A VISION PLAN

for the

Charlotte Regional Partnership

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by

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Executive Summary

In the winter and spring of 2004–05, the Carolina Center for Competitive Economies (C^3E) guided the Charlotte Regional Partnership (CRP) through the initial steps of a vision planning process. This summary report documents the work done under the contract and outlines future action steps. The first part of the report provides context for the Plan by summarizing key economic and demographic characteristics of the region. The second section summarizes and extends existing "SWOT" analyses for the region. The third part of the report summarizes and extends existing studies that identify target clusters for the region. The report concludes by recommending the steps that should be taken next.

Economic and demographic context

The most important take-away from our quick economic and demographic scan is that the 16-county region is diverse, so one size will not fit all counties, Mecklenburg County relative to the region-at-large has more people, a greater percent of college grads, the most manufacturing jobs, a lower unemployment rate, and a higher percentage of professional/business service and financial sector employment. The other counties have more rapidly growing Hispanic and Asian populations, lower crime rates, a higher percentage of workers in manufacturing who earn lower wages, and a higher percentage of workers in health and education.

Strengths, weaknesses, opportunities, and threats

Strengths indicate areas to build upon. Weaknesses indicate areas where improvements appear to be warranted. Opportunities address the potential to either build upon strengths or to offset weaknesses. Threats are negative factors that, typically, could not be addressed by opportunities; some of those are factors beyond the control of regional leadership.

The SWOT analysis indicates that the greater Charlotte region has impressive strengths including an extensive public infrastructure, strong organizational leadership (particularly in Charlotte /Mecklenburg County), excellent and productive applied Research and Development capital (particularly at UNC-C and CPCC), growing industrial sectors including advanced manufacturing, a premier university/college system, and an excellent community environment for high-tech industry and professional employees.

There are weaknesses as well as strengths. The region is strong in applied R&D but weak in basic research and in regional dispersion of research activities; it is strong in air, rail and interstate highway networks but weak in highway access to the Wilmington port and is threatened by the possible demise of US Airways and the specter of bank relocation; it is strong in Charlotte area leadership but weak in regional-wide leadership/promotion and in entrepreneurial leadership; the region is strong in college and university education but weak in K–12 SAT scores and in the educational attainment levels of its population outside Mecklenburg county; and Charlotte area air pollution is an important weakness.

A potential weakness results from the widely different industrial composition between Mecklenburg County and the rest of the CRP area. Mecklenburg's finance, professional, and information employment (percentage-wise) represents about three times the employment in the rest of the CRP region; whereas, manufacturing employment (percentage-wise) in the rest of CRP is about three times the Mecklenburg manufacturing employment. Such a wide difference in industrial composition potentially creates conflicts between the goals of trying to stem the tide of manufacturing job losses, and to retrain and re-hire laid-off workers, and of expanding high-tech professional sectors.

There are opportunities both to build upon some of the region's strengths and to mitigate some of its weaknesses. For example, US 74, the east-west connector to Wilmington, needs repair and improvements; there is an opportunity to communicate that weakness to elected officials. In addition, the lack of additional capacity in Charlotte's intermodal depot (a weakness) is offset by opportunity to include in airport expansion plans a rail and truck depot; the region's limited entrepreneurial network (a weakness) is offset by the opportunity to develop an entrepreneurial network and support services; the lack of venture capital (a weakness) is offset by the opportunity to develop venture capital fund; and the fact that UNC-Charlotte receives less state funding than any other campus in the UNC system is offset by the opportunity for workforce and education providers to collaborate on funding/legislative issues.

There are relatively few "threats." That is positive since threats are difficult to address by regional leadership. Some of these threats include: failure to provide entrepreneurial opportunities to displaced employees; load loss for Duke Power (if industrial base not maintained or expanded); potential loss of R&D without technology transfer efforts; entrepreneurial efforts not flourishing without early venture capital sources; low workforce skill and literacy levels; and internal competition within the 16 county region.

Targets (clusters) of opportunity

There is no "right" answer to what constitutes a "target of opportunity." Is it a set of businesses that already have demonstrated strength in the region, that is: build on success? If so, does it matter whether those entrenched businesses are becoming more or less competitive? Are they businesses that are not yet in the region in great numbers, but appear to have a reason to be there? Or are they businesses that community leaders want to attract and nurture for any number of reasons, but for which success is theorized or imagined, rather than demonstrated historically in the region? These are not necessarily mutually exclusive directions to take—communities typically incorporate into their strategic (vision) plans some of each of these types of targets.

Clusters with existing strength

There are differences among CRP subregions in existing cluster competitiveness. Textiles and apparel, and wood processing and furniture, for example, are still large employers and relatively important in non-MSA counties, but are shedding workers. Business and financial services and insurance are particularly robust in the MSA counties. Higher education and hospitals, and basic health services, are competitive and growing throughout the region, particularly in the MSA counties. The arts and media sector is competitive in the MSA counties, but growing (emerging) in all parts of the region. The next question is whether, and how, to slow down losses in the important declining clusters, and to enhance the important and growing clusters.

Emerging clusters

At the same time that the Charlotte-Gastonia-Rock Hill MSA has been becoming more of a service and knowledge-based economy, it also has witnessed the emergence of basic sectors related to food, and the emergence of manufacturing-oriented clusters (motor vehicles, machine tools, and chemicals). The rural and South Carolina counties have seen an emergence of construction-related industries, along with their general population and business growth.

Desired clusters

Throughout the course of the project the region's leaders and economic developers articulated their desired clusters in ways that did not always line up with our technical analysis. The final table in the report shows the region's "industry targets," in a matrix that would be developed in the next stage of work. The targeted industries and industry niches are not inconsistent with the cluster analysis in this report. Once they are prioritized, the "members" of the targeted group would be identified using cluster concepts—which allows linkages to be defined more broadly than just within a standard industry code.

The final table also begins to identify the general means used to develop industry niches (recruiting, retaining, and growing particular businesses; strengthening the workforce; improving the tax and regulatory climate physical infrastructure, and other quality-of-life amenities; and coordinating economic development in the region. Each one of these has associated with it specific tasks and products that would be assigned to specific stakeholders in the next round of planning.

Next steps

1) Agree to the list of industry targets
2) Prioritize the list for attention, understanding that different targets of opportunity will be appropriate in different types of CRP counties
3) Complete the list of specific activities/products needed to develop successful targeted industries/clusters
4) Assign action items to different institutional players, including, but not limited to:
    a. Economic Developers Advisory Committee
    b. Higher education and K–12 representatives
    c. Workforce officials
    d. Chamber/public policy leaders
    e. CRP Executive Committee and Board of Directors
    f. N.C. Department of Commerce officials
    g. Tourism leadership group
5) Develop a means to ensure accountability
6) Solidify the cluster institutional structure, with clearly identifiable cluster champions and a coordinative body
7) Identify a time and place for the region to come together each year to track the results of the plan across organizations and functions.

Contents

Tables

Figures

1. A Vision Plan for the Charlotte Regional Partnership

In the winter and spring of 2004–05, the Carolina Center for Competitive Economies (C^3E) guided the Charlotte Regional Partnership (CRP) through the initial steps of a vision planning process. C^3E staff met with CRP leadership and the EDAC at the beginning of the process to clarify objectives and expectations. In April 2005, C^3E presented its preliminary report to a group of community leaders assembled by the CRP. This summary report documents the work done under the contract and outlines future action steps.

Several principles guided the work:

1) We reviewed a considerable volume of reports recently completed or then underway for various parts of the CRP region. To the extent possible, we wanted to summarize and synthesize those reports, not duplicate them. We also wanted to ensure consistency among reports.

2) This undertaking was conceived more as a foundation for vision implementation than as a full-blown vision plan. CRP staff recognized that there was to be a change of leadership in the summer of 2005 and wanted to provide the new president and CEO of the partnership with material to build upon, not a *fait accomplis*.

C^3E's contract called for a "synthetic SWOT analysis" and a review and augmentation of cluster studies for the region. This summary report begins with a characterization of the region's economy and demography to establish context, contains sections on strengths, weaknesses, opportunities, and threats as well as on existing, emerging, and desired clusters, and concludes with some suggested follow-up steps for the partnership. The report incorporates the documents presented to the client and other Charlotte area stakeholders during the contract period, including PowerPoint presentations.

Regional economic and demographic characteristics

This section presents a brief overview of the economic and demographic characteristics of the Charlotte Regional Partnership (CRP) region as background for the regional strengths, weaknesses, opportunities, and threats (SWOT) covered in the next section. Table 1 provides some of the key economic and demographic variables as summarized from a large number of tables contained in the Market Street Services report entitled, "A Regional Economic Profile for Advantage Carolina." The Market Street report is one of five to be summarized in section 2.

Table 1 presents a wide range of population, demographic, and economic measures for the CRP region, Mecklenburg County; the region without Mecklenburg County, and North Carolina. We took the most recent information available, ranging from 2000 to 2004, for each of the 11 measures included. The comparisons between Mecklenburg and the rest of the region are included to illustrate the considerable variation in economic and demographic conditions across the region; many of these comparisons will be referenced later in this report.

Table 1: Key demographics:
Mecklenburg County, CRP w/o Mecklenburg, CRP region, and North Carolina

Measure	Mecklenburg County	CRP region w/o Mecklenburg	CRP region	North Carolina
2003 population	751,683	1,498,864	2,250,547	
% of CRP	33.4	66.6		
% increase, 1990–2000	36.0	20.8		
1990–2000:				
% total pop. increase	36.0	20.8		
% Hispanic pop. change	570.4	621.6	596.5	393.9
% Asian pop. change	220.1	283.0	247.7	127.8
Total labor force, April 2004	416,588	755,601	1,172,189	
% of CRP	35.5	64.5		
Educational attainment, 2000				
% pop. >25 with college	66.4	42.4		
% pop. > 25 with HS	19.9	31.9		
% pop. >25 less than HS	13.7	25.6		
Composite SAT score, 2003	1001	997	999	989
Crime rate per 1,000 pop	73.0	42.8	52.8	47.7
Median house value, 2000	$141,800	$94,133	$97,113	$108,300
2002:				
Per capita personal income	$38,566	$25,641	$29,931	$27,785
Proprietors' income	$41,904	$18,785	$28,231	$20,857
Avg. unemployment rate, January–April 2004 (%)	5.1	7.8	6.8	5.7
2000 poverty rate (%)	9.0	10.1	9.8	

CRP without Mecklenburg comprises two thirds of the CRP population (66.6 percent) and slightly less than two thirds of the labor force (64.5 percent). The growth in the Hispanic population from 1990 to 2000 has been tremendous—621.6 percent for CRP without Mecklenburg, 570.4 percent for Mecklenburg, and 393.9 percent for North Carolina. The Asian population has expanded by 247.7 percent for the region versus 127.8 percent for the state. Differences in educational attainment levels between Mecklenburg and the rest of CRP are pronounced: 66.4 percent of the former has some college education versus 42.4 percent of the latter. SAT scores are not appreciably different between the county, the rest of the region, and the state. The crime rate is 73.0 per 1,000 population for Mecklenburg versus 42.8 for the rest of CRP and 47.7 for the state.

Median home values in Mecklenburg County are well above the rest of the region: $141,904 versus $94,133 for the rest. Likewise, per capita income for this county well exceeds that of the region—$38,566 versus $25,641—while per proprietor income in Mecklenburg is more than twice that of the rest—$41,904 versus $18,785. The state figures for these two income measures more closely track amounts for CRP without Mecklenburg. The unemployment rate difference between Mecklenburg and the rest of the region is also stark: for the first four months of 2004, the rate was 5.1 percent for Mecklenburg and 7.8 percent for the rest, while for the state the rate was 5.7 percent.

Commuting to work within county of residence is 90.8 percent for Mecklenburg and 63.3 percent for the rest of CRP. For the rest of CRP, 52.1 percent of the commuters out of the county commute into Mecklenburg County. CRP has very little commuting outside the region, with only 3.0 percent of the commuters from Mecklenburg County and 3.2 percent of the rest commuting outside the CRP region. Finally, the poverty rate for Mecklenburg is 9.0 percent versus 10.1 percent for the rest of the region.

Table 2 shows employment by industry and employment changes from the first quarter of 2001 to the fourth quarter of 2003.

Table 2: Employment and wages by industry and employment change for Mecklenburg County and CRP without Mecklenburg

	Percent employed in industry, 2003, Q4		Wages, 2003, Q4	
	Mecklenburg County	CRP region w/o Mecklenburg	Average annual for CRP ($)	% Mecklenburg wages exceed CRP average
Public administration	3.0	4.9	35,731	21.4
Other services	2.9	4.4	24,498	12.6
Leisure/hospitals	8.8	8.6	18,337	13.5
Education & health svcs	14.3	18.5	36,382	16.1
Professional/business svcs	18.3	7.8	46,349	15.7
Financial activities	11.4	2.7	57,464	10.0
Information	4.1	1.0	51,918	7.8
Transportation/warehousing	5.7	3.3	41,738	12.2
Retail trade	10.4	12.5	24,019	9.7
Wholesale trade	7.1	4.0	48,539	9.6
Manufacturing	7.5	24.8	41,645	30.1
Construction	5.8	5.8	40,038	16.2
Change in Employment: 2001–Q4 2003	**Number jobs gained or lost**	**Number jobs gained or lost**		
Total change in private sector	-16,019	-26,770		
Some key sector changes:				
Manufacturing	-8,444	-36,123		
Management	-10,022	731		
Professional/technical svcs	-4,482	51		
Educational services	3,128	5,192		
Health care and social asst.	4,041	6,171		
Finance and insurance	14,302	58		

The differences in employment percentages between Mecklenburg County and the rest of the CRP region are quite pronounced for both manufacturing and the professional, financial, and information sectors. Manufacturing accounts for 24.8 percent of all employment in CRP without Mecklenburg versus only 7.5 percent in Mecklenburg. On the other hand, the professional/business services, financial activities, wholesale trade, and information sectors comprise a substantial 40.9 percent of all Mecklenburg County employment, whereas they account for only 15.5 percent of all employment in the rest of the region.

The four sectors for which Mecklenburg County has a substantial advantage in employment numbers are also the leading average annual CRP region wage sectors, with wages ranging from $46,349 per year for professional/business services to $57,464 for financial services. The average annual regional wage for manufacturing is $41,645. For the sectors that might represent the best source of alternative employment for those losing manufacturing jobs—leisure/hospitality, other services, and retail trade—the annual wages are, respectively, $18,337, $24,498, and $24,019, wages that are only about 44 to 59 percent of manufacturing wages.

The last column in table 2 requires some clarification. Mecklenburg County has 81 percent of the region's employment in the finance sector and 79 percent of the employment in the information sector; thus, for these sectors, the regional percentages are heavily weighted by Mecklenburg, leading to small percentage differences in wages between the region and Mecklenburg. Conversely, for manufacturing, the percentage wage difference is appreciable (30 percent), since Mecklenburg accounts for only 22 percent of the region's manufacturing employment.

The bottom part of table 2 shows that the manufacturing sector in CRP without Mecklenburg lost 36,123 jobs in the brief period from Q1 2001 to Q4 2004—by far, the major job loser for this period. For Mecklenburg County, the main sectors losing jobs were management (10,022), manufacturing (8,444), and professional/technical services (4,482).

These figures dramatically portray a basic difference between Charlotte/Mecklenburg County and the rest of the region. The rest of the region is still highly dependent on manufacturing employment (even after years of manufacturing decline), whereas Mecklenburg County has become an employment center for the professional, financial, wholesale trade, and information industries, all sectors that provide higher annual wages.

The most important conclusion from this quick economic and demographic scan is that the 16-county region is diverse, so that one size will not fit all counties. Compared to the region as a whole, Mecklenburg County has more people, a greater percentage of college graduates, more manufacturing jobs, a lower unemployment rate, and a higher percentage of professional/business service and financial sector employment. The other counties have more rapidly growing Hispanic and Asian populations, lower crime rates, a higher percentage of workers in manufacturing who earn lower wages, and a higher percentage of workers in health and education.

2. The Region's Strengths, Weaknesses, Opportunities, and Threats

In this section, we synthesize information contained in recently completed reports to depict the economic state of the region in terms of its strengths, opportunities, weaknesses, and threats ("SWOT analysis," listed as task 2 in our *Statement of Work*). We describe how we chose which studies to synthesize, discuss what the weaknesses of those studies are, state guiding principles used in developing our synthesis, present a conceptual "capital accounting" framework to summarize the data, and summarize the main insights of the SWOT synthesis.

Major studies selected

Information contained in the five documents listed below provide the basis for the SWOT synthesis table presented in this section:

- "Advantage Carolina: Greater Charlotte Region Innovation Development Strategy," Thomas P. Miller and Associates, September 8, 2004
- "A Regional Economic Profile for Advantage Carolina," Market Street Services, August 9, 2004
- "A Competitive Assessment for Advantage Carolina," Market Street Services, August 25, 2004
- "Centralina Regional Comprehensive Economic Development Strategy: Community Assessment," Angelou Economics, August 23, 2004
- "Centralina Regional Comprehensive Economic Development Strategy: Recommendations Report," Angelou Economics, September 23, 2004

The first three of these documents are part of a study commissioned by Advantage Carolina in 2004. The latter two documents are part of a CEDS study conducted for the Centralina Council of Governments.

These reports contain information that is: (1) reasonably representative of the region and all its counties; (2) inclusive of the best available current data for the region; (3) reflective of all major economic assets/liabilities, including financial, physical, social/cultural, and human resource dimensions; and (4) representative of the strengths, weaknesses, opportunities, and threats facing the region's economy.

Table 3 shows the coverage of three studies in terms of counties included and various categories used in the analysis. The Miller and Market Street studies provide data and SWOT results for all 16 counties in the CRP region; the Angelou Economics study includes 9 of the 16 CPR counties (those included in the Advantage Carolina initiative). However, some of the data and the SWOT findings used in the Angelou study include the entire region. Likewise, although the Miller and Market Street reports indicate coverage of the entire region, some of the data and some of the SWOT findings do not provide full regional coverage simply because of the limited geographic coverage of the available data used; such limited coverage is shown in table 3 by a minus sign for each of the counties covered.

Table 3: Coverage of CRP counties and CRP strengths, weaknesses, opportunities, and threats by three major 2004 studies

CRP Counties	Miller	Market	Angelou
Alexander, NC	✓-	✓-	
Anson, NC	✓-	✓-	✓
Cabarrus, NC	✓-	✓-	✓
Catawba, NC	✓-	✓-	
Cleveland, NC	✓-	✓-	
Gaston, NC	✓-	✓-	✓
Iredell, NC	✓-	✓-	✓
Lincoln, NC	✓-	✓-	✓
Mecklenburg, NC	✓-	✓-	✓
Rowan, NC	✓-	✓-	✓
Stanley, NC	✓-	✓-	✓
Union, NC	✓-	✓-	✓
Chester, SC	✓-	✓-	
Chesterfield, SC	✓-	✓-	
Lancaster, SC	✓-	✓-	
York, SC	✓-	✓-	
SWOT Tables			
Knowledge capital: R&D	✓		✓
Physical capital: business	✓		✓
Physical capital: community		✓	✓
Organizational capital: community	✓		✓
Financial capital	✓	✓	✓
Human capital: education and training	✓	✓	✓
Human capital: skills and experience	✓	✓	✓
Social capital: business-oriented	✓	✓	✓
Social capital: resident- and employee-oriented	✓	✓	✓

Table 3 also shows that the Miller and Angelou reports cover all of the SWOT categories and that the Market Street reports cover all but three categories. The Angelou and Miller reports contain some SWOT tables the results of which we converted into our SWOT categories. The Market Street reports contain information that we used to convert into SWOTs using our categories.

Critique of existing studies

The reports used to construct the SWOT synthesis table that follows provide good information and are timely, but they are far from perfect as a source of information. In several places, they indicate weaknesses and threats without either providing any sense of what could or should be done to address them or connecting them to a related strength or opportunity, if there is one. In addition, the reports do not use public opinion or the judgments of economic development professionals, including those at the CRP. Finally, the reports present a somewhat piecemeal picture of a self-contained set of counties, not a holistic view of an internally integrated region that also is connected in critical ways to the outside world.

For these reasons, we provide some additional interpretation and context and do not rely solely on the reports cited.

Disconnect between needs and resources

Several studies cite problems in K-12 education. There are many ramifications to such problems, including the inability to prepare workers for the jobs that tend to be created in the region that require more and better education. The reports we have summarized do not include among their "opportunities" any means to rectify such problems. One document refers to a "strategic plan for the public education system in Charlotte," but it focuses on Charlotte only (not the entire CRP area).

As another example, the reports note the large-scale displacement of textile manufacturing workers in the region who lack the appropriate skills to be reemployed. Little is said in the reports about the kinds of skill-training and on-the-job-training programs that are or need to be in place in the region. The studies do not discuss whether the primary source of training for new jobs—in-house—represents an opportunity or a threat to the region.

More generally, a recent survey (discussed below) indicates that the top six training needs today are teamwork, communication, interpersonal skills, self-initiative, leadership ability, and listening. The documents we reviewed noted training in communication skills only, not in the other areas.

These documents do not analyze the extent to which laid-off workers attempt to take the entrepreneurial route after being displaced; we suspect that very few laid-off workers try to establish their own businesses, given the large capital requirements and uncertainties involved.

The existing studies cited do not discuss the implications of the fact that the low-skilled, low-income workers in the region who have been displaced are most likely to compete for jobs in the service sector. First, many of those jobs will go to younger and new immigrant (Hispanic) workers. Second, if a person is fortunate enough to find service work, s/he will have to settle for a low rate of pay.

Information sources used for the studies

The reports we reviewed fail to incorporate the opinions and perceptions of CRP employees and the general public. Public opinion could well enhance the SWOTs in several of the categories in the synthesis table. For example, the table provides little SWOT information concerning health care and human services needs, subjects on which the public could provide valuable information.

The geography of analysis

Some of the strengths, weaknesses, opportunities, and threats shown in the table address regional issues, while some address more specific subregional issues. There is, however, little information concerning SWOTs for the region as a system of interrelated components. For example, there are few maps, charts, and other presentations that depict such crucial regional interrelated components as transportation (roads, public systems, commuting patterns, rail lines, airports, etc.), land use and zoning, industrial locations, income and other resident characteristics, communications, public facilities, utilities, among many others. We will not likely have a comprehensive picture of the SWOTs for the CRP until these interrelations are better developed and better understood. Most of the basic information on the interrelated components is now available from county and municipal jurisdictions within the region; it needs to be developed and converted into SWOTs for the region as a whole.

All three synthesis studies emphasize the capital strengths, weaknesses, opportunities, and threats within the region. In some cases, it is implied that the region is self-contained and competes with other regions. This perspective sometimes fails to address the opportunities for drawing on assets and programs outside the region where warranted. For example, in research and development, health services, state programs and services, rural programs, and other areas, external assets could well be accessed to offset CRP weaknesses, or to capitalize on CRP opportunities, or to offset threats.

Many government programs in North Carolina and South Carolina address the weaknesses present in the CRP. For example, the NC Department of Transportation has long-term plans to develop a high-speed passenger rail service between the Research Triangle and Charlotte. Such a service could open new economic opportunities, yet the documents we reviewed made little mention of these plans. Nor did they mention the incentive programs that the Department of Commerce administers through the Commerce Finance Center.

In the four CRP South Carolina counties, a regional transportation agency—Pee Dee RTA—has provided human service transportation service for years. Prior to the passage of the federal Welfare-to-Work (WTW) legislation, Pee Dee was providing WTW service to these four counties (and to many other counties in northern South Carolina). A key component of this service has been daily employment trips to the major distribution and warehouse section of Charlotte for individuals on welfare commuting from these SC counties. North Carolina human service transportation systems, although quite advanced, have failed to take advantage of this transportation-to-work opportunity for their welfare population.

As another example, the NC Rural Center supports infrastructure and provides other assistance to rural counties in the state. Recently, the Center established an Institute for Rural Entrepreneurship. One of its key objectives is to actively assist laid-off employees who want to become entrepreneurs. No mention was found in these studies regarding possible use of this service in the CRP region, a region hard hit by layoffs.

The NC State Extension and Engagement service recently established an Economic Development office to facilitate and support the export of technology and knowledge from NC State research and extension to the rest of North Carolina and to respond to economic needs. Extension is a grass- roots activity that has proven important to agriculture and that has contributed to economic development. Again, no mention was found in the three studies regarding this important state contribution to counties and regions.

Dogwood Equity is the manager of the North Carolina Opportunities Fund, a licensed Small Business Investment Company. Dogwood seeks to invest in high-growth industries. The fund can invest in both equity securities and debt securities with equity features. Dogwood Equity has offices in both Raleigh and Charlotte; however, the three studies did not cite Dogwood as a source of equity financing for CRP.

The medical facilities at Duke University, Wake Forest University-Baptist, and UNC-Chapel Hill are considered world class. These facilities represent the gold standard for advanced medical service in North Carolina. In addition, the AHEC program of UNC-Chapel Hill reaches into all corners of the state. However, since these facilities are external to CRP, they are not discussed in the studies, even though they could be crucial to persons in the CRP region with dire and complex medical problems.

The list could go on. Our point is that the Charlotte Regional Partnership is not an "island unto itself." There is a lot of help available from elsewhere, and CRP needs to draw on that help to meet its goals. The SWOT table below (table 4) should be expanded to incorporate out-of-region resources and capital.

Guiding principles

- Capture all SWOTs from the five reports.
    - All of the strengths, weaknesses, opportunities, and threats from 5 reports are incorporated into this structure without "forcing a fit."
- Provide a framework that presents all regional assets and liabilities as "stocks" rather than flows.
    - We use a capital accounting framework that treats R&D; buildings and equipment; labor; infrastructure, education and training; and social and business networks, as stocks that contribute to economic development.
- Provide a structure that makes it easy to understand which SWOTs fit into each category.
    - In assigning and developing SWOTs for the following table, there was seldom a question or issue as to which category to use in assigning study results. This makes it easy for the reader to find a particular category and to know that all major SWOT results from 5 reports are shown for that category.
- Provide a structure whereby the reader is not overwhelmed by SWOT results in any particular category—preferably one page per category.
    - In the following table, eight of the nine categories are only one page in length. The only category requiring two pages is human resources: education and training.

Structure used in tables

We use a capital accounting framework in this synthesis. That is a useful approach because it treats different types of assets and liabilities within the region as "stock variables," at least conceptually. A flow of additional R&D, schooling, or good will, for example, may be important for economic development, but the accumulated stocks are what really matter.

Stocks of capital

Knowledge capital: Research and development

Physical capital: business

Physical capital: community

Organizational capital: community

Financial capital

Human capital: workforce skills and experience[1]

Human/knowledge capital: education and training

Social capital: business-oriented

Social capital: resident- and employee-oriented

The SWOT synthesis table

The following table shows the results from the recent studies that present the major strengths, weaknesses, opportunities, and threats facing the CRP region. Results from the Angelou, Miller, and Market Street studies are designated by (A), (M), and (MS), respectively.

Some preliminary observations include:

- **Knowledge capital:** research and development. Most results from Miller study; a few strengths and one weakness/one opportunity from Angelou; no results from Market Street. More strengths than weaknesses. Six opportunities but only two threats.
- **Physical capital: business.** Results from Miller and Angelou studies but no results from Market Street study. Overall: fewer SWOTs than expected for this important category; no weaknesses.
- **Physical capital: community.** A category sometimes called "infrastructure." Results from all three studies. Most items in table relate to transportation.
- **Organizational capital: community.** A category added to original list of categories since community organizational leadership appears important as reflected by extensive SWOT results. Results in table from Miller and Angelou studies but not Market Street. Ten opportunities listed, the most for any of the nine categories.
- **Financial capital:** Contains results from all three studies but limited, fragmented results overall in table. Only two opportunities and one threat.
- **Human/knowledge capital:** education and training. Results from all three studies. Two-page table shows 14 strengths and 13 weaknesses, the most for any category. Few opportunities listed and fewer threats. Most opportunities relate to universities and college; most weaknesses relate to K-12, especially lack of regional educational achievements.
- **Human capital: skills and experience.** Very few points made in the studies. Only one opportunity versus four threats; three weaknesses versus three strengths. *We provide*

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[1] Table 5, below, contains additional information on this item from the Urban Institute, UNC-Charlotte Urban Institute, and the Central Piedmont Community College "Survey of the Workforce Needs of Charlotte-Mecklenburg Employers."

additional data and analysis of human capital relating to skills and experience in the following section.

- **Social capital: business-oriented.** This was originally a social capital category but it was subdivided into two categories, social capital: business-oriented and social capital: resident- and employee-oriented, since some items such as taxes and business environment relate to business only, whereas other items such as cultural, sports, and recreational opportunities affect residents and employees in the region. Results from all three studies.
- **Social capital: resident- and employee-oriented.** Results from all three studies. Thirteen strengths listed; seven weaknesses. Weaknesses include one of the few duplicative results at the item level—air quality non-attainment, from both Angelou and Market Street studies.

Table 4: CRP strengths, weaknesses, opportunities, and threats — 2004 synthesis

Knowledge capital: research and development	
Strengths	**Opportunities**
• Research and development assets tremendous (A) • UNC-Charlotte Office of Technology Transfer: 1st in startups formed; 2nd in invention disclosures received; 2nd in patent applications, 3rd in patents issued; 5th in licenses executed; 20th in licenses and options yielding income (vs. comparable US universities) (A) (M) • Strong applied research focus (M) • Central Piedmont Community College (CPCC) a highly recognized, prestigious community college with strong, technology-focused leadership team (M) • CPCC foci: bioinformatics, geo-spatial technology, homeland security, information tech and health services (M) • UNC-C applied research in precision metrology, motor sports, optoelectronics, bio-informatics and e-banking/e-business (M) • Johnson C. Smith with a research center; conducts research for NASA (M) • Greater Charlotte's understanding of the need to better leverage innovation (especially telecommunications) to drive positive economic growth (M)	• Continue to advance premier research focus areas and local academic institutions (M) • Expand applied research efforts (M) • Facilitate communication between research institutions and business community (M) • UNC-C Office of Technology Transfer: potential for strengthening the technology transfer process (M) • UNC-C has the Charlotte Research Institute and ambition to take its research to the next level (M) • Market and leverage R&D resources (A)
Weaknesses	**Threats**
• Research and Development assets not well known or leveraged in the region (A) • Lack of basic research efforts (M) • Lack of innovation vision for Greater Charlotte Region at large (M) • Community innovation vision not communicated to research institutions (M) • Few cooperative efforts with Research Triangle—not only competitor; could be collaborator (M)	• Must continue to set high leadership standards at academic institutions to ensure innovation is a focus (M) • Without improved technology transfer efforts, R&D efforts will be lost or exported elsewhere (M)

Table 4: CRP strengths, weaknesses, opportunities, and threats – 2004 synthesis *(continued)*

Physical capital: business	
Strengths • Industrial sites plentiful in region (A) • Strong and growing banking, motor sports, and advanced manufacturing sectors (M) • The growing small business sector: Management, Scientific and Technical Consulting Services (M)	**Opportunities** • Entrepreneurship opportunities in the Management, Scientific and Technical Consulting Services sector and sectors related to banking, motor sports, and advanced manufacturing (M) • Old mills along river in Gaston County could be re-tooled—Defense Technologies is successful example (M)
Weaknesses	**Threats** • Failure to provide entrepreneurial opportunities to displaced employees (A) • Few industrial sites certified by State Department of Commerce (A) • Much of the value of new construction in uptown Charlotte is associated with bank headquarters. Reorganization that moves HQ out of Charlotte could threaten that.

Physical capital: community	
Strengths • Road Network Excellent: 3 major interstate systems (I-77, I-85, I-40); 2nd largest trucking center in southeast; major improvements underway (A) • Rail Network: largest most consolidated rail system in NC; 2 major lines—CSX and Norfolk Southern (A) • Charlotte/Douglas International Airport: 6th largest hub in US; 1st in US in number of flights per day per capita (A) • Utilities competitively priced and plentiful (A) • Five of region's counties with Internet access for over 84 percent of households; thus, 41.7 percent of region's counties have such access versus 27 percent of all counties in North Carolina (MS) • Charlotte airport: ranked 21st nationally in total passengers, 35th in cargo (2003); serves 23 international destinations (MS)	**Opportunities** • Highway improvements (A) • Airport expansions (A) • Consideration: move intermodal terminal in Charlotte to Airport (A) • Expand commuter rail lines (A) • Serve as test-bed for world's first commuter rail application of hydrail technology (A) • Improvements to US 74 in NC DOT transportation plan, but economic value of these improvements needs to be communicated to elected officials to expedite (A)
Weaknesses • US Highway 74, a major east-west connector to the port at Wilmington, in need of improvements—directly affecting Gaston, Mecklenburg, Union, and Anson counties but indirectly affecting whole area (A) • Lack of telecommunication assets (Wi-Fi networks) outside Charlotte (A) • Intermodal depot in Charlotte reached capacity (A) • US Airways' 482 daily departures comprise 92.2% of daily departures from Charlotte airport, a risky dependence should the airline's financial troubles cause it to cut operations (MS) • Evidence of greater supply than demand of advanced telecommunications services (M)	**Threats** • Load loss for Duke Power (A) • Continued telecommunications supply-demand mismatch leading to financial difficulties for the region's providers of advanced telecommunications services, thereby resulting in loss of a differentiating regional asset (M) • Wachovia-First Union is split between Charlotte and Philadelphia; Bank of America is split between Charlotte and San Francisco. There is always a threat of relocation to other cities.

Table 4: CRP strengths, weaknesses, opportunities, and threats – 2004 synthesis *(continued)*

Organizational capital: community	
Strengths	**Opportunities**
• Leadership of Charlotte Regional Partnership (A) • Duke Power active participant (A) • Focus on target industries (A) • Commercialization Committee, Charlotte Research Institute, Ben Craig Center, and Urban Institute provide support services to start-ups (M) • Business Innovation and Growth Council (BIG), an entrepreneurial support organization (M) • Central Piedmont Community College (CPCC): strong interest in entrepreneurship (M) • Gaston County hospital ranked in top 100 US hospitals, indicating potential for a Life Sciences sector (M) • Workforce Continuum Initiative encouraging communication between business and industry and educational institutions (M) • North Carolina Motorsports Association facilitating communication between industry partners and local academic institutions (M)	• Develop an entrepreneurial culture (A) • Improve collaboration among small business and entrepreneurial groups (A) • Develop entrepreneurial network and include entrepreneurial support service providers (M) • Create an Economic Development District (A) • Queens College with the McColl Graduate School of Business: may establish Center for Entrepreneurial Studies (M) • Council for Entrepreneurial Development (at Research Triangle): potential youth entrepreneurship program model for the Greater Charlotte Region (M) • Gaston County focused on entrepreneurship; has motivated mayors in Mt. Holly and Gastonia (M) • Organize regional technology transfer organization to facilitate communication among government, business, and academic institutions (M) • Potential for a system to facilitate interaction among organizations that support innovative entrepreneurship and to market entrepreneurship opportunities (M) • Further regional collaboration to support entrepreneurship (A)
Weaknesses	**Threats**
• Regional Tourism promotion (A) • Lack of a coordinated effort to encourage entrepreneurship throughout the region (A) • Limited networking among entrepreneurial organizations, support services, etc. (M) • No method to measure start-up success rate (M) • Very few entrepreneurial mentoring programs to partner businesses and prospective or early-stage entrepreneurs (M) • Lack of youth entrepreneurship programs to develop future entrepreneurs (M) • Limited SBIR presence (M) • Lack of thorough communication between academic institutions and local business, industry, and government officials (M) • No organized system to facilitate interaction among organizations that support entrepreneurship (M)	• "Turfism" among county economic development groups (A) • Without communication among organizations, ideas not synergized and often duplicated, resulting in wasted effort and inefficiency (M) • Regional fragmentation. Lack of unified vision and cooperation within entire 16-county region (M)

Table 4: CRP strengths, weaknesses, opportunities, and threats – 2004 synthesis *(continued)*

Financial capital	
Strengths	**Opportunities**
• Small business lending increasing over past 5 years (A) • Greater Charlotte Region ranking 3rd among 8 Southeastern metropolitan areas for total venture capital funding (M) • Region's per capita bank deposits appreciably higher than comparable areas—Richmond, Tampa, Nashville—indicating high level of community assets as one possible source of financing business activities (MS) • Small business in region using SBA business loans to greater extent than Richmond and Nashville (less than Tampa) (MS)	• Develop venture capital fund (M) • Traditional investors: need to address region's entrepreneurial potential and develop more aggressive financing and investment approach (A)
Weaknesses	**Threats**
• Disparity of lending activity among counties (A) • Lack of pre-seed and seed venture capital; all venture capital in NC went to Research Triangle area during 3 months in 2004 (M) • Lack of deal flow (M) • One venture capital deal (a financing arrangement that provides start-up or expansion funds in exchange for an equity position) in 2nd quarter 2004 versus 2 in Nashville, 1 in Tampa, 0 in Richmond(and versus 6 in Durham, 3 in Raleigh, 1in Greensboro (MS) • Lack of private sector funding in some counties (A)	• Must develop early venture capital sources or entrepreneurial activity will never flourish (M) • Availability of capital is tied to high presence of banking assets. They are always vulnerable.

Human capital: education and training	
Strengths	**Opportunities**
• Premier community college system; community college in every Centralina county (A) • UNC-Charlotte a premier state university (A) • Several private colleges providing liberal arts and specialty degrees (A) • Several technical institutes providing, among other specialties, certificates in motorsports, a targeted regional industry (A) • Greater Charlotte Region slightly ahead of Greensboro and state of NC in percentage of students reading at or above grade level (approximately 80 % at each grade level) (M) • Charlotte-Mecklenburg schools improved literacy from 1995 to2001 (M) • Technology focused post-secondary presence (M) • CPCC a nationally recognized community college (M) • Programs such as Pathways to Employment, TechConnect, Adopt a School, Charlotte Reads, Technology Talent Initiative (M) • Computer Access in the Neighborhood program (M) • CRP region: greater proportion of teachers with advanced degrees compared to state average (MS) • 38 higher education institutions in CRP with enrollment of about 88,000—an enrollment larger than Nashville and Richmond but smaller than Tampa (MS) • UNC-C a university with regional draw, increased research expenditures, and increased enrollment (MS) • 10 community and technical colleges in CRP, with total enrollment of about 43,000 (MS)	• Workforce and education providers opportunity: further collaboration on funding/legislative issues • Additional private funding (A) • Additional foundation funding (A) • Implement K-12 Literacy Program (MS) • Develop strategic plan for public education system in Charlotte (MS) • Expand professional programs at several local 4-year institutions (MS) *Weaknessess and threats on next page*

Table 4: CRP strengths, weaknesses, opportunities, and threats – 2004 synthesis *(continued)*

Weaknesses	Threats
• Significant disparity in educational attainment levels within the region (A) • UNC-Charlotte receives the least funding of universities in UNC system (M) • 33% to 47% of students in grades 3 through 8 have not mastered subject matter of their grade (M) • Charlotte-Mecklenburg schools post SAT scores significantly below local private schools (M) • In 2003 CMS lost 17% of teachers, incurring replacement costs of approximately $14 million (M) • Greater Charlotte Region falls significantly behind peers in adult literacy scores (M) • No strong business or professional school in metropolitan area focused on banking (M) • Large number of displaced workers with no high school diploma or GED (M) • Only 13.8 percent of high schools in region designated as Schools of Excellence or Schools of Distinction (MS) • 76.9 percent of the region's middle schools and 70.4 percent of the high schools did not meet the adequate yearly progress performance standards under the No Child Left Behind Act (MS) • 13.5 percent of high schools had at least 80 percent of students testing at or above grade level versus 18.4 percent for all state high schools (MS) • CRP region with higher dropout rates than Richmond, Tampa, and Nashville (but lower than NC state average) (MS) • Region's SAT scores lagging behind national average (MS)	• Low workforce skill and literacy levels (A) • Local employers seeking business graduates from Duke, UNC-Chapel Hill, and out-of-state educational institutions (M)

Human capital: skills and experience	
Strengths	**Opportunities**
• Increase of service sector jobs resulting in a decrease in recent unemployment rate and an increase in job growth (M) • Workforce assistance in transportation, childcare, resume and interview skills, and college financing (M) • Charlotte metro area gross product ($1.58) per dollar of salary ($1.00) higher than that for Nashville, Richmond, and Tampa, 1999-2002 (MS)	• Market social service programs (M)
Weaknesses	**Threats**
• Significant loss of textile manufacturing jobs, which are proven by research to be highly important to Greater Charlotte Region economy (M) • Lack of soft skills in workforce: motivation, work ethic, timeliness, communication skills, ability to follow directions (M) • Social service programs not marketed well (M)	• Workforce skills gap (A) • Existing basic skills lacking with regard to employer needs (A) • Potential increase in off-shoring of service industry jobs including banking (M) • Needs of new generation in the workforce do not mesh with older generation's (M)

Table 4: CRP strengths, weaknesses, opportunities, and threats – 2004 synthesis *(continued)*

Social capital: business-oriented	
Strengths	**Opportunities**
• Property taxes (A) • Pro-business environment (A) • Small business centers at community colleges (A) • Recent recruitment of 2 Fortune 500 companies (M) • Union membership low in North Carolina versus Tennessee, Florida, and Virginia (MS)	• Build on Junior Achievement models in region (A) • Charlotte Research Institute (A) • Develop marketing plan emphasizing that the Greater Charlotte Region has something for everyone: big city and business, rural life, motor sports, entertainment, etc. (M)
Weaknesses	**Threats**
• Lack of strong marketing scheme (M) • North Carolina corporate income tax rates higher than the three comparison states (MS)	• Average wages (A) • North Carolina tax structure high for business (A) • Economic development competitors such as Atlanta, Tampa, Greensboro (M) Greenville/Spartanburg, Nashville, Orlando, Charleston, and Jacksonville (M)

Social capital: resident- and employee-oriented	
Strengths	**Opportunities**
• Downtown Charlotte's numerous attributes (A) • Small-towns charm (A) • Numerous recreational assets (A) • Geographic center of Carolinas • Family-oriented image • High level of diversity • Efforts to develop vibrant after-hours scene in downtown Charlotte • General consensus: a high quality of life • Favorable climate and weather patterns • Charlotte ranking 3rd among Southeastern metropolitan areas for population growth from 1990 to 2003 • Overall cost of living lower than national average and lower than Richmond and Tampa (similar to Nashville) (MS) • High arts ranking (MS) • Recreation: 67th of 354 metro areas, behind Tampa and Nashville but ahead of Richmond (MS)	• Regional land use planning (A) • Regional tourism promotion (A) • Public transportation network (A) • Charlotte Region has something for everyone: big city and business, rural life, motor sports, entertainment, etc. (M)
Weaknesses	**Threats**
• Air quality non-attainment (A) (MS) • Access to healthcare (A) • Affordability for displaced workers (A) • 3rd highest cost of living in group of nine Southeastern metropolitan regions (M) • Compared to other Southeastern metropolitan regions, Charlotte has the largest percentage of residents commuting outside its metropolitan statistical area (M) • Charlotte metro's ranking of 101 of 317 metro areas in "2003 Health Pole Index", behind Nashville, Richmond, and Tampa (MS) • CRP region with more potentially hazardous materials than Nashville and Richmond (MS)	• Growth pressures (A) • Decreasing percentage of 25-44 year olds (A) • Valuable airport jeopardized if quality highway access isn't developed and maintained (M)

More on human capital: skills and experience of the workforce

Because the five reports used to construct the synthesis table are thin in the area of workforce skills and experience, we provide additional insights here from another study, "Survey of the Workforce Needs of Charlotte-Mecklenburg Employers" by the UNC-Charlotte Urban Institute and the Central Piedmont Community College. We did not incorporate the information from this report into the table above, because it covers only the Charlotte-Mecklenburg part of the 16-county CRP area and is also less comprehensive than the other reports.

The authors administered a survey to employers that showed a relative shortage of workers in the region, especially at the skilled and professional levels.

Table 5: Worker availability in Mecklenburg County

Type of worker:	Low-skilled	Skilled	Professional
Availability:	*Percentage of respondents with this answer*		
Some-to-always	69.8	64.3	64.5
Some-to-little	45.7	86.1	76.5

Almost 70 percent of respondents indicated a fairly good supply of unskilled workers, some five percentage points more than for skilled and professional workers. The difference is more dramatic when respondents answered whether the workers were relatively hard to find. The shortage of skilled workers in the Charlotte-Mecklenburg area will worsen because, according to respondents, the skill requirement of jobs is increasing.

The difference in skills (and pay) between the high and low ends of the workforce is widening in the region. Forty percent of employer-respondents indicated that skill levels of low-skilled employees were now lower than 10 years ago; only 7.7 percent indicated that skill levels for low-skilled employees were higher. For skilled workers and professional workers, skill levels were perceived as higher than 10 years ago: 56.2 percent higher now for skilled workers and 56.7 percent higher now for professional workers.

Looking forward, employers noted six training needs to make and keep their workforces competitive: teamwork ability, communication, interpersonal skills, self-initiative, leadership ability, and listening. They planned to provide this training in-house to a large degree, but also from the sources listed below:

Source	Percentage planning to use
In-house training	98.7%
Private consulting firms	58.7%
2-year college	39.7%
4-year college	35.2%
Government resources	24.5%
Union resources	3.0%

Summary

This section presents a table of strengths, weaknesses, opportunities, and threats for the CRP region drawn from recently completed studies within the region. As we have indicated, the synthesis tables could well be expanded, and in some cases modified, based on additional information and alternative perspectives. The lack of a comprehensive and interrelated regional perspective and the failure to acknowledge the potential contribution of resources from outside the region are but two of the limitations of the studies. The human resources components are particularly thin.

Strengths shown in the SWOT table indicate areas to build upon. Weaknesses indicate areas where improvements appear to be warranted. Opportunities address the potential either to build upon strengths or to offset weaknesses. Threats are negative factors that, typically, could not be addressed by opportunities; some of these are factors beyond the control of regional leadership.

The SWOT table in this section shows that the greater Charlotte region has impressive strengths, including an extensive public infrastructure, strong organizational leadership (particularly in Charlotte/Mecklenburg County), excellent and productive applied Research and Development capital (particularly at UNC-C and CPCC), growing industrial sectors including advanced manufacturing, a premier university and college system, and an excellent community environment for high-tech industry and professional employees. In the CRP SWOT table, the number and importance of strengths surpasses the number and importance of weaknesses.

But the weaknesses are significant. For example, the region is strong in applied R&D, but weak in basic research and in the regional dispersion of research activities; it is strong in air, rail, and interstate highway networks, but weak in highway access to the Wilmington port as well as threatened by the possible demise of US Airways; it is strong in Charlotte area leadership, but weak in region-wide leadership and promotion and in entrepreneurial leadership; it is strong in college and university education, but weak in K–12 SAT scores and in the educational attainment levels of its population outside Mecklenburg county. In addition, Charlotte area air pollution is an important weakness. The targeted industry/cluster analysis that follows underscores the widespread significance of the banking sector, owing to the presence of two major headquarters. There is always a threat that activities of those and other banks are relocated elsewhere.

A potential weakness not highlighted in the SWOT findings of the five reports results from the widely different industrial compositions of Mecklenburg County and the rest of the CRP area. Mecklenburg's finance, professional, and information employment (percentage-wise) represents about three times the corresponding employment in the rest of the CRP region, whereas manufacturing employment (percentage-wise) in the rest of CRP is about three times the Mecklenburg manufacturing employment (see table 2). Such a wide difference in industrial composition potentially creates conflicts between two goals: 1) the goal of stemming the tide of manufacturing job losses and retraining and rehiring laid-off workers and 2) the goal of expanding high-tech professional sectors.

There are opportunities both to build upon some of the region's strengths and to mitigate some of its weaknesses. For example, US 74, the east-west connector to Wilmington, needs repair and improvements; there is an opportunity to communicate that weakness to elected officials. In addition, the lack of additional capacity in Charlotte's intermodal depot is offset by the opportunity to include a rail and truck depot in airport expansion plans; the region's limited entrepreneurial network is offset by the opportunity to develop an entrepreneurial network and support services; the lack of venture capital is offset by the opportunity to develop venture capital fund; and the fact that UNC-Charlotte receives less state funding than any other campus in the UNC system is offset by the opportunity for workforce and education providers to collaborate on funding and legislative issues.

In most of the categories in the preceding tables, there are relatively few "threats," which is fortunate, since threats are difficult to address by regional leadership. Some of these threats include: failure to provide entrepreneurial opportunities to displaced employees; load loss for Duke Power (if the industrial base is not maintained or expanded); potential loss of R&D in the absence of technology transfer efforts; entrepreneurial efforts not flourishing without early venture capital sources; low workforce skill and literacy levels; and internal competition within the 16-county region.

3. Targets of Opportunity

In this section we summarize what three existing studies say about promising clusters for the region, present our own cluster analysis, and discuss how both sources of information relate to strategic opportunities as identified by the CRP.

Overview of what existing studies say

Only two of the five reports used for the SWOT synthesis provide any appreciable information regarding targets of opportunity:

- "Centralina Regional Comprehensive Economic Development Strategy: Recommendations Report," Angelou Economics, September 23, 2004
- "Advantage Carolina: Greater Charlotte Region Innovation Development Strategy," Thomas P. Miller and Associates, September 8, 2004

A third report, completed in 1998 as part of Vision 2030, provides a cluster analysis for the CRP region:

- "At the Crossroads: North Carolina's Place in the Knowledge Economy of the Twenty-First Century," for the North Carolina Alliance for Competitive Technologies and North Carolina Board of Science and Technology. Edward J. Feser, Harvey A. Goldstein, and Michael I. Luger, April 1998

The Angelou report identifies six promising industries for the region, all of which are driven by advances in technology, availability of venture capital and entrepreneurs, and community/university leadership. They are:

- Fuel cells
- Biotech/bioinformatics
- Optoelectronics
- Automotive
- Software development
- Defense/advanced security

For each of these targeted industries, the report assesses the Centralina Region's assets and potential for future expansion.

The Angelou report makes three recommendations, some related to the promising clusters:

- Enhance the environment for manufacturing by promoting innovation and incorporating advanced manufacturing in all pertinent business sectors
- Expand R&D to support motorsports and optoelectronics
- Promote the region's tourism

The Miller study identifies "information technology connectivity" as a particularly promising sector, because of the greater Charlotte region's existing telecommunications assets, strong planning and administrative support, and favorable regulatory processes.

The 1998 UNC report (which was augmented by studies in 1999 and 2000) includes both a statewide and region-by-region industrial cluster analysis. Although this report is now somewhat dated, it provides a useful baseline for comparison with the Angelou and Miller reports cited above.

What existing studies say

Angelou's industry targets for the Centralina region

Fuel cells

Fuel cell technology involves combining hydrogen and oxygen to generate electricity, heat, and water without combustion or harmful emissions. The best known and most researched application is for automobile fuel, but there are other applications, including many portable devices such as laptop computers, cell phones, cameras, and generators as well as the provision of electric power in remote sites.

The Angelou report indicates that the outlook for fuel cells is bright. The current US market for fuel cells is estimated to grow from the current $700 million to $14 million over the next decade. Fuel cells could add as much as 750,000 jobs to the US economy by 2030. Every major car company is planning to debut a fuel cell-powered car within the next decade.

The study states that "the fuel cell target industry represents a great opportunity for the Centralina region" and cites several examples of start-up plans and activities:

1) Early stage planning is underway for the world's first hydrogen fuel cell-powered passenger rail conveyance: CATS Charlotte-to-Mooresville line, supported by two UNC-Charlotte research initiatives.
2) Centralina Clean Fuels Coalition promotes the use of alternative fuels in the transportation sector as part of the national Clean Cities Program.
3) EcoVehicle, in Salisbury, is one of the first independent zero emission transportation manufacturers in the US and has already developed a prototype.

This industry will require the following for success:

- Public-private sector cooperation—good in Centralina
- Recruiting employees from established industries—existing high tech and automotive sector employees in the region are a good source
- Industrial space, particularly industrial parks—available in the region

Biotech/bioinformatics

The biotechnology industry uses the basic structure of the cells and molecules of living organisms to develop useful products. The biotech industry was the only industry to achieve employment growth from 2001 through 2003. Bioinformatics is the marriage of molecular biology and high-speed computing to develop databases and algorithms that enhance the understanding of complex biological interactions and processes.

Biotechnology as an industry is still in its infancy and is still relatively small after a decade of growth. It is expected to add almost 400,000 jobs in the decade ahead.

Biotechnology is listed as one of the top two target industries by 83 percent of the communities recently surveyed by the Brookings Institution.[2] Competition among areas for biotech firms is therefore expected to be quite fierce over the next decade.

[2] Joseph Cortright and Heike Mayer, *Signs of Life: The Growth of Biotechnology Centers in the U.S.* Washington, DC: The Brookings Institution, June 2002.

Biotech activities already on-going in the Centralina region include:

1) An established biotech industry and proximity to the Research Triangle biotech industry
2) A proposed $35-million bioinformatics research center at UNC-Charlotte, one of the first in the nation and an invaluable tool for developing this industry
3) Canon Research Center in downtown Charlotte conducting biomedical research
4) Region's medical manufacturing industry with 150 companies and 6,000 employees—an asset in recruiting and developing biotech/bioinformatics industry[3]

Competitive assets include:

1) Regional research strength
2) Educated workforce
3) Access to capital
4) Available office and lab space

Optoelectronics

Optoelectronics is focused on the emission, transmission, deflection, amplification, and detection of light by optical components and instruments, lasers and other light sources, fiber optics, electro-optical instrumentation, and related electronics.

In 2002, industry revenues were $4.23 billion. Revenues are expected to almost double to $7.23 billion by 2009.

The heart of this industry in the Centralina region is the UNC-Charlotte Center for Optoelectronics and Optical Communications, which is scheduled to move into a $24-million facility in 2005. It serves as a research center for the industry and a link between the regional industry and the university.

Competitive assets include:

1) Regional research strength—UNC-C ranks near the top of all US universities in technology transfer
2) Technical workforce
3) Low cost of doing business
4) Strong telecommunications

Automotive

The automotive industry primarily designs, manufactures, and distributes transportation vehicles. The industry is gradually expanding into the southeast US, which is attractive because of lower prevailing wages and low unionization. Two Japanese manufacturers are believed to be considering the southeast US as the location of new plants.

NASCAR is also considered to be part of the automotive industry. Its audience is now second only to that of the National Football League. NASCAR has annual revenues from TV deals ($2.8 billion), ticket sales ($1 billion), merchandise sales ($2 billion), and corporate sponsors ($1 billion).

The Centralina Automotive Industry, which includes transportation equipment manufacturers employing over 11,000, has the advantages of close proximity to the BMW plant in Greenville, SC, and good highway access to major vehicle production facilities in Tennessee, Kentucky, and Ohio.

Centralina is home to NASCAR—90 percent of NASCAR teams are located within the region—and therefore to an industry that provides a $2 billion economic impact for NC.

[3] Subsequent to the Angelou report, the chairman of Dole Foods, David Murdock, purchased the vacated Pillowtex No. 1 plant in Kannapolis and is trying to develop a biotech research center in cooperation with several North Carolina universities.

The UNC-Charlotte automotive and motorsports engineering program has been a huge success.

The region's competitive assets include:

1) Industry cluster
2) Low structural costs
3) Right to work state
4) Large land tracts
5) Existing R&D

Software development

The software industry is comprised of computer programming services, prepackaged software, data processing, and information retrieval services. Nationwide, this industry has revenues in excess of $200 billion. The security segment has grown rapidly due to the attack of viruses and hackers; it is expected to grow by $2 billion by 2006 (nearly 50 percent).

Centralina lacks a developed software industry and the region's cluster is well below the national average. However, it is close to the Research Triangle, which is one of the nation's leading software locations.

The region's competitive assets include:

1) Educated workforce
2) Access to capital
3) Area research
4) Quality of life

Defense/advanced security

The US security market includes surveillance and monitoring, access control, biometrics, computer security, alarms, and home automation. The industry has received greater recognition and the demand for its products have increased since the 9/11 attack.

Of the three security market segments—commercial, government, and residential—commercial security is the largest, growing from $14 billion in 2002 to $29 billion in 2009. The combined effect of lower prices and increased demand is driving this growth.

Close behind, the government spent $7.5 billion in 2002 and will be spending $16 billion by 2009, an increase fuelled by terrorism fears.

The third market segment, residential security, had sales of $1.7 billion in 2002 and is forecasted to expand sales to $3.2 billion in 2009.

Centralina has a moderate sized defense industry. The size of the security market is not reported by the Angelou study.

The region's software assets include:

1) Defense presence
2) High-tech cluster
3) Educated workforce
4) Reasonably priced and abundant utilities

Miller's industry targets

Miller and Associates focus on information technology connectivity (telecommunications) in their report. Telecommunications infrastructure and services have a positive impact on economic growth. Such services provide both a direct return on investment to the providers and an indirect return—such as the reputation for being a "wired" community and, thus, a desirable location site for high-tech firms with an educated workforce.

Some of Greater Charlotte's strengths and opportunities in the area of telecommunications include:

1) About 66 percent of the community having the option of DSL or cable modem broadband
2) One of the top six US metros with respect to computer usage in schools (77 percent)
3) Low risk-disaster zone
4) Collaborative spirit among vendors
5) Good GIS infrastucture

Some of Greater Charlotte's threats and weaknesses in this area include:

1) Lack of regional networking among telecom stakeholders
2) Lack of regional telecom planning
3) Greater Charlotte not perceived as a "wired" region
4) Telecom services supplied exceed usage, which could lead to provider financial difficulties

UNC-Office of Economic Development's industry clusters

Neither the Angelou report nor the Miller report was based on a comprehensive cluster analysis to identify targeted industries for the region. Their recommended industry sectors appear to be based primarily on discussions with regional officials and analyses of regional data. Advanced cluster analysis, as developed and applied by researchers at UNC-Chapel Hill, goes beyond these approaches by using a sophisticated economic statistical approach to developing clusters of industries with common bonds. In the 1998, 1999, and 2000 reports, this methodology was applied statewide and to each of the regional partnerships.

<u>Limitations</u>

The principal limitation of the UNC reports is that the data and the resulting designation of target industries are now somewhat dated: the last report was published in 2000 and the data represent the 1990s. Since that time, we have gone through a recession and seen numerous changes in the economy.

<u>Strengths</u>

The strength of the UNC report lies in its comprehensive methodology and its extensive application in North Carolina and elsewhere over several years. A cluster analysis may identify strong underlying currents in a regional economy that are not evident in individual industry analyses.

An industry is a group of businesses producing a similar product, whereas a cluster comprises not only final market producers but also suppliers, related producer services, and other linked enterprises. The critical feature of an industry cluster is the benefit that comes from the cluster's size and scope. Large clusters benefit from ready access to supplies and equipment, skilled labor, specialized infrastructure, and quality technical and scientific personnel, typically giving that cluster a competitive advantage over many of its competitors in other regions. Sometimes cluster analyses identify linked businesses that might be missed in industry studies. For example, cluster analysis shows that the vehicle manufacturing industry, which is quite an important employer in the CRP region, is comprised primarily of transportation equipment suppliers and aftermarket parts producers; an industry analysis would show only that there is little employment in the final product (motor vehicles) in the region.

Further, the UNC study identified *existing clusters*, *emerging clusters*, *potential clusters*, and *technology clusters*. This identification should help a region establish policies and plans that address the special characteristics of each type of cluster. Existing and emerging clusters are both characterized by large absolute employment, large relative employment (versus US average), and a diversity of underlying cluster sectors. However, existing clusters usually have higher (US) relative employment percentages than emerging industries and emerging clusters usually have higher year-to-year growth rates than existing industries. Potential clusters are characterized by strong growth relative to national trends, but they often lack a diversity of underlying sectors. Technology clusters have a higher percentage of skilled workers in their workforces.

Results

The largest *existing clusters* in the region in 1998 were apparel (with 57,887 employees) and fabricated textiles (41,073), in both cases well above the US average. However, both of those sectors experienced over 3 percent annual declines for the 1989 to 1998 period. Banking and advertising was the region's strongest existing cluster, with 38,618 employees, an annual rate of growth of 9.9 percent (1989-1998), and an average wage of $48,365. Other strong existing clusters included transportation, shipping, and logistics, as well as motor vehicle manufacturing—both with over 30,000 employees and positive annual percentage increases.

The most notable *emerging clusters* were printing and publishing and hospitals, labs, and specialized medical services, with 72,796 and 52,370 employees, respectively, 4.7 and 7.4 annual rates of change, and over $38,000 in annual wages (both). Both of these clusters fall just below the relative US employment percentages.

The prominent *potential clusters* were information technology and instruments (24,731 employees and an annual wage of $50,840) and securities and insurance (10,338 employees and an annual wage of $39,688). However, the relative employment percentages for each are only about two-thirds of the US average.

Finally, the region's most important *technology clusters* included information technology and instruments, communications services and software, motor vehicle manufacturing, chemicals and plastics, and industrial machinery. All had positive annual rates of increase from 1989 to 1998; all had employment percentages just above or just below the US average; all paid high wages; and all (but industrial machinery) had 12,000 employees or more. Both motor vehicle manufacturing and information technology clusters, differently defined, are represented in the other types of clusters shown above.

Updating the cluster analysis

Because the analysis we (C^3E) conducted in 1998-2000 may now be outdated, we repeated it for the region, using more recent data. We began with 45 "national benchmark clusters" defined by C^3E researchers based on national input-output data. [4] We used 1998 and 2003 six-digit NIACS employment data, by county, to ascertain how prominent and rapidly growing each of those clusters was in four sub-regions of the CRP:[5] [6]

- The Charlotte Regional Partnership
    - Twelve North Carolina and four South Carolina counties: Alexander, Anson, Cabarrus, Catawba, Chester (SC), Chesterfield (SC), Cleveland, Gaston, Iredell, Lancaster (SC), Lincoln, Mecklenburg, Rowan, Stanly, Union, York (SC).

[4] National clusters from: Feser, Edward, 2004, "An updated set of benchmark value chains for the United States, 1997." Regional Economics Applications Laboratory, University of Illinois at Urbana-Champaign.

[5] Data from the North and South Carolina Employment Security Commissions, ES-202 files, and U.S. Department of Commerce, Bureau of Labor Statistics, annual employment data, by industry.

[6] The following issues may affect the accuracy of our analysis: (1) South Carolina counties (other than York) have extremely low employment, and it is likely that much of it is suppressed at the six-digit level. That creates problems in generating employment-based indicators; (2) it is difficult to attribute cluster groupings to very small geographic areas with low employment; (3) because of the low levels of cluster employment outside MSA counties, a cluster robustness analysis may not be appropriate.

- Charlotte-Gastonia-Rock Hill, NC-SC MSA
    - Six North Carolina counties and one South Carolina county: Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, Union, York (SC).
- NC-SC Non-MSA Counties
    - Seven North Carolina and three South Carolina counties: Alexander, Anson, Catawba, Chester (SC), Chesterfield (SC), Cleveland, Iredell, Lancaster (SC), Stanly, Union
- South Carolina Counties
    - York, Chester, Chesterfield, Lancaster

The tables presented in this section show, for each sub-region, the:

- Top 20 clusters in 1998 by location quotient (LQ)
- Top 20 clusters in 2003 by LQ
- Clusters with increasing competitiveness
- Clusters with decreasing competitiveness
- Clusters with increasing employment
- Clusters with decreasing employment
- Simple shift-share/LQ data and bubble-chart

Table 6: Top 20 regional clusters, 1998

Cluster ID Code	Cluster Descriptor	Employment 1998	Location Quotient 1998
1	Textiles & apparel	74,490	6.47
18	Wood products & furniture	24,445	4.36
8	Construction	2,638	3.45
25	Plastics products	11,088	1.53
21	Paper	8,034	1.51
45	Leather products	2,746	1.49
32	Grain milling	1,102	1.41
20	Wood processing	10,649	1.28
10	Chemical-based products	5,745	1.21
16	Nondurable industry machinery	18,425	1.21
3	Plastics & rubber manufacturing	7,432	1.18
23	Motor vehicles	12,996	1.17
37	Nonresidential building products	19,791	1.14
27	Arts and media	105,920	1.06
29	Information services	95,250	1.02
5	Basic health services	154,336	1.01
40	Appliances	8,821	1.01
31	Business services	187,921	1.00
19	Cnstrctn machinery & distribn equipmt	6,275	1.00
22	Concrete, brick building products	6,515	0.98

Table 7: Top 20 regional clusters, 2003

Cluster ID Code	Cluster Descriptor	Employment			Location Quotient		
		1998	2003	Change	1998	2003	Change
1	Textiles & apparel	74,490	45,080	-29,410	6.47	6.29	-0.18
18	Wood products & furniture	24,445	20,811	-3,634	4.36	4.21	-0.15
8	Construction	2,638	1,709	-929	3.45	3.15	-0.30
21	Paper	8,034	7,459	-575	1.51	1.67	0.16
45	Leather products	2,746	2,099	-647	1.49	1.66	0.17
25	Plastics products	11,088	9,498	-1,590	1.53	1.51	-0.02
32	Grain milling	1,102	1,005	-97	1.41	1.41	0.00
20	Wood processing	10,649	10,410	-239	1.28	1.36	0.07
3	Plastics & rubber manufacturing	7,432	6,403	-1,029	1.18	1.25	0.07
10	Chemical-based products	5,745	4,594	-1,151	1.21	1.24	0.02
23	Motor vehicles	12,996	11,383	-1,613	1.17	1.16	-0.02
16	Nondurable industry machinery	18,425	14,334	-4,091	1.21	1.14	-0.06
27	Arts and media	105,920	116,194	10,274	1.06	1.13	0.07
31	Business services	187,921	222,270	34,349	1.00	1.13	0.12
9	Financial services & insurance	103,532	126,404	22,872	0.95	1.09	0.15
42	Hotels & transportation services	134,905	159,801	24,896	0.93	1.05	0.11
5	Basic health services	154,336	171,603	17,267	1.01	1.05	0.03
40	Appliances	8,821	8,480	-341	1.01	1.03	0.02
29	Information services	95,250	98,331	3,081	1.02	1.02	-0.00
11	Machine tools	9,583	8,185	-1,398	0.93	0.99	0.06

Table 8: Regional clusters with increasing competitiveness

ID	Cluster Descriptor	Location Quotient		
		1998	2003	Change
15	Dairy products	0.15	0.73	0.58
36	Steel milling	0.38	0.64	0.26
45	Leather products	1.49	1.66	0.17
21	Paper	1.51	1.67	0.16
33	Rubber products	0.74	0.89	0.15
2	Packaged food products	0.50	0.65	0.15
9	Financial services & insurance	0.95	1.09	0.15
31	Business services	1.00	1.13	0.12
42	Hotels & transportation services	0.93	1.05	0.11
13	Printing & publishing	0.76	0.87	0.11
12	Precision instruments	0.14	0.22	0.08
20	Wood processing	1.28	1.36	0.07
7	Farming	0.23	0.30	0.07
27	Arts and media	1.06	1.13	0.07
3	Plastics & rubber manufacturing	1.18	1.25	0.07
11	Machine tools	0.93	0.99	0.06
34	Glass products	0.44	0.50	0.06
28	Higher education & hospitals	0.84	0.89	0.05
24	Wood building products	0.84	0.88	0.04
30	Petroleum & gas	0.30	0.33	0.04
5	Basic health services	1.01	1.05	0.03
10	Chemical-based products	1.21	1.24	0.02
40	Appliances	1.01	1.03	0.02
26	Feed products	0.25	0.26	0.02

Table 9: Regional clusters with decreasing competitiveness

ID	Cluster Descriptor	Location Quotient		
		1998	2003	Change
23	Motor vehicles	1.17	1.16	-0.02
25	Plastics products	1.53	1.51	-0.02
4	Aluminum & aluminum products	0.39	0.37	-0.02
6	Mining	0.30	0.26	-0.04
17	Computer & electronic equipment	0.19	0.16	-0.04
16	Nondurable industry machinery	1.21	1.14	-0.06
43	Aerospace	0.08	0.01	-0.07
44	Breweries & distilleries	0.51	0.44	-0.08
35	Pharmaceuticals	0.56	0.48	-0.08
14	Metalworking & fabricated metal products	0.95	0.81	-0.15
37	Nonresidential building products	1.14	0.99	-0.15
18	Wood products & furniture	4.36	4.21	-0.15
39	Optical Equipment & Instruments	0.51	0.35	-0.16
1	Textiles & apparel	6.47	6.29	-0.18
19	Construction machinery & distribution equipment	1.00	0.79	-0.21
8	Construction	3.45	3.15	-0.30

Table 10: Regional clusters with increasing employment

Cluster ID Code	Cluster Descriptor	Employment			Location Quotient		
		1998	2003	Change	1998	2003	Change
31	Business services	187,921	222,270	34,349	1.00	1.13	0.12
28	Higher education & hospitals	194,174	222,313	28,139	0.84	0.89	0.05
42	Hotels & transportation services	134,905	159,801	24,896	0.93	1.05	0.11
9	Financial services & insurance	103,532	126,404	22,872	0.95	1.09	0.15
5	Basic health services	154,336	171,603	17,267	1.01	1.05	0.03
27	Arts and media	105,920	116,194	10,274	1.06	1.13	0.07
29	Information services	95,250	98,331	3,081	1.02	1.02	-0.00
13	Printing & publishing	16,063	18,040	1,977	0.76	0.87	0.11
15	Dairy products	422	2,128	1,706	0.15	0.73	0.58
2	Packaged food products	5,536	6,961	1,425	0.50	0.65	0.15
7	Farming	1,248	1,612	364	0.23	0.30	0.07
30	Petroleum & gas	3,992	4,296	304	0.30	0.33	0.04
36	Steel milling	745	981	236	0.38	0.64	0.26
12	Precision instruments	572	727	155	0.14	0.22	0.08
24	Wood building products	6,274	6,358	84	0.84	0.88	0.04

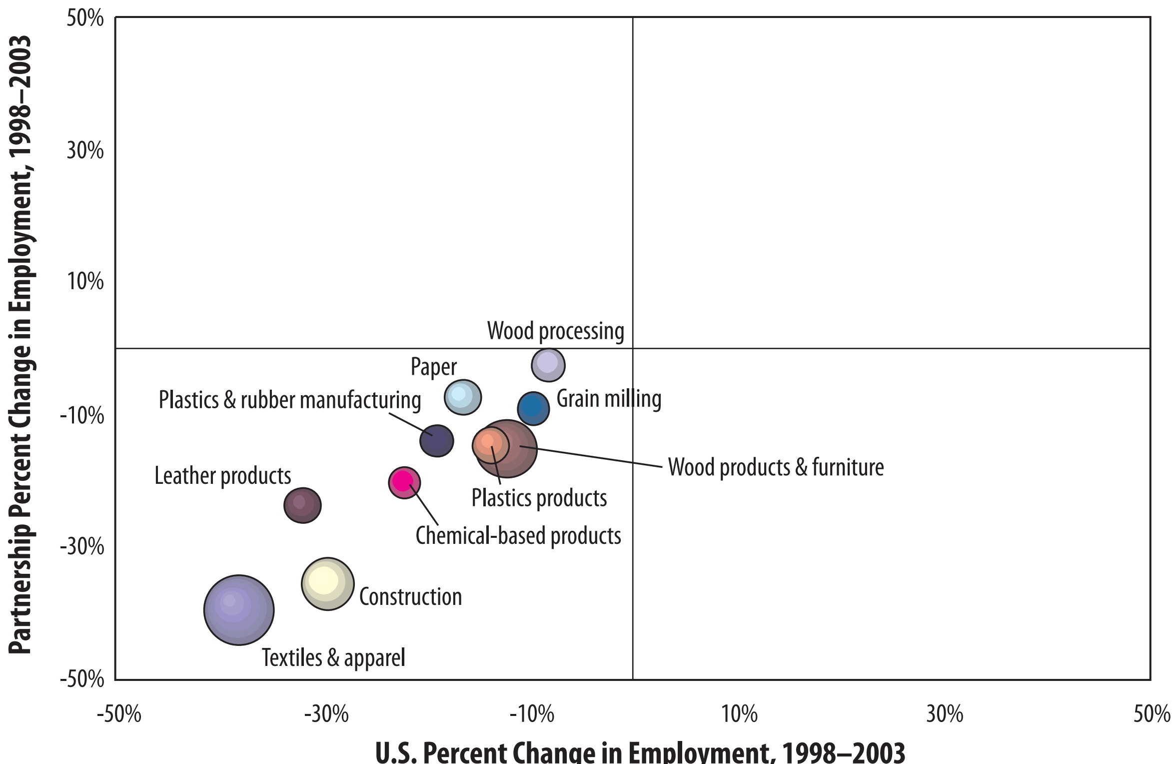
Table 11: Regional clusters with decreasing employment

Cluster ID Code	Cluster Descriptor	Employment			Location Quotient		
		1998	2003	Change	1998	2003	Change
26	Feed products	1,751	1,744	-7	0.25	0.26	0.02
22	Concrete, brick building products	6,515	6,507	-8	0.98	0.98	-0.00
33	Rubber products	3,856	3,784	-72	0.74	0.89	0.15
32	Grain milling	1,102	1,005	-97	1.41	1.41	0.00
34	Glass products	1,499	1,389	-110	0.44	0.50	0.06
41	Copper & copper products	486	374	-112	0.22	0.21	-0.00
6	Mining	875	679	-196	0.30	0.26	-0.04
20	Wood processing	10,649	10,410	-239	1.28	1.36	0.07
44	Breweries & distilleries	1,506	1,192	-314	0.51	0.44	-0.08
35	Pharmaceuticals	2,361	2,039	-322	0.56	0.48	-0.08
40	Appliances	8,821	8,480	-341	1.01	1.03	0.02
43	Aerospace	473	46	-427	0.08	0.01	-0.07
21	Paper	8,034	7,459	-575	1.51	1.67	0.16
4	Aluminum & aluminum products	2,527	1,930	-597	0.39	0.37	-0.02
45	Leather products	2,746	2,099	-647	1.49	1.66	0.17
39	Optical Equipment & Instruments	2,137	1,269	-868	0.51	0.35	-0.16
8	Construction	2,638	1,709	-929	3.45	3.15	-0.30
3	Plastics & rubber manufacturing	7,432	6,403	-1,029	1.18	1.25	0.07
17	Computer & electronic equipment	2,808	1,708	-1,100	0.19	0.16	-0.04
10	Chemical-based products	5,745	4,594	-1,151	1.21	1.24	0.02
14	Metalworking & fabricated metal products	5,523	4,127	-1,396	0.95	0.81	-0.15
11	Machine tools	9,583	8,185	-1,398	0.93	0.99	0.06
25	Plastics products	11,088	9,498	-1,590	1.53	1.51	-0.02
23	Motor vehicles	12,996	11,383	-1,613	1.17	1.16	-0.02
37	Nonresidential building products	19,791	17,454	-2,337	1.14	0.99	-0.15
19	Construction machinery & distribution equipment	6,275	3,705	-2,570	1.00	0.79	-0.21
18	Wood products & furniture	24,445	20,811	-3,634	4.36	4.21	-0.15
16	Nondurable industry machinery	18,425	14,334	-4,091	1.21	1.14	-0.06
1	Textiles & apparel	74,490	45,080	-29,410	6.47	6.29	-0.18

Table 12: CRP bubble chart data

ID	Cluster Descriptor	Regional Employment				US Employment				2003 LQ
		1998	2003	Change	% Change	1998	2003	Change	% Change	
1	Textiles & apparel	74,490	45,080	-29,410	-39.48%	1,483,565	918,353	-565,212	-38.10%	6.29
18	Wood products & furniture	24,445	20,811	-3,634	-14.87%	722,296	633,027	-89,269	-12.36%	4.21
8	Construction	2,638	1,709	-929	-35.22%	98,605	69,451	-29,154	-29.57%	3.15
21	Paper	8,034	7,459	-575	-7.16%	685,257	572,507	-112,750	-16.45%	1.67
45	Leather products	2,746	2,099	-647	-23.56%	237,509	161,603	-75,906	-31.96%	1.66
25	Plastics products	11,088	9,498	-1,590	-14.34%	933,539	804,631	-128,908	-13.81%	1.51
32	Grain milling	1,102	1,005	-97	-8.80%	100,731	91,045	-9,686	-9.62%	1.41
20	Wood processing	10,649	10,410	-239	-2.24%	1,069,394	982,690	-86,704	-8.11%	1.36
3	Plastics & rubber manufacturing	7,432	6,403	-1,029	-13.85%	811,148	658,006	-153,142	-18.88%	1.25
10	Chemical-based products	5,745	4,594	-1,151	-20.03%	610,167	475,264	-134,903	-22.11%	1.24

Figure 1: CRP bubble chart



Charlotte-Gastonia-Rock Hill, NC-SC MSA

Table 13: Top 20 MSA clusters, 1998

Cluster ID Code	Cluster Descriptor	Employment 1998	Location Quotient 1998
1	Textiles & apparel	30,951	3.62
8	Construction	1,386	2.44
21	Paper	5,776	1.46
27	Arts and media	90,311	1.22
29	Information services	82,761	1.19
31	Business services	159,945	1.15
45	Leather products	1,565	1.14
14	Metalworking & fabricated metal products	4,848	1.12
5	Basic health services	126,478	1.11
9	Financial services & insurance	89,150	1.10
19	Construction machinery & distribution equipment	5,102	1.09
42	Hotels & transportation services	111,395	1.04
16	Nondurable industry machinery	11,500	1.01
25	Plastics products	5,287	0.98
28	Higher education & hospitals	162,230	0.94
13	Printing & publishing	14,405	0.92
11	Machine tools	6,895	0.90
37	Nonresidential building products	11,053	0.85
18	Wood products & furniture	3,077	0.74
40	Appliances	4,757	0.73

Table 14: Top 20 MSA clusters, 2003

Cluster ID Code	Cluster Descriptor	Employment			Location Quotient		
		1998	2003	Change	1998	2003	Change
8	Construction	1,386	1,028	(358)	2.44	2.52	0.08
1	Textiles & apparel	30,951	12,987	(17,964)	3.62	2.41	(1.21)
21	Paper	5,776	5,412	(364)	1.46	1.61	0.15
25	Plastics products	5,287	6,026	739	0.98	1.27	0.29
31	Business services	159,945	188,264	28,319	1.15	1.27	0.12
9	Financial services & insurance	89,150	108,729	19,579	1.10	1.25	0.15
27	Arts and media	90,311	95,533	5,222	1.22	1.23	0.01
3	Plastics & rubber manufacturing	3,088	4,457	1,369	0.66	1.15	0.49
29	Information services	82,761	83,231	470	1.19	1.15	(0.05)
42	Hotels & transportation services	111,395	131,774	20,379	1.04	1.15	0.11
11	Machine tools	6,895	7,118	223	0.90	1.14	0.25
10	Chemical-based products	2,105	3,192	1,087	0.60	1.14	0.54
5	Basic health services	126,478	136,915	10,437	1.11	1.11	(0.01)
45	Leather products	1,565	1,036	(529)	1.14	1.09	(0.05)
23	Motor vehicles	4,442	7,842	3,400	0.54	1.06	0.52
13	Printing & publishing	14,405	15,656	1,251	0.92	1.01	0.09
28	Higher education & hospitals	162,230	181,167	18,937	0.94	0.96	0.02
16	Nondurable industry machinery	11,500	8,975	(2,525)	1.01	0.95	(0.06)
18	Wood products & furniture	3,077	3,432	355	0.74	0.92	0.18
14	Metalworking & fabricated metal products	4,848	3,508	(1,340)	1.12	0.91	(0.21)

Table 15: MSA clusters with increasing competitiveness

ID code	Cluster Descriptor	Location Quotient		
		1998	2003	Change
15	Dairy products	0.03	0.88	0.85
10	Chemical-based products	0.60	1.14	0.54
23	Motor vehicles	0.54	1.06	0.52
3	Plastics & rubber manufacturing	0.66	1.15	0.49
36	Steel milling	0.04	0.45	0.41
32	Grain milling	0.32	0.70	0.38
25	Plastics products	0.98	1.27	0.29
2	Packaged food products	0.57	0.83	0.26
11	Machine tools	0.90	1.14	0.25
20	Wood processing	0.61	0.80	0.19
18	Wood products & furniture	0.74	0.92	0.18
9	Financial services & insurance	1.10	1.25	0.15
21	Paper	1.46	1.61	0.15
24	Wood building products	0.65	0.79	0.14
22	Concrete, brick building products	0.70	0.84	0.14
31	Business services	1.15	1.27	0.12
42	Hotels & transportation services	1.04	1.15	0.11
40	Appliances	0.73	0.84	0.11
13	Printing & publishing	0.92	1.01	0.09
12	Precision instruments	0.07	0.15	0.09

Table 16: MSA clusters with decreasing competitiveness

ID code	Cluster Descriptor	Location Quotient		
		1998	2003	Change
1	Textiles & apparel	3.62	2.41	(1.21)
14	Metalworking & fabricated metal products	1.12	0.91	(0.21)
19	Construction machinery & distribution equipment	1.09	0.89	(0.20)
39	Optical Equipment & Instruments	0.49	0.32	(0.17)
44	Breweries & distilleries	0.62	0.53	(0.09)
35	Pharmaceuticals	0.64	0.57	(0.07)
16	Nondurable industry machinery	1.01	0.95	(0.06)
17	Computer & electronic equipment	0.17	0.11	(0.06)
45	Leather products	1.14	1.09	(0.05)
43	Aerospace	0.05	0.00	(0.05)
29	Information services	1.19	1.15	(0.05)
5	Basic health services	1.11	1.11	(0.01)

Table 17: MSA clusters with increasing employment

Cluster ID Code	Cluster Descriptor	Employment 1998	Employment 2003	Employment Change	Location Quotient 1998	Location Quotient 2003	Location Quotient Change
31	Business services	159,945	188,264	28,319	1.15	1.27	0.12
42	Hotels & transportation services	111,395	131,774	20,379	1.04	1.15	0.11
9	Financial services & insurance	89,150	108,729	19,579	1.10	1.25	0.15
28	Higher education & hospitals	162,230	181,167	18,937	0.94	0.96	0.02
5	Basic health services	126,478	136,915	10,437	1.11	1.11	-0.01
27	Arts and media	90,311	95,533	5,222	1.22	1.23	0.01
23	Motor vehicles	4,442	7,842	3,400	0.54	1.06	0.52
2	Packaged food products	4,653	6,694	2,041	0.57	0.83	0.26
15	Dairy products	56	1,935	1,879	0.03	0.88	0.85
3	Plastics & rubber manufacturing	3,088	4,457	1,369	0.66	1.15	0.49
13	Printing & publishing	14,405	15,656	1,251	0.92	1.01	0.09
10	Chemical-based products	2,105	3,192	1,087	0.60	1.14	0.54
20	Wood processing	3,766	4,638	872	0.61	0.80	0.19
37	Nonresidential building products	11,053	11,830	777	0.85	0.89	0.04
25	Plastics products	5,287	6,026	739	0.98	1.27	0.29
22	Concrete, brick building products	3,437	4,170	733	0.70	0.84	0.14
24	Wood building products	3,587	4,262	675	0.65	0.79	0.14
29	Information services	82,761	83,231	470	1.19	1.15	-0.05
36	Steel milling	59	517	458	0.04	0.45	0.41
40	Appliances	4,757	5,192	435	0.73	0.84	0.11
18	Wood products & furniture	3,077	3,432	355	0.74	0.92	0.18
30	Petroleum & gas	2,625	2,954	329	0.26	0.30	0.04
7	Farming	915	1,206	291	0.23	0.30	0.07
11	Machine tools	6,895	7,118	223	0.90	1.14	0.25
32	Grain milling	188	376	188	0.32	0.70	0.38
12	Precision instruments	208	381	173	0.07	0.15	0.09
6	Mining	383	491	108	0.18	0.25	0.08
26	Feed products	898	967	69	0.17	0.19	0.02
41	Copper & copper products	249	290	41	0.15	0.22	0.07

Table 18: MSA clusters with decreasing employment

ID	Cluster Descriptor	Employment 1998	Employment 2003	Employment Change	Location Quotient 1998	Location Quotient 2003	Location Quotient Change
1	Textiles & apparel	30,951	12,987	(17,964)	3.62	2.41	(1.21)
16	Nondurable industry machinery	11,500	8,975	(2,525)	1.01	0.95	(0.06)
19	Construction machinery & distribution equipment	5,102	3,131	(1,971)	1.09	0.89	(0.20)
14	Metalworking & fabricated metal products	4,848	3,508	(1,340)	1.12	0.91	(0.21)
17	Computer & electronic equipment	1,848	922	(926)	0.17	0.11	(0.06)
39	Optical Equipment & Instruments	1,524	872	(652)	0.49	0.32	(0.17)
45	Leather products	1,565	1,036	(529)	1.14	1.09	(0.05)
21	Paper	5,776	5,412	(364)	1.46	1.61	0.15
4	Aluminum & aluminum products	1,838	1,479	(359)	0.38	0.38	(0.00)
8	Construction	1,386	1,028	(358)	2.44	2.52	0.08
44	Breweries & distilleries	1,367	1,092	(275)	0.62	0.53	(0.09)
43	Aerospace	199	0	(199)	0.05	0.00	(0.05)
35	Pharmaceuticals	1,999	1,829	(170)	0.64	0.57	(0.07)
33	Rubber products	2,318	2,164	(154)	0.60	0.68	0.08
34	Glass products	1,151	1,101	(50)	0.46	0.53	0.07

Table 19: MSA bubble chart data

ID	Cluster Descriptor	MSA Employment 1998	MSA Employment 2003	MSA Employment Change	MSA Employment % Change	US Employment 1998	US Employment 2003	US Employment Change	US Employment % Change	LQ 2003
8	Construction	1,386	1,028	-358	-25.83%	98,605	69,451	-29,154	-29.57%	2.52
1	Textiles & apparel	30,951	12,987	-17,964	-58.04%	1,483,565	918,353	-565,212	-38.10%	2.41
21	Paper	5,776	5,412	-364	-6.30%	685,257	572,507	-112,750	-16.45%	1.61
25	Plastics products	5,287	6,026	739	13.98%	933,539	804,631	-128,908	-13.81%	1.27
31	Business services	159,945	188,264	28,319	17.71%	24,164,799	25,274,083	1,109,284	4.59%	1.27
9	Financ'l services & insurance	89,150	108,729	19,579	21.96%	14,069,525	14,796,853	727,328	5.17%	1.25
27	Arts and media	90,311	95,533	5,222	5.78%	12,827,852	13,168,505	340,653	2.66%	1.23
3	Plastics & rubber mfg	3,088	4,457	1,369	44.33%	811,148	658,006	-153,142	-18.88%	1.15
29	Information services	82,761	83,231	470	0.57%	12,035,680	12,349,667	313,987	2.61%	1.15
42	Hotels & transport. services	111,395	131,774	20,379	18.29%	18,630,613	19,561,693	931,080	5.00%	1.15

Figure 2: MSA bubble chart

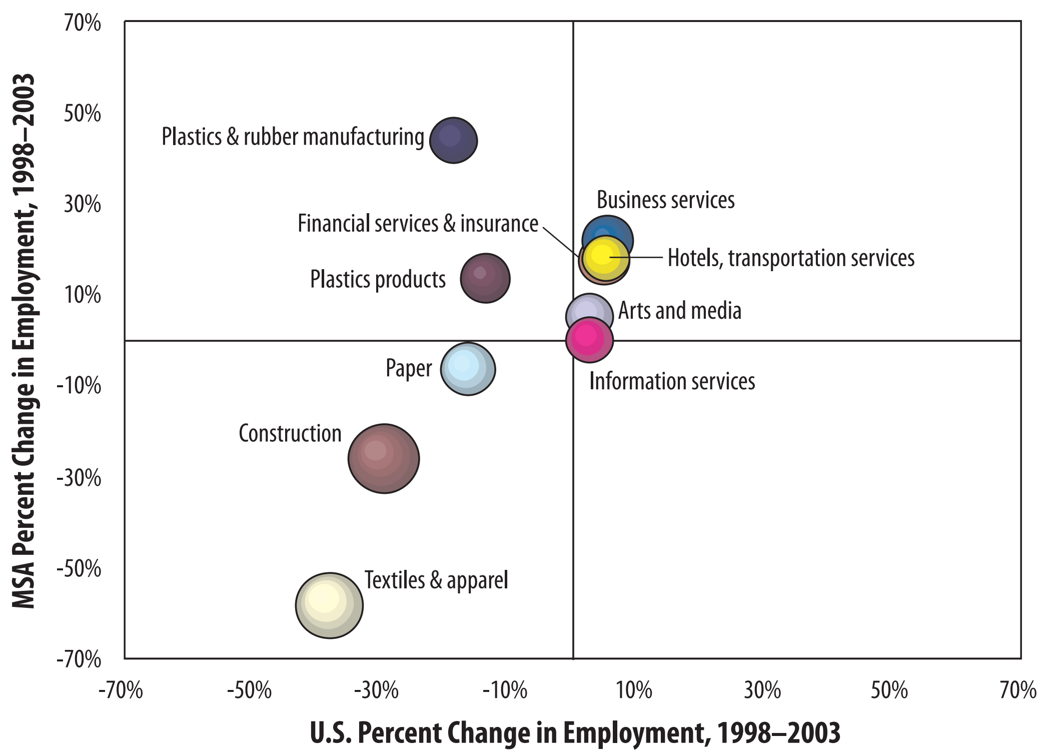


Table 20: Top 20 non-MSA clusters, 1998

Cluster ID Code	Cluster Descriptor	Employment 1998	Location Quotient 1998
18	Wood products & furniture	0.18	31.38
1	Textiles & apparel	0.23	18.81
20	Wood processing	0.04	4.60
45	Leather products	0.00	2.12
21	Paper	0.01	1.73
25	Plastics products	0.01	1.53
33	Rubber products	0.01	1.41
42	Hotels & transportation services	0.12	0.80
5	Basic health services	0.11	0.70
9	Financial services & insurance	0.07	0.58
31	Business services	0.09	0.48
24	Wood building products	0.00	0.44
27	Arts and media	0.04	0.34
29	Information services	0.03	0.31
11	Machine tools	0.00	0.29
28	Higher education & hospitals	0.06	0.26
22	Concrete, brick building products	0.00	0.25
26	Feed products	0.00	0.24
16	Nondurable industry machinery	0.00	0.19
40	Appliances	0.00	0.19

Table 21: Top 20 non-MSA clusters, 2003

Cluster ID Code	Cluster Descriptiptor	Employment			Location Quotient		
		1998	2003	Change	1998	2003	Change
18	Wood products & furniture	18,151	15,815	(2,336)	31.38	27.17	(4.20)
1	Textiles & apparel	22,348	17,584	(4,764)	18.81	20.82	2.02
8	Construction	0	598	598	0.00	9.36	9.36
20	Wood processing	3,937	3,815	(122)	4.60	4.22	(0.37)
25	Plastics products	1,147	1,390	243	1.53	1.88	0.34
21	Paper	947	797	(150)	1.73	1.51	(0.21)
24	Wood building products	337	877	540	0.44	1.03	0.60
22	Concrete, brick building products	170	709	539	0.25	0.91	0.66
42	Hotels & transportation services	11,892	15,494	3,602	0.80	0.86	0.06
5	Basic health services	10,966	16,591	5,625	0.70	0.86	0.16
27	Arts and media	3,483	9,361	5,878	0.34	0.77	0.43
45	Leather products	403	109	(294)	2.12	0.73	(1.39)
40	Appliances	170	709	539	0.19	0.73	0.54
31	Business services	9,268	16,253	6,985	0.48	0.70	0.22
9	Financial services & insurance	6,545	8,740	2,195	0.58	0.64	0.06
29	Information services	2,981	5,955	2,974	0.31	0.52	0.22
23	Motor vehicles	0	602	602	0.00	0.52	0.52
28	Higher education & hospitals	6,211	14,625	8,414	0.26	0.50	0.24
13	Printing & publishing	246	1,047	801	0.11	0.43	0.32
37	Nonresidential building products	295	822	527	0.16	0.40	0.23

Table 22: Non-MSA clusters with increasing competitiveness

Cluster ID Code	Cluster Descriptor	Location Quotient 1998	Location Quotient 2003	Change
8	Construction	0.00	9.36	9.36
1	Textiles & apparel	18.81	20.82	2.02
22	Concrete, brick building products	0.25	0.91	0.66
24	Wood building products	0.44	1.03	0.60
40	Appliances	0.19	0.73	0.54
23	Motor vehicles	0.00	0.52	0.52
27	Arts and media	0.34	0.77	0.43
15	Dairy products	0.00	0.35	0.35
25	Plastics products	1.53	1.88	0.34
7	Farming	0.00	0.33	0.33
13	Printing & publishing	0.11	0.43	0.32
28	Higher education & hospitals	0.26	0.50	0.24
37	Nonresidential building products	0.16	0.40	0.23
31	Business services	0.48	0.70	0.22
29	Information services	0.31	0.52	0.22
39	Optical Equipment & Instruments	0.00	0.21	0.21
19	Construction machinery & distribution equipment	0.00	0.19	0.19
5	Basic health services	0.70	0.86	0.16
16	Nondurable industry machinery	0.19	0.34	0.15
26	Feed products	0.24	0.35	0.12
41	Copper & copper products	0.00	0.08	0.08
42	Hotels & transportation services	0.80	0.86	0.06
9	Financial services & insurance	0.58	0.64	0.06
14	Metalworking & fabricated metal products	0.00	0.06	0.06
30	Petroleum & gas	0.01	0.06	0.05
2	Packaged food products	0.00	0.03	0.03
34	Glass products	0.13	0.15	0.01
17	Computer & electronic equipment	0.00	0.01	0.01

Table 23: Non-MSA clusters with decreasing competitiveness

Cluster ID code	Cluster Descriptor	Location Quotient 1998	Location Quotient 2003	Change
18	Wood products & furniture	31.38	27.17	(4.20)
33	Rubber products	1.41	0.00	(1.41)
45	Leather products	2.12	0.73	(1.39)
20	Wood processing	4.60	4.22	(0.37)
21	Paper	1.73	1.51	(0.21)
11	Machine tools	0.29	0.17	(0.12)

Table 24: Non-MSA clusters with increasing employment

ID Code	Cluster Descriptor	Employment			Location Quotient		
		1998	2003	Change	1998	2003	Change
28	Higher education & hospitals	6,211	14,625	8,414	0.26	0.50	0.24
31	Business services	9,268	16,253	6,985	0.48	0.70	0.22
27	Arts and media	3,483	9,361	5,878	0.34	0.77	0.43
5	Basic health services	10,966	16,591	5,625	0.70	0.86	0.16
42	Hotels & transportation services	11,892	15,494	3,602	0.80	0.86	0.06
29	Information services	2,981	5,955	2,974	0.31	0.52	0.22
9	Financial services & insurance	6,545	8,740	2,195	0.58	0.64	0.06
13	Printing & publishing	246	1,047	801	0.11	0.43	0.32
23	Motor vehicles	0	602	602	0.00	0.52	0.52
8	Construction	0	598	598	0.00	9.36	9.36
24	Wood building products	337	877	540	0.44	1.03	0.60
22	Concrete, brick building products	170	709	539	0.25	0.91	0.66
40	Appliances	170	709	539	0.19	0.73	0.54
37	Nonresidential building products	295	822	527	0.16	0.40	0.23
25	Plastics products	1,147	1,390	243	1.53	1.88	0.34
7	Farming	0	206	206	0.00	0.33	0.33
16	Nondurable industry machinery	305	503	198	0.19	0.34	0.15
15	Dairy products	0	119	119	0.00	0.35	0.35
19	Construction machinery & distribution equipment	0	106	106	0.00	0.19	0.19
26	Feed products	173	278	105	0.24	0.35	0.12
39	Optical Equipment & Instruments	0	90	90	0.00	0.21	0.21
30	Petroleum & gas	20	95	75	0.01	0.06	0.05
14	Metalworking & fabricated metal products	0	35	35	0.00	0.06	0.06
2	Packaged food products	0	33	33	0.00	0.03	0.03
41	Copper & copper products	0	16	16	0.00	0.08	0.08
17	Computer & electronic equipment	0	11	11	0.00	0.01	0.01
34	Glass products	47	48	1	0.13	0.15	0.01

Table 25: Non-MSA clusters with decreasing employment

ID	Cluster Descriptor	Employment			Location Quotient		
		1998	2003	Change	1998	2003	Change
1	Textiles & apparel	22,348	17,584	(4,764)	18.81	20.82	2.02
18	Wood products & furniture	18,151	15,815	(2,336)	31.38	27.17	(4.20)
33	Rubber products	762	0	(762)	1.41	0.00	(1.41)
45	Leather products	403	109	(294)	2.12	0.73	(1.39)
21	Paper	947	797	(150)	1.73	1.51	(0.21)
11	Machine tools	306	161	(145)	0.29	0.17	(0.12)
20	Wood processing	3,937	3,815	(122)	4.60	4.22	(0.37)

Table 26: Non-MSA bubble chart data

ID	Cluster Descriptor	Non-MSA Employment 1998	Non-MSA Employment 2003	Non-MSA Employment Change	Non-MSA Employment % Change	US Employment 1998	US Employment 2003	US Employment Change	US Employment % Change	LQ 2003
18	Wood products & furniture	18,151	15,815	(2,336)	-12.87%	722,296	633,027	-89,269	-12.36%	27.17
1	Textiles & apparel	22,348	17,584	(4,764)	-21.32%	1,483,565	918,353	-565,212	-38.10%	20.82
8	Construction	0	598	598		98,605	69,451	-29,154	-29.57%	9.36
20	Wood processing	3,937	3,815	(122)	-3.10%	1,069,394	982,690	-86,704	-8.11%	4.22
25	Plastics products	1,147	1,390	243	21.19%	933,539	804,631	-128,908	-13.81%	1.88
21	Paper	947	797	(150)	-15.84%	685,257	572,507	-112,750	-16.45%	1.51
24	Wood building products	337	877	540	160.24%	961,367	922,630	-38,737	-4.03%	1.03
22	Concrete, brick bldg products	170	709	539	317.06%	854,879	849,073	-5,806	-0.68%	0.91
42	Hotels & transport. services	11,892	15,494	3,602	30.29%	18,630,613	19,561,693	931,080	5.00%	0.86
5	Basic health services	10,966	16,591	5,625	51.30%	19,678,780	21,042,448	1,363,668	6.93%	0.86
27	Arts and media	3,483	9,361	5,878	168.76%	12,827,852	13,168,505	340,653	2.66%	0.77
45	Leather products	403	109	(294)	-72.95%	237,509	161,603	-75,906	-31.96%	0.73
40	Appliances	170	709	539	317.06%	1,128,025	1,053,387	-74,638	-6.62%	0.73
31	Business services	9,268	16,253	6,985	75.37%	24,164,799	25,274,083	1,109,284	4.59%	0.70
9	Financial services & insurance	6,545	8,740	2,195	33.54%	14,069,525	14,796,853	727,328	5.17%	0.64
29	Information services	2,981	5,955	2,974	99.77%	12,035,680	12,349,667	313,987	2.61%	0.52
23	Motor vehicles	0	602	602		1,429,655	1,260,671	-168,984	-11.82%	0.52
28	Higher education & hospitals	6,211	14,625	8,414	135.47%	29,883,781	32,007,137	2,123,356	7.11%	0.50
13	Printing & publishing	246	1,047	801	325.61%	2,722,426	2,645,821	-76,605	-2.81%	0.43
37	Nonresidential bldg products	295	822	527	178.64%	2,244,968	2,261,661	16,693	0.74%	0.40

Figure 3: Non-MSA bubble chart

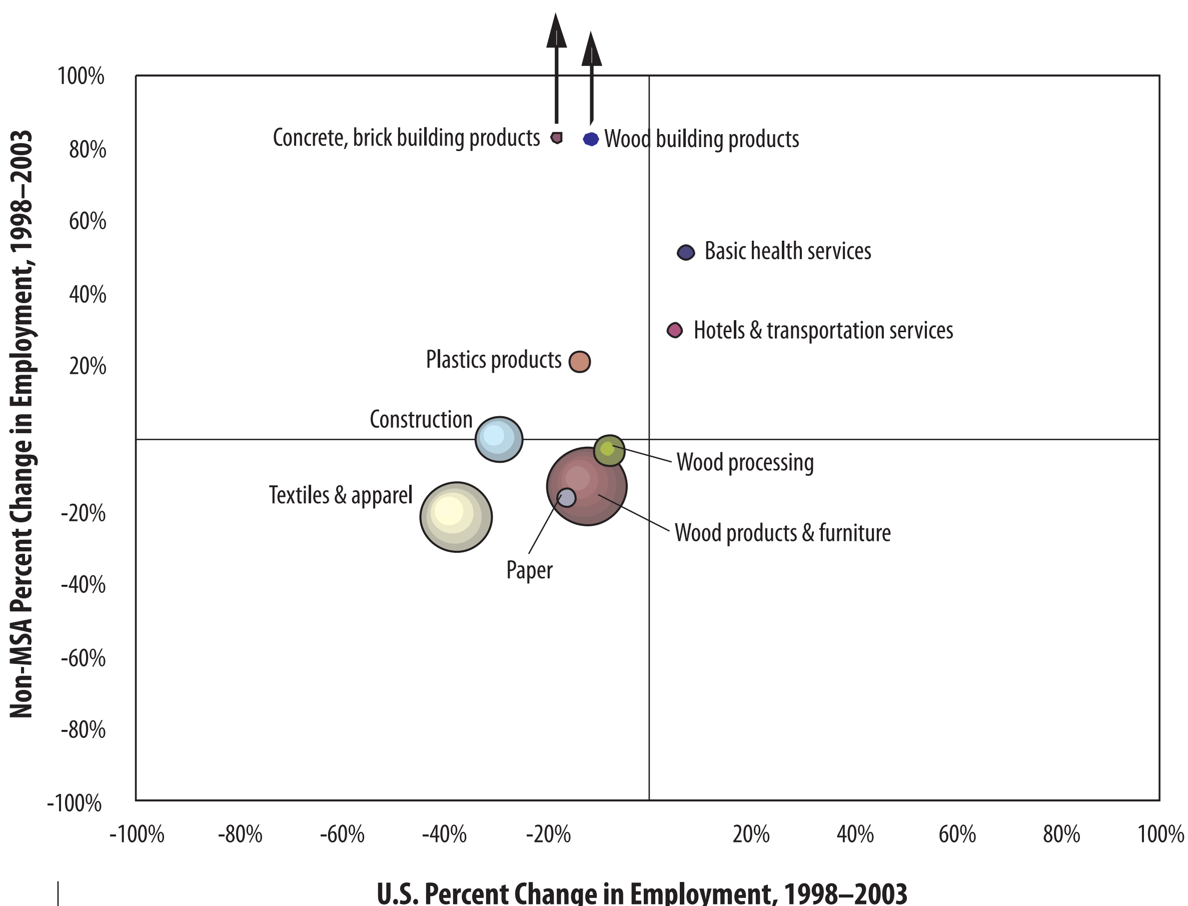


Table 27: Top 20 SC clusters, 1998

Cluster ID Code	Cluster Descriptor	Employment 1998	Location Quotient 1998
1	Textiles & apparel	623	1.87
20	Wood processing	432	1.80
42	Hotels & transportation services	5,033	1.20
5	Basic health services	5,291	1.20
9	Financial services & insurance	3,320	1.05
31	Business services	4,865	0.90
16	Nondurable industry machinery	287	0.65
27	Arts and media	1,479	0.51
37	Nonresidential building products	248	0.49
11	Machine tools	135	0.45
29	Information services	1,191	0.44
13	Printing & publishing	252	0.41
19	Construction machinery & distribution equipment	73	0.40
28	Higher education & hospitals	2,658	0.40
18	Wood products & furniture	29	0.18
22	Concrete, brick building products	29	0.15
24	Wood building products	29	0.13
40	Appliances	29	0.11

Table 28: Top 20 SC clusters, 2003

Cluster ID Code	Cluster Descriptor	Employment			Location Quotient		
		1998	2003	Change	1998	2003	Change
1	Textiles & apparel	623	527	-96	1.87	1.71	-0.16
20	Wood processing	432	540	108	1.80	1.64	-0.16
42	Hotels & transportation services	5,033	9,303	4,270	1.20	1.42	0.22
5	Basic health services	5,291	9,918	4,627	1.20	1.41	0.21
9	Financial services & insurance	3,320	6,172	2,852	1.05	1.25	0.19
33	Rubber products	0	207	207	0.00	1.13	1.13
31	Business services	4,865	9,227	4,362	0.90	1.09	0.19
29	Information services	1,191	3,070	1,879	0.44	0.74	0.30
36	Steel milling	0	49	49	0.00	0.74	0.74
27	Arts and media	1,479	3,126	1,647	0.51	0.71	0.20
28	Higher education & hospitals	2,658	7,384	4,726	0.40	0.69	0.29
16	Nondurable industry machinery	287	343	56	0.65	0.64	-0.01
13	Printing & publishing	252	504	252	0.41	0.57	0.16
24	Wood building products	29	164	135	0.13	0.53	0.40
37	Nonresidential building products	248	401	153	0.49	0.53	0.04
22	Concrete, brick building products	29	145	116	0.15	0.51	0.36
40	Appliances	29	145	116	0.11	0.41	0.30
11	Machine tools	135	143	8	0.45	0.40	-0.05
18	Wood products & furniture	29	40	11	0.18	0.19	0.01
19	Construction machinery & distrib. equip.	73	36	-37	0.40	0.18	-0.22

Table 29: SC clusters with increasing competitiveness

ID	Cluster Descriptor	Location Quotient		
		1998	2003	Change
33	Rubber products	0.00	1.13	1.13
36	Steel milling	0.00	0.74	0.74
24	Wood building products	0.13	0.53	0.40
22	Concrete, brick building products	0.15	0.51	0.36
29	Information services	0.44	0.74	0.30
40	Appliances	0.11	0.41	0.30
28	Higher education & hospitals	0.40	0.69	0.29
42	Hotels & transportation services	1.20	1.42	0.22
5	Basic health services	1.20	1.41	0.21
27	Arts and media	0.51	0.71	0.20
9	Financial services & insurance	1.05	1.25	0.19
31	Business services	0.90	1.09	0.19
13	Printing & publishing	0.41	0.57	0.16
14	Metalworking & fabricated metal products	0.00	0.09	0.09
37	Nonresidential building products	0.49	0.53	0.04
18	Wood products & furniture	0.18	0.19	0.01

Table 30: SC clusters with decreasing competitiveness

ID	Cluster Descriptor	Location Quotient		
		1998	2003	Change
16	Nondurable industry machinery	0.65	0.64	-0.01
11	Machine tools	0.45	0.40	-0.05
1	Textiles & apparel	1.87	1.71	-0.16
20	Wood processing	1.80	1.64	-0.16
19	Construction machinery & distribution equipment	0.40	0.18	-0.22

Table 31: SC clusters with increasing employment

Cluster ID Code	Cluster Descriptor	Employment			Location Quotient		
		1998	2003	Change	1998	2003	Change
28	Higher education & hospitals	2,658	7,384	4,726	0.40	0.69	0.29
5	Basic health services	5,291	9,918	4,627	1.20	1.41	0.21
31	Business services	4865	9227	4,362	0.90	1.09	0.19
42	Hotels & transportation services	5033	9303	4,270	1.20	1.42	0.22
9	Financial services & insurance	3,320	6,172	2,852	1.05	1.25	0.19
29	Information services	1191	3070	1,879	0.44	0.74	0.30
27	Arts and media	1,479	3,126	1,647	0.51	0.71	0.20
13	Printing & publishing	252	504	252	0.41	0.57	0.16
33	Rubber products	0	207	207	0.00	1.13	1.13
37	Nonresidential building products	248	401	153	0.49	0.53	0.04
24	Wood building products	29	164	135	0.13	0.53	0.40
22	Concrete, brick building products	29	145	116	0.15	0.51	0.36
40	Appliances	29	145	116	0.11	0.41	0.30

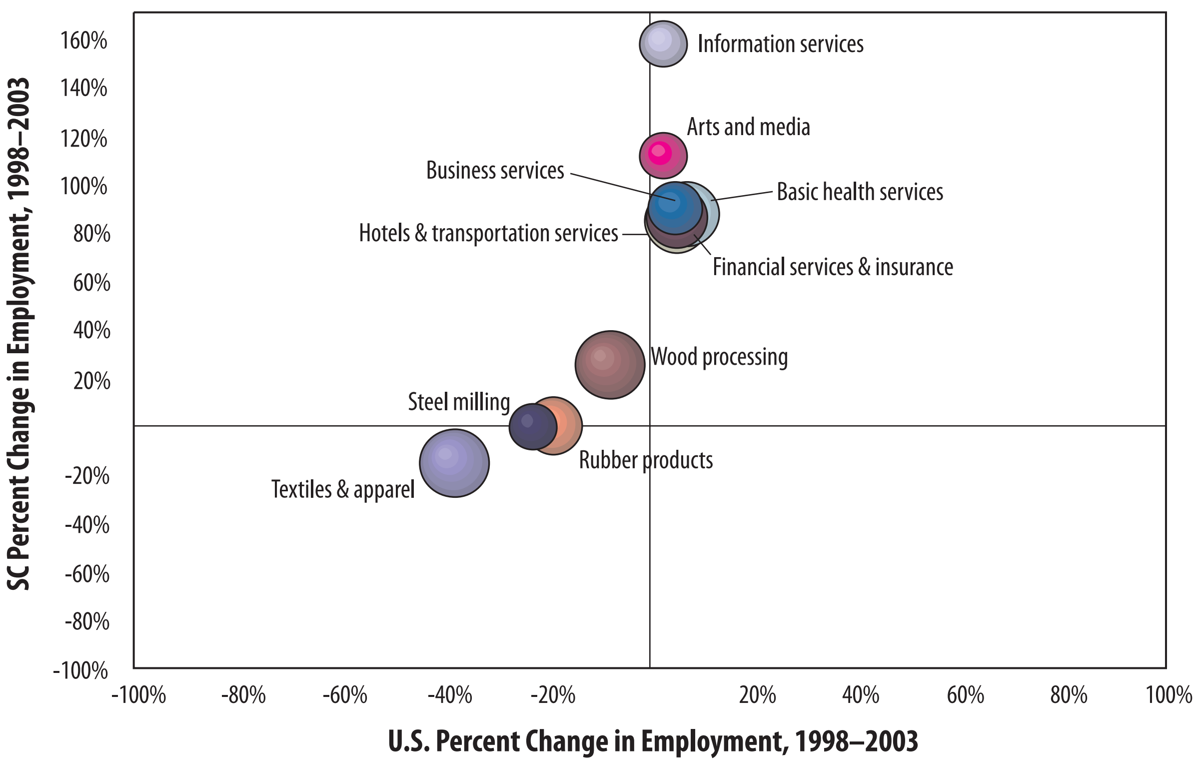
Table 32: SC clusters with decreasing employment

Cluster ID Code	Cluster Descriptor	Employment			Location Quotient		
		1998	2003	Change	1998	2003	Change
19	Construction machinery & distrib. equip.	73	36	-37	0.40	0.18	-0.22
1	Textiles & apparel	623	527	-96	1.87	1.71	-0.16

Table 33: SC bubble chart data

ID	Cluster Descriptor	SC Employment				US Employment				2003 LQ
		1998	2003	Change	% Change	1998	2003	Change	% Change	
1	Textiles & apparel	623	527	-96	-15.41%	1,483,565	918,353	-565,212	-38.10%	1.71
20	Wood processing	432	540	108	25.00%	1,069,394	982,690	-86,704	-8.11%	1.64
42	Hotels & transport. services	5,033	9,303	4,270	84.84%	18,630,613	19,561,693	931,080	5.00%	1.42
5	Basic health services	5,291	9,918	4,627	87.45%	19,678,780	21,042,448	1,363,668	6.93%	1.41
9	Financial services & insurance	3,320	6,172	2,852	85.90%	14,069,525	14,796,853	727,328	5.17%	1.25
33	Rubber products	0	207	207	0.00%	673,466	545,549	-127,917	-18.99%	1.13
31	Business services	4,865	9,227	4,362	89.66%	24,164,799	25,274,083	1,109,284	4.59%	1.09
29	Information services	1,191	3,070	1,879	157.77%	12,035,680	12,349,667	313,987	2.61%	0.74
36	Steel milling	0	49	49	0.00%	255,866	197,708	-58,158	-22.73%	0.74
27	Arts and media	1,479	3,126	1,647	111.36%	12,827,852	13,168,505	340,653	2.66%	0.71

Figure 4: SC bubble chart



Pulling the evidence together: targets of opportunities for the CRP

There is no "right" answer to what constitutes a "target of opportunity." Is it a set of businesses that have already demonstrated strength in the region and therefore offer the opportunity to build on success? If so, does it matter whether those entrenched businesses are becoming more or less competitive? Is it a set of businesses that are not yet in the region in great numbers but seem as though they ought to be? Or is it a set of businesses that community leaders want to attract and nurture for any number of reasons but for which success is theorized or imagined rather than demonstrated historically in the region? These are not necessarily mutually exclusive categories—communities typically incorporate into their strategic (vision) plans some of each of these types of targets.

The analyses reviewed and presented in the preceding section provide a sufficient basis for a target-of-opportunity strategy. In this section, we summarize the results of these studies in terms of the strategic questions posed above.

Clusters with existing strength

Tables 34 and 35 summarize for the CRP as a whole as well as the three subregions the industrial clusters that are already strong, in terms of location quotient (LQ) and employment. By showing the concentration of a given cluster in a defined area relative to the U.S. as a whole, LQ is a measure of demonstrated competitiveness. An index greater than 1.0 means that there is more than proportionate representation in the defined area, suggesting for any number of reasons a competitive advantage.

Table 34: Highest location quotients among industrial clusters, 2003

	2003 LQs and (+/–) change from 1998			
Industrial cluster	CRP	Charlotte-Gastonia-Rock Hill MSA	Non-MSA counties	South Carolina counties only
Textiles/apparel	6.29 (–)	2.41 (–)	20.80 (+)	1.71 (–)
Wood products/furniture	4.21 (–)	0.92 (+)	27.20 (–)	0.19 (+)
Construction	3.15 (–)	2.52 (+)	9.39 (+)	
Paper products	1.67 (+)	1.61 (+)	1.51 (–)	
Leather products	1.66 (+)	1.09 (–)	0.73 (–)	
Plastics	1.51 (–)	1.27 (+)	1.88 (+)	
Business services	1.13 (+)	1.27 (+)	0.70 (+)	1.09 (+)
Arts and media	1.13 (+)	1.23 (+)	0.77 (+)	0.71 (+)
Financial services and insurance	1.09 (+)	1.25 (+)	0.70 (+)	1.25 (+)
Wood processing				1.64 (–)
Hotels and transportation				1.42 (+)
Basic health services				1.41 (–)

These tables tell us that there are differences among the subregions in existing cluster competitiveness. Textiles and apparel, and wood processing and furniture, for example, are still large employers and relatively important in non-MSA counties, but they are shedding workers. Business and financial services and insurance are particularly robust in the MSA counties. Higher education and hospitals and basic health services, are competitive and growing throughout the region, particularly in the MSA counties. The arts and media sector is competitive in the MSA counties, but growing (emerging) in all parts of the region. The next question is whether, and how, to slow down losses in the important declining clusters and how to enhance the important and growing clusters.

Table 35: Largest employers among industrial clusters, 2003

Industrial cluster	2003 Employment, in 1,000s (change from 1998)			
	CRP	Charlotte-Gastonia-Rock Hill MSA	Non-MSA counties	South Carolina counties only
Business services	222.3 (+)	188.3 (+)	16.3 (+)	9.2 (+)
Higher education and hospitals	210.0 (+)	181.2 (+)	14.6 (+)	7.4 (+)
Basic health services	171.6 (+)	136.9 (+)	16.6 (+)	9.9 (+)
Hotels and transportation	159.8 (+)	131.2 (+)	15.5 (+)	9.3 (+)
Financial services and insurance	126.4 (+)	108.7 (+)		6.2 (+)
Arts and media	116.2 (+)	95.5 (+)		3.1 (+)
Textiles and apparel			17.6 (-)	
Wood products and furniture			15.8 (-)	

Emerging clusters

We define emerging clusters as those that do not start with high LQs but rapidly increased their market share over the 1998-2003 period, adding some employment. Table 36 gives some examples.

Table 36: Examples of emerging clusters

Industrial cluster	Change in LQ, 1998-2003 (employment growth)			
	CRP	Charlotte-Gastonia-Rock Hill MSA	Non-MSA counties	South Carolina counties only
Dairy products	0.58 (1,706)	0.85 (1,879)	0.34 (119)	
Paper	0.17 (na)			
Plastics and rubber	0.16 (na)	0.49 (1,369)		
Packaged foods	0.15 (1,425)	0.26 (2,041)		
Chemical-based industries		0.54 (1,067)		
Motor vehicles		0.52 (3,400)	0.52 (602)	
Machine tools		0.25 (223)		
Construction and bldg materials			>1.0 (1,500)	>0.4 (>500)
Arts and media			0.43 (5,876)	

We report for the subregions only here. Increases in LQs of these magnitudes signify large increases in competitiveness. It is interesting to note that at the same time that the Charlotte-Gastonia-Rock Hill MSA has been becoming more of a service and knowledge-based economy, it also has witnessed the emergence of basic sectors related to food as well as the emergence of manufacturing-oriented clusters (motor vehicles, machine tools, and chemicals). The rural and South Carolina counties have seen an emergence of construction-related industries, along with their general population and business growth.

Desired clusters

Throughout the course of this project, including responses to a preliminary presentation of this study at the CRP retreat in April 2005, the region's leaders and economic developers articulated their desired clusters in ways that did not always line up with the analysis just presented. One reason is that the cluster methodology we employ can result in unusual cluster names. Remember that a cluster is an aggregation of businesses in many different industries, not just in one NAICS group. The clusters are created by the data analysis, not by industry experts who understand functional and strategic connections among industries (connections that may be valid, but do not show up in the input-output data). So, for example, there is no benchmark cluster named "biotechnology," even though that is commonly identified as a target of opportunity. Elements of the biotech cluster show up in other named clusters in this study, including basic health services and hospitals and higher education. Nor are there clusters called tourism or motor sports.

The approach taken by Angelou and Miller is more qualitative and leads to proposals for more commonly understood clusters that are not as rigorously defined. The rationales for fuel cells, biotech/bioinformatics, automotive, and optoelectronics make sense. Some dimensions of those clusters are shown in our data to be emerging or strong—for example, business services and finance and insurance support those industries. Emerging strength in machinery benefits optoelectronics, just as strength in higher education and hospitals and basic health benefits biotech.

Table 37 draws on discussions with leaders and economic developers during the course of this project to present targets of opportunity in a matrix that would be developed in the next stage of work.

The first row of the table lists five general types of industrial clusters: manufacturing, business services, creative industries, tourism, and distribution/logistics. The first two are considered separate "sectors" by the U.S. Department of Commerce. The last three have elements spread across different industrial sectors. But for our purposes, they represent five different sectors of activity. The cluster analysis indicated existing and potential strength in all these areas, especially in a tailored way to subparts of the region.

The second and third rows identify more specific clusters of opportunity, or industry niches, for the region and its subparts. In some, but not all, cases, the targets are supported by existing or emerging strength, based on the data analysis. In other cases, the targets are potential or desired rather than demonstrated.

The first column (row headings, starting in row 4) identifies types of public-private actions, necessary to translate the targets of opportunity to reality. The second column begins to list specific activities and products that need to be developed. The cells of the table would be filled in with stakeholders' and partners' names, assigned responsibility for the specified task.

Table 37: Schematic of targets of opportunity as conceived by client

	ECONOMIC ACTIVITY:			MANUFACTURING								
	Industries			Transportation Equipment		Plastics		Commercial Machinery		Food Process'g	Construction Materials	
ACTIVITIES	**Sub-activities**	**Sample tools (ED products)**	**Industry niches**	Automotive /Truck Parts & Components Suppliers	Motorsports Manufacturing	Injection Molding Operations	Food & Beverage Products	Medical Equipment Machinery	Machine Tools	Packaged Foods	Home-building Materials	Commercial Construction Materials
Recruite new businesses	Target US-based companies	trade-shows, cluster-based planning/ID, marketing, calls										
	Target foreign companies	trade-missions, cluster-based planning/ID, marketing, calls										
	Induce location in rural counties	Lee Act										
	Develop appropriate sites/buildings	industrial parks, research parks, shell buildings										
	Create a stronger external brand											
Retain existing businesses	Ensure access to essential business services											
	Improve business retention in rural places											
Grow new businesses	Help existing businesses innovate											
	Assist commercial entrepreneurs											
	Increase IP from universities											
	Enhance rural entrepreneurship											
Strengthen the workforce	Encourage in-migration of qualified workers											
	Increase college attendance											
	Increase supply of qualified technical workers											
	Improve K-12											
	Expand "life-long learning"											
Improve tax and regulatory climate	Streamline regulatory approvals											
	Provide local incentives											
Improving physical infrastructure												
Improving other quality-of-life amenities												
Coordinate economic development in the region												

MANUFACTURING			BUSINESS SERVICES				CREATIVE INDUSTRIES		TOURISM			DISTRIBUTION/ LOGISTICS
Textiles	**Optoelectronics**		**Customer Service**			**Shared Srvs (HQ funct'ns)**	**Film & Television**		**Sports & Recreation**	**Conventions, Tradeshows, Conferences**	**Art & Culture**	**Intermodal Operations**
High-value Textile Equipment and Apparel	Optical Instruments	Telecom equipment	Back-offices	Financial services	Healthcare services	Human resources/ Information technology outsourcing	Film production	Graphic arts production				

4. Next steps

Table 37 provides the template for the next step in the vision process. The region needs to:

1) Agree to the list of industry targets
2) Prioritize the list for attention, understanding that different targets of opportunity will be appropriate in different types of CRP counties
3) Complete the list of specific activities/products needed to develop successful targeted industries/clusters
4) Assign action items to different institutional players, including, but not limited to:
    a. Economic Developers Advisory Committee
    b. Higher education and K-12 representatives
    c. Workforce officials
    d. Chamber/public policy leaders
    e. CRP Executive Committee and Board of Directors
    f. N.C. Department of Commerce officials
    g. Tourism leadership group
5) Develop a means to ensure accountability
6) Solidify the cluster institutional structure, with clearly identifiable cluster champions and a coordinative body
7) Identify a time and place for the region to come together each year to track the results of the plan across organizations and functions.