From Traditional to Interventionist Economic Development: Implications for Upstate South Carolina

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Committee Chair: Heike Mayer, Ph.D.
Committee Member: John Provo, Ph.D.
Committee Member: Jesse Richardson, J.D.
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Abstract

Regions throughout the United States and the world appear to be weighing non-traditional economic development strategies as globalization and increased competition diminish local developers’ success of maintaining companies through locational incentives (Clarke and Gaile, 1998). Upstate South Carolina has been well known for its heavy reliance on incentive based economic development. Though challenges persist, recent research has shown that the Upstate is developing alternative economic development strategies that utilize and encourage nongovernmental actors to spur local innovation. A thorough analysis of the traditional and recent methods and strategies will provide valuable insight into the evolution of economic development techniques into more technology-based policies. Such results may provide practitioners with knowledge of what economic development practices look like over time in a region well known for “smokestack chasing”.

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I. Introduction

In many regions, economic development incentives have been forced to evolve to accommodate the increased competition of the global market. This has created a challenge for some areas, such as the Upstate of South Carolina, that have focused heavily on recruiting large, multinational corporations as a dominant economic development strategy. As research by Clarke and Gaile (1998) has shown, traditional economic development strategies that promote “smokestack chasing” over local innovation and development are not sustainable. Large national and international companies can be lured away by jurisdictions with better incentive packages. Conversely, regions that invest in local companies and focus on diversifying the economy are better protected from recessions and global competition.

Shortly after the Civil War, the state and region put greater political effort into building the industrial sector and increasing manufacturing throughout the state. During this period, the textile mills of the Upstate began to flourish and dominated the industrial sector for most of the twentieth century (Eelman, 2004). However, just as most of the manufacturing regions of the United States lost textile mills to overseas competition, the Upstate experienced steady manufacturing job losses from the Great Depression forward. When Michelin’s U.S. based headquarters entered the Upstate in 1972, the local industry gradually changed from textile to automotive manufacturing. Furthermore, even though the state continued to experience a -.75% decline in manufacturing employment between 1980 and 2001, transportation equipment manufacturing employment rose by 12% (Bureau of Labor Statistics). Economic developers soon began focusing on building the auto manufacturing cluster. The Upstate used an enormous amount of incentives to lure BMW in the early 1990s, including over $130 million in discounted land, cash, capital projects, and tax credits (Miller 2006). Additionally, until the 1995 Enterprise
Zone Act, a statewide incentives package was not available for small businesses, as most financial support was reserved for recruiting large corporations (“A Small Business Owners”, 2009).

However, in the beginning of the century, the Upstate’s economic development strategies began to shift to include recruitment of high-tech firms, both small and large, that fit the industrial areas growing in the region. Increased collaboration between public-private organizations and public economic development officials became more necessary to recruit the appropriate businesses, as third-party firms were able to provide the market research and industry analysis needed for recruitment. Additionally, these organizations were useful in spurring local entrepreneurship in high-tech fields, as the manufacturing-based region needed a more diversified local economy.

The Upstate also encouraged the research and development potential of the region by promoting the partnership of BMW and other leading industries with research centers at Clemson University. Clemson’s International Center for Automotive Research (ICAR) campus, as well as state-sponsored research centers in Anderson County, are primarily responsible for the innovation that has occurred in the Upstate in the past decade. Government officials recognized that collaborative partnerships with the private sector was essential in 1) encouraging local industries to develop local ties to the Upstate, and 2) producing high-quality research and innovation.

Therefore, this paper demonstrates how economic development strategies have evolved to better utilize nongovernmental organizations and partnerships to increase economic development potential within the Upstate. Interviews with economic developers indicate that the local
incentive strategies have remained largely unchanged, though the recruitment methods have become more strategic, and officials have become more involved in entrepreneurship and R&D.

Some economic developers contribute the regional success to the efforts of the private sector and Clemson University, since these actors took an assertive role in increasing the economic development potential of the Upstate through research and innovation partnerships (Personal Communication, April 3, 2009). Nevertheless, the leadership has since highly encouraged and supported these partnerships by founding intermediary organizations to assist with commercialization, technology licensing and other basic necessities of high-tech startups.

In conclusion, the technology-based economic development methods have become more effective through the support of many individual actors. The region has improved greatly in the number of opportunities available for entrepreneurs, researchers and industry leaders. However, challenges still exist, such as the lack of venture capital in the Upstate, compared to neighboring North Carolina and Georgia. Limited funding is a significant concern for economic developers wishing to continue support of high-tech innovation and development projects (Personal Communication, April 3, 2009).

The Upstate, with its rich, longstanding history in manufacturing, would provide a useful case-study for similar regions hoping to diversify the local economy. The region has improved in many facets, though it still faces realistic challenges that may require more assistance on the local and state level. This paper will provide specific information on the types of technology-based economic development methods being used in the upstate, the organizations and educational institutes involved in the economic development process, as well as governance structure in each level of development. It will conclude with suggestions for practitioners.
II. Methodology

In order to conduct sufficient research for the scope of this paper, academic articles were consulted to outline evolutionary economic development policies and why they are important to traditional regions in a globalized, competitive environment. Then a regional analysis of the manufacturing industry was conducted to determine how historical policies and incentives have shaped present economic development methods in the Upstate. In order to better understand which technology-based programs and partnerships currently exist in the region, The State Science and Technology Institute’s (SSTI) State and Local Story Index was consulted. This database opened up many other search opportunities with a long list of interrelated organizations that are focused in economic development and technology innovation in the region. Finally, interviews were conducted with four significant industry and public leaders that play a consistent role in community and economic development in the Upstate. Meetings were conducted with the Spartanburg Chamber of Commerce, BMW, The Greater Area Development Corporation and Upstate Alliance. The interviews were necessary to better understand how the government, public and private entities work together to establish an economic development agenda for the region. The results of these interviews were incorporated into the findings section of the paper.

III. Literature Review

The economic development “wave” theory proposed by Clarke and Gaile (1998) offers a broad understanding of the natural evolution in economic development strategies that has taken place in regions across the United States. Since the authors’ publication in the late 1990s, there has been a substantial amount of research underlying the importance of technology-based
economic development strategies to regional growth (“PEW Center on the States”, 2007; “A Resource Guide for Technology-based Economic Development”, 2006). Some of these high-tech strategies were still recognized in Clarke and Gaile’s research, such as the more globally competitive economic development practices of the 1980s. However, more recently, economic development practitioners have needed to develop even more innovative strategies as competitive regions, such as the Silicon Valley, are maximizing their economic development potential through university/industry/governmental collaborations. Thus, the traditional method of “smokestack chasing”, or the linear approach to investing only in recruiting large, profitable companies, is not sufficient to compete with the more strategic, technology-based methods of economic development.

The literature review will outline the four waves proposed by Clarke and Gaile (1998) and will subsequently underline the importance of increased governmental intervention in fostering technology-based economic development (TBED) practices necessary for economic growth. The following table is provided to break down the four waves by economic development methods, existing actors, governance and nature of governmental involvement. It is useful to note that each of the waves are not mutually exclusive, but rather compliment and build upon one another as the economic development strategies become more complex.
Table 1: Overview of Clarke and Gaile’s Four Waves of Economic Development Strategies

<table>
<thead>
<tr>
<th>Wave 1</th>
<th>Method</th>
<th>Actors</th>
<th>Governance</th>
<th>Government Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidization of production costs</td>
<td>Governmental leaders</td>
<td>Government controls economic development strategies</td>
<td>Positive business environment: Low taxes, relaxed environmental legislation, Banning of Unions</td>
<td></td>
</tr>
<tr>
<td>Locational Incentives: low-interest financing, tax credits, abatements, exemptions, etc</td>
<td></td>
<td>No use of non-public entities for economic development</td>
<td>Little governmental interference on market</td>
<td></td>
</tr>
<tr>
<td>Standardized economic development strategy</td>
<td></td>
<td></td>
<td>Government decisions catered to private sector needs</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Wave 2</th>
<th>Method</th>
<th>Actors</th>
<th>Governance</th>
<th>Government Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrepreneurial incentives: entrepreneurial development strategies (incubators, loans to expanding businesses and local firms)</td>
<td>Governmental Leaders</td>
<td>Government controls economic development strategies</td>
<td>Increased risk taking by government leaders through investing in markets with potential for high growth</td>
<td></td>
</tr>
<tr>
<td>Shift in focus from recruiting to retaining existing businesses</td>
<td></td>
<td>No use of non-public entities for economic development</td>
<td>Greater governmental influence on market to reduce imperfections and encourage new economic activity</td>
<td></td>
</tr>
<tr>
<td>Fund and assist businesses that contribute to a specific market segments that adds sustainable economic value to the community (that might otherwise be overlooked by private investment groups due to market deficiencies)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Wave 3</th>
<th>Method</th>
<th>Actors</th>
<th>Governance</th>
<th>Government Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on creating new enterprises instead of only protecting</td>
<td>Governmental Leaders</td>
<td>Greater freedom for local officials to use market based policy tools- not confined to specific organizations</td>
<td>Priority to maximize rates of return in the market through greater intervention</td>
<td></td>
</tr>
<tr>
<td>Utilize both public and private funds for leveraging instead of relying too heavily on just one</td>
<td></td>
<td></td>
<td>Risk seen as necessary for investment, not risk-averse</td>
<td></td>
</tr>
<tr>
<td>Utilize private organizations and public-private partnerships as a way to spur economic development</td>
<td></td>
<td></td>
<td>Allow public-private organizations more control in leading economic development programs; reduce bureaucracy</td>
<td></td>
</tr>
<tr>
<td>Offer incentives on a case-by-case basis rather than through traditional standardized method</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Wave 4</th>
<th>Method</th>
<th>Actors</th>
<th>Governance</th>
<th>Government Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengthen human capital: encourage innovation and commercialization in the universities; develop high-quality workforce through job training and city/college partnerships</td>
<td>Governmental Leaders</td>
<td>Partnerships highly encouraged: University-Industry/ University-Industry/ Public-Private</td>
<td>Governments have an “interventionist” role and attempt “differentiated approaches to development” by employing more progressive economic development policies</td>
<td></td>
</tr>
<tr>
<td>Integrate economies into the global market: international development planning, foreign trade zones, export promotion, sister cities</td>
<td>Public-Private Economic Development Organizations</td>
<td></td>
<td>Greater concern to disperse economic benefits equitably among the region</td>
<td></td>
</tr>
<tr>
<td>Improve telecommunication potential: build fiber-optic networks; allow public access to the internet; extend telecommunication access to low-income areas</td>
<td>Private Businesses</td>
<td></td>
<td>Riskiest strategies for governments, but risk is slightly reduced with private financial and technical support</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Universities and Community Colleges</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The traditional economic development strategies utilized in the first wave have not been abandoned. Many regions still use low-interest financing and tax credits to encourage companies to relocate to the region. However, first-wave strategies tend to employ standardized methods of economic development, meaning that practitioners are less likely to have an individualized plan for recruiting companies. Often large companies offering high employment are the prime targets for recruitment. First-wave strategies also utilize policies that decrease corporate expenses. For example, the practice of relaxing environmental regulations and banning unions may increase a company’s net income. Additionally, localities tend to allow private businesses to operate freely without much governmental intervention (Clarke and Gaile, 1998).

First-wave policies are not particularly focused on encouraging innovative growth. The primary strategy of these policies is to continuously recruit companies with large employee bases to ensure steady economic development from property taxes and commercial sales. However, these methods aren’t “sticky” in the respect that large, national or international companies do not have an obligation to remain in the region and may be lured away by other governmental sectors that offer greater incentives. Additionally, these locational incentives alone do not encourage companies to invest in the local workforce or to create innovative collaborations with universities and nongovernmental organizations in the region. Strategies involved in the more interventionist methods contribute to entrepreneurism and human capital and are more likely to create the “sticky” workforce needed for sustainable economic growth.

Second-wave strategies focus more directly on building economic development locally, with less concern for business recruitment. Generally, these efforts are more entrepreneurial in
nature than the traditional policies. The government attempts to reduce market inefficiencies by connecting potentially successful entrepreneurs to private-sector funding sources. In doing so, the government is able to facilitate the growth of startup companies that contribute to growing commercial niches within the region. Additionally, governmental organizations may collect and manage market data, especially information regarding growing industry clusters in the region, to assist private investors in making informed lending decisions (“A Resource Guide for Technology-based Economic Development”, 2006).

Methods in the second-wave aim to 1) retain businesses that already exist in the region and help them to expand by offering financial assistance, 2) target specific market segments for investment, 3) provide adequate and affordable facilities for startup companies, 4) organize networking events and opportunities for entrepreneurs, 5) establish small business development centers, 6) offer comprehensive assistance programs that provide both technical and financial assistance for local businesses. These methods are typically riskier than first-wave strategies since an economic return may not be observed immediately. However, they are more likely to provide the basic resources necessary to survive the critical first years of business. Second-wave strategies are most critical for high-tech business startups.

The local government leaders are the primary actors involved in wave-two strategies. They are heavily involved in providing financial assistance to emerging and expanding businesses, as well as in creating incubators, hosting events, and offering technical support needed for physical assistance. The more strategic methods of the third and fourth-waves utilize the same programs with an extended network of actors, including universities, nonprofits, and private companies. Additionally, local and state governments in the 1980s (around the time when wave-two strategies were most popular) typically used a linear approach of investing money
directly into the universities for research and development. As will be mentioned in the strategies of the next two waves, governments have since increased investment in statewide research and development programs, as well as industry-university partnerships. These collaborative efforts are an important component of successful TBED strategies (“PEW Center on the States”, 2007).

Economic development strategies in the third-wave use the same methods to nurture fledgling businesses, but focus on creating new enterprises over protecting existing businesses. Third-wave strategies require greater management of the market since the primary focus is to maximize return. Additionally, the government is much more risk-tolerant and uses individualized economic development decisions (rather than standardized decisions) to invest in and assist innovative companies (Clark and Gaile, 1998).

Governments utilizing third-wave strategies typically employ public-private organizations to facilitate successful economic development projects. This method reduces the amount of money lost in bureaucratic processes, as well as encourages private sector organizations to play a greater role in the planned economic growth of the region (Clark and Gaile, 1998). Public-private economic development organizations are also influential in coordinating regional partnerships, which may alternatively reduce the negative effect of parochialism on regional economic development efforts.

Therefore, third-wave strategies are more effective when implemented through governmental and nongovernmental actors. Likewise, the governance structure begins to shift from complete control by the local and state authorities (in the first two waves) to more responsibility given to nongovernmental leadership to facilitate economic development projects. (Clarke and Gaile, 1998).
Strategies in the fourth-wave are described by Clarke and Gaile (1998) as “interventionist” and constitute “differentiated approaches to development” (Clarke and Gaile, 1998, P. 181). Generally, they are similar to the more high-tech methods employed by TBED organizations, though these organizations have further developed innovative economic development strategies since Clarke and Gaile (1998) conducted their research in the late 1990s.

Clarke and Gaile (1998) propose that methods in the fourth-wave primarily address projects involving human capital development, global market facilitation, and advanced telecommunications. These strategies are designed to create long term economic development solutions that are also beneficial to the entire community. For example, incubators are useful tools in developing human capital, but youth internship programs and job-training centers also offer opportunities for local residents to advance professionally.

Other examples of methods that build human capital include city/college job-training and entrepreneurial programs, school-to-work programs, and technical services to aid in job-training (online tutorials, software packages, etc.). Similarly, universities and local colleges are utilized to tie the local community into the global market through providing internationally oriented educational programs, research centers and events. A few examples of policies that incorporate local businesses into the global market include: export promotion, sister cities, trade missions abroad, and foreign trade zones (Clarke and Gaile, 1998).

Finally, advanced telecommunications related policies include the use of fiber-optic networks, public access to Internet resources, and other types of services for low-income residents (Clarke and Gaile, 1998).
TBED organizations have employed additional methods for building research and development and human capital. These include: 1) strategies to prepare universities to lead the community in knowledge-based economic development, 2) utilization of university-industry research centers, 3) eminent scholars programs (to attract world-class faculty researchers), 4) industry-university matching grants, and 5) university technology commercialization centers and programs (“A Resource Guide for Technology-based Economic Development”, 2006).

The first method is most efficiently addressed through: investing in key research areas that are both vital to regional economic growth and competitive on a national and global level; recruiting world-class faculty members (who are often responsible for discovering high-tech R&D); encouraging and rewarding relationships between key faculty and entrepreneurs; and ensuring the proper infrastructure and technical support exists to market valuable research (which may require investment from multiple funding sources) (“A Resource Guide for Technology-based Economic Development”, 2006).

Furthermore, university-industry research centers provide an engaging environment for high-tech research and collaboration, but also require consistent work on the part of all participating actors to make the research center successful (“A Resource Guide for Technology-based Economic Development”, 2006). These actors often include faculty members, industrial partners, graduate students, commercialization experts, public figures and other educational leaders. The centers are often funded through matching programs, public sector funds, donations and other miscellaneous organizations. Industry-university matching grants often provide sustainable economic development programs that further encourage collaboration. These funds may be distributed through government programs, private economic development groups or university research centers. The role of the host organization is to locate
researchers/entrepreneurs that match the technology to be developed or commercialized, and then provide funding and technical assistance to further develop the partnership. Similarly, some states provide centers of excellence that match universities to industries for large research and development projects. For example, these states may offer a predetermined amount to a university research department and require that the university staff locate an equal amount of private investment from external industries or organizations. This activity further encourages the involved actors to seek out partnerships outside of the organization to accelerate successful commercialization projects (“A Resource Guide for Technology-based Economic Development”, 2006).

In order for human capital building programs to be successful, multiple actors from a diverse number of organizations, sectors and educational entities must be actively involved. Additionally, these methods require more support from community leaders than any of the previously mentioned economic development strategies. Since the projects are larger in scope and have a greater impact on the entire community, they require greater support from residents and business leaders as well.

State governments take a greater responsibility in promoting research and development in the growing, high-tech industry sectors by focusing on technology centers and industry-university partnerships (“PEW Center on the States”, 2007). Therefore, the governance structure is different from the governance structure of the previous wave strategies. These regions are experiencing greater intervention by local and state governmental leaders, but are also led by private sector and university leaders initiating economic development projects. Thus, collaborative partnerships are more important than ever in facilitating high-tech R&D and economic growth.
The following quote summarizes the importance of high-tech economic development strategies in the global market:

An increasing number of states have moved from a linear approach that simply funds university research in hopes that such investments will eventually reap worthwhile returns, to new approaches that encourage public-private collaboration and focus on making competitive investments with greater accountability for results… But it can have a potent multiplier effect when governors use limited investments to bring together other players—notably universities, research institutions and the private sector—that are already putting in a great deal of money (“PEW Center on the States”, 2007, P. 12).

Therefore, it is important that governments encourage partnerships between universities and industries, and even more vital that state and local governments continue providing the financing that is needed to develop and spur new commercial products and high-tech research.

IV. Case Study

The manufacturing industry has played a vital role in the Upstate economy since the beginning of the 19th century. The area has been conducive to the industry due to its abundance in water, cheap land and government support for industrial manufacturing (Eelman, 2004). This section will discuss the earliest and most recent governmental efforts to lure giant manufacturers. For the purpose of discussing the historical, political and industrial landscape of the region, data for the Greenville and Spartanburg County MSA’s will be provided.

The manufacturing industry accounts for the highest level of employment in the Spartanburg MSA (23%) and the second highest in the Greenville MSA (19%) (American Community Survey: 2005-2007).
In the 1970s, during the period of Michelin’s relocation of its North American headquarters to the Upstate, most of the jobs in the region were dedicated to manufacturing (41.5%) and over half of all total manufacturing jobs in the state were located in the Upstate (Schunk & Woodward, 2000). While the Upstate was still heavily involved in textile manufacturing in the 1970s, Michelin was the first major auto manufacturing company to enter the region.
The region’s heavy involvement in manufacturing has been influenced greatly by political efforts to encourage this type of industrial development. Specifically, during the civil war era and the Reconstruction, the agrarian based Upstate experienced a “change in political economy that resulted in greater state support for industry and an increased awareness of the exigencies of a diversified economy” (Eelman, 2004, P. 99). The development of the rail line had a significant effect on the increased industrial activities, as the South utilized the opportunity to better compete with the more industrial North.

In 1950, the Chamber of Commerce (of both Greenville and Spartanburg) began recruiting suppliers to relocate in the region in order to serve the textile mills that currently dominated the industrial base (Miller, 2006). They did this by providing training to local technical colleges and encouraging partnerships among the groups to strengthen innovation. Additionally, Richard Tukey of the Spartanburg Chamber of Commerce was a key player in attracting foreign interest, both in the form of investment and firm relocation. Tukey, and many other Upstate leaders, advertised the region as favorable to firm needs, including discounted or eliminated property taxes, cheap land and labor, state-sponsored training facilities, abundant water and protection from unionization (Miller, 2006).

Other business leaders were influential in marketing the Upstate as a manufacturing region and a place lucrative to outside firms. Charles E. Daniels played an important role in recruiting 400 industrial plants from the North in the 1960s, over half of which landed in South Carolina. Daniels owned Daniels Construction Company and was contracted by the government to develop the Greenville Army Air Base. Once the project was completed, Daniels teamed up with Roger Miliken and J.P. Stevens and Company to revitalize the textile mills of the South to increase operation for their Northern customers (Canup, 1981). Miliken was also influential in
encouraging textile suppliers in Germany and Switzerland to relocate to the Spartanburg region in the 1950s (Kanter, 1995).

Traditionally, the region struggled with parochialism among the adjacent counties as manufacturing began to grow. In most cases, local governments are responsible for raising the majority of the budget from local taxes. Since businesses raise a substantial means of revenue and are less costly to the county in terms of social services, economic developers have fought strongly to recruit large firms. Even as recent as 2006, Miller observed that the Upstate faced similar challenges to practicing regional economic development: “Some elected officials want to micromanage the economic development staff and often insist that a company locate in their jurisdiction rather than another part of the region that would make sense for the whole region” (Miller, 2006, P. 116). These parochial issues will be revisited in the findings section of the paper.

**Introduction of BMW**

Economic developers in the Upstate fought strongly to encourage the German based company, BMW, to relocate to the Spartanburg site in 1994. The incentives used were very similar to the historical methods preferred by Tukey, including tax relief and cash rewards, infrastructure development, and discounted land. The region also marketed its “international friendliness” and pro-business development plan to recruit the German automaker.

BMW was lured to the Upstate with over $130 million worth of industrial incentives, which included everything from capitol projects (runway extensions, new roads) to free land and cash (Miller 2006). The state also offered $71 million in tax breaks for 20 years. Overall the incentives would cost the county “$73,400 per job for the 1,768 employees that BMW estimated
it would hire” (Rondinelli & Burpitt, 2000 P. 183). The state also invested in a $40 million project to extend the runway of the Greenville-Spartanburg airport, which is located near the new plant (Ady, 1992).

Additionally, the region offered a special incentive to the auto-giant in providing a pre-trained labor pool and educational facilities for BMW to utilize to advance their training capabilities. When the average training amount of an automotive industry employee costs the company between $10,000 and $20,000, this government subsidized worker-training is a great asset to a large company like BMW (Ady, 1992). South Carolina’s traditional practice of investment in community worker-training demonstrates its dedication to economic development methods that exceed “smoke-stack chasing” related policies. The findings section of this paper will provide greater insight into how the region is presently encouraging high-tech development and innovation by investing in university-industry partnerships and training campuses.

Overall, the region was more willing than the 250 other worldwide candidate sites to accommodate BMW. The strength of the total package convinced President Robert Ady of the international consulting firm, PHH Fantus, to point BMW toward Spartanburg. He noted that it was the “rare flexibility” of the state in the negotiations deal that set them apart (Ady, 1992, P. A10).

BMW Successes

The Greer, SC (Spartanburg County) plant was named the “2006 Top Plant” in Plant Engineering Magazine. The more than 5,000 employees at the plant manufacture the X6 Sports Activity Coupe and the X5 Sports Activity Vehicle (“Our Plant”, 2009). The main facility is 2.5 million square feet, with an additional 1.5 million square feet located elsewhere on the campus.
Daily, over 600 vehicles are produced, and 1,248,028 have been produced since the plant’s opening (as of 12/31/2007) (“Manufacturing Stats and Information”, 2009). The plant produces 80% of its vehicles customized for individual consumers. The company also boasts of its strong relationship with South Carolina schools and universities, as well as its charitable giving which is more than $23 million as of 2007 (“Manufacturing Stats and Information”, 2009).

Currently, it seems that BMW recruitment efforts have been successful for the state, despite the hefty cash incentives in the beginning. The region and state have seen a 3.9 multiplier effect in total jobs due to BMW’s presence. Overall, the state received over $27.6 million from facility outputs in 2002. Dr. Douglas Woodward of the USC School of Business is optimistic that BMW will be “an enduring economic development driver” for the state (“Economic Impact Study”, 2009).

BMW has also been an important contributor to the auto manufacturing research and innovation taking place in the Upstate. The company was the first tenant in Clemson University’s International Center for Automotive Research (CU-ICAR) in 2007 and has been heavily involved with the campus as well as the graduate engineering department at Clemson. Additionally, BMW has placed an endowed chair, Dr. Tom Kurfess, on the campus as the director of the graduate engineering program to lead students in projects involving motorsports and automotive research.

The ICAR program will be discussed at length in the findings section of this paper.

*Overview of Job Growth in Advanced Manufacturing*
Once Michelin and BMW were established and growing in the Upstate region, a “creative destruction” of the textile manufacturing industry took place and automotive manufacturing began to quickly grow. However, as was noted in many other areas of the United States, the textile industry began to lose business to overseas producers and declined quickly across the nation during the same period of Michelin and BMW’s rise (“South Carolina Workforce Trends”, 2003). The Upstate region was fortunate to be able to evolve into a new type of manufacturing that was internationally competitive at that time.

Currently, the Upstate is experiencing high net return in automotive manufacturing and related industries. The two industrial fields that BMW and Michelin belong to, ‘engine, turbine, and power transmission equipment manufacturing’ and ‘plastics and rubber products manufacturing’, are the number one and three industries in sales per capita in the state. As of 2002, engine, turbine, and power transmission equipment manufacturing earned $8,857,179 in total sales and plastics and rubber products manufacturing earned $5,752,838 (2002 Economic Census, U.S. Census Bureau). Textile mills came in second with $7,067,343 in sales.

Additionally, these industries not only create high net revenue in the region, they encompass a large portion of total employment. This is evident in the high location quotients for auto and rubber product manufacturing industries. In the Spartanburg MSA, the following industries top the list in location quotients: motor vehicle electric equipment (3.76), Transportation equipment manufacturing (3.54), Plastics and rubber products manufacturing (2.75), and Other motor vehicle parts manufacturing (2.48) (Bureau of Labor Statistics 2007). The Greenville MSA had less significant location quotients in these areas, though results were not disclosed for plastics and rubber products manufacturing and motor vehicle parts.
manufacturing. However, the MSA did have a 2.2 location quotient for motor vehicle electric equipment.

Table 2: Location Quotients for Auto-related Manufacturing

<table>
<thead>
<tr>
<th>Industry</th>
<th>Spartanburg MSA</th>
<th>Greenville MSA</th>
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<tbody>
<tr>
<td>Base Industry: Total, all industries</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NAICS 326 Plastics and rubber products manufacturing</td>
<td>2.75</td>
<td>ND</td>
</tr>
<tr>
<td>NAICS 332 Fabricated metal product manufacturing</td>
<td>1.59</td>
<td>0.91</td>
</tr>
<tr>
<td>NAICS 336 Transportation equipment manufacturing</td>
<td>3.54</td>
<td>0.81</td>
</tr>
<tr>
<td>NAICS 33632 Motor vehicle electric equipment</td>
<td>3.76</td>
<td>2.22</td>
</tr>
<tr>
<td>NAICS 3363 Motor vehicle parts manufacturing</td>
<td>2.33</td>
<td>ND</td>
</tr>
<tr>
<td>NAICS 33639 Other motor vehicle parts manufacturing</td>
<td>2.48</td>
<td>1.44</td>
</tr>
</tbody>
</table>


ND: Not Disclosable

According to the BMW website, of the 187 North American suppliers utilized by BMW, 49 of those firms exist in South Carolina. As mentioned before, the company is also responsible for a 3.9 multiplier effect of jobs across the state. These jobs include supplier firms that relocated to the state to be near BMW. For example, in 2003 Dana Corporation opened a completely new plant in Orangeburg, South Carolina in order to fulfill a special contract for the production of a front-axle for the BMW X5 vehicle. The new 120,000 square foot facility added 123 employees and was strategically located on open land that would be available for expansion (Wilson, 2004).
Other examples of expansions in 2002 and 2003 include 400 jobs in the BMW Spartanburg plant; 100 jobs in the Spartanburg based automotive supplier, Stankiewicz International; 153 jobs in the Greenville based automotive engineering firm, Bosch; 20,000 jobs for the automotive research park (on the ICAR campus) in Greenville; and 150 to 200 jobs for Standard Motor Products in Greenville (“2008 Economic Activity”, 2005).

On a state and regional level, the area has seen overall growth in automotive manufacturing that is very likely tied to the presence of BMW and Michelin. Specifically, according to the Bureau of Labor Statistics, between 1980 and 2001 the state of South Carolina experienced a -.75% decline in manufacturing employment and a 12% growth in transportation equipment manufacturing employment. Figures 4 and 5 provide a graph of these changes. Unfortunately, these statistics are not available for the Greenville-Spartanburg MSA, but it may be inferred that the rise in transportation equipment manufacturing on the state level also represents a rise in employment for the Upstate region (Bureau of Labor Statistics, State and Area Employment, Hours, and Earnings (SIC)).

Figure 2: Employment Change in South Carolina Transportation Equipment Manufacturing

Source: Bureau of Labor Statistics
Many of the original manufacturing centers have evolved from textile to automotive, and presently to other industries such as aeronautical engineering and advanced fiber manufacturing. Aerospace manufacturing has become a sought after industry in the Upstate due to its adaptability from automotive research. For example, SAE International is a global company that specializes in aerospace as well as automotive engineering. The company is strategically located on the Clemson University International Center for Automotive Research (CU-ICAR) campus in order to take advantage of developing engineering research from the various partnering technology-based firms. Vision 2025, a project led by the Greenville Chamber of Commerce, has named the aerospace industry as one of its five dominant industry clusters for the region (“Vision 2025”, 2003).
The CU-ICAR campus has also created demand for other industrial needs, such as a high-tech software. INTEC, a German based software company and leader in the automotive field, has become an asset to the ICAR campus. INTEC produces vehicle products such as SIMPACK, which is utilized by large companies in the region including BMW. Ozen Engineering Inc., CADFEM and EnginSoft are three separate companies that formed a consortium in the ICAR campus to offer specialized software and consulting services to automotive manufacturers in the area (“On-site Partners”, 2008).

V. Findings

Government Led Economic Development

The South Carolina legislature faced a great challenge in 2005 due to continued offshoring of textile manufacturing. The FDIC Regional Profile explained that, “in the second quarter of 2005, South Carolina ranked 50th in the nation in job growth and had America’s sixth highest unemployment rate” (Sams & Pridgen, 2006 P. 25). Therefore, it is understandable that the primary objective of the South Carolina leadership was to create jobs. Localities in the Upstate are more specifically focused on creating jobs in the technology-based sectors, which generally offer high-paying wages. The local and state governments have primarily addressed this issue by shifting their attention from traditional, standardized methods of recruitment to recruiting high-tech companies.

More recently, the government has introduced policies to encourage entrepreneurship and growth in human capital. Some of these policies are introduced through statewide legislative Acts, while others are implemented on a local level. Additionally, the governance structure has
changed gradually in the past decade to include more involvement of partnerships between public, private, and university entities.

This paper will briefly introduce the policies and programs that have had a strong influence on recent economic development strategies, and then explain in greater depth how these policies and programs have improved and encouraged high-tech recruitment, entrepreneurship and human capital development.

**Important Policies and Programs**

Until the 1995 Enterprise Zone Act, economic development incentives in South Carolina mainly catered to large corporations that were able to invest significant financial contributions to the state. The Enterprise Zone Act was the first piece of legislation to financially award small businesses for creating at least 10 new jobs in enterprise zones (rural or economically depressed areas). Businesses meeting the standard qualifications may receive job tax credits and job development fees to reduce state income and construction costs (“A Small Business Owners”, 2009).

Furthermore, a significant change in government policy occurred throughout the state in 2001 and 2002. In 2001, the Research Centers of Economic Excellence Act was passed, which was primarily funded by the creation of the South Carolina Education Lottery. The Centers of Economic Excellence encourage university/industry partnerships through the funding of endowed chairs. They provide funding and assistance to the three research universities in the state: Clemson University, University of South Carolina and The Medical University of South
Carolina (MUSC). The Centers of Economic Excellence (CoEE) will be discussed in greater detail later in this section.

In 2002, the legislature passed the Economic Development Bond Act, which rewarded expanding enterprises investing at least $400 million of R&D and infrastructure and creating 400 or more jobs. This Act was highly influenced by BMW’s lobbying to the legislature, in which BMW soon expanded its facility with the exact expansion requirements (Lyne, 2002). Of the $250 million total funds available for the Act, $80 million went to BMW. Money was also awarded to Clemson University to contribute to its new graduate automotive engineering program, of which BMW invested $10 million as well. Thus, the Act was created for needed infrastructure improvements for economic development, but was also influential in building the intellectual infrastructure needed for high-tech development (Lyne, 2002).

Changes also occurred in 2003 when Harvard professor, Michael Porter, presented South Carolina officials with a document entitled *A Strategic Plan for South Carolina* (“South Carolina Competitiveness Initiative”, 2005). The publication was also referred to as the Monitor Study. Understanding the urgency for immediate improvements, government and other economic development leaders established New Carolina and the South Carolina Council on Competitiveness (“New Carolina”, 2008). New Carolina is a state-wide economic development organization that calls for state leaders to create innovative solutions for solving the challenges addressed in Michael Porter’s study. One of the significant challenges of the organization is to raise the per capita income, which was one of Porter’s recommendations. The organization addresses this challenge in a number of ways, mostly by educating the state with annual progress reports, conducting regional cluster studies to improve local industries, and partnering with the
South Carolina Centers of Economic Excellence, which will be discussed at length throughout this paper (“About the Movement”, 2008)

In 2004, the legislature voted to increase spending for the development of the intellectual infrastructure in South Carolina. The Research Infrastructure Bond Act dedicated $220 million to the research universities to create research campuses that are suitable for private sector investment and partnership. The ICAR campus received $5 million from the Act, which has been well utilized to enhance industry-university partnerships and increase economic development capabilities within the university (“Testing, Research Equipment”, 2006). Furthermore, in 2004, the Venture Capital Investment Act extended funding availability for enterprises and small and medium-sized businesses wishing to start-up, relocate, expand, or restructure.

The Innovation Center Act was created in 2005 to establish a research innovation center in the three major research universities. Within the three centers, research is conducted in relevant technology areas, including “hydrogen and fuel cells, automotive, aerospace and information technology biotechnology, military and defense technology, chemical products, high tech fibers, advanced materials and life sciences” (“South Carolina’s Economic”, 2009). The innovation center established in the Upstate, The Clemson University Advanced-Fiber Materials Center of Excellence, will be discussed in greater detail in this section. Additionally, the South Carolina Research Authority developed the research collaborative, SC Launch!, to help assist with commercialization projects taking place at the innovation centers.

The Industry Partners Act of 2006 further encouraged industries to partner with universities in commercialization projects by offering a full 100% tax and fee credit for any contributions to the innovation centers (“South Carolina’s Economic”, 2009). The Act has been
influential in encouraging a $1 million investment by AdvanceSC and Duke Energy to the construction of the Advanced Materials Center in Anderson, SC (Woodward (b), 2008).

Finally, in 2007, construction of Technology Park I at the CU-ICAR campus was completed. BMW was the first tenant to occupy the campus in October of 2005, followed by Timken in September of 2006 and the Campbell Graduate Engineering Center in December of 2006. Construction is still underway for Technology Parks II-V, which will provide 79 additional acres for tenancy by high-tech companies. Technology Park IV will provide on-surface parking to accommodate around 1,000 cars (“CU-ICAR Campus”, 2008).
The following table provides a list of the major economic development policies and programs in the region and state from 1995 to 2007.


<table>
<thead>
<tr>
<th>Year</th>
<th>Policy/Program</th>
<th>Spin-off Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>Enterprise Zone Act</td>
<td></td>
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<tr>
<td>2000</td>
<td>Upstate Alliance</td>
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<tr>
<td>2001</td>
<td>GADC</td>
<td></td>
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<tr>
<td></td>
<td>Research Centers of Excellence Act</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>South Carolina Centers of Economic Excellence (passed through General Assembly)</td>
<td>BMW, Michelin &amp; Timken Endowed Chairs (CU-ICAR)</td>
</tr>
<tr>
<td></td>
<td>Economic Development Bond Act</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>Monitor Study (Porter)- <em>A Strategic Plan for South Carolina</em></td>
<td>New Carolina</td>
</tr>
<tr>
<td>2004</td>
<td>Research Infrastructure Bond Act</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Venture Capital Investment Act</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advance SC (Duke Energy)</td>
<td>Clemson University Advanced Materials Center*</td>
</tr>
<tr>
<td>2005</td>
<td>Innovation Center Act</td>
<td>SC Launch!, Advanced-Fiber Materials Center of Excellence</td>
</tr>
<tr>
<td>2006</td>
<td>Industry Partners Act</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NEXT Greenville</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>Completion of Technology Park I at I-CAR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relocation of CU Graduate Engineering Department to I-CAR campus</td>
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</tr>
</tbody>
</table>

* Partially funded through Advance SC
These state policies and programs have had an important influence in developing the knowledge-based economy in the Upstate. They are specific examples of how the government has been proactive in achieving strategic economic development goals that are focused on technology development and building the intellectual infrastructure. The rest of this paper will discuss how specific organizations and actors implement TBED strategies the Upstate. Many have utilized local assistance and collaborations to achieve effective and efficient results.

Changes in Recruitment Methods

Interviews with economic developers in the Upstate have demonstrated that some change has occurred in the practice of business recruitment. In particular, recruitment methods have evolved to become more specific to high-tech companies that contribute to the growing industrial sectors in the Upstate. The industrial sectors, identified by Greenville’s Vision 2025, include “Aircraft Inspection, Maintenance and Safety (AIMS), Advanced Materials/Optics, Systems Integration, Supply Chain Management and small turbine engine manufacturing and applications” (Shi 2004 P 54).

One economic developer explains the current process for business recruitment in the Upstate:

As far as a strategy organization we’ve focused more on technology type companies and our policy is to incent them a little more. We focus on them with our marketing dollars. These targets are really technology areas. Where it’s going to be better paying jobs where there’s a lot more intellectual talent associated with the companies, the processes. Plus we’ve got some strength in this. So it’s not necessarily that we’ve necessarily changed incentives that much other than we’ve tried to better understand the technology areas, and then we’ve spent marketing dollars and energy around recruiting those companies (Personal Communication, April 3, 2009).
One of the specific policies used to recruit high-tech businesses includes the Business License Abatement Program. Additionally, counties in the region utilize marketing research provided by Clemson University and public-private organizations such as Upstate Alliance to create strategic plans for recruitment.

City of Greenville

The Business License Tax Abatement Program, provided through the City of Greenville, requires that businesses qualifying as “high technology growth”, “research and development”, “manufacturing” and “corporate headquarters” are eligible for the discounts, which will allow 100% deduction of taxes in the first year of business, 66% for the second and 33% for the third\(^1\). As the ordinance explains, research and development related businesses include “those facilities or enterprises devoted directly and primarily to research and development in the experimental or laboratory sense for new products, new uses, for existing products, or for improving existing products”. Likewise, high technology growth businesses include “those enterprises which have as the primary revenue component of their business activity the earnings derived from the design, engineering, development, or production of innovative technology in business which are expanding significantly in the world economy.” ("Business License Tax Abatement", 2009).

Greater Area Development Corporation

The Greater Area Development Corporation (GADC) is a mostly public organization that utilizes marketing research and target industry studies from regional organizations, such as Upstate Alliance, to advertise to relevant companies hoping to relocate and grow in the industry

\(^1\) Applicable for companies opening between January 1 and June 30, 2009
fields that are relevant to the area. The GADC holds the sole authority to negotiate incentive packages, such as the discounts offered through the Business License Tax Abatement program, with interested companies. The organization’s collaborative partnership with public and nongovernmental organizations is an important factor in the success of its business recruitment.

*Upstate Alliance*

With about 70% private funding, the Alliance is able to carry out the Upstate’s vision with support of government entities as well as private businesses. According to the organization’s website, “the Alliance's goal is to spearhead an aggressive, innovative and comprehensive global marketing strategy to attract new investment to the Upstate region” (“About Upstate SC”, 2008). They market to potential firms that exist within their target areas, which include plastics, life sciences, automotive, distribution and logistics, advanced materials and automotive industries. They also advertise these target industries in publications as a way to broadcast the Upstate “brand”. Other roles include market and industry studies, which are highly utilized by other economic development groups, such as the chambers, GADC and university marketing groups (“Alliance Facts”, 2008).

Additionally, an important mission for Upstate Alliance is to create a regional vision for economic development in the Upstate. Every quarter, economic developers and industry/university leaders from the ten counties (Abbeville, Anderson, Cherokee, Greenville, Greenwood, Laurens, Oconee, Pickens, Spartanburg, and Union) meet at Upstate Alliance to discuss economic development initiatives among the individual counties (“Alliance Facts”, 2008). These initiatives then set a path for Upstate Alliance to know which industries to target and how to conduct future research (Personal Communication, April 3, 2009). Moreover, the
meetings are intended to encourage partnerships between counties, industries and universities. Increased regional collaboration sends a more inviting message to interested companies and investors.

**Methods that Promote Entrepreneurship**

Various methods exist to promote entrepreneurship in the Upstate. Some of these include training support (assistance writing business plans, technical assistance, workshops for entrepreneurship basics, skilled training, networking events, counseling from retired business executives), legislative representation, and financial assistance.

**Training Opportunities and Basic Services**

New business owners, or those hoping to expand into a new field, may need assistance getting started. Training opportunities may be offered in a variety of ways, with counseling by experienced entrepreneurs as one of the most successful means to equipping new entrepreneurs for managing startups or expansions. Within the Upstate, the universities and colleges, city governments, chambers and private organizations exist as a useful medium for such assistance. Many of these organizations utilize local experienced volunteers or retirees to provide basic assistance. Additionally, experienced entrepreneurs assist with a range of important entrepreneurial services, including business plan assistance, marketing research and legal consulting.

Clemson University hosts the Small Business Development Center and the Spiro Center, which both provide business plan assistance among other services. The SBDC also offers assistance with financing, marketing, and management (financial and technical).
The Arthur M. Spiro Center for Entrepreneurial Leadership is a completely university-led organization that assists with hands-on support for companies, researchers, students and inventors aspiring to create a start-up. The center utilizes the Clemson University College of Business and Behavioral Science for current research on entrepreneurial services and tools (St. John 2006).

Additionally, the Greenville Technical College Buck Mickel Center and the Spartanburg Community College offer business assistance opportunities. The Spartanburg Community College hosts the Tyger River Campus, which serves as an incubator for businesses hoping to expand or accelerate the business start-up process. A BMW center is among the businesses present at the campus.

Greenville Technical College serves entrepreneurs in training for business maintenance as well as in workforce development. SSTI Weekly Digest writes that, “for more than 35 years, Greenville Technical College has been the premiere source for business and industry education, training and consulting” (“SSTI Weekly Digest”, 2008). Since the region has been historically known for its emphasis in workforce training, Greenville Tech has been given great responsibility in fulfilling the technical needs of the region. Primarily, the college acts as an educational resource for entrepreneurs by providing market information for target industries, advising entrepreneurs on legal start-up laws, conducting seminars and offering online assistance.

Additionally, the city of Greenville and the Greater Greenville Chamber of Commerce provide various types of services for local entrepreneurs. The City of Greenville’s Economic Development Department provides direct support as well as referrals for emerging and
expanding businesses. The services include assistance with business plans, demographic research, site selection, and GIS mapping analysis. The city also offers information on available incentives, such as the Business License Abatement program mentioned earlier, and loan opportunities (“Doing Business in Greenville”, 2009).

The Greater Greenville Chamber of Commerce provides a number of networking opportunities for new entrepreneurs through the form of committees and councils. These organizations include experienced volunteers that assist in identifying pertinent needs of the local emerging businesses and offering guidance for possible solutions. Such solutions may include assistance with marketing, human resources, expense reduction, legal counsel, and financial assistance (“Doing Business in Greenville”, 2009). Additionally, the chamber provides opportunities for entrepreneurs to network with other emerging entrepreneurs, including a breakfast forum, an evening social networking program, a sales roundtable and a small business start-up forum (“Business Hub”, 2008).

Other organizations that have played a role in business training and networking include AdvanceSC, the Senior Corps of Retired Executives (SCORE), and Innoventure. AdvanceSC, an affiliate of Duke Power, financially supports educational institutions in the region (high schools, technical colleges and colleges/universities) that provide training, manufacturing apprenticeships, innovation assistance, collaborative education-industry programs as well as other economic development related programs. Technical colleges may be granted up to $250,000 for worker training (“Grant Applications”, 2009).

SCORE is a national business assistance organization that is a resource partner of the U.S. Small Business Administration. The organization provides free counseling by mostly
retired, highly experienced business executives as well as affordable workshops on various entrepreneurial topics (“Doing Business in Greenville”, 2009).

Statewide, events are planned through organizations to provide entrepreneurs with the most up to date information regarding startup ideas and opportunities. These organizations often provide a wide range of networking options as well. For example, InnoVenture is an annual conference presented by the Swamp Fox Community and CEO, John Warner, to offer a mix of networking events and informational sessions. The 2009 conference held in Greenville provided opportunities for entrepreneurs to present elevator pitches to investors, anchor organizations to showcase innovation ideas, and participants to exhibit displays in the Innovation Hall (“SSTI Weekly Digest”, 2008).

Financial Assistance

Some organizations exist in the Upstate to connect emerging and expanding businesses to potential financing sources. Without such intervention, new entrepreneurs may have difficulty finding affordable financing. In some cases, nonprofits exist to provide direct funding needed for development when an entrepreneur is unable to locate financing from traditional sources. Examples of these types of organizations include the Greenville Local Development Corporation (GLDC), Business Carolina, Inc. and the Appalachian Council of Governments (ACOG) Loan Program. InnoVenture also plays a role in connecting entrepreneurs to investors through its annual networking conference.

The GLDC is a non-profit that offers loans to projects that are consistent with the comprehensive and strategic plans, contribute to historic preservation and job creation, and offer
potential for future growth. The organization facilitates loans primarily for companies unable to find traditional sources of investment (“Doing Business in Greenville”, 2009).

Business Carolina, Inc. provides financial opportunities for businesses falling short of complete funding. Business Carolina especially focuses on increasing competitiveness among small businesses in order to strengthen their presence within the local economy. Alternatively, the Appalachian Council of Governments (ACOG) Loan Program provides affordable loans for emerging and expanding businesses, with an emphasis on job creation and firms focusing in manufacturing, industrial and service sectors. The program mandates that one job must be created per $25,000 of loans granted (“Doing Business in Greenville”, 2009).

Additionally, the goal of local economic developers is to reward emerging or expanding businesses that produce secure employment and contribute to growing market sectors. For this reason, governmental organizations have created and support NEXT Greenville. NEXT acts as a public advocate for local entrepreneurs by providing in depth assistance for a wide range of services. The organization also communicates on behalf of high-tech start-ups to improve the legislative process, and therefore lobbies for governmental assistance for business start-ups and expansions (“Advocacy”, 2008). NEXT was successful in encouraging the City of Greenville to pass the Business License Abatement program that was discussed previously.

One of the responsibilities of NEXT is to connect entrepreneurs to capital sources. The organization sponsored the launching of the Upstate Angel Network, which services “high-growth businesses” in the Upstate by screening and editing the entrepreneur’s portfolio for interested investors. The organization is administered through a network of investors, which, through collaboration, are able to make highly informed investment decisions for high-
return/high-risk, innovative companies. As the human capital section will demonstrate, financial assistance is also important in the costly commercialization process. A strong network of organizations and research firms are often needed to ensure successful commercialization.

Finally, one economic developer interviewed believes that, although improvement has been made in investment opportunities, the region still lacks the venture capital needed for high-risk/high-return economic development investment projects. As he notes, “I think the only thing that’s held us back from having 20 companies over there [at CU-ICAR] is the fact that nobody can find any money to build speculative space. If we had speculative space I think we’d be able to pull hundreds of 2, 3, 4 person operations” (Personal Communication, April 3, 2009). Greater financial support by the local government would better encourage angel investors and venture capitalists to move to and invest in the region.

**Governance**

As briefly mentioned, the organizations assisting entrepreneurship development in the Upstate often depend upon one another for success. Specifically, NEXT was created “as the single point of contact for accessing the full portfolio of entrepreneurial support services in the Greenville area” (“Doing Business in Greenville”, 2009). NEXT utilizes the resources of the Spiro Center, Buck Mickel Center, the City of Greenville, InnoVenture, and the Greenville Chamber of Commerce, and other local financial aid organizations to foster its three services for Upstate entrepreneurs: “client services to technology-based entrepreneurs; infrastructure; and voice/advocacy” (“NEXT Mission”, 2008). These organizations collaborated to create NEXT in 2006 in order to achieve a higher level of entrepreneurial service for the region (“NEXT Reflects”, 2007).
Additionally, the universities often utilize several departments within the campus to strengthen entrepreneurship programs offered for the community. For example, the Spiro Center at Clemson is able to use the resources of the College of Business and Behavioral Science, as well as the entrepreneurial research provided by undergraduate and graduate students at the university. The center is able to supply grants and awards to students, yielding high quality, up to date research used to advance the tools needed to mentor local entrepreneurs (“About: Spiro Institute”, 2006).

The Spiro Center also provides support to the Office of Technology Transfer (OTT) in order to accelerate the process of commercialization, which can be very time consuming and costly. Such services include standard market assessments for potential technologies that are in the process of commercialization. The center also has a representative to sit on the Office of Technology Transfer’s Intellectual Property Committee (St. John, 2006) (“Outreach: Collaborations”, 2006). The university’s role in commercialization will be discussed further in the following section.

Collaborative partnerships are essential for building the innovative entrepreneurship that is needed to sustain the knowledge economy. The next section will discuss how educational, private and public organizations in the Upstate collaborate to foster R&D and innovation.

**Human Capital**

Technology based economic development is evident in the Upstate through the policies, universities and organizations that foster R&D and innovative entrepreneurship in the growing industry sectors. Specifically, these groups and policies are focusing on funding and maintaining the graduate engineering program at the CU-ICAR campus, recruiting high-caliber faculty and
endowed chairs, seeking industry-university partnerships that increase research possibilities, and exposing students to local industry partners. Additionally, commercialization centers and organizations are utilizing high-tech R&D to promote innovative entrepreneurship within the region.

The collaboration between research centers and commercialization teams is essential for TBED strategies to be successful. In many cases, without additional assistance, research produced in educational facilities and research centers is lost or commercialized very slowly, leaving the region with missed opportunities for economic growth. The conclusion of this section will demonstrate that programs such as SC Launch!, NEXT Greenville and the Office of Technology Transfer are working as intermediaries to help spur the commercialization process.

**R&D Investment**

The knowledge economy of the Upstate is developed through funding and supporting innovative research and development. R&D is promoted through state policies such as the South Carolina Centers of Economic Excellence (CoEE), Research Infrastructure Bond Act (2004), Industry Partners Act (2006) and the Innovation Center Act (2005). These policies have been influential in developing the infrastructure needed for high-quality research centers, such as the Advanced Materials Center and the Clemson University ICAR campus. Additionally, these state policies encourage private industry leaders to support these centers by: funding the recruitment of high-caliber researchers and endowed chairs, investing in advanced technology, and influencing the future workforce through assistance with graduate programs. This section will provide information about how the policies encourage R&D within the Advanced Materials Center and ICAR campus.
CoEE

In 2002, the General Assembly created the CoEE program to specifically enhance new opportunities for technological advancement through university-industry partnerships. According to Paula Harper Bethea, chair of the program, “The Centers of Economic Excellence have become that part of the economy that clearly touches and clearly identifies ways that we can build this knowledge-based economy” (“2008 Report”, 2008). The funds provided to the university research centers must be matched by donations from private companies and organizations. The established research centers will be specifically geared to “knowledge-intensive areas”, including automotive engineering, biotechnology and nanotechnology (Morris, 2009). The CoEE leadership is responsible for providing funding to universities for the recruitment of endowed chairs and then steering them in the appropriate direction for economic development projects. The endowed chairs at CU-ICAR will be discussed in detail in this section.

Clemson University’s Role in Economic Development

Clemson University has historically been an important driver for innovation and industry development in South Carolina. Sams and Pridgen (2006) provide a sound overview of Clemson’s role in the state:

Throughout our history, Clemson has supplied the educated manpower that helped South Carolina’s economic base expand from growing and weaving cotton to manufacturing films and fibers to assembling automobiles. It has helped South Carolina progress by directly advising agribusiness and industry on best practices for everything from seed selection to energy conservation to tourism planning and management (Sams and Pridgen, 2006, P. 25).
The university’s research in the Upstate has become more technology-based through the establishment of the ICAR campus and the Advanced Materials Center. With the help of private industries and economic development organizations in the region, Clemson has played a vital role in developing cutting-edge research that has been successful in creating spin-offs and technology products that contribute to the knowledge-based economy.

**CU Advanced Materials Center**

The Advanced Materials Center, due to be completed in August of 2009, is a “high-tech business incubator” that has been widely supported by local industries in the Upstate (Woodward (b), 2008). The center has been offered substantial donations from public-private organizations and philanthropists, as well as $5 million for construction costs through the Research Infrastructure Act. AdvanceSC and Duke Energy are among the private contributors, donating $1 million each to the center. The space will be available for emerging advanced-material companies, entrepreneurial start-ups and Clemson related spin-offs (Woodward (b), 2008).

Furthermore, the South Carolina Research Authority agreed to develop a $4 million building adjacent to the Advanced Materials Center in order to provide “technology-based solutions” to industries and researchers utilizing the center (Woodward (b), 2008). Similarly, Innovate Anderson, a public-private economic development organization, paid $1.3 million to use the remaining portion of the campus “for recruitment and development of advanced materials-related business” (Woodward (b), 2008). “The CEO, Bill Mahoney, explained that the partnership of the facilities will “accelerate discovery and commercialization of advanced materials for both military and corporate applications, and help generate higher-paying, knowledge-based jobs in South Carolina” (Woodward (b), 2008).
CoEE provided an $8 million donation in 2008 to the Advanced-Fiber Materials Center of Economic Excellence at the Clemson University campus. Clemson will use the funds to advance the textile industry, which has been traditionally struggling throughout the state due to off-shoring. Among the private investors, KENTWOOL, a leading textile producer in South Carolina, donated $500,000 to the CoEE in order to encourage technological advancements in the trade. According to a Clemson University news release, CEO Mark Kent proclaimed “We believe our unique partnership in innovation and education with Clemson University will support sustainable economic development strategies in South Carolina, and our corporate vision to become the premier wool innovation and manufacturing company in the world” (Polowczuk, 2008).

Additionally, the center’s research and development is diversifying textile uses to meet other industry needs in the state. Biomedical fibers and other “non-traditional textile fibers” are being used to advance the medical field, as well as for use in telecommunications and defense-related applications (Polowczuk, 2008).

CU-ICAR

CU-ICAR has been a major influence in the development of advanced automotive and engineering research in the Upstate. As one economic developer noted, “I can honestly tell you that ICAR has been a god-send to our ability to recruit automotive opportunities and I would also say that its probably one of the strong points to help BMW decide whether or not they were going to expand their facility” (Person Communication, April 3, 2009).
The CU-ICAR campus is located along the I-85 corridor, strategically placed in Greenville County in near proximity to Spartanburg County and the BMW factory. Research at the campus is focused in four basic areas, which exist as four Centers of Economic Excellence: automotive design and development, automotive manufacturing, automotive systems integration, and vehicular electronic systems integration (“C.U. Centers of Economic”, 2009). These research areas are studied at the Technology Neighborhood 1, which contains the BMW Information Technology Research Center, the Carroll A. Campbell Jr. Graduate Engineering Center, Timken, and the CU-ICAR AutoPark. The remaining four technology neighborhoods are in the planning stages of development, and will allow space for entrepreneurial spin-offs and expansions. The neighborhoods range from 12 to 40 acres and will be located on the periphery of the campus. According to the CU-ICAR website, the technology neighborhoods are “designed uniquely for optimizing an innovative and collaborative environment” (“Technology Neighborhood 1”, 2008).

Clemson University created CU-ICAR with the vision to develop an exceptional graduate engineering program, as well as to increase the caliber of innovation in the Upstate region and state. The graduate school classes were relocated from Clemson University to the ICAR campus in 2007 (Polowczuk, 2007). Specifically, the university garners the strength of the automotive engineering program by fostering interaction between the students and world-class industry leaders both locally and abroad. Clemson requires all master’s and Ph.D. students to study with an international industry leader for 6 months, as well as to enroll in foreign language classes (“Overview”, 2008). With the nation’s only Ph.D. in automotive engineering, the school has set its standards high for the ICAR campus to become an international model for effective university-industry partnership. In order to meet such lofty goals, the university has taken
advantage of donations by the CoEE to place world-class leaders in charge of key research areas, which include the four endowed chairs at ICAR.

Endowed Chairs of ICAR

Dr. Venhovens was chosen to lead the systems integration department at CU-ICAR due to his hands-on experience with research and development at the Munich, Germany BMW headquarters. He works directly with Clemson University students in the graduate mechanical engineering program by leading research projects in motorsports and automotive research. The research is specific to the many facets and systems that influence the production of the automobile, which some claim is a unique strength of CU-ICAR (Woodward (a), 2008). Industry leaders in the region, such as BMW and Michelin, may utilize the department to solve complex problems associated with their company’s manufacturing.

Another BMW Endowed Chair, Dr. Thomas Kurfess, is the director and a professor at the graduate engineering department. Dr. Kurfess focuses primarily on manufacturing, specifically automation, robotics, controls and precision systems (“Research Stars”, 2008). The director played an important role in earning a $1.9 million bid from Michelin North America to study how reduction in tire rolling-resistance may enhance automotive fuel economy (“Clemson Researchers Team Up”, 2009). Michelin was a founding partner of CU-ICAR and often takes advantage of its research services.

Additionally, Dr. Todd Hubing has been a vital addition to the ICAR campus as the Michelin Endowed Chair. His research in vehicular electronic systems integration is applicable to the other complex engineering systems that are studied at ICAR. For example, the overlap of vehicular systems integration with aircraft and other aerospace technologies is similar to the
research performed at SAE International, another on-campus partner. According to a Clemson University press release, Michelin president Jim Micali noted that “[Hubing’s] strong collaboration with other industry and academic partners will help ensure the long term success of CU-ICAR and its partners” (Polowczuk, 2007).

Finally, Timken, a U.S. based engineering firm, joined Michelin and BMW as a founding partner of ICAR with a $3 million endowment. Dr. John Ziegert now leads automotive engineering research on the campus. Timken offers ICAR a technical expertise in powertrain research, where Dr. Ziegert has extensive experience in mechanical engineering and precision machining (“Timken, Clemson University”, 2006). A Clemson University press release quotes Timken’s president, Jacqui Dedo, stating that “John Ziegert is in the unique position with the endowed chair to combine research with innovation to develop friction management and power transmission solutions that will transform the automotive industry and other industrial markets” (Polowczuk, 2007).

With the leadership of the endowed chairs, the ICAR campus has been largely successful in facilitating advanced research that has led to greater industry output by the local Upstate companies. The campus has also been successful in creating spin-off and start-up companies and high-tech products. Overall, the Spiro Center, CU-ICAR and the Centers of Economic Excellence have been successful in creating eleven spin-off companies since 2005. Among these, Tetramer Technologies, LLC has earned its five-year anniversary, which is a difficult accomplishment for start-up firms (“Clemson spin-off”, 2009). The company began in the chemistry department at Clemson in 2001, where the marketing and research was conducted around advanced polymeric materials.
Table 4 provides examples of other spin-off companies that were created through Clemson University and CoEE efforts.

Table 4: Clemson University and CoEE Spin-Off Companies: 2005-2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Spin-Off Company</th>
<th>Number of Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2005</td>
<td>Tetramer Technologies, LLC [CoEE]</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Advanced Photonic Crystals [CoEE]</td>
<td>3</td>
</tr>
<tr>
<td>FY 2006</td>
<td>Kiyatec, LLC</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Specialty Custom Fibers, LLC [CoEE]</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Andrew Clark</td>
<td>1</td>
</tr>
<tr>
<td>FY 2007</td>
<td>BalancedFlow Supply Chain Solutions, LLC</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>iTography, LLC</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Selah Technologies, LLC</td>
<td>8</td>
</tr>
<tr>
<td>FY 2008</td>
<td>Earth Renewable Technologies, LLC</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>SensorTech, LLC</td>
<td>7</td>
</tr>
</tbody>
</table>


**Innovative Entrepreneurship**

Third-party organizations exist in the Upstate to provide the advanced technical and financial assistance needed to spur commercialization in the research centers. These organizations assist fledgling companies in a variety of ways, namely with technological, financial and marketing assistance.

*Spiro Center, Office of Technology Transfer, University Research Foundation, Technology Innovation Partnership*

Within Clemson University, the Spiro Center, Office of Technology Transfer (OTT), University Research Foundation and Technology Innovation Partnership collaborate to provide all of the necessary means to commercialize university-developed research. For example, the Spiro Center offers market assessments to the Office of Technology Transfer in order to
determine which technologies will be in demand for commercialization. The OTT also helps the Research Foundation develop intellectual property by providing licensing agreements, incubation and other start-up resources (“Office of Technology Transfer”, 2009).

Additionally, the university has recently created the Technology Innovation Partnership (TIP) to utilize all of the resources available within the university to further encourage innovation. Specifically, the role of the organization is to “nurture affiliated startup companies through research collaboration, intellectual property licensing and close connection between industry and Clemson’s research emphasis areas” (“Office of Technology Transfer”, 2009). TIP has been successful in recruiting two Florida-based companies with relevant research areas, StormRider and Gulf Fiberoptics, to the Advanced Materials Center.

SC Launch!

SC Launch! is a non-profit spin-off of the South Carolina Research Authority that assists the major research universities in intellectual property leveraging, research consulting, and facility development, among other services. As a 2007 press release notes, “SC Launch! has, since its April, 2006 inception, provided 34 companies with seed funding in the form of grants, loans or equity investments and provided counsel and support to more than 60 start-ups” (“SCRA Garners”, 2007). Two grants have been awarded to Clemson University in 2007 and 2008 to promote energy research. In 2007, Clemson’s South Carolina Institute for Energy Studies received a $15,000 grant to conduct a project to assess the achievability of wind powered electricity at Waties Island off the coast of South Carolina. The university partnered with Santee Cooper electric company and Coastal Carolina University for the one-year study (Hirsekorn 2007).
SC Launch! also fostered the growth of a Clemson-based fledgling company, PinPoint GeoTech, with a $200,000 investment in 2008. The company reduces greenhouse emissions by providing educational software to government entities demonstrating efficient ways to manage water, transportation, and disaster relief (“Clemson Firm Helps Deliver”, 2008). PinPoint GeoTech is a prime example of a company likely to be sponsored by SC Launch!, since it provides high-tech, innovative solutions for pertinent problems while alternatively creating higher paying jobs.

NEXT Greenville

NEXT Greenville acts as a one stop center for new entrepreneurs by providing a range of services offered through partnering organizations. More importantly for high-tech companies, NEXT is able to connect spin-offs developed within the universities and research campuses to interested entrepreneurs and investors. In 2008, the Spiro Center, SC Launch!, the OTT and NEXT collaborated to successfully launch SensorTech, “a new, patent-pending contact sensing technology that can accurately measure force, pressure, torque, or impact” (Hirsekorn, 2008). The technology was first created by a Ph.D. student in the bioengineering department at Clemson, and then disclosed to the University for patenting. Shortly after the Spiro Center arranged for MBA students to assist in gathering data needed for the start-up, SC Launch! was able to take SensorTech on as one of its portfolio companies. NEXT was influential in providing basic services during the companies’ formation, as well as marketing the company to the investment community to encourage additional partnerships (Hirsekorn, 2008).
Governance

Statewide Participation

A greater amount of involvement is needed on the state level to provide the financial support to build and maintain large research centers. Compared to other economic development methods focused on recruitment and entrepreneurship, investment in human capital requires a greater financial commitment to develop the infrastructure and technology needed to ensure successful projects. Therefore, it was essential that the General Assembly pass a number of Acts to invest in the knowledge economy.

The Research Infrastructure Bond Act was an important contributor to the construction of the Advanced Materials Center, as well as other research centers sponsored by Clemson University, the University of South Carolina and the Medical University of South Carolina. Additionally, economic development projects that build the knowledge economy require more commitment and financing from the private sector to be successful. For this reason, the South Carolina CoEE program calls for a dollar for dollar matching of private investment for large state grants in order to encourage industry-university partnerships in research and innovation.

University-Industry Partnerships

Private partnerships were essential for the R&D advancements to take place at ICAR. The CoEE website explains that, “The non-state partnerships increase each institution's research capabilities far beyond what would have been possible had a constituent group of faculty, graduate students, and technical staff worked independently” (“Background and History”, 2007). Additionally, the researchers and students at ICAR benefit from the endowed chairs, which
provide them with an insight to the workforce experience of the local and global industry sector. Likewise, large industry leaders in the region, such as BMW, are focused on building the technical skills of the future workforce at ICAR. One BMW representative explained, “We’re involved with the universities in training and preparing the future workforce. We do internships, etc.” (Personal Communication, April 3, 2009). Specifically, the auto manufacturer is concerned with finding and developing “the future workers, the future presidents, the future executives” that are currently being trained at ICAR (Personal Communication, April 3, 2009).

Network of Public/Private/University Organizations

The methods used to develop human capital in the Upstate require more regional collaboration on all levels than do the traditional economic development methods mentioned in Clark and Gaile’s waves (1998). Upstate Alliance, Clemson University and BMW, among many others, have played crucial roles in developing the regional collaboration needed to encourage innovation at ICAR and the research campuses.

Clemson University’s presence in Anderson, Greenville and Pickens counties has helped spur a regional partnership that has improved the success of the economic development projects throughout the Upstate. One economic developer explained that Clemson has acted as a bridge for much of the regional collaborations that take place in the Upstate. As he mentioned, “When I go outside of the bounds to leverage resources, typically it’s to Clemson” (Personal Communication, April 3, 2009). Because of the University’s intricate ties to government and public-private economic development organizations throughout the region, research developed within the various campuses is better exposed to networks of entrepreneurs and investors.
Additionally, Clemson has a wide range of statewide opportunities through the assistance of SC Launch! and the Centers of Economic Excellence.

BMW has also worked to utilize all research opportunities available throughout the Upstate. Strategically positioned on Interstate 85 between Spartanburg and Greenville Counties, the German automaker collaborates regularly with the ICAR campus, Buck Mickel Center at Greenville Tech and the Tyger Campus in Spartanburg. BMW also has a representative on the board of directors at Upstate Alliance to further promote partnerships in research and development.

Finally, Upstate Alliance has created a network among the ten counties in the region in order to best market local R&D and commercialization projects to interested investors and entrepreneurs. The Alliance also strategically recruits businesses that will compliment the growing technology areas in all counties of the region. Unlike many public organizations, the Alliance is able to impartially negotiate with governmental leaders and interested companies when recruitment matters rise, and therefore has been an important third party economic development organization to the Upstate.

Regional partnerships and networks are essential for economic development projects to successfully build human capital. These strategic methods would most likely be hampered by strong parochialism within the region. Therefore, the work done by Upstate Alliance to build relationships between counties should be recognized as an important contributor to recent improvements in economic development.
VI. Conclusion

The Upstate has grown and diversified quickly since the introduction of BMW. The traditional policies have slightly evolved to meet increased technological development needs accompanying the large automaker. The universities and private sector have also responded by creating organizations to employ TBED methods throughout the region. Specifically, both governmental and non-governmental organizations have focused on 1) recruiting high-tech companies that fit the growing industry areas, 2) assisting entrepreneurs with startup and expansion needs of local businesses, and 3) improving human capital potential by fostering R&D and innovative entrepreneurship.

The government’s role in TBED methods of the Upstate is largely focused in business recruitment, entrepreneurial support and financing for the research centers. Where the local government is more heavily involved in high-tech business recruitment and support, the state government has encouraged human capital development through the economic development Acts.

Some organizations are primarily involved in R&D, such as ICAR, the Advanced Materials Center and the Clemson University Research Foundation. The industries partnered with these organizations play a significant role in the overall quality of the R&D produced.

Others mentioned in this paper, such as NEXT Greenville, the Spiro Center, and SC Launch! are involved on all three levels to recruit high-tech companies, encourage innovative research and assist in commercialization. These groups have proven pivotal to the development of the knowledge economy, as heavy collaboration is needed to foster research from the earliest stage to commercialization and licensing/investment.
Even though some organizations are more heavily involved in innovation and R&D, each group just mentioned has played a role in employing technology-based economic development methods. The recruitment of talented entrepreneurs and advanced technological companies has a positive impact on the region in job growth and spin-offs.

*Thoughts for Practitioners*

Across the U.S., economic developers are beginning to realize that the predominant use of traditional economic development methods, such as incentive-based smokestack chasing, is not going to be effective in a competitive global economy. Specifically, it is important for a region heavily invested in a manufacturing industry to refocus on local innovation. The Upstate has been successful in diversifying its economic development methods in four basic ways. These governmental actions may provide a useful framework for a similar region hoping to diversify and expand its economic development methods.

1) The SC state government increased its R&D potential by providing the infrastructure necessary to partner locally dominant tech-based companies (BMW, Michelin, Timken) with a leading research university (Clemson University). The ICAR campus has been successful in providing high-caliber education and training to the future workforce of the Upstate, as well as providing the technology and infrastructure needed to recruit R&D intensive, high-tech companies to utilize the facility for innovative purposes.

2) The local government recruited other innovative companies and suppliers to the region to encourage job growth in technology intensive areas, as well as provided entrepreneurial assistance to encourage startups and expansions of small, innovative
businesses. In order to increase efficiency in entrepreneurial support and marketing, the Upstate supported the creation of public-private organizations, such as NEXT Greenville and Upstate Alliance, to connect new or expanding companies to local resources.

3) Similarly, the state and local government supported the creation of intermediary organizations to connect universities/research centers/private companies to potential investment/commercialization resources. NEXT Greenville and SC Launch! played an important role in providing these services. Additionally, the collaborative departments within Clemson University frequently partnered with external organizations to spur the commercialization process.

4) Finally, collaboration has been essential on every level to improve technology-based economic development practices in the Upstate. The recruiting efforts and assistance with entrepreneurial services has been more successful with the help of nongovernmental organizations in the region. However, as Clark and Gaile’s (1998) research demonstrates, the collaborative efforts needed to develop human capital are slightly more intricate, as external assistance is often needed to pull viable technology out of research centers for commercialization. The state government has needed to play a greater role in financing university-industry partnerships and research centers, since these projects are often too large to be financed from local funds alone.

Overall, the Upstate has made great improvements in economic development practices by recruiting businesses in high-growth technology areas and supporting the economic development
efforts of nongovernmental organizations and universities. Though the actual incentive methods have not changed drastically, the Upstate has seen improvement in innovation and job growth by investing in and assisting the research groups and organizations that are excelling in R&D. Specifically, the large industry leaders such as BMW and Michelin have greatly influenced the amount of innovation being created in the Upstate.

However, in a fiscally conservative state like South Carolina, it is important for local and state officials to “avoid the potent multiplier effect when governors use limited investments to bring together other players” (“PEW Center on the States”, 2007, P. 12). Since the research institutes, universities and private companies are often spending the majority of the money for large R&D projects, the state needs to contribute substantial financing to continue encouraging the development of the knowledge-based economy. The limited venture capital may be an indicator that more public financing should be available for research and entrepreneurship. Therefore, a region similar to the Upstate would benefit from emulating some of the economic development strategies that have developed in the region in the past decade, while also recognizing the challenges the Upstate still faces in governmental assistance and support.
Works Cited


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Appendix

Interview Questions

1. In what ways have policies change from tax breaks to more innovation-based/technology based economic development?

2. In what ways does the local government or state encourage university/industry partnerships for commercialization projects? How does this specifically work with BMW and Clemson?

3. How does BMW collaborate with universities, public and other private companies to promote research and development in the region?

4. How is the region developing technology-based policies to promote economic development? In what ways do these policies build an intellectual infrastructure and an entrepreneurial climate?

5. In terms of technology based economic development collaboration in the Upstate, how does the public sector work with the private sector and how do universities link with industry? How does this happen across county lines?

6. How may economic development policies continue to evolve so that they remain effective in the region? What do policymakers need to do in order for this to happen?