tr>
<td>20.</td>
<td>Hanes, HanesBrands Inc.</td>
<td>Hoseiry</td>
<td>Winston-Salem, NC</td>
</tr>
<tr>
<td>21.</td>
<td>Lantal Textiles</td>
<td>Transportation Textiles</td>
<td>Rural Hall, NC</td>
</tr>
</tbody>
</table>
6. **GUILFORD**

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<th>Description</th>
<th>Location, Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.</td>
<td>Wrangler, VF Corporation</td>
<td>Jeanswear</td>
<td>Greensboro, NC</td>
</tr>
<tr>
<td>23.</td>
<td>Nautica, VF Corporation</td>
<td>Clothing and Apparel</td>
<td>Greensboro, NC</td>
</tr>
<tr>
<td>24.</td>
<td>Unifi Inc.</td>
<td>Textile Manufacturing</td>
<td>Greensboro, NC</td>
</tr>
<tr>
<td>25.</td>
<td>Se7en LLC</td>
<td>Jacquard and woven fabrics</td>
<td>Gibsonville, NC</td>
</tr>
<tr>
<td>26.</td>
<td>Valdese Weavers</td>
<td>Upholstery Fabrics</td>
<td>High Point, NC</td>
</tr>
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</table>

7. **MONTGOMERY**

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<tbody>
<tr>
<td>27.</td>
<td>Capel Rugs</td>
<td>Carpet and rug manufacturing</td>
<td>Troy, NC</td>
</tr>
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8. **RANDOLPH**

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</thead>
<tbody>
<tr>
<td>28.</td>
<td>Acme McCrary</td>
<td>Women’s Hosiery</td>
<td>Asheboro, NC</td>
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9. **ROCKINGHAM**

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11. SURRY

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12. YADKIN

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APPENDIX B

List of Questions for Interviews

Group 1: Company Representatives

1.a. How do you define the ‘creative/innovative cluster’ with respect to the textile and apparel industry?

2.a. Which entities, according to you, are parts of this ‘creative-innovative cluster’ in the state of North Carolina?

3.a. Would you consider your company to be a part of this ‘creative-innovative cluster’?

4.a. What are the activities that you will term as ‘creative-innovative’ in your company? What percentage of activities in your company’s operations in North Carolina would you attribute to ‘creativity/innovation’?

5.a. What are the benefits, according to you, of being part of this cluster?

6.a. How do you think being part of the cluster has helped increase the productivity of your company with respect to operations in the state of North Carolina? How do you think this affects your company’s global services, if any?

7.a. How would you define the ‘pace of innovation’? In what ways do you think being a part of the cluster drives the pace of innovation in your company?

8.a. In what ways do you think being part of the cluster aids in the start of new businesses?

9.a. What do you think should be done in order to foster the growth of the cluster in
the state, and what needs to be done for its sustenance?

10.a. What are the types of auxiliaries (e.g. universities, government) that you think aid in the dynamics of the cluster?

**Group 2: Government and Auxiliaries**

1. b. Do you think NC has enough creative potential in the textile and apparel industry to be considered as a cluster?

2. b. Do you think further developing the creative cluster in the textile and apparel industry can be a source of economic advantage for the state of NC?

3.b. Do you think sufficient efforts are being taken to foster the development of this cluster?

4.b. How do you think the textile and apparel companies, government, auxiliaries and university can help in the sustenance of the cluster?

5.b. Do you think being part of the cluster has helps increase the productivity of a company?

6.b. Do you think being part of the cluster drives the pace of innovation in a company?

7.b. Do you think being part of the cluster aids in the start of new businesses?
**Group 3: University Representatives**

1. c. Do you think the various universities in the state like NCSU make a contribution to the creative cluster in the textile and apparel industry? If so, how?

2. c. How do you think the facilities and resources available at the college can help the industry people in their creative/innovative endeavors?

3. c. What steps do you think should be taken by the government to encourage more collaborative efforts between the universities and industries in the cluster?

4. c. Do you think being part of the cluster has helps increase the productivity of the company?

5. c. Do you think being part of the cluster drives the pace of innovation in a company?

6. c. Do you think being part of the cluster aids in the start of new businesses?
APPENDIX C

IRB Approval Letter

From: Debra Paxton, IRB Administrator
North Carolina State University
Institutional Review Board

Date: November 18, 2009

Project Title: Analysis of Creative-Innovative Cluster in the NC State Textile and apparel Complex
IRB#: 1197-09-11

Dear Aarti Patil:

The research proposal named above has received administrative review and has been approved as exempt from the policy as outlined in the Code of Federal Regulations (Exemption: 46.101. b.2). Provided that the only participation of the subjects is as described in the proposal narrative, this project is exempt from further review.

NOTE:
1. This committee complies with requirements found in Title 45 part 46 of The Code of Federal Regulations. For NCSU projects, the Assurance Number is: FWA00003429.

2. Any changes to the research must be submitted and approved by the IRB prior to implementation.

3. If any unanticipated problems occur, they must be reported to the IRB office within 5 business days.

Please provide your faculty advisor with a copy of this letter. Thank you.

Sincerely,

Debra Paxton
NCSU IRB