

Northwest North Carolina Comprehensive Economic Development Strategy



Looking toward the future

Northwest North Carolina CEDS

Target Industry Analysis

August 2003

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AngelouEconomics is pleased to present the *Target Industry Analysis* as part of the Northwest North Carolina Comprehensive Economic Development Strategy (CEDS). This report is one of several that will examine the 8-County study area during a 10-month process to identify the area's assets and prepare the area for future growth. Industries are examined in a regional context with detail provided at the county level when appropriate. Specific Counties' targets are given in the body of the text. Following this report, marketing plans will be developed within the counties and final recommendations will be given.

All reports will be available online at www.northwestnc.com as they are completed. We encourage you to review them thoroughly and provide us with your comments and insight. Thank you for your input.

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Target Industry Analysis

Introduction

Contained within this report are Northwest North Carolina’s Target Industries. After completing county-specific reviews of economic and demographic trends and assessing the strengths and weaknesses of each, eight target industries have been identified as having high growth potential in Northwest North Carolina. These industries are: Logistics & Distribution; Biotechnology; Design; Materials; Transportation Equipment; Food Processing; Value-Added Agriculture; and Hospitality.

The focus of this report is regional in nature, as industries do not confine themselves to political borders. Building a regional base for these industries will allow each county to play its respective role. While some counties are better suited for certain industries and some counties have geographic limitations that exclude them from others, factors such as labor pool are shared throughout the CEDS region. The following table identifies targets specific to each county:

Target Industries

	Logistics, Distribution	Biotech	Design	Materials	Transportation Equipment	Food Processing	Value-Added Agriculture	Hospitality
Alleghany			✓	✓	✓		✓	✓
Ashe			✓		✓	✓	✓	✓
Davie	✓	✓	✓		✓		✓	✓
Forsyth	✓	✓	✓					✓
Rockingham	✓		✓	✓	✓	✓	✓	✓
Stokes			✓	✓			✓	✓
Surry		✓	✓		✓		✓	✓
Yadkin	✓		✓	✓	✓	✓	✓	✓

These are by no means the only industries that will locate into Northwest North Carolina, but by conducting a targeted economic development strategy, the region will build an employment base that will inspire similar businesses – suppliers, customers, and businesses using similar technologies and workers – to expand in Northwest North Carolina.

The industries were selected not only because of their potential to bring strong economic impacts to Northwest North Carolina, but also because they represent a good mix for short, mid, and long-term economic development. The regional economy is beginning a transition away from traditional manufacturing industries. Many of these industries will aid in that transition while moving the economy into high growth areas.

Chapter Overview

The first section of this chapter applies AngelouEconomics' target selection process tailored to the needs of Northwest North Carolina. Our approach is designed to reveal the strengths of Northwest North Carolina within the state and regional economy for several sectors.

The second section lists and describes potential target industries for Northwest North Carolina's economic development efforts. These are industries that can be attracted to the area, with specific niche targets identified. Targets are those industries that leverage the existing strengths of the local economy, demographics, and industry, fit the needs of the community, and display growth potential nationwide.

Overview of Methodology

While choosing target industries for Northwest North Carolina, AngelouEconomics considers a number of factors. Industry trends are considered alongside communities' assets and economic development goals. The final result is a target list that fills immediate needs as well as helps the regional economy meet long-term goals.

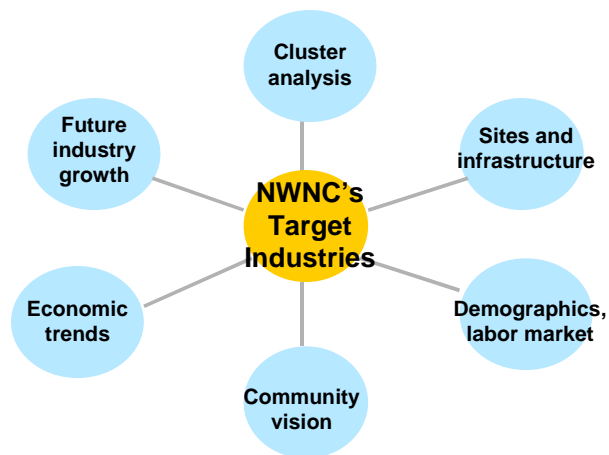
The target industry selection process begins with 34 major industry sectors. While often matching up with definitions set by the U.S. Census Bureau's North American Industry Classification System (NAICS), these industry sectors stress linkages between companies – common suppliers, workforce, and infrastructure. Industries must meet the following criteria to be selected as final target recommendations:

1. Is the industry growing locally or does it provide transitional opportunities?

Immediate and obvious candidates for targets are industries that are experiencing growth within the community or surrounding communities. Food processing, for instance, is becoming a major industry throughout the region as the nation's population migrates south. Logistics and distribution is an immediate fit for the existing workforce while preparing the regional economy for a transition into high-tech industries.

2. Are there local assets that give industries a competitive edge? Communities are as unique as people. Each one has strengths that companies can leverage to create competitive advantages. These strengths can include such things as workforce skills, tax structure, and climate. The challenge is to identify the key assets in the region. Northwest North Carolina has a well-developed manufacturing base with the workforce to support it. Combining other factors such as the absence of an inventory tax and North Carolina's right-to-work laws make NWNC ripe for capital intensive manufacturing sectors like transportation equipment and materials manufacturing.

3. Does the industry match community goals? Often the most important criterion is whether or not the industry matches the stated economic goals of the community. Industries that seem to be a natural fit will struggle to succeed without the backing of the populace and its elected officials. Likewise, deficiencies in infrastructure can be overcome with a solid commitment by government to support businesses. Agriculture, while declining nationally, has a strong history in Northwest North Carolina. It is an industry that the region takes pride in and one that people are not willing to



let slide too far into decline. For these reasons and so many others, the region has embraced new farming methods and crops. Recent efforts to establish the Yadkin Valley as an American Viticulture Area speaks wonders about the future agriculture will have in the region.

4. **Does the region meet the minimum requirements for the industry?** When all is said and done, industries have minimum requirements that must be met in order to locate into a county. With such a diverse area as Northwest North Carolina, there are bound to be counties in which some industries work and some do not. The most notable example is food processing. The industry continues to grow regionally and is an excellent pairing for a well-developed distribution industry. Food processing plants, however, require large amounts of water and wastewater. Those counties without adequate water would never be able to support the industry.

Once all the requirements are met for a regional target, counties are examined individually to see what their contribution to the industry will be. Contributions depend on factors such as workforce skills, infrastructure, and environmental assets. It should also be understood that as the target industries mature, industry roles might move from one county to the next. Economic development is a fluid process.

The regional biotechnology industry is a prime example. Still in its infancy, biotech research in the area will largely take place within Forsyth County due to efforts at the Triad Research Park and Wake Forest University. Surrounding counties, however, are well positioned to immediately target biomanufacturing and health services. As research efforts within Forsyth County mature, they will likely spread into the surrounding counties near population centers and low-cost facilities.

Target #1: Logistics & Distribution

Counties: Davie, Forsyth, Rockingham, Yadkin

Industry Overview

Logistics is the process of planning, implementing, and controlling the efficient flow of goods and services through the supply chain from producer to consumer. Distribution includes all freight carriers (air, water, trucking, and intermodal) and warehousing. These companies warehouse and store goods that have been transported by air, water, freight, and rail. Until recently, most manufacturing firms took responsibility for the warehousing and coordination of their flow materials. More often these services are outsourced to develop an advanced just-in-time delivery system.

Virtually every product sold moves through the distribution industry, meaning that this industry touches roughly a third of the nation's GDP. The movement of these goods, a \$264 billion industry, is increasingly coordinated by high-tech means such as global positioning satellites, real-time Internet tracking, and just-in-time inventory systems.

And so, the industry has two distinct sides. The distribution of goods will continue to be serviced by "low-tech" suppliers – trucks, airplanes, and ships. The logistical coordination, on the other hand, is a high value-added service that will differentiate companies and drive industry growth in coming years. Technical workers dominate employment in this field. Federal Express clearly pioneered the service side of distribution, and more established companies have been racing to catch up, including the United States Postal Service.

Logistics in Northwest North Carolina

Much talk regarding the distribution and logistics industry in North Carolina centers on the future FedEx hub scheduled to begin operations in 2009. The hub will likely open up new markets to the Piedmont Triad region, particularly for those firms needing rapid transit of small parcels, such as electronics and biotech firms. It should have a strong multiplier effect on the economy,

Logistics & Distribution

NAICS Definition

484	Truck Transportation
482	Rail Transportation
4885	Freight Transportation Arrangement
4884	Support Activities for Road Transportation
4882	Support Activities for Rail Transportation
493	Warehousing & Storage

Industry Profile

\$264 billion in revenues
640,000 employees in U.S.

Wage Rates

\$11/hour average in the US

Top Location Criteria

Good access to major highway
Affordable Land
Large nearby market for goods
No inventory tax

Top Workforce Requirements

Industrial Truck and Tractor Operators
Hand Packers and Packagers
Machine Assemblers
Machinery Maintenance Mechanics

Regional Assets for Distribution

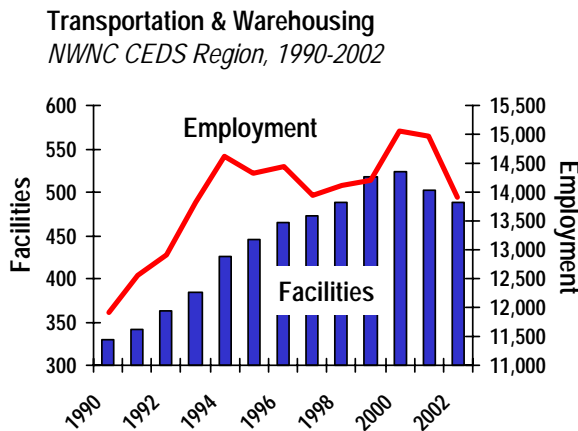
Access to Major Highways
Access to Air Transportation
Proximity to Major Markets
Low Labor Costs
Future FedEx Hub
Complementary Industries
No Inventory Tax
Commitment to Industry

creating jobs not just for FedEx employees, but enticing other businesses to locate in the region as well.

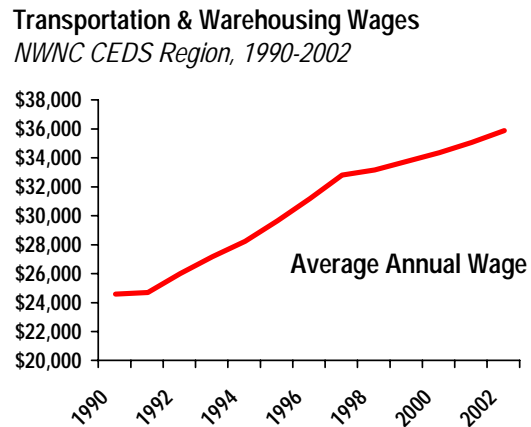
Many of the counties in the region are too distant from the hub for it to directly impact their economy (Most firms will locate within 20 miles of the hub.); however, everyone will benefit from a regional development policy targeting the distribution industry. The actual operation is slated to begin in six years – much can be done before then.

The past and projected growth of the Southeast region attracted FedEx to the area. This growth coupled with access to major markets in the Eastern U.S. make the industry a great target for Northwest North Carolina. It is in this light that logistics and distribution should be examined. Logistics and distribution is not a good fit because FedEx is building a hub; rather, the company chose the region as a hub because the area's logistics and distribution strengths are a good fit for FedEx.

Looking at regional employment trends paints a bleak picture of the last few years. One must understand however, that logistics and distribution is highly dependent upon trends in the general economy. During these times of economic decline, virtually every sector has slowed production. Shipment of these goods, then, must necessarily decline as well. The logistics and distribution industry will likewise be one of the first industries to turn around with the general economy.



Source: Employment Security Commission of North Carolina, NAICS 48



Source: Employment Security Commission of North Carolina, NAICS 48

- Despite the current decline in numbers, distribution and warehousing remains among the top industries for new projects, especially in the South.
- Total employment in NWNC is up 17 percent since 1990, reaching its peak of 15,000 jobs in 2000.
- There are currently 488 facilities primarily engaged in transportation and warehousing throughout the CEDS region. This does not include numerous firms engaged in distribution activities as a lesser function.
- About a third of all jobs in transportation and warehousing exist within the trucking industry.

- Transportation and warehousing is especially strong around the Greensboro-Winston-Salem-High Point MSA, making up about 25 percent of the industry's employment in the state. Activities around the airport influence these numbers considerably, so that industry employment within the 8-county CEDS region only makes up 7 percent of the state's transportation and warehousing jobs.
- The mean annual wage for transportation and warehousing in NWNC is \$33,480.
- High demand for transportation services has maintained strong wage growth in the industry for skilled drivers and technicians.

Workforce Requirements

Occupations in logistics and distribution use varied skill sets. Entry-level positions are available as laborers and materials handlers. The truck driving school at the Yadkin Center of Surry Community College is a good resource for people looking to get into the industry and needing the necessary licenses to drive heavy-duty and tractor-trailer trucks.

Workforce Requirements
Industrial Truck and Tractor Operators
Hand Packers and Packagers
Machine Assemblers
Machinery Maintenance Mechanics
Purchasing and shipping clerks
Electricians

As expected, transportation and material moving overwhelmingly dominate industry employment. Almost half of these workers are truck drivers, and many of those are self-employed. Material movers include workers that load and unload freight and move it around the warehouses, either manually or with the assistance of equipment such as forklifts and conveyor belts.

Employment in distribution-related occupations is expected to grow by 22 percent between 2000 and 2010, compared to an average growth rate of 16 percent over all occupations. Job opportunities will abound for qualified truck drivers and service technicians.

Profile of a Typical Distribution Facility

As Northwest North Carolina prepares itself for the coming growth in distribution, sites and infrastructure will have to be improved to meet the needs of prospective companies.

The following table outlines the specific infrastructure requirements that can be expected:

Regional Distribution Center Typical Requirements		
	Input	Details
Activity	Warehouse and Distribution	
Size	250,000 to 500,000 sq. ft.	1 story building, tall ceilings (25-35 ft.)
Acres	15-50 acres	w/ separate entrance for trucks and employees
Employees	600 employees	10% Admin (\$40k), 90% production (\$9/hr) 3 shifts / 7 days per week
Water	6,000 gallons / day	
Wastewater	5,400 gallons / day	does not need to be treated
Electricity	1,350 kw Demand 1+ mil kwh per month	dual substations, possibly on separate grids
Natural Gas	175,000 Therms a year	
Telecom	T-1 minimum	
Investment (\$) (for a typical U.S. facility)		
Building/Land	\$25 million	
Equipment	\$12 million	
Other	Within 5 miles of Interstate Rail is a plus, but not required Within 60 miles of commercial airport, 250 miles of port No history of flooding in area or on typical route to facility	
Source: AngelouEconomics		

Target #2: Materials

Counties: Alleghany, Rockingham, Stokes, Yadkin

Industry Overview

Materials include anything from traditional textiles and yarn to petroleum-based construction material. At the forefront of this field are firms dealing in nanotech products and processes. This industry is extremely practical; most products are developed with a use in mind. These targets combine R&D with real world manufacturing processes and support industries such as tool and die makers.

Materials range from exotic to commonplace, though all have familiar uses. Shape-memory alloys, for example, have the ability to remember a predetermined shape, returning back to that shape after repeatedly being bent. Commercial applications for such an odd sounding concept are being found in robotics, biomedical implants, and perhaps the more familiar use, eye glass frames.

Materials
<p><u>NAICS Definition</u></p> <ul style="list-style-type: none"> 313-315 Textiles & Apparel Mfg 3212 Engineered Wood Products 326 Plastics & Rubber Products 327 Nonmetallic Mineral Products 332 Fabricated Metal Products 3335 Metalworking Machinery 3252 Synthetic Rubber, Fibers, & Filaments 5417 Research & Development <p><u>Industry Employment</u></p> <ul style="list-style-type: none"> · 3.6 million employed - US <p><u>Wage Rates</u></p> <ul style="list-style-type: none"> · \$15 an hour in the US <p><u>Location Criteria</u></p> <ul style="list-style-type: none"> · Large affordable open tracts of land · Proximity to manufacturers · Low industrial electric rates · Manufacturing non-union workforce · Highway transportation linkages

More familiar materials include cement and plastics. World consumption of concrete is more than 2.5 tons per person per year. Plastics manufacturing operations become a prime target for economic development efforts due to their strong growth and ability to complement virtually every other industry. Plastic manufacturers often refer to themselves as contract manufacturers due to their ability to supply specialized products to such varied customers as automobile manufacturers, soft drink bottlers, and hospitals.

Materials in Northwest North Carolina

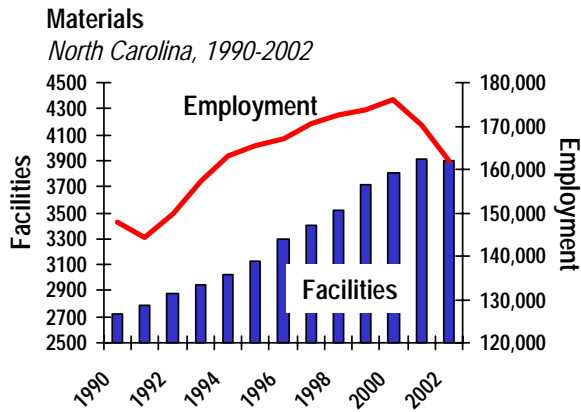
Due to recent layoffs, NWNC residents are wary of all things manufacturing. Advanced automation has replaced some jobs, while foreign competition has eliminated others. The state and region, however, remain world centers for research in materials. In the past this has largely meant textiles, but as the industry declines, researchers are looking for new ways to match old knowledge to new markets. The envelope is being pushed on high-tech fabrics, advanced polymers, and industrial uses for each.

Regional Assets for Materials
<p>Proximity to Customer Base</p> <p>Non-Union Workforce</p> <p>Skilled Production Workers</p> <p>Workforce Training Programs</p> <p>Regional Knowledge Base</p>

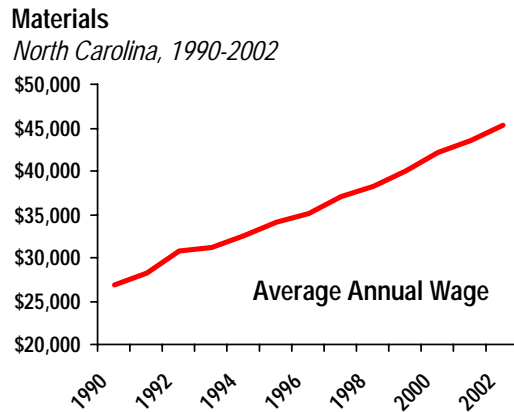
University programs throughout the state produce leading research in materials science and engineering. Locally, Wake Forest's chemistry and physics departments carry out materials research, and the medical school is actively pursuing new biomedical applications in materials.

Commercial applications of stronger, lighter composite materials can be found throughout the region. Excellent examples are the fiber-reinforced composite materials manufactured at Martin Marietta in Sparta. These composites are being used in the construction of highway bridge decks, commercial truck trailers, and components for rail cars. The company's addition of 380 new jobs in Alleghany ranked 4th in the state among job creating projects, both manufacturing and non-manufacturing, in 2002. The company's activities also highlight the symbiotic relationship between materials manufacturing and transportation equipment, another recommended target.

While textiles are typically included among materials, large plant closures and layoffs would dominate the industry data. For this reason, the textile employment has been omitted from the data shown in the graphs below.



Source: Employment Security Commission of North Carolina



Source: Employment Security Commission of North Carolina

- The decline in employment beginning in 2001 is a reaction to worldwide recession. After peaking at 175,900, employment fell to 162,000 in 2002.
- The number of facilities, however, has stayed roughly constant the past two years.
- Increasing or steady plant counts combined with declining employment shows the industry's switch to more automated plants, keeping U.S. producers competitive.
- The average plant employed 85 people in 1995. By 2002, this had been reduced to 42.
- With more automation has come the need for high-skilled workers with well above average wages. During the same 1995-2002 period, wages increased 32 percent.

- The average wage in 2002 was \$45,000, compared to an all-industry average of \$32,700.

Workforce Requirements

For counties looking to transition into high-wage jobs, materials offers an excellent opportunity. The industry provides well-paying jobs for skilled production workers. A full 60 percent of employment in the materials industry is composed of production workers, most of which are machine operators and setters. The required skills match well with those of the current workforce as well as those of the workforce training programs.

Workforce Requirements
Machine Setters and Operators Team Assemblers Machinery Maintenance Mechanics Hand Packers and Packagers Industrial Truck and Tractor Operators Engineers

Many local employers report a shortage of technical workers. They often have to search outside the area for suitable job candidates. With the skill sets of much of the labor force is textile-industry specific, programs are needed to retrain workers in new production methods. Successful programs include major employers in curriculum design to ensure that there immediate and long-term labor needs are met.

Profile of a Typical Materials Manufacturer

Materials manufacturers are high users of industrial electricity. For this reason, they often shop around for low utility rates or negotiate deals with local providers. The following table outlines the specific requirements of a typical material manufacturing facility:

Materials Manufacturing Typical Requirements		
	Input	Details
Activity	Light Manufacturing	
Size	50,000 - 150,000 sq. ft.	
Acres	10 acres	
Employees	200 employees	15% Admin (\$40k), 85% production (\$11/hr) 3 shifts / 7 days per week
Water	20,000 to 50,000 gallons / day 4,000 gallons / day	for process potable
Wastewater	30,000 gallons / day	
Electricity	5,500 kw Demand 3 mil kwh / month	dual substations, possibly on separate grids
Natural Gas	50,000 therms / month	
Telecom	T-1 desirable	
Investment (\$) (for a typical U.S. facility)		
Building/Land	\$10-15 million	
Equipment	\$7-10 million	
Other	20 miles of Interstate Rail is a plus, but not required Within 60 miles of commercial airport, 250 miles of port No history of flooding in area or on typical route to facility	
Source: AngelouEconomics		

Target #3: Transportation Equipment

Counties: Alleghany, Ashe, Davie, Rockingham, Surry, Yadkin

Industry Overview

Transportation equipment includes aircraft and vehicles, parts, and subassemblies for carrying cargo or passengers, as well as vehicle bodies and cabs for sale separately or for assembly on a purchased chassis. Manufacturing process inputs include automotive stampings; carburetors, pistons, piston rings, and valves; vehicular lighting equipment; storage batteries; engine electrical equipment; and other motor vehicle parts. Industry suppliers include electronics and semiconductors, computer services, and freight, storage and distribution.

A growing trend is the introduction of supplier parks, which house several suppliers under one roof and cut production time and costs on transportation, logistics, and overhead. The Southeast has become a particularly popular site, due to the region's availability of large, greenfield sites, relatively low wages, lower workers' union activity, and flexible workforce and facilities that support production of several models of automobiles at one site.

For the third straight year, the transportation equipment industry ranked first in *Site Selection Magazine's* list of new and expanded corporate facilities. With a large number of plants already nearby, and many new projects online, NWNC needs to work towards capturing some of this investment.

Transportation Equipment	
<u>NAICS Definition</u>	
32621 Tire Manufacturing	
32622 Rubber & Plastics Hoses & Belting	
332 Fabricated Metals	
3336 Engine & Turbine Mfg	
333924 Truck, Tractor, Trailer Machinery Mfg	
3353 Electrical Equipment	
336 Transportation Equipment	
<u>Industry Employment</u>	
· 1.7 million employed - US	
<u>Wage Rates</u>	
· \$22 an hour in the US	
<u>Location Criteria</u>	
· Proximity to customer base	
· Proximity to good technical training institutions	
· Large affordable tracts of land	
· Good affordable power supply	

Top Five Industries (2001)			
(In terms of number of new and expanded facilities)			
Industry	New	Exp.	Total
Transportation Equip.	246	466	712
Fabricated Metals	165	254	419
Chemicals	161	209	370
Machinery	129	239	368
Food Processing	136	230	366

source: *Site Selection Magazine*

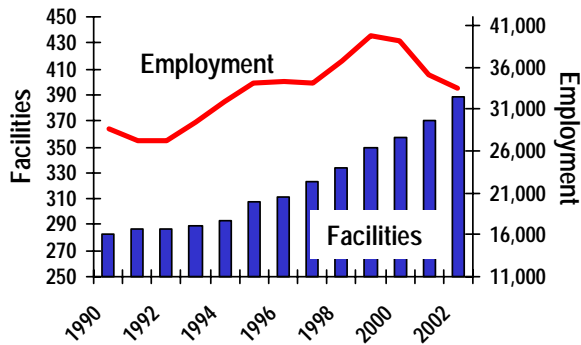
Transportation Equipment in Northwest North Carolina

Large auto manufacturers can impact virtually every community within a 200-mile radius of their plants, and the State of North Carolina has come out in strong support of the automotive industry. As major projects move into the Southeast, recipient communities are reaping the rewards. Major manufacturing sites currently exist in the Southeast for BMW, GM, GM-Saturn, Ford, Nissan, DaimlerChrysler, and Volvo. Matched to each is an array of support facilities making everything from tires to seatbelts.

Regional Assets for Transportation Equipment
Proximity to Customer Base
Large, Low-Cost Land
Non-Union Workforce
Production Workers
Regional Transportation Industry
Commitment to Industry

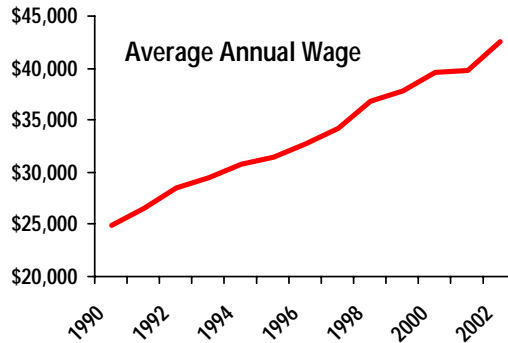
Statewide industry employment has tapered off during the economic development downturn, yet both average wages and the number of facilities continue to show strong growth. Much of the recent news regarding the state’s transportation industry has centered on Alamance County and a 1,300-acre “megasite” extending along Interstate 40/85 near Graham. On a smaller scale, virtually every county currently has established transportation equipment manufacturers, whether it is ambulances in Jefferson or fuel tanks in Reidsville.

Transportation Equipment
North Carolina, 1990-2002



Source: Employment Security Commission of North Carolina, NAICS 336

Transportation Equipment
North Carolina, 1990-2002



Source: Employment Security Commission of North Carolina, NAICS 336

- In 2002, there were 33,450 North Carolina jobs in transportation equipment manufacturing, down 16 percent from its high in 1999.
- Number of facilities, however, continues to grow in the state. Between 1999 and 2002 the number of plants increased 11 percent.

- The Charlotte/Gastonia and Greensboro/Winston-Salem/High Point MSAs account for most of the state's employment, making up 40 percent and 20 percent, respectively.
- Though these new plants are highly automated, they still employ an average of 85 people per plant.
- The average wage for the industry is \$42,486 – quite above the all-industry average of \$32,700.
- Industry wages are growing at above average rates, increasing 24 percent over the last five years.

Workforce Requirements

The manufacturing skills of the current labor force fit well with production jobs in the transportation equipment industry; about one in five people working in the NWNC CEDS region are employed in manufacturing. Required skills for transportation equipment also match well with the skills of those that have lost their jobs due to the closing of local manufacturers.

Workforce Requirements
Engineers
Team Assemblers
Machinery Maintenance Mechanics
Welders, Cutters, Solderers, and Brazers
Machinists

After production workers, **engineering** accounts for the largest share of positions in the transportation equipment industry; they also earn outstanding wages. Engineers make up 13 percent of the industry's workforce. These jobs are primarily mechanical and industrial engineers that design the manufacturing equipment, coordinate processes, and maintain quality control. Many area employers expressed a difficulty in finding quality employees with technical and engineering skills.

From 2000 to 2010, the motor vehicle and equipment manufacturing industry is projected to see its employment rise by 9 percent. The fastest growing occupations within this industry are expected to be those of a technical nature, namely, mechanical engineers, electricians, industrial machinery mechanics, and computer-controlled machine tool operators.

Profile of a Typical Transportation Equipment Facility

The following table outlines the specific infrastructure requirements of an automotive supplier. The criteria are typical of other transportation equipment manufacturers.

Automotive Supplier (Tier 2) Typical Requirements		
	Input	Details
Activity	Auto Supply Mftg	Tier 2
Size	100,000 - 200,000 sf	1 story building, tall ceilings
Acres	15-50 acres	w/ separate entrance for trucks and employees
Employees	100-200 employees	10% Admin (\$40k), 90% production (\$12/hr) 3 shifts / 7 days per week
Water	up to 170,000 gallons / day	
Wastewater	up to 155,000 gallons / day	does not need to be treated
Electricity	1000-2000 kw Demand 1.4-1.8 mil kwh per month	dual substations, possibly on separate grids
Natural Gas	4,000 - 6,000 mcf / month	
Telecom	T-1 minimum	
Investment (\$) (for a typical U.S. facility)		
Building/Land	\$10-15 million	
Equipment	\$15-20 million	
Other	5-10 miles of Interstate Rail is a plus, but not required Within 60 miles of commercial airport, 250 miles of port	
Source: AngelouEconomics		

Target #4: Food Processing

Counties: Ashe, Alleghany, Rockingham, Yadkin

Industry Overview

The food processing industry includes establishments that manufacture or process food and beverages for human consumption as well as related products such as chewing gum, manufactured ice, and vegetable and animal fats and oils. The food processing industry is the link between the agricultural and retail sectors. Raw fruits, vegetables, grains, meats, and dairy products are processed in the plants and then sold to retailers or wholesalers, who then pass these finished products along to the consumer.

Production and distribution of food and beverages account for over one-sixth of the nation's industrial output. The largest concentration of food processing employment in the U.S. is in meat production, employing 30 percent of the total workforce. Bakery goods and preserved fruits production employ an additional 25 percent.

Demand for food products is expected to grow as niches such as specialty foods, ethnic foods, and pre-packaged foods make their way to the dinner table more frequently. As new plants are built, they are more and more dependent on large-scale automation, making a traditionally labor intensive industry fairly high-tech and bringing communities higher-wage jobs.

Food Processing in Northwest North Carolina

Six food manufacturers are ranked among the top 50 in a listing of North Carolina's largest overall manufacturing employers. These include Smithfield Packing Co. Inc. (6th, pork and processed meats), Tyson Farms Inc (9th), Carolina Turkeys (26th), House of Raeford Inc. (32nd, poultry products), Gold Kist Inc. (36th, the nation's second largest and only cooperative chicken company), and Interstate Brands Corp. (46th, bakery goods). Among NWNC counties, top food manufacturing employers include Miller Brewing Co. in Rockingham and Wayne Farms LLC (the nation's 6th-largest vertically-integrated poultry processor) in Surry.

Food Processing

NAICS Definition

- 1123 Poultry & Egg Production
- 311 Food Manufacturing
- 312 Beverage & Tobacco Product Mfg

Industry Profile

- \$3 trillion in revenues
- 1.7 million employed - US

Wage Rates

- \$14 an hour in the US

Location Criteria

- Large population within 500 mi.
- Good access to major highway
- Inexpensive labor
- Available water and wastewater

Regional Assets for Food Processing

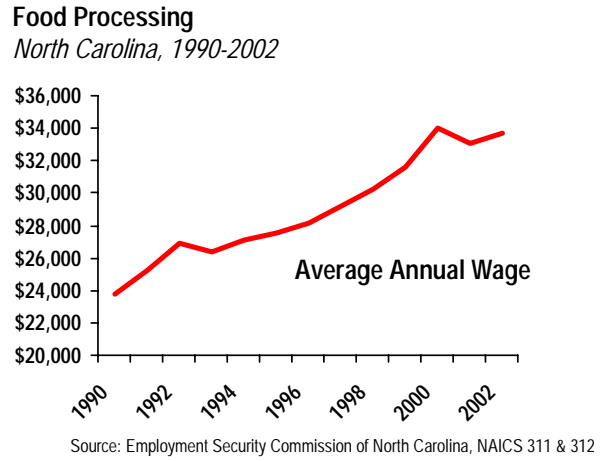
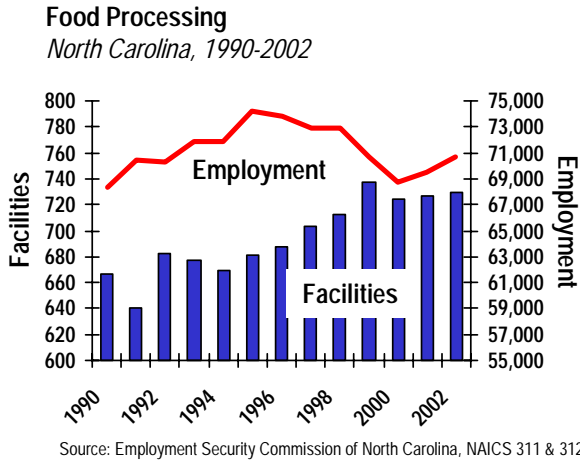
Proximity to Large Population

Low Labor Costs

Strong Agricultural Presence

Opportunity to Plug Economic Holes

While tobacco is still processed in many of the NWNC counties, the industry is in decline. The skill sets and regional knowledge base already in place should be applied to growing areas of the industry. Participants in many of the focus groups and interviews expressed a need for beef and specialty food processors. A large amount of agricultural and farm products gets shipped out of the region for processing. Not only are the farm goods leaving the community, but local dollars are as well. This represents an opportunity to keep that agriculture base in the area.



- Statewide employment in food processing has been increasing during a time when virtually every other industry has been laying off workers.
- Industry employment declined in the latter part of the 1990s though the number of facilities continued to increase. This is in part due to the decline of tobacco as well general automation of the production process.
- This trend will likely continue with growth rates in the number of plants outpacing that of industry employment.
- Average wages continue to increase, and industry yearly wages are about \$1,000 above the state average of \$32,695.

Almost half of the jobs in the food processing industry are production-related. These generally pay low wages, but offer stable entry-level positions for the unemployed labor force. Transportation and material moving accounts for almost 20 percent of the workers in the industry, emphasizing the relationship food processing has with the distribution industry.

Workforce Requirements

- Slaughterers, Meat Packers, and Trimmers
- Machine Setters and Operators
- Machinery Maintenance Mechanics
- General Production Helpers
- Laborers and Material Movers

Fluid milk, prepared flour mixes and dough, pickles, sauces, salad dressings, and bread, cake, and related products, and bottled and canned soft drinks are among the most value-added

of all the food processing industries. The industries currently located in Broome County are among the highest paying industry segments and therefore require the more highly skilled workers than other sectors of food processing. **This is one of the reasons why the productivity rates in the food processing sector of Broome County greatly exceed both the national and state averages.** This level of skill and productivity should also ensure that these jobs remain in Broome County and will be less likely to be replaced due to automation. So, the current makeup of Broome County's food processing sector is more attractive than the food processing sector as a whole, and therefore should be a target industry.

Profile of a Typical Food Processing Facility

The following table outlines the specific requirements that can be expected. A large constraint is the amount of water and wastewater available, as the industry is a heavy user. The plant profiled below uses 270,000 gallons of water a day, including up to 50,000 gallons per hour three times each day to clean the facility.

Food Processing Typical Requirements		
	Input	Details
Activity	Food Processing	
Size	120,000 sq. ft.	
Acres	10-15 acres developable	
Employees	600	15% Admin (\$40k), 85% production (\$11/hr) 24 hours / 2 shifts
Water	120,000 gallons / day 150,000 gallons / day	200 gallons / employee full facility cleaning 3x / day for 1 hour (up to 50,000 gallons / hour for cleaning)
Wastewater	240,000 gallons / day	on-site treatment
Electricity	1,000 - 1,500 kwh demand 700,000 - 1,100,000 kwh / month	dual substations
Natural Gas	50,000 therms / month	
Telecom	T-1 desirable	
Investment (\$) (for a typical U.S. facility)		
Building/Land	\$15-20 million	
Equipment	\$10-15 million	
Other	facility requires special construction: sloped floors for draining, floor coatings, unique building footprint for several long lines	
Source: AngelouEconomics		

Target #5: Hospitality

Counties: Alleghany, Ashe, Davie, Forsyth, Rockingham, Stokes, Surry, Yadkin

Industry Overview

The hospitality industry includes hotels, bed & breakfasts, restaurants, entertainment options and general tourism activities that take place within an economy. Hospitality includes activities for both tourists and community residents.

Nationally, the hospitality industry suffered following the terrorist attacks of September 11. People traveled less and began to eat more meals at home. While this is still partly true, tourism is once again picking up, and early figures for 2003 are well above those of the last two years.

Restaurant dining has become both a large part of the American way of life and a large part of the American economy. According to the National Restaurant Association, the restaurant industry is the nation's largest employer outside of government. Not only does the industry provide work for about 9 percent of the workforce, but also one-third of all adults at some time have worked in the industry. Studies show that the average American spends 43 percent of his/her food budget in restaurants, eating out an average of 4.2 times per week, and half of the population visits a restaurant on their birthdays. In 2003 alone, the industry is expected to grow by 4.5 percent and account for 4 percent of U.S. GDP.

Easing customers' hassles has become crucial to success in the hospitality industry. PricewaterhouseCoopers estimates that security concerns and general hassles account for more of a decline in travel and lodging than the economic downturn. To facilitate customers, more and more companies are offering travel planning online. According to Jupiter Research, 20 percent of all travel sales in 2003 will occur online. By 2008, online sales are expected to increase by over 80 percent.

Hospitality in Northwest North Carolina

Hospitality, especially the tourism segment of the industry, is an important part of North Carolina's economy. Due to the part-time and seasonal nature of the work, jobs tend to be very entry-level and pay low salaries, but a strong hospitality industry remains an important driver of economic development. Over 44 million people visited the state in 2002, making North Carolina

Hospitality

NAICS Definition

71	Arts, Entertainment, Recreation
72	Accommodation & Food Services
481-3	Passenger Transportation
487	Scenic & Sightseeing Transportation
53211	Car Rentals
5615	Travel Bureaus & Reservation Svcs

Industry Profile

\$630 billion in revenues
9.5 million employed in the US

Wage Rates

\$7 an hour in the US

Location Criteria

Established tourism destination
Small business / retailer network
Seasonal workers
High aesthetics

the sixth most visited state in the country. Last year domestic travelers spent \$12 billion in the state, with total tax receipts as high as \$2.2 billion.

The number of establishments in hospitality (mostly in food services) has risen in NWNC from 933 in 1990 to 1,295 in 2002. The largely part-time jobs paid an average yearly salary of \$12,118 in 2002.

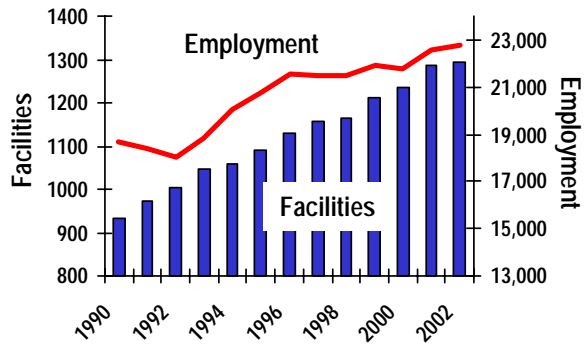
Additional benefits to the jobs that are created in the hospitality industry are the sales and bed tax revenues brought in from visitors outside of the region. Occupancy taxes alone accounted for \$3.5 million in revenues in NWNC for fiscal year 2001-2002. Over \$2.2 million of this went directly to tourism-related program funding.

Neither Stokes County nor Yadkin County has an occupancy tax, and while Mt. Airy has an occupancy tax, Surry County does not. These taxes are often politically favorable, as the burden primarily falls on non-residents.

Perhaps no other industry highlights the diversity in the

Northwest North Carolina study area more than tourism. Those visiting the mountain counties are much more likely to be traveling for pleasure than those visiting communities surrounding Winston-Salem. According to the NC Department of Commerce, 22 percent of visitors to the Heartland Region were there to conduct business, while only 8 percent of tourists to the Mountain Region were business-related. Thus, counties within a short drive of Winston-Salem and Greensboro must take care to address the needs of professionals, whereas the more rural counties will want to target family vacationers.

Hospitality & Leisure
NWNC CEDS Region, 1990-2002



Source: Employment Security Commission of North Carolina, NAICS 71&72

Occupancy Tax Collections, FY 2001-2002

County	Rate	Total Collected	Amount to County	Amount to Municipality	Amount to Tourism Dept, etc.
Alleghany	3%	\$28,309	\$4,309		\$24,000
Ashe	3%	\$109,088			\$109,088
Davie	3%	\$35,059			\$35,059
Forsyth	6%	\$3,121,985	\$525,196	\$678,849	\$1,917,940
Rockingham	3%	\$150,621	\$85,731		\$64,890
Stokes	-				
Surry	-				
Mt. Airy	3%	\$100,196		\$100,196	\$100,196
Yadkin	-				
Total		\$3,545,258	\$615,236	\$779,045	\$2,251,173

source: North Carolina Department of Commerce

Workforce Requirements of the Hospitality Industry

The hospitality industry traditionally pays very low wages; most positions require few skills, are often part-time, and have a readily available labor pool. It is estimated that one in three adults in American has worked in the hospitality industry at some time. The day-to-day workers within the hospitality industry are entry-level and low-wage. There is no real need to devote resources to building this segment of the labor force. However, as the industry matures, **upper-level management** becomes a high-skilled position. For this reason, many universities and schools throughout the country provide programs in hospitality or similar fields. Master chefs are becoming local celebrities, and many are products of top-notch culinary schools.

SIC 70 - Hotels and Lodging Places

source: Occupational Employment Statistics, Bureau of Labor Statistics 2001

Occupation	Employment Estimate		Wage Estimate	
	US Employment	% of Total	Mean Hourly	Mean Annual
TOTAL	1,772,980	100.0%	\$10.22	\$21,250
Building and Maintenance	509,040	28.7%	\$8.36	\$17,380
Food Preparation and Serving	474,920	26.8%	\$9.04	\$18,800
Maids and Housekeeping Cleaners	395,500	22.3%	\$7.86	\$16,350
Office and Administrative Support	298,560	16.8%	\$9.87	\$20,530
Hotel, Motel, and Resort Desk Clerks	167,210	9.4%	\$8.45	\$17,580
Waiters and Waitresses	138,010	7.8%	\$7.74	\$16,100
Personal Care and Service	134,790	7.6%	\$9.78	\$20,340
Management	89,780	5.1%	\$23.54	\$48,960
Installation, Maintenance, and Repair	71,070	4.0%	\$12.51	\$26,010
Maintenance and Repair Workers, General	58,370	3.3%	\$11.60	\$24,120
Sales and Related	54,730	3.1%	\$11.19	\$23,270
Cooks, Restaurant	53,160	3.0%	\$10.83	\$22,520
Janitors and Cleaners	51,580	2.9%	\$9.14	\$19,000
Dining Room and Cafeteria Attendants	43,960	2.5%	\$8.05	\$16,750
Gaming Dealers	40,130	2.3%	\$6.96	\$14,480
Dishwashers	39,160	2.2%	\$8.28	\$17,220
Bartenders	38,560	2.2%	\$8.88	\$18,460
Food Servers, Nonrestaurant	37,590	2.1%	\$8.18	\$17,020
Production Occupations	36,430	2.1%	\$9.19	\$19,120

Regional Hospitality Assets

Regional assets that support hospitality and tourism in NWNC include:

Natural beauty. Far and away the largest tourist draw to many of the counties is the mountains. An estimated 23.5 million people a year travel along the Blue Ridge Parkway. This serves as an excellent opportunity to bring tourist dollars into the community. Additional natural assets that draw in tourists include: Hanging Rock State Park, Pilot Mountain, the Dan River, and the New River.

State Marketing Programs. The North Carolina Department of Commerce recently hired a fulltime heritage tourism development officer solely devoted to studying and promoting area heritage. The Blue Ridge Heritage Initiative, a multi-state collaboration, is an excellent example of an effective regional promotion.

NASCAR. NASCAR is a large source of both entertainment and revenue for many communities. Farmington Racetrack in Davie is one good example. The county is looking to build on the popularity of the sport by recruiting a training track from Charlotte. Racetracks have an estimated multiplier of 1.5, meaning that every dollar spent at the racetrack creates an estimated \$1.50 worth of local economic activity.

A Growing Wine Industry. Vineyards have a growing presence in the region. They serve to tie the hospitality industry with the local agriculture.

Target #6: Design

Counties: Alleghany, Ashe, Davie, Forsyth, Rockingham, Stokes, Surry, Yadkin

This industry will become a defining trade for the Northwest North Carolina. Arts and design have a rich history in the region, ranging from traditional arts and crafts to furniture design. The design industry will build upon these assets, eventually developing NWNC into a world-class center for design. Italy, for example, was not always the fashion capital of the world. They took their traditional expertise in shoe making and stole this industry from France. It was a conscious effort to target the industry that led to Italy's global dominance in fashion.

Industry Overview

Design is the complex combination of computers and the art world. This target is largely driven by the skills of the workforce – computer aided graphic design. With both artistic and commercial appeal, occupations can be found in a broad spectrum of industries. AngelouEconomics recommends the fast growing and high paying targets of **computer-aided animation, graphic design, and industrial design** as a primary sector in which NWNC can find a differentiating niche vis-à-vis other competitors.

Digital design continues to work its way into all fabrics of American life. As more of our day-to-day activities involve computers, designers keep these systems efficient and user-friendly. Most people are familiar with occupations such as computer animation and graphic design, though many overlook the more industrial applications. Commercial and industrial designers develop and design manufacturing products, from cars to biomedical lab equipment to missiles. From this industry, while not often full-time, is the traditional artistic community comprised of craftsmen and visual artists.

Design in Northwest North Carolina

Recent efforts across the state have led to growing pockets of designers in the motion picture, software design, and furniture design industries. Architectural and specialized design firms are also becoming a larger part of the regional economy. This bodes well for Northwest North Carolina due to large

Design

NAICS Definition

323	Printing & Support Activities
511	Publishing
5121	Motion Picture & Video
516	Internet Publishing & Broadcasting
5413	Architectural, Engineering, & Related Svcs
5414	Specialized Design Services
5418	Advertising & Related Services
54192	Photographic Services

Industry Profile

2.7 million employed - US

Wage Rates

\$21 / hour in the US

Location Criteria

Large pool of skilled designers
 Technical design training programs
 Cultural & lifestyle amenities important
 Quality office space

Regional Assets for Design

Technical Design Training Programs
Complementary Industries
Local Support of Arts
High Quality Office Space
Affordable Cost of Living
Artistic Environment

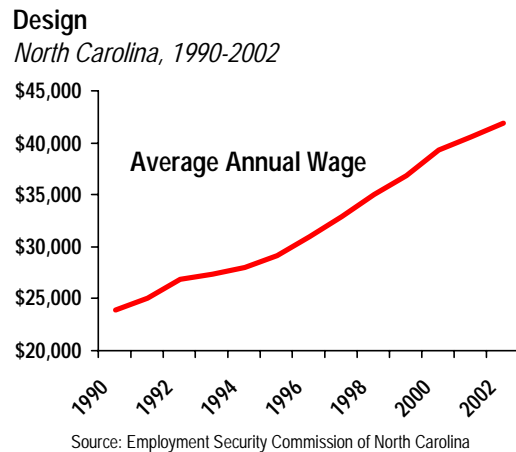
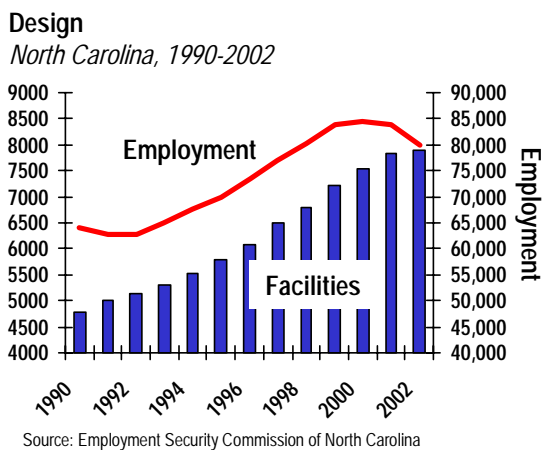
agglomeration economies for the industry, or the need for peers (companies or artists) to be located geographically close together. This allows them to share labor, draw on a collective knowledge base, and collaborate on projects.

Throughout Northwest North Carolina one can find an array of homegrown talent and excellent support for local arts councils. Urban Forsyth County has begun to invest in art amenities found only in larger metros. Artists looking to “drop out” of the city scene are finding welcoming homes in small rural towns.

Perhaps one of the greatest opportunities NWNC currently has is to build up its intellectual capital. Northwest North Carolina has a tremendous asset in its community by way of the North Carolina School for the Arts. Discussions are being held regarding the future of the school in Winston-Salem and the possibility of supporting a digital arts program at the school. Such a program is a high impact opportunity and will lead to a critical mass of knowledge and skills in the region. Having 200-300 students being trained as experts in Design will give the region a critical mass that will not only help the region in building more jobs in this industry but will also help to differentiate the region.

It will also complement workforce programs already in place. Several area community colleges have design programs as well, including programs in graphic arts and imaging technologies at Forsyth Tech. Alleghany County has a number of excellent programs. The Cyber Campus’ location at the high school expands learning opportunities in all fields, but also exposes students to video production at an early age. The entrepreneurial network, design services, and available technology at the Blue Ridge Business Development Center will support developing this industry in Alleghany.

Design, like most other service sectors of the economy, has taken a hit in the current downturn. Regardless, the industry has shown remarkable growth in the past ten years and will be evermore important in years to come.



Historic employment figures are difficult to track due to the diversity of the field. The figures above reflect employment in traditional design industries, mostly printing, advertising, and architecture. Figures are included for sectors such as motion pictures and specialized design. A regrettable omission is employment of self-employed artists and industrial designers who work for firms whose primary function is manufacturing; these workers would be included in employment figures for manufacturing. Figures for specialized design, however, do include industrial designers that work for design firms. In 2000, there were an estimated 300 people employed in such jobs throughout the state.

- Statewide employment peaked in 2000, at 84,500, but lost about 4,500 from 2000-2002.
- This is largely due to the high service content of the industry, which companies usually scale back during tough budget times.
- Regardless, the industry grew an impressive 27 percent over the last 10 years.
- The number of establishments continues to increase year after year. This is partly due to the trend towards smaller firms.
- The average design firm has about 10 full-time employees.

Workforce Requirements

Design firms tend to be small in size, consisting mainly of high-skilled designers. Roughly one third of all designers are self-employed. Thus, the entrepreneurial network of a community is vital to the success of local firms.

The workforce spans such varied industries as motion pictures and industrial machinery. These jobs generally require advanced training in specialized design software.

Selected Design Occupations

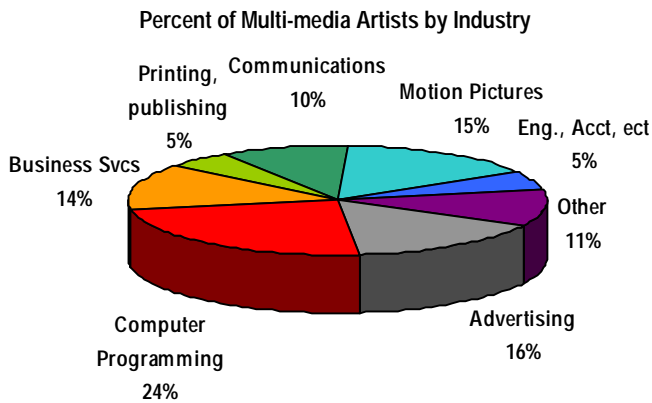
source: Occupational Employment Statistics, Bureau of Labor Statistics 2001

Occupation	US Employment	Wage Estimate	
		Mean Hourly	Mean Annual
Art Directors	20,880	\$31.52	\$65,570.00
Fine Artists, Including Painters, Sculptors, and Illustrators	9,710	\$18.43	\$38,330.00
Multi-Media Artists and Animators	30,530	\$22.45	\$46,700.00
Commercial and Industrial Designers	33,600	\$25.20	\$52,410.00
Graphic Designers	136,470	\$19.07	\$39,670.00
Set and Exhibit Designers	7,840	\$17.29	\$35,960.00
Photographers	61,250	\$13.43	\$27,940.00
Film and Video Editors	13,750	\$20.20	\$42,010.00

According to the Bureau of Labor Statistics, design occupations are expected to grow by 20-35 percent over the next ten years. Design applications tied to software will be the fastest growing segment, as software engineers in any industry will be the quickest growing career option in the country.

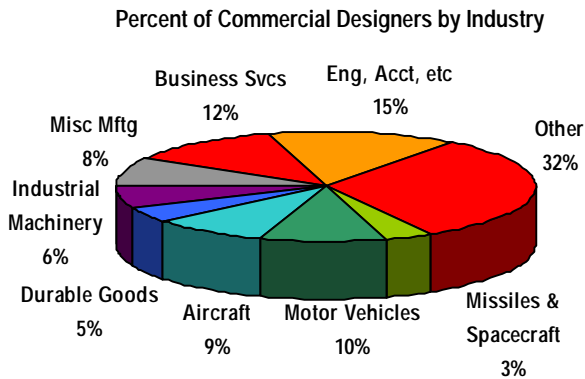
Specific job categories in this industry include:

Multi-media Artists and Animators: Create special effects, animation, or often visual images using film, video, computers, or other electronic tools and media for use in products or creations, such as computer games, movies, music videos, and commercials. (*BLS SOC definition*)



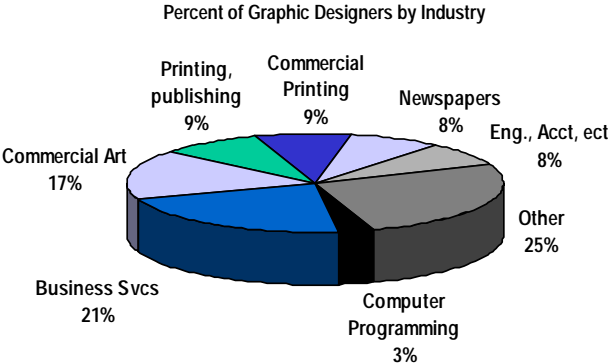
Wages of Artists by Industry:
 Printing: \$40,300
 Communications: \$37,850
 Computer Programming: \$51,200
 Motion Pictures: \$55,220
 Engineering, Acct, etc.: \$43,310

Commercial & Industrial Designers: Develop and design manufactured products, such as cars, home appliances, and children's toys. Combine artistic talent with research on product use, marketing, and materials to create the most functional and appealing product design. (*BLS SOC definition*)



Wages of Commercial Designers by Industry:
 Motor Vehicles: \$65,450
 Missiles & Spacecraft: \$59,280
 Durable Goods: \$58,710
 Industrial Machinery: \$52,040
 Engineering, Acct, etc.: \$59,120

Graphic Designers: Design or create graphics to meet specific commercial or promotional needs, such as packaging, displays, or logos. May use a variety of mediums to achieve artistic or decorative effects. (BLS SOC definition)



Wages of Graphic Designers by Industry:
Commercial Printing: \$32,380
Newspapers: \$31,520
Computer Programming: \$43,660
Commercial Art: \$43,720
Engineering, Acct, etc.: \$41,650

Target #7: Value-Added Agriculture

Counties: Alleghany, Ashe, Davie, Rockingham, Stokes, Surry, Yadkin

Industry Overview

Value-added agriculture builds off of traditional farming and ranching techniques to target niche food products. **Viticulture** is an excellent example of value-added agriculture in Northwest North Carolina. AngelouEconomics suggests further developing this local industry as well as promoting **organic farming**.

While organic products currently only make up 2 percent of the American food supply, they are becoming more mainstream. In 2000 sales of organics at conventional stores finally surpassed sales at specialty food stores. According to the USDA, 73 percent of all conventional grocers carry organic products. Year after year, this niche produces strong growth. Sales of organic foods have increased by 20 percent or more each year since 1990, making it the fastest growing agriculture sector in the nation.

Higher prices seen in grocery stores for organic foods are largely a product of marketing, and are seldom passed along to the grower. As long as the mark-up goes to the grocers, farmers are going to remain reluctant to bear the costs of growing organic. Many communities overcome this by running “by local campaigns” and providing large farmers’ markets where growers can access customers directly.

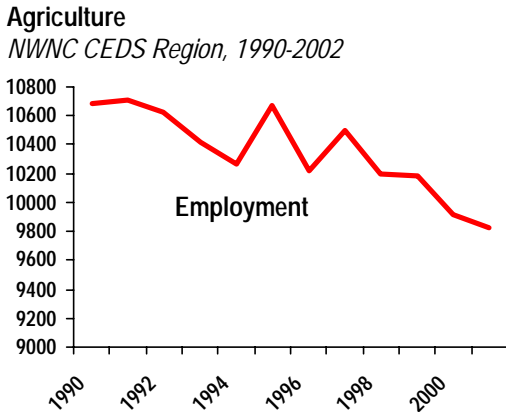
Agriculture
NAICS Definition <ul style="list-style-type: none">11 Agriculture, Forestry, Fishing, Hunting3115 Dairy Product Mfg (Creameries, Cheese)31213 Wineries31214 Distilleries
Industry Profile <ul style="list-style-type: none">• \$20 trillion in market receipts• \$5 trillion in farm labor & proprietors income• 3 million employed - US
Location Criteria <ul style="list-style-type: none">• Quality agricultural land• Strong agricultural traditions• Local agriculture coop• Established Farmers' Market

Value-Added Agriculture in Northwest North Carolina

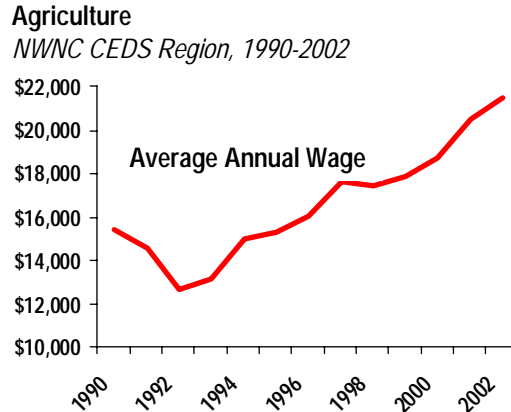
Northwest North Carolina remains primarily rural with a strong agricultural tradition. Many of the current crops are in decline or are unsustainable, such as tobacco and Christmas trees. Other crops, such as ornamentals and grapes, continue to see growth throughout the region. As the area begins its transition into new markets, efforts should be taken to support this important sector of the economy.

Regional Assets for Value-Added Agriculture
Proximity to Major Markets
Local Agriculture Coop
Traditional Agricultural Base
Seasonal and Field Workers
Established Farmers' Market
Commitment to Industry

Like elsewhere in the nation, farm employment has been declining in the CEDS regions. The figures below serve to illustrate trends, but the values should be taken with a grain of salt, as they do not reflect a growing number of part-time and undocumented agriculture workers throughout the region. Furthermore, many farms exist as secondary means of income or as hobbies for those that farm them.



Source: Bureau of Economic Analysis



Source: Employment Security Commission of North Carolina

- Local farmers do not seem to be concerned with the downward trend in employment; rather they explain it as a shift towards using more part-time and season work as well as more capital-intensive processes. Farms are becoming larger, and income to farm proprietors has been steadily increasing.
- Major concerns, rather, focus on the spread of population into rural areas and the need for farm districts to preserve farmland.
- In 2001, 9,800 people were employed on farms throughout the CEDS region. This does not count the large number of undocumented migrant workers that have a profound affect on the area. Percentage-wise, employment fell 8 percent in the past decade.

- Reported incomes for 2002 were \$21,400, and while wages remain well below the all-industry average, this represents a 40 percent increase since 1990.

New Opportunities for Agriculture in NWNC

Agriculture has been a long-standing staple of the NWNC economy, and the workforce is well equipped to support the industry. Thanks in part to a strong state cooperative extension service, farmers are in-tune with industry growth patterns. Those that have provided input during the CEDS process are realistic about declines in tobacco and the sustainability of Christmas tree farming. They also welcome new crops such as Vinifera grapes and are actively looking for ways to preserve the industry in NWNC.

Recent national recognition of Yadkin Valley's wines and its designation as an American Viticulture Area are signs of renewed life in area agriculture. With strong local support, the region has begun an aggressive schedule of marketing and education in hopes of becoming an established wine region in 8 to 10 years. New uses are being found for grapes, including using the seeds and hulls to produce resveratrol. Resveratrol has been proven to reduce cholesterol and risk of heart attacks, cancer, and Alzheimer's. It is one the many new products in the growing field of nutraceuticals – farm crops processed for pharmaceutical purposes.

One of the more promising State programs is North Carolina Farm Fresh. Farm Fresh is a directory put together by the North Carolina Department of Agriculture and Consumer Services of pick-your-own farms, roadside markets, and farmers markets throughout North Carolina. The initiative is part of a larger "buy local" movement designed to help state farmers; by bringing consumers directly to the producers, farmers are able to make up some of the costs for practices such as organic farming. These programs do an excellent job of promoting and preserving the area's agricultural heritage.

Target 8: Biotechnology

Counties: Davie, Forsyth, Surry

Industry Overview

Biotechnology, as its name implies, combines biology with technology. It applies knowledge of molecular, cellular, and genetic processes to real world products and services. It refers to scientific work related to genetic engineering for humans, animals and agriculture, environmental work, genetic data mining, and firms involved in the neurosciences and genome work. The area of biotechnology that is more closely linked with direct applications in health services is known as biomedical. Biomedical includes pharmaceutical manufacturing, medical equipment manufacturing, medical and dental laboratories, and hospital applications.

While the health service industry in the U.S. has outpaced population growth by 2-3 times, biotechnology has grown at an even faster rate. Global sales of prescription drugs currently top \$300 billion with the U.S., Japan, and Europe accounting for 80 percent of all sales. According to the BLS, drug manufacturing will add 75,000 jobs through 2010, an average annual growth rate of 2.2 percent, while output will grow even faster at an average annual rate of 5.6 percent (in real terms). Medical equipment is expected to add another 50,000 jobs in the same time period, a growth rate of 1.6 percent. Additionally, research and testing facilities are expected to net an additional 244,000 jobs during the period from 2000-2010, growing at an annual rate of 3.3 percent. All told, biotechnology should add nearly 400,000 jobs throughout the current decade across the United States.

Competition for biotech firms will be fierce, as almost every major metro includes it among its list of target industries. The Brookings Institute reports that out of 77 local and 36 state economic development agencies surveyed, 83 percent list biotechnology as one of their top two target industries. Biotech and health services, however, will likely experience growth in all markets,

Biotechnology

NAICS Definition

- 3254 Pharmaceutical Mfg
- 3391 Medical Equipment & Supplies Mfg
- 54171 Life Sciences R&D

Industry Employment

- 300,000 employed - US

Wage Rates

- \$34 an hour in the US

Location Criteria

- Educated workforce
- Access to capital
- Research incubator
- Large medical sector
- Research University
- Venture Capital
- Government Support

Top Biotech Regions in the US

San Francisco Bay Area / Silicon Valley
 Research Triangle
 Boston
 Los Angeles
 Seattle
 NY / NJ Metro Area
 Washington, DC
 Richmond
 San Diego
 Pennsylvania

Regional Assets for Biotech

Research Incubator
 Established Medical Sector
 Workforce Training Programs
 University Research Programs
 Future FedEx Hub
 Commitment to the Industry

creating opportunities for those communities that have prepared themselves. Successful communities will be those that excel in research and are able to turn that research into marketable products. Currently, most biotechnology clusters are located in the northeast (New Jersey and Boston), the Research Triangle, or California. New contenders in recent years include Central Texas and Salt Lake City.

Biotechnology in Northwest North Carolina

North Carolina has become a leader in biotech due to strong research programs in the Research Triangle. The recent expansion of the North Carolina Biotechnology Center into the Piedmont Triad Research Park serves as a strong signal of the State and local governments' commitment to the Winston-Salem biotechnology sector. The park will serve as an anchor to the regional biomedical sector and give the area much needed exposure to the biotech community. Following the Center's dedication events, the Biotechnology Center's Board of Directors convened in Winston-Salem for their first ever meeting outside of Research Triangle Park.

In addition, the Research Park is close to establishing a High-Performance Computing Center in the Piedmont Triad Research Park. Focusing on grid and cluster computing, the center will involve collaboration between all the major universities -- WFU, WFU School of medicine, WSSU and Forsyth Technical Community College -- and WinstonNet. University high-performance computing equipment, as well as personnel, will be co-located in the center. Classroom space will be included and shared by all the educational institutions. It will be a huge asset for the universities and research park tenants. It will also be a magnet for recruiting new companies to the Park. Another asset that Forsyth County has is the WFU School of Medicine and Virginia Tech have established a joint graduate program called the Virginia Tech - Wake Forest University School of Biomedical Engineering and Sciences.

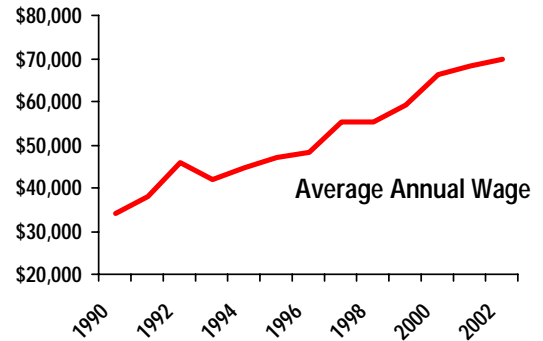
- In 2002, biotech companies throughout the state employed 20,500 people. This represents a 57 percent increase over the last 10 years.

Biotechnology
North Carolina, 1990-2002



Source: Employment Security Commission of North Carolina

Biotechnology
North Carolina, 1990-2002



Source: Employment Security Commission of North Carolina

- Most of this employment is in the Research Triangle, though some of it is beginning to move over to the Greensboro-Winston-Salem-High Point MSA. 2002 biotech employment for the MSA was just over 1,200.
- One of the exceptional features of this industry is the high-wage jobs it brings. The average salary for a biotech employee is \$70,000.
- Industry wages are more than double that of the state average, indicating the allure of the industry as well as the high-skill level required of its employees.

Biotech is a strong growth field with a bright future. Due to large barriers to entry, a firm's success is highly dependent on entrepreneurial networks and long-term venture capital. Marketable results generally take between 5 and 12 years.

The large biotech firm is a rarity. Even in established markets, biotech firms are not considered large employers. Firms that specialize in research are generally no more than a small lab. These firms sell or license their marketable products to large vertically integrated powerhouses such as Merck and Pfizer.

Workforce Requirements

Medical Scientists
Biological and Medical Technicians
Computer and Electrical Engineers

Attracting and retaining a quality workforce is more important in high-tech fields such as biotech than most others. Workers tend to be highly mobile, meaning that they are willing to venture into a community, but they are also easily swayed away. In an industry with high turnover, people tend to seek communities with numerous employment options.

Niche Targets for Northwest North Carolina

Nanotechnology – “Science of the small”, allows for extreme precision in manufacturing, creating less waste and more efficiency. This industry is revolutionizing our understanding of the fundamental building blocks of all physical things. It will be a \$1 trillion industry by 2015. Industrial applications can be found in semiconductors, electronics, computers, and biotechnology and life sciences. There are approximately 900 start-ups nationally within nanotech.

NWNC has recently made a strong addition to its nanotech workforce, better positioning itself for rapid future growth. WFU just hired Dr. David Carroll, a well-know nanotechnology expert who is bringing between 10 and 14 people with him, in addition to significant funding and contracts. He is heading up the new Center for Nanotechnology at Wake Forest University; a 5,000 sq. ft laboratory is being retrofitted for this program near the WFU campus.

Bioinformatics - Management and analysis of data using advanced computing to increase speed of biological research. The Human Genome Project opened new research frontiers in this industry. More than 20,000 new jobs are expected in this industry

by 2005. Additionally, IBM, Lion Bioscience, Informax, Accelrys, United Devices are key players in an industry that is forecast to have a \$7 billion market of by 2007.

Pharmaceutical Research – Pharmaceuticals are at the heart of biotechnology as more and more drugs are being developed with the aid of advanced computing and data techniques. According to the Biotechnology Industry Organization an estimated 325 million worldwide have been treated with over 130 FDA-approved drugs and vaccines. Most of these drugs are new, with 70 percent of the biotech drugs on the market being approved within the last six years.

Profile of a Typical Biotechnology Lab

The following table outlines the specific infrastructure requirements of a typical biotechnology lab:

Biotech Research Facility Typical Requirements		
	Input	Details
Activity	Biotech R&D	Biological, agriculture, or chemical research
Size	30,000 sf	1 story building
Acres	4-6 acres	
Employees	50 employees	2 shifts / 5 days per week
Water	2,500 gallons / day	250 gal/shift
Wastewater	2,250 gallons / day	does not need to be treated
Electricity	600 kw Demand 324,000 kwh per month	dual substations, possibly on separate grids 70% average load factor
Natural Gas	150 mcf / month	
Investment (\$) (for a typical U.S. facility)		
Building/Land	\$4-8 million	
Equipment	\$30 million	about \$1,000 per sf

Source: AngelouEconomics