NORTH CAROLINA'S Supply Chain

CONDUIT FOR COMMERCE & ECONOMIC DEVELOPMENT

An Economic Impact Statement & Analysis

To better understand the dynamic industries of the supply chain in North Carolina is to better understand a significant driver for statewide economic health.

Contents

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Executive Abstract

To better understand the dynamic industries of the supply chain in North Carolina is to better understand a significant driver for statewide economic health. The relationships and connectivity between these diverse industries help to deliver continued economic growth for North Carolina. This report investigates the impact of the 14 different key supply chain sectors in terms of direct, indirect, and induced employment, labor income, output and value added. It also draws attention to the significant local, state, and federal tax contributions of the supply chain. Once better understood, future plans, investments, and prudent policy decisions can further strengthen this vital conduit for prosperity in North Carolina.

Purpose & Report Context

Prior to the completion of this research and report, there have been limited investigations of the overall economic impact of the supply chain in North Carolina. Specific industries within the supply chain have been the subject of individual research and analysis, however no report has yet provided perspective and visibility across the entire supply chain. The scope of this report includes all industries relevant to a clearly articulated definition of the supply chain, and captures their full impact on state and local economies. It also provides context through a sector-by-sector investigation, highlighting pertinent data for the various relevant industries. Key trends for each sector are discussed, while broader themes that more holistically impact the supply chain are also examined.

Another key characteristic of this study was the creation of a systematic and consistent methodology to capture and analyze the economic impact of supply chain related activities and industries in North Carolina today and in the future. This methodology is also intended to provide a simple and easy-to-follow process for investigating the economic impact of the supply chain in other states, regions, and communities across the U.S. A benefit provided by this consistency in process is a better view and awareness of the importance of the supply chain on the domestic and global economy, as well.

Summary of Findings

Across North Carolina, supply chain industries employ nearly 12% of the state's workforce, or more than 479,800 employees. Supply chain average labor income of more than $67,700 is 56% higher than the state's average non-farm wage. Indirect and induced impact on North Carolina's economy accounts for an additional 770,000 jobs across all industries. Together that represents more than 31% of North Carolina's entire labor force. Providing a total direct, indirect, and induced GDP contribution of more than $150B, or 32% of state GDP for 2013. Supply chain tax contributions exceed $32.1B to local, state, and federal governments, while total combined output exceeds $337B across all industries.

TOTAL ECONOMIC IMPACT OF THE SUPPLY CHAIN

Employment	Labor Income	Value Added	Output	Taxes
479,800 Direct	$32.5B Direct	$85.8B Direct	$218.3B Direct	$13.4B State & Local
770,000 Indirect & Induced	$37.9B Indirect & Induced	$65.0B Indirect & Induced	$118.9B Indirect & Induced	$18.7B Federal
1,249,800	**$70.4B**	**$150.8B**	**$337.2B**	**$32.1B**

Leading sectors within the supply chain include Pharmaceutical, Biologics & Medical, first in the overall GDP contributions of value added with more than $19.4B. This sector is also the largest contributor to federal coffers with $2.9B in federal taxes paid. For overall output, the Industrial Machinery & Transportation Equipment manufacturing sector leads all supply chain sectors with direct output of nearly $38.4B. For direct employment and labor income, the industries of Transportation, Distribution & Logistics are the most robust in North Carolina, the equivalent of nearly 24% of the state's manufacturing workforce, and almost $5.7B in labor income.[1] Lastly, the legacy Tobacco & Foodstuffs sector provides the most profuse contribution to local and state government through more than $5.1B paid in 2013. These leading sectors are only a few of the 14 sectors analyzed in the report, but reflect major industrial sectors in North Carolina.

Along with relevant data, context is provided for each industrial sector included in the report. Historical legacy and current industry dynamics are discussed to provide additional perspective and context for the sectors of the supply chain. Key trends across all sectors have also been identified and discussed at the global, national, and state level. These 8 trends are:

1. Strong residential construction and housing starts increases output demand for many sectors in the supply chain. Non-residential and infrastructure projects are also growing. Yet, just as rising residential, commercial, and infrastructure investment drive demand, consumer and social trends also impact the sectors of the supply chain.

2. Environmental stewardship efforts are being strengthened in every sector across North Carolina's supply chain. The proliferation of green, sustainable products and practices and the pursuit of efficiency are demonstrations of this focus on sustainability.

1. NC Chamber of Commerce. "Manufacturing." 2016.

3. Strong U.S. currency bolsters purchasing power for domestic consumers, and makes imported goods less expensive. Price pressures from foreign manufacturers producing goods at lower cost in less regulated business environments are also relevant across the supply chain. To offset this disadvantage, sectors within the supply chain look to expand their presence in export markets. In the international marketplace, a strong U.S. dollar can also limit export demand.

4. Corporate consolidations increase as U.S. firms seek to maximize economies of scale and control costs in their domestic manufacturing operations. For some, overall industry participation in many sectors is expected to decline. Foreign production of primary or intermediary goods, often called offshoring, has impacted manufacturing in North Carolina, but may be leveling off. Those sectors able to maintain production in North Carolina may enjoy benefits from local markets or favorable government incentives.

5. Foreign markets remain important. Rising wages signal an increase in purchasing power for the growing Asian middle class. U.S. sectors are able to capture demand through niche product development, or through favorable trade agreements. Increased export demand bolsters overall supply chain utilization.

6. Highly skilled labor is a key ingredient in nearly every supply chain sector. Supporting this through the educational infrastructure of the community college and university system in North Carolina is vital to sustaining workforce demands.

7. Research and development are important to supporting the continued growth of each sector in the supply chain, not just high-tech industries. Research parks and university development partnerships are key catalysts for innovation across the sectors of the supply chain.

8. The regulatory environment is a direct and significant influence on the activities of every supply chain sector. Staying up-to-date on relevant regulations requires constant attention. These sectors invest heavily in the infrastructure needed to maintain compliance, as well as leveraging highly skilled, experienced labor to innovate and more efficiently address regulations and environmental considerations.

Scope & Methodology

For this investigation, Impact Analysis for Planning, more commonly known as IMPLAN, was used to analyze and adjust data relevant to the supply chain in North Carolina. IMPLAN is a widely used, and generally accepted input-output analysis tool that quantifies the economic effects of a particular industry or change within an industry on a given region or economy.

This report recognizes a specific definition of the supply chain that includes:

Those activities, stakeholders, or organizations engaged from the sourcing of inputs, including raw materials, continuing through production, distribution, and delivery of goods and services to downstream or consumer markets.

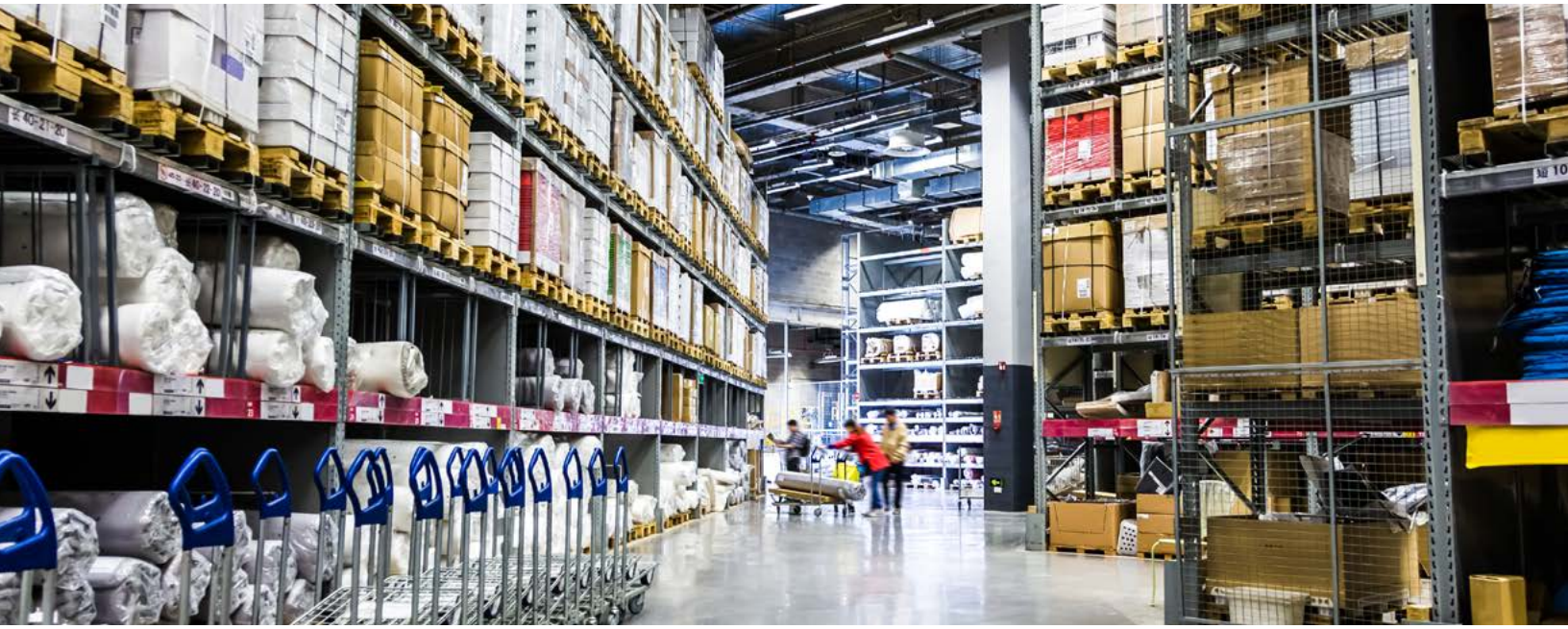
A broader scope would include industries such as finance, customer service, real estate, wholesale, retail, food and beverage service, and most agricultural sectors. However, for the purposes of this analysis, they are considered supplementary to the supply chain. Regardless, these industries remain

relevant, and are discussed as beneficiaries to the significant indirect and induced economic impact of the supply chain.

The geographic focus of this report is the state of North Carolina. Data for this analysis were obtained from North Carolina databases for 2013 licensed through MIG, Inc. The analysis also utilized multipliers, and an Excel-based tool developed by Dr. Jesse Daystar of Duke University's Center for Sustainability & Commerce, and Dr. Eric McConnell of NC State University's Department of Forest Biomaterials. Further calculations were completed using spreadsheets and pivot tables. Outside of IMPLAN data, additional academic and industry research was completed to support this report, as well as to provide context at the global, U.S., and state level for each sector included. These sources include academic, government, and industry databases, publications and periodicals, as well as discussions and interviews with subject matter experts.

The overall report is structured to provide in-depth analysis for each of the 14 sectors compiled and considered as a part of the supply chain. Rankings and summary statistics for each sector and the supply chain as a whole are provided for further illustration. In developing this study, a concerted effort was made to consider report reproducibility in other regions. Throughout the process, the definitions, industry sector groupings, analysis methodology, and even the final report have all been structured in a way that is easy to understand and replicate with similar resources. The report itself is built to be consistent and formulaic in its composition, yet also provide a compelling narrative for the 14 industrial sectors considered in the analysis. Similar statistics were captured for each sector, compared in a regular format, and discussed consistently in the sector economic impact summaries. Yet, unique trends and dynamics specific to each sector, as well as broader trends across the supply chain, are captured in each sector summary.

A full listing of all industries considered by sector with associated IMPLAN numbers is available in the report Appendix starting on page 108, or online at MHLRoadmap.org.

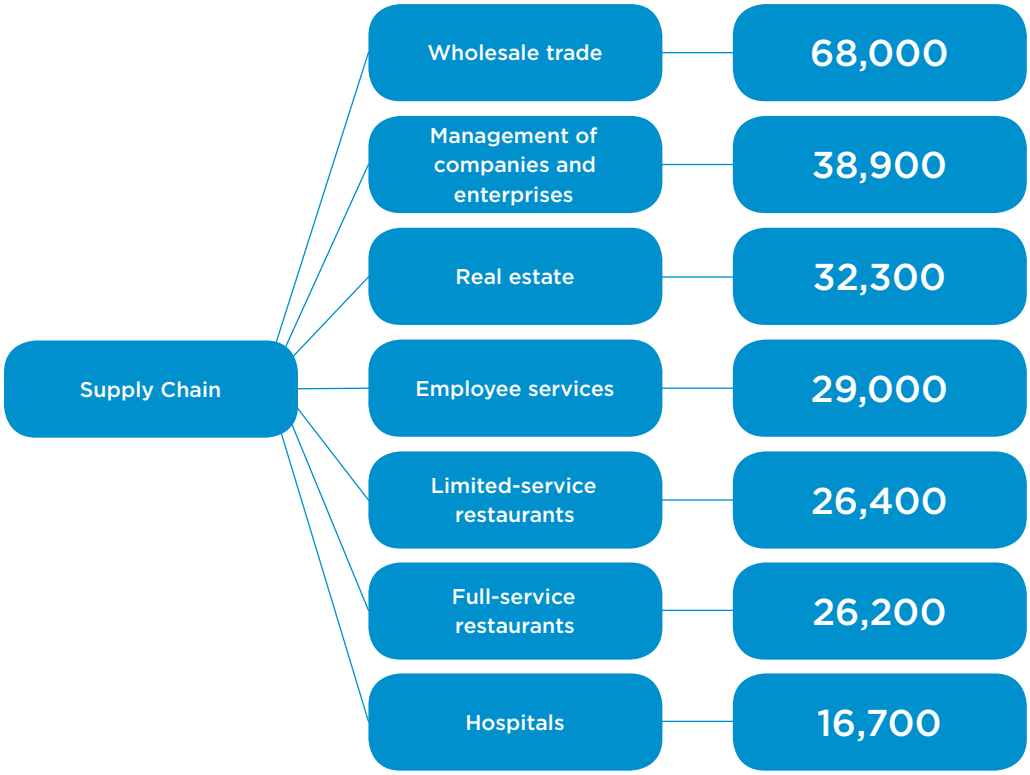


Ranking Lists & Summary Statistics

TOTAL ECONOMIC IMPACT OF THE SUPPLY CHAIN

Employment	Labor Income	Value Added	Output	Taxes
479,800 Direct	$32.5B Direct	$85.8B Direct	$218.3B Direct	$13.4B State & Local
770,000 Indirect & Induced	$37.9B Indirect & Induced	$65.0B Indirect & Induced	$118.9B Indirect & Induced	$18.7B Federal
1,249,800	**$70.4B**	**$150.8B**	**$337.2B**	**$32.1B**

JOBS CREATED IN NON-SUPPLY CHAIN INDUSTRIES



RANKINGS OF SUPPLY CHAIN SECTORS

Employment

1 Transportation, Distribution & Logistics
2 Industrial Machinery & Transportation Equipment
3 Textiles
4 Chemical Manufacturing
5 Household Goods & Furniture
6 Metal Products
7 Tobacco & Foodstuffs
8 Pharmaceutical, Biologics & Medical Products
9 Manufacturing N.E.S.
10 Electronics
11 Wood Products
12 Building Materials
13 Communications & Computer
14 Paper Products

Labor Income

1. Transportation, Distribution & Logistics
2. Industrial Machinery & Transportation Equipment
3. Pharmaceutical, Biologics & Medical Products
4. Chemical Manufacturing
5. Metal Products
6. Electronics
7. Communications & Computer
8. Textiles
9. Tobacco & Foodstuffs
10. Household Goods & Furniture
11. Manufacturing N.E.S.
12. Building Materials
13. Wood Products
14. Paper Products

Average Labor Income

1. Communications & Computer
2. Pharmaceutical, Biologics & Medical Products
3. Electronics
4. Industrial Machinery & Transportation Equipment
5. Chemical Manufacturing
6. Manufacturing N.E.S.
7. Paper Products
8. Metal Products
9. Tobacco & Foodstuffs
10. Building Materials
11. Transportation, Distribution & Logistics
12. Wood Products
13. Household Goods & Furniture
14. Textiles

Value-Added (GDP Contribution)

1. Pharmaceutical, Biologics & Medical Products
2. Chemical Manufacturing
3. Industrial Machinery & Transportation Equipment
4. Tobacco & Foodstuffs
5. Transportation, Distribution & Logistics
6. Metal Products
7. Electronics
8. Communications & Computer
9. Textiles
10. Household Goods & Furniture
11. Manufacturing N.E.S.
12. Building Materials
13. Paper Products
14. Wood Products

Output

1. Industrial Machinery & Transportation Equipment
2. Chemical Manufacturing
3. Pharmaceutical, Biologics & Medical Products
4. Tobacco & Foodstuffs
5. Transportation, Distribution & Logistics
6. Metal Products
7. Textiles
8. Electronics
9. Communications & Computer
10. Household Goods & Furniture
11. Manufacturing N.E.S.
12. Paper Products
13. Building Materials
14. Wood Products

Productivity (Output/Employees)

1. Pharmaceutical, Biologics & Medical Products
2. Tobacco & Foodstuffs
3. Chemical Manufacturing
4. Communications & Computer
5. Industrial Machinery & Transportation Equipment
6. Electronics
7. Paper Products
8. Metal Products
9. Building Materials
10. Manufacturing N.E.S.
11. Textiles
12. Wood Products
13. Household Goods & Furniture
14. Transportation, Distribution & Logistics

State Tax

1. Tobacco & Foodstuffs
2. Transportation, Distribution & Logistics
3. Industrial Machinery & Transportation Equipment
4. Pharmaceutical, Biologics & Medical Products
5. Chemical Manufacturing
6. Metal Products
7. Electronics
8. Textiles
9. Communications & Computer
10. Household Goods & Furniture
11. Manufacturing N.E.S.
12. Paper Products
13. Wood Products
14. Building Materials

Federal Tax

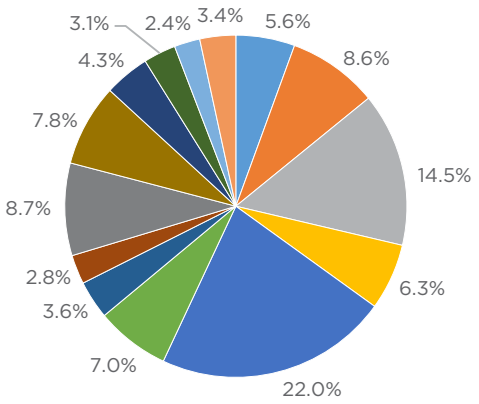
1. Pharmaceutical, Biologics & Medical Products
2. Industrial Machinery & Transportation Equipment
3. Tobacco & Foodstuffs
4. Chemical Manufacturing
5. Transportation, Distribution & Logistics
6. Metal Products
7. Electronics
8. Communications & Computer
9. Textiles
10. Household Goods & Furniture
11. Manufacturing N.E.S.
12. Building Materials
13. Wood Products
14. Paper Products

Total Tax

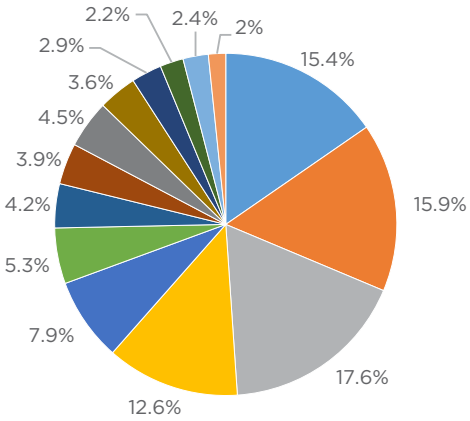
1. Tobacco & Foodstuffs
2. Industrial Machinery & Transportation Equipment
3. Pharmaceutical, Biologics & Medical Products
4. Transportation, Distribution & Logistics
5. Chemical Manufacturing
6. Metal Products
7. Electronics
8. Textiles
9. Communications & Computer
10. Household Goods & Furniture
11. Manufacturing N.E.S.
12. Building Materials
13. Wood Products
14. Paper Products

COMPARISON OF SUPPLY CHAIN SECTORS

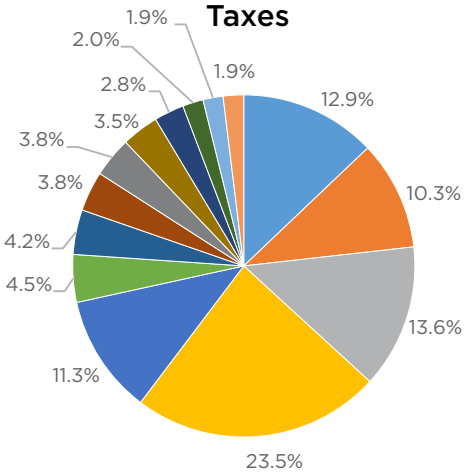
Employment



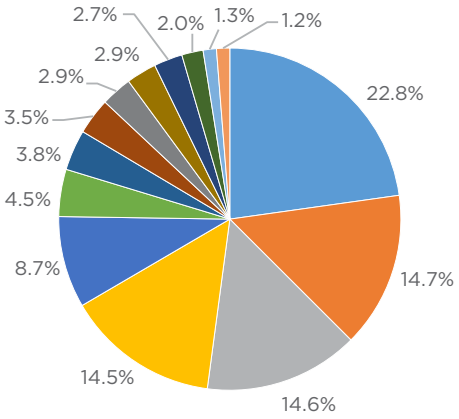
Output



Taxes



Value Added



- Pharmaceutical, Biologics & Medical Products
- Chemical Manufacturing
- Industrial Machinery & Transportation Equipment
- Tobacco & Foodstuffs
- Transportation, Distribution & Logistics
- Metal Products
- Electronics
- Communications & Computer
- Textiles
- Household Goods & Furniture
- Manufacturing N.E.S.
- Building Materials
- Paper Products
- Wood Products

Introduction

For the industries that make up the supply chain in North Carolina, this report tells a story about challenges and determination, changes and adaptability. For the state of North Carolina, it is also a story about improving communities through expanding economic connectivity, growing production and prosperity. The supply chain employs employ nearly 12% of the state's workforce with more than 479,800 employees. Supply chain average labor income of more than $67,700 is 56% higher than the state's average non-farm wage. Indirect and induced impact on North Carolina's economy accounts for an additional 770,000 jobs across all industries. Together that represents more than 31% of North Carolina's entire labor force. Providing a total direct, indirect, and induced GDP contribution of more than $150B, or 32% of state GDP for 2013. Supply chain tax contributions exceed $32.1B to local, state, and federal governments, while total combined output exceeds $337B across all industries.

This is also a story about success.

Recent data from the U.S. Bureau of Economic Analysis show nearly 70% of the United States Gross Domestic Product is attributable to consumer spending or personal consumption expenditures.[2] The purchase of goods and services is a clear driver for the American economy. Meeting this demand requires successful, productive firms across a range of industries, each reliant on an interconnected supply chain for their continued success. In North Carolina, this figure is closer to 66%, but still a significant driver and stimulus for state and local economies.[3]

A company's supply chain is vital to its health, too. Consider a global company like Greensboro-based VF Corporation, brand manager and creator of products from designer denim to high-performance outdoor clothing and gear. VF Corporation's supply chain includes relationships with other firms across industries from sourcing raw materials, to manufacturing, and on to wholesale and retail markets. The links in the chain, such as vendors, processes, or intermediary services, enable the continued production and distribution of VF Corporation's family of brands, ready to meet consumer demand.

Investments in supply chain innovation, as well as research and development, allow the company to thrive in a number of fiercely competitive global markets. Continued improvement has increased efficiency while also increasing productivity.[4] By better managing and cultivating their supply chain, VF Corporation is able to realize higher margins, cost savings, and other benefits. An efficient and well-managed supply chain helps make VF Corporation a more prosperous business.

Why not then also examine how to best support, steward, and cultivate North Carolina's supply chain? In 2014, VF Corporation's revenues exceed the GDP of nations such as Nicaragua and Laos.[5] By comparison, North Carolina's GDP, if considered against nations, would rank 28th in the world above more industrially relevant nations like Denmark or South Africa.[6] Higher stakes indeed, and managing the supply chain at the state level is more complex. Yet, innovation, efficiency, and adaptability remain relevant.

2. Federal Reserve Bank of St. Louis. "Graph: Personal Consumption Expenditures/Gross Domestic Product." 2016.
3. Bureau of Economic Analysis. "U.S. Bureau of Economic Analysis (BEA)." 2016. Note: $481.9B NC total GDP 2014, $318.9B personal consumption expenditures for NC 2014 = 66.1%.
4. VF Corporation. "Supply Chain: VF Corporation (VFC)." 2016.
5. Wikipedia. "List of Countries by GDP (Nominal)." 2016.
6. Ibid.

Better understanding of the dynamics and relationships between the supply chain and North Carolina's economy is the first step in cultivating growth across these diverse sectors. This report aims to provide information, perspective, context, and economic impact analysis for the industries of the supply chain in North Carolina. Once better understood, future plans, investments, and prudent policy decisions can further strengthen this vital conduit for economic growth and prosperity.

Defining the Supply Chain in North Carolina

What exactly is the supply chain? Often, the term *supply chain* is confused with logistics. For some, the term has become a ubiquitous business buzzword with very little clarity or meaning. In an effort to answer this question and avoid the spectrum of confusion, it was important to clearly define supply chain for this analysis.

The Council of Supply Chain Management Professionals defines supply chain as "the material and informational interchanges in the logistical process stretching from acquisition of raw materials to delivery of finished products to the end user."[7] Another perspective is offered by professor and director of the NC State Supply Chain Resource Cooperative, Dr. Robert Handfield, who defines the supply chain as "activities cover[ing] everything from product development, sourcing, production, and logistics," as well as the "systems needed to coordinate these activities."[8]

While both of these are relevant definitions, the primary ambition of this report is to better articulate how the sectors of the supply chain impact local and state economies through manufacturing, transportation, and distribution.

To that end, this report recognizes a more tailored definition of supply chain that includes:

Those activities, stakeholders, or organizations engaged from the sourcing of inputs, such as raw materials, continuing through production, distribution, and delivery of goods and services to downstream or consumer markets.

A broader scope would include industries such as finance, customer service, real estate, wholesale, retail, food and beverage service, and most agricultural sectors. However, for the purposes of this analysis, they are considered supplementary to the supply chain. Regardless, these industries remain relevant, and are discussed as beneficiaries to the significant indirect and induced economic impact of the supply chain.

As defined in this analysis, the industries of the supply chain generate significant economic benefits for communities across North Carolina and beyond. To better quantify these benefits and appreciate their implications, a rules-based economic impact analysis is conducted using financial, economic, and social data. By generating estimates of output, employment, labor income, tax revenues, and GDP contributions, one can better understand the changes in economic activity resulting from the industry, sector, project, and activity being studied.

Audience and Scope

The audience for this report is two-fold. The primary audience includes relevant state and local business and community leaders. These include supply chain professionals, legislators, economic development professionals, and others interested in the health of this major economic driver in

7. Council of Supply Chain Management Professionals. "Supply Chain Management Terms and Glossary." 2013.
8. NC State University Supply Chain Resource Cooperative. "What Is Supply Chain Management?." 2016.

North Carolina. Data and conclusions from this report clearly acknowledge the broad impact that supply chain has on North Carolina. It is important that these significant economic benefits are well understood by all key stakeholders. The report is also structured to provide in-depth analysis for each of the 14 sectors compiled and considered part of the supply chain. These individual sectors may also be considered independently. Rankings and summary statistics for each sector and the supply chain as a whole are provided for further illustration. In addition, major trends across all sectors have been identified and discussed at the global, national, and state level. For this audience, the content can better inform planning, development, investment, and policy decisions. It also tells the story of the supply chain's positive and significant economic impact in North Carolina.

The second audience for this report includes those people and organizations seeking to better understand the impact of the supply chain in their own state or region. In developing this study, a concerted effort was made to consider report reproducibility in other regions. Throughout the process, the definitions, industry sector groupings, analysis methodology, and even the final report have all been structured in a way that is easy to understand and replicate with similar resources.

The report itself is built to be consistent and formulaic in its composition, yet also provide a compelling narrative for the 14 sectors considered in the analysis. Similar statistics were captured for each sector, compared in a regular format, and discussed consistently in the sector economic impact summaries. Yet, unique trends and dynamics specific to each sector, as well as broader trends across the supply chain, are captured in each sector summary.

For this investigation, *Impact Analysis for Planning*, more commonly known as IMPLAN, was used to analyze and adjust data relevant to the supply chain in North Carolina. IMPLAN is a widely used and generally accepted input-output analysis tool that quantifies the economic effects of a particular industry or change within an industry on a given region or economy. An input-output model is "a technique for quantifying interactions between firms, industries, and social institutions within a local economy." Such models are "driven by changes in final consumption."[9]

The geographic focus of this report is the state of North Carolina. The data discussed refers to statewide data unless otherwise specified. Data for this analysis was obtained from North Carolina databases for 2013 licensed through MIG, Inc. The analysis also utilized multipliers and an Excel-based tool developed by Dr. Jesse Daystar of Duke University's Center for Sustainability & Commerce and Dr. Eric McConnell of NC State University's Department of Forest Biomaterials. Further calculations were completed using spreadsheets and pivot tables. Outside of IMPLAN data, additional academic and industry research was completed to support this report, as well as provide context at the global, U.S. and state level for each sector included. These sources include academic, government, and industry databases, publications and periodicals, as well as discussions and interviews with subject matter experts. These materials and more guidance on developing a similar economic impact analysis and report for other states or regions are included in the document methodology.

9. Mulkey, David, and Alan W. Hodges. "Using IMPLAN to Assess Local Economic Impacts." Edis.ifas.ufl.edu. 2016.

Supply Chain Sector Analysis

Supply Chain Sector Analysis

North Carolina's supply chain represents nearly 12% of the state's total employment, and upwards of $32.5B in direct labor income. Undeniably, the 14 unique sectors of the supply chain deliver significant economic impact. From Pharmaceuticals, Biologics & Medical Product manufacturing through Wood Products, the supply chain in North Carolina provided a total direct GDP value added contribution of more than $85.8B in 2013. Led by the Industrial Machinery & Transportation Equipment manufacturing sector, North Carolina's total supply chain direct industrial output exceeded $218B. The supply chain in North Carolina supports local, state, and federal activities through significant tax contributions. Led by Tobacco & Foodstuffs, the 14 sectors analyzed paid local and state taxes of nearly $13.4B, while federal assessments exceeded $18.7B.

These figures represent direct impacts. However, if estimated indirect and induced impacts from the supply chain in North Carolina are taken into account, more than 30% of all jobs in North Carolina are connected to this vital collection of industries. This represents labor income of more than $70B. Total output spurred by the supply chain exceeds $337B with GDP value added contributions of nearly another $151B. Accounting for direct, indirect, and induced impacts, the numbers are staggering.

While Tobacco, Textiles, and Furniture are foundational to the growth and development of the economy in North Carolina, the sectors that currently make up the supply chain in North Carolina rank in the following order by total direct GDP contribution value added:

1. Pharmaceutical, Biologics & Medical Products
2. Chemical Manufacturing
3. Industrial Machinery & Transportation Equipment
4. Tobacco & Foodstuffs
5. Transportation, Distribution & Logistics
6. Metal Products
7. Electronics
8. Communications & Computer
9. Textiles
10. Household Goods & Furniture
11. Building Materials
12. Paper Products
13. Wood Products
14. Manufacturing Not Elsewhere Specified (N.E.S.)

Beyond Transportation, Distribution & Logistics, the majority of supply chain jobs in North Carolina are related to manufacturing. The range of industries producing in North Carolina is broad. From high-tech products such as semiconductor, to more traditional industries such as furniture, textiles, paper, and wood products, manufacturing in North Carolina is a modern reflection of the state's industrial legacy. Change and technological advancement are currency for this dynamic sector. Yet, innovation is not limited to only high-tech sectors. Development of new processes and efficiencies across all kinds of manufacturing continue to deliver previously unimaginable productivity. This progress has not come without costs.

Most sectors of the U.S. economy returned to and have surpassed previous peak employment following the recent 'great' recession. Manufacturing did not. It is clear that today's productive sectors are different, yet with this change comes opportunity. Previously modest or nascent industries have blossomed. Specific industry clusters have developed across the state, from filters to pharmaceuticals to fiber optics. Together with the modernization of legacy sectors, North Carolina manufacturing has adapted. The nimble sectors of North Carolina's supply chain face the challenges of global completion, while also fielding the complications of several key trends.

Key Trends Facing the Supply Chain in North Carolina

Across nearly every sector, the growth of residential construction and housing starts has increased output demand for the supply chain sectors in North Carolina. Non-residential and infrastructure projects are also growing. These developments are clearly a boon to sectors like Building Materials, Metal Products manufacturing, and even Chemical Manufacturing. Just as rising residential, commercial, and infrastructure investment drives demand, consumer and social trends also impact the sectors of the supply chain.

For example, with shifting consumer focus to more healthy lifestyles, the Tobacco & Foodstuffs sector is changing. The state's leadership in share of tobacco production remains, but the overall domestic market is shrinking. Others in the sector are able to leverage the trend to grow. Food

North Carolina's robust community college, university, and worker training capacity supports demand for highly skilled labor necessary in the more sophisticated manufacturing environment seen across the supply chain.

manufacturers have expanded product lines to include healthy options in both ingredients and product portioning. In the Household Goods & Furniture sector, rising consumer desire for integrated electronics have prompted product and production changes, and these investment decisions must be weighed against other opportunities.

The growing importance of environmental impact must also be considered as a pressing trend across the supply chain. Every sector across North Carolina's supply chain is adapting, strengthening their environmental stewardship. The proliferation of green, sustainable forestry practices are examples of the supply chain's focus on sustainability in the Paper Products and the Wood Products sectors. These complement efforts to increase fleet fuel efficiency across the air, ground, rail, and ocean transport industries. There is evidence, too, that this trend represents a growth opportunity for many other supply chain sectors across North Carolina.

Other key trends facing the supply chain include the repercussions of the strong U.S. dollar. This bolsters purchasing power for consumers and domestic firms, but also makes imported goods less expensive for American consumers or companies. This monetary condition creates price pressure on domestic firms from foreign manufacturers producing goods at lower cost in a less regulated business environment. To offset this disadvantage, the ability of sectors such as Textiles, Electronics, and Paper Products look to expand their presence in export markets.

Other sectors within North Carolina's supply chain are handling global pressures through corporate consolidations, as U.S. manufacturers seek to maximize economies of scale and control costs in domestic operations. This allows U.S. firms to compete on a more level ground with foreign producers. Despite this, domestic industry participation in many sectors is expected to decline. Foreign production of primary and intermediary goods, often called offshoring, has impacted manufacturing in North Carolina. Some analysts suggest that the trend of offshoring production has leveled off.[10] For those sectors that maintain production in North Carolina, benefits from local consumption or favorable government incentives have helped to offset losses.

Other opportunities come with rising wages and concern for the natural environment in Asia, where the once strong advantage of low-cost, low-wage producers has been weakened. Increases in purchasing power and the growth of middle class consumption in Asia have increased demand for items such as high-end or niche furniture from North Carolina. Industries in the Building Materials and the Paper Products sectors are also able to benefit from export opportunities with valued trading partners such as Mexico, Canada, and South Korea. Favorable agreements expand market opportunity for supply chain sectors in North Carolina to grow revenues abroad. Favorable tariffs

10. Manufacturers Alliance for Productivity and Innovation. "The Post-Recession State of U.S. Manufacturing." 2015.

protect domestic industries and maintain price stability in the U.S. Continued growth in North Carolina exports will also drive higher utilization for the transportation and logistics industries within the supply chain. For instance, containerized port operations at Wilmington experienced nearly 118% growth in total container throughput between 2014 and 2015.[11]

Although domestic manufacturing will not offer the low-cost, low-wage, and low-regulatory environment of offshore production, some domestic sectors have found that manufacturing in North Carolina offers lower relative cost, a non-union environment, and fast access to markets in the nation's fastest growing region. North Carolina's robust community college, university, and worker training capacity supports demand for highly skilled labor necessary in the more sophisticated manufacturing environment seen across the supply chain. In addition to meeting demand for highly skilled labor, North Carolina's university and community college systems support one of the nation's most significant research and development infrastructures. Home to innovative research parks, including the renowned Research Triangle Park, North Carolina is well suited to support each of the sectors of the supply chain where research and development are vital to maintaining global competitiveness. Innovation is not just important in highly regulated and research-intense sectors like Pharmaceutical, Biologics & Medical Products. For example, the impact of new product and process development can be seen in the growing market share of strand-based, engineered Wood Products in its sector. Electronics manufacturing faces a constant and rapid pace of technological change. Advances in Textiles allow the sector to develop new products and creative applications for fabrics and fibers.

11. North Carolina Ports Authority. "Port of Wilmington Statistics." 2015.

With advancing technology, many sectors are also focusing their efforts on gaining efficiency, limiting environmental impact, and further developing sustainable business practices. Regulations that mandate or limit certain levels of environmental impact are a constant concern for manufacturing-heavy supply chain sectors. Effects on water and air quality are also relevant concerns for industries and the communities that house manufacturing operations.[12] Consumer interest in the manufacturing practices of upstream providers incentivize firms in the industry to invest in efficiency or innovation to reduce their footprint of manufacture.

Aside from environmental stewardship, there is a solid business case for sustainable operations. Some firms within industries use their environmentally-friendly manufacturing practices to differentiate their products in generally commoditized markets. Additionally, as companies update freight fleets to newer vehicles, or firms pursue newer manufacturing processes, sectors including Industrial Machinery & Transportation Equipment manufacturing, Metal Products, and Electronics are seeing increased demand for products with higher efficiency.

A complicated and changing regulatory landscape is a constant concern for the supply chain in North Carolina. Industries such as Pharmaceutical, Biologics & Medical Products and Chemical Manufacturing must structure their business model around regulatory compliance and procedures. Regulations for the Tobacco & Foodstuffs sector complicate their very access to market. Staying up-to-date on relevant regulations requires constant attention. These sectors invest heavily in the infrastructure needed to maintain compliance, as well as leverage highly skilled, experienced labor. Even this provides opportunity as firms with expertise and experience around these issues support firms in regulated industries, expanding the economic impact of each sector on the local, state, and federal economy.

Economic Impact Sector Summaries

These trends represent a snapshot of the business landscape facing the more than 275 individual industries considered to be a part of North Carolina's supply chain for this analysis. The supply chain is highly interconnected and linked inextricably with business and commerce across the state. Its impact on the economy and quality of life in North Carolina is undeniable. To better understand the impact each sector has on the economy in North Carolina, the following sector summaries offer additional focused information and perspective, including extensive statistics, domestic and global context, comparisons across the supply chain, and—most importantly—a review of the economic impact of each sector on the state's economy.

12. Clean Water Action Council. "Paper Industry." 2015.

Supply Chain Sectors

Pharmaceutical, Biologics & Medical Products

The sector in North Carolina is supported by a dynamic research and development, and worker training infrastructure. The Pharmaceutical, Biologics & Medical Products manufacturing sector represents more than 6% of the state's manufacturing workforce, robust labor income, high wages, and state-leading productivity exceeding $1.25M for every employee.

Pharmaceutical, Biologics & Medical Products

Pharmaceutical, Biologics & Medical Products manufacturing is a global sector with a strong presence in North Carolina. This research and development heavy collection of industries faces an active regulatory landscape, both domestically and in international markets. With healthcare policy changing at state and federal levels, the sector will also need to remain nimble to change, especially facing changing regulations. The sector is not immune to the pressures of import penetration or low-cost, low-wage manufacturing regions. Yet, consolidation is also leveraged to bolster pipelines, as larger companies buy firms with promising products or clinical outcomes. The sector in North Carolina is supported by a dynamic research and development and worker training infrastructure. The Pharmaceutical, Biologics & Medical Products sector represents more than 6% of the state's manufacturing workforce, with robust labor income, high wages, and state-leading productivity exceeding $1.25M for every employee. Sales, property, income, and social insurance taxes, as well as corporate contributions, lead all assessments for a total tax contribution of more than $2.3B.

TOTAL ECONOMIC IMPACT OF THE SECTOR

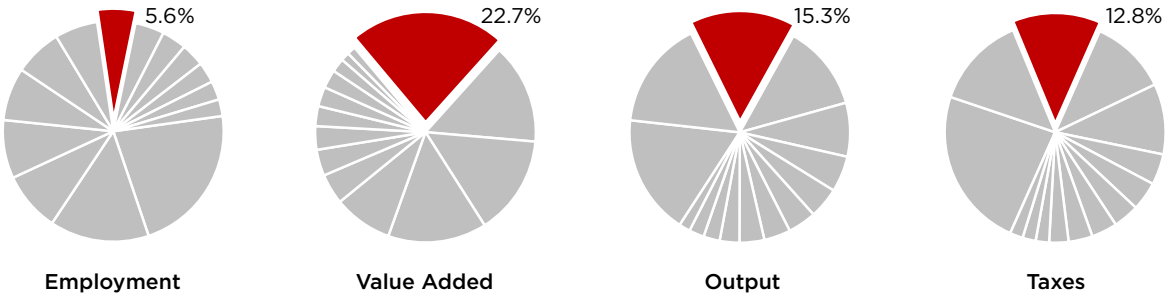
Employment	Labor Income	Value Added	Output	Taxes
26,750 Direct	$3.15B Direct	$19.54B Direct	$33.57B Direct	$1.16B State & Local
97,880 Indirect & Induced	$5.45B Indirect & Induced	$9.03B Indirect & Induced	$15.61B Indirect & Induced	$2.97B Federal
124,630	$8.60B	$28.57B	$49.18B	$4.13B

Pharmaceutical, Biologics & Medical Products Sector in North Carolina

North Carolina was home to medical compound and drug manufacturing as early as 1863 at the Lincolnton Laboratory along the banks of the South Fork of the Catawba River.[13] Yet, modern biotechnology in North Carolina has little in common with its apothecary ancestors. Today's Pharmaceutical, Biologics & Medical Products manufacturing industries are on the leading edge of science and technology.

13. Stopping Points Historical Markers & Points of Interest. "Confederate Laboratory." 2015.

PHARMACEUTICAL, BIOLOGICS & MEDICAL PRODUCTS VS. ALL SUPPLY CHAIN SECTORS



By leveraging the state's research and development infrastructure, including the world's first state-sponsored biotechnology center, North Carolina has grown to be a global center for these important life science manufacturers. North Carolina is also home to Research Triangle Park (RTP). This biotechnology hub houses research and development, as well as corporate offices and customer service operations. Additional manufacturing centers have evolved in nearly every corner of the state.

For the Pharmaceutical, Biologics & Medical Products sector the numbers are staggering. North Carolina is home to more than 600 companies, including 350 research and development firms, 125 contract research and testing companies, and 110 production and manufacturing operations.[14] North Carolina has three key strengths benefitting sustainability of this sector in the state: a talented workforce; robust education and research and development resources; and a low cost of doing business. North Carolina has seen proliferation in all areas of this sector despite many other manufacturing locations facing pressure to offshore production. *Forbes Magazine* ranks North Carolina 2nd in the U.S. for lowest overall cost of doing business.[15]

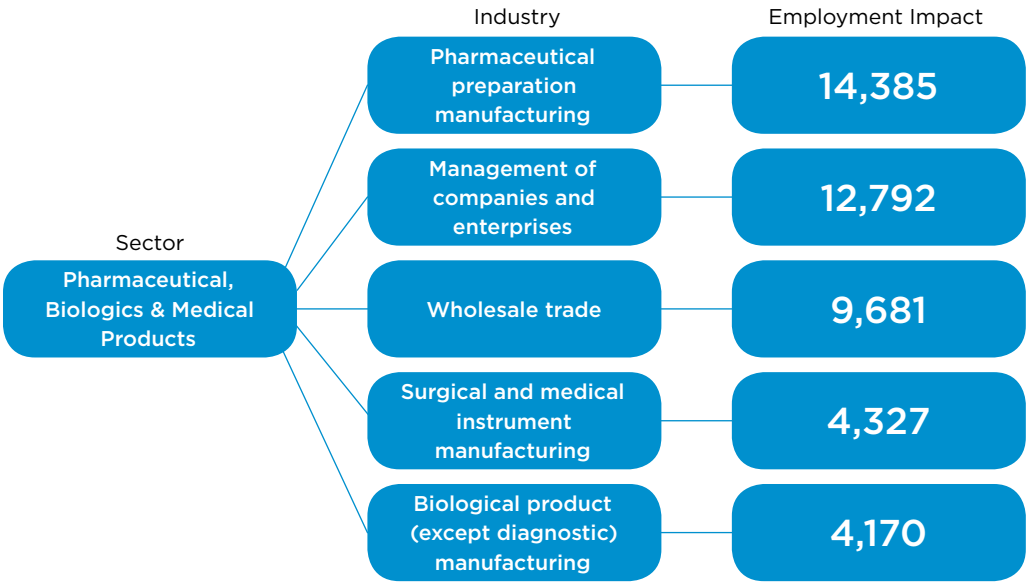
Pharmaceutical, Biologics & Medical Products manufacturing in North Carolina also benefits from substantial investment across the public and private sectors. From 1998 until 2008, the state allocated $857M to research facilities, $135M to workforce training, $115M to the biotech center, and $102M to infrastructure in direct company incentives.[16] This commitment to the sector has continued, and North Carolina has seen employment in the sector grow at four times the national average. In fact, according to the NC Biotechnology Center, "new life science jobs account for half of the net new jobs in North Carolina."[17]

The biotechnology industry, along with the chemical product, medical device, medical instrument, and navigational instrument manufacturing industries prove to be the largest supply industries. Drug wholesaling, supermarkets, pharmacies, and hospitals all drive the demand. Additionally, key influencing factors in the economy include Medicare and Medicaid funding, population age, number of private insurance holders, and research and development expenses. The pharmaceutical manufacturing industry alone accounts for nearly 80% of total value added within this supply chain sector in North Carolina.

Economic Impact in North Carolina

The Pharmaceutical, Biologics & Medical Products sector in North Carolina supports more than 26,700 employees directly engaged statewide, generating direct employment income impact of nearly $3.2B. This translates into an average labor income[18] of nearly $118,000 per individual employed in the sector in North Carolina. This is far above the 2014 statewide average compensation of $43,280.[19] Additionally, when labor

14. "Biotech Landscape." North Carolina Biotechnology Center. 2015
15. Badenhausen, Kurt. "The Best and Worst States for Business." Forbes. 2015.
16. "International Connections." North Carolina Biotechnology Center. 2015.
17. "Biotech by the Numbers." North Carolina Biotechnology Center. 2015.
18. Note: Labor Income consists of "all forms of employment income, including Employee Compensation, wages and benefits, and Proprietor Income" according to IMPLAN definitions.
19. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates." 2015.
    Note: BLS also provides a 2012 figure of $41,750 average compensation.



The industries of the Pharmaceutical, Biologics & Medical Products sector drive demand across the entire economy. For the Pharmaceutical, Biologics & Medical Products sector, these are the top five benefiting industries and associated employment impact.

income is compared to other supply chain related industries in North Carolina, the Pharmaceutical, Biologics & Medical Products sector ranks 3rd, accounting for nearly 10% of the total. Sector production excels by comparison, producing more than $33.5B in direct output in 2013—or 15% of the entire supply chain output for the state. In addition to direct employment, the Pharmaceutical, Biologics & Medical Products sector is indirectly responsible for more than 52,000 jobs, accounting for another $3.6B in labor income. The impact of local industries buying goods and services from other local industries, or indirect effects[20] can be seen in the additional $9.9B of output.

Tax Contributions

The tax impact of the Pharmaceutical, Biologics & Medical Products sector in North Carolina on state, local, and federal tax revenues is also significant, accounting for more than $4.1B, ranking 3rd among supply chain related sectors for tax impact. The Pharmaceutical, Biologics & Medical Products sector accounts for nearly 8.7% of total state and local tax revenues generated from supply chain related sectors, with receipts exceeding $1.1B in 2013. Of this, sales tax, property tax, and personal income tax provide the most significant contributions, totaling more than 76% of assessments for the year, and a combined total of more than $883M. Pharmaceutical, Biologics & Medical Products lead all sectors in federal taxes paid, with receipts exceeding $2.97B. Leading totals include corporate profits, followed by personal income and social insurance taxes.

- 3rd in state and local taxes paid (8.68% of supply chain contributions, $1,161,688,578)
- 1st in federal taxes paid (15.82%, $2,968,848,978)

Broader Context: Pharmaceutical, Biologics & Medical Products Sector in the U.S.

The pharmaceutical industry is a major component of the Pharmaceutical, Biologics & Medical Products sector, and, likewise, is a major component of the U.S. economy. The pharmaceutical industry in the U.S. accounts for nearly 814,000 jobs. Additionally, it creates upwards of 3 million indirect jobs[21] with the highest ratio (17%) of jobs being involved with life, physical, and social

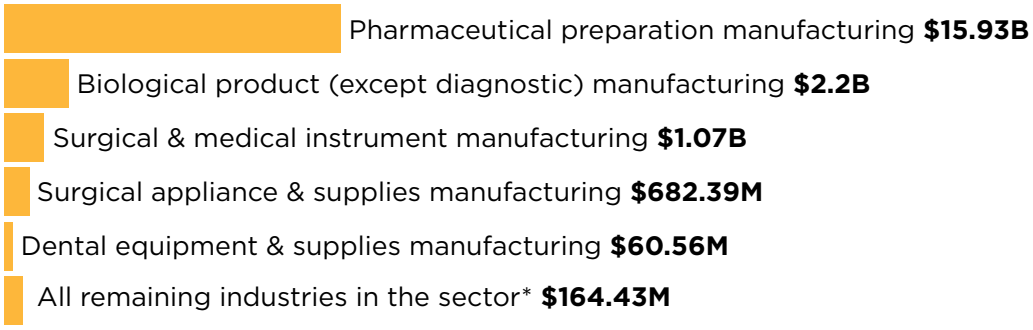
20. IMPLAN.com. "Definitions: IMPLAN." 2015.
21. "Biopharmaceutical Sector." Phrma.org.

science.[22] The U.S. sector comprises more than 40% of the worldwide market making it the largest domestic market[23] for pharmaceuticals. North America also represents the largest pharmaceutical market of any continent, worldwide.[24]

The U.S. is also "the world leader in biopharmaceutical research," with investment of "more than 10 times the amount of research and development per employee than all manufacturing industries overall."[25] With pricing structures beneficial to industry, the Pharmaceutical, Biologics & Medical Products sector also benefits from robust intellectual property and patent protection.[26] This is a key feature of the industry business model for many in the sector. Revenue earned under patent exclusivity helps to offset the intense research and development investment required.

As with many supply chain industries, regulatory considerations are a major part of doing business. Especially relevant for the Pharmaceutical, Biologics & Medical Products sector is federal healthcare reform. The federal government and the Pharmaceutical Research and Manufacturers of America (PhRMA) recently finalized a deal which will cost manufacturers of pharmaceuticals upwards of $84B in both taxes and costs related to the Medicaid and Medicare coverage gaps and discounts.[27] There is a bright side for the sector, however, as the agreement discontinues federal bargaining for lower drug prices, as well as pursuing Medicare rebates. This will help to mitigate some of the impact on the sector. Pressure to control costs in manufacturing and research and development, as well as the costly process of drug discovery and approval, have led to consolidations within the sector. With the intense front-end investment required to bring a treatment from the lab to the pharmacy, many startup companies are being bought by larger firms seeking to bolster pipelines.

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION

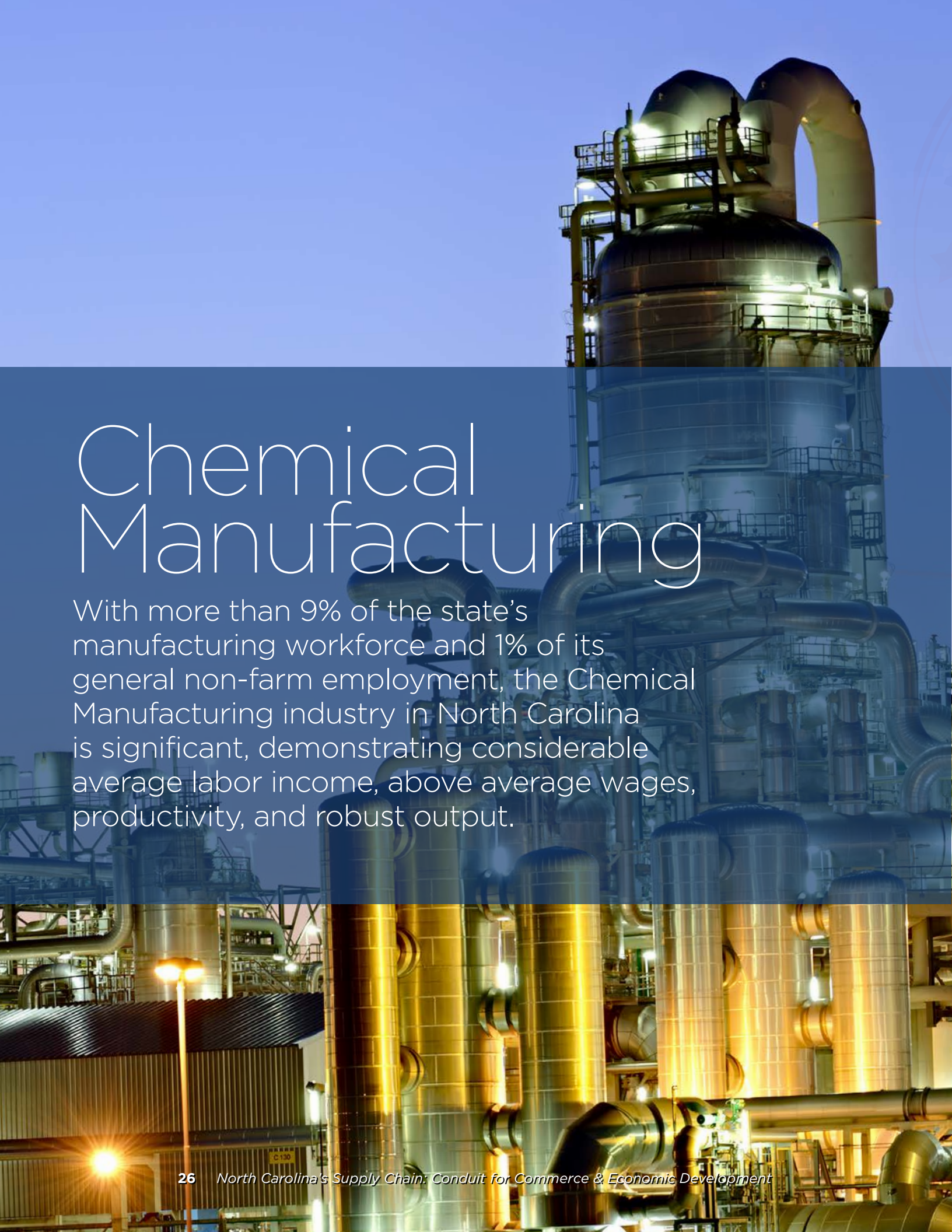


* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Pharmaceutical, Biologics & Medical Products sector has been defined to include the following industries and their associated IMPLAN codes: Medicinal and botanical manufacturing (173); Pharmaceutical preparation manufacturing (174); In-vitro diagnostic substance manufacturing (175); Biological product (except diagnostic) manufacturing (176); Optical instrument and lens manufacturing (272); Surgical and medical instrument manufacturing (379); Surgical appliance and supplies manufacturing (380); Dental equipment and supplies manufacturing (381); Ophthalmic goods manufacturing (382).

22. "Biopharmaceutical Sector." Phrma.org.
23. "Pharmaceutical Industry in the U.S." The Statistics Portal. 2015.
24. Ibid.
25. "The Pharmaceutical and Biotech Industries in the United States." US Department of Commerce: SelectUSA. 2015.
26. Ibid.
27. Turk, Sarah. "Brand Name Pharmaceutical Manufacturing in the US (IBISWorld Industry Report 32541A)." IBISWorld US. 2015.



Chemical Manufacturing

With more than 9% of the state's manufacturing workforce and 1% of its general non-farm employment, the Chemical Manufacturing industry in North Carolina is significant, demonstrating considerable average labor income, above average wages, productivity, and robust output.

Chemical Manufacturing

Chemical Manufacturing is vital to nearly every other economic sector. Some industry advocates even claim the sector provides access to better living through chemistry. In this already highly regulated sector, firms and industries must adapt quickly and cost effectively to both market conditions and environmental or efficiency requirements. A global sector, Chemical Manufacturing in the U.S. is currently enjoying the advantage of lower-cost shale gas for important feedstocks versus international oil-based production, but research and development are analysts' prescription for continued prosperity. Growth in housing and consumer goods markets will help this effort as well. With more than 9% of the state's manufacturing workforce and 1% of its general non-farm employment, the Chemical Manufacturing industry in North Carolina is significant, with above average wages, productivity, and robust output. Corporate profits, sales, property, income, and social insurance taxes lead all Chemical Manufacturing assessments for a total tax contribution of nearly $3.3B.

TOTAL ECONOMIC IMPACT OF THE SECTOR

Employment	Labor Income	Value Added	Output	Taxes
41,030 Direct	$3.01B Direct	$12.62B Direct	$34.79B Direct	$1.08B State & Local
84,690 Indirect & Induced	$4.27B Indirect & Induced	$7.47B Indirect & Induced	$13.87B Indirect & Induced	$2.24B Federal
125,720	**$7.28B**	**$20.09B**	**$48.66B**	**$3.32B**

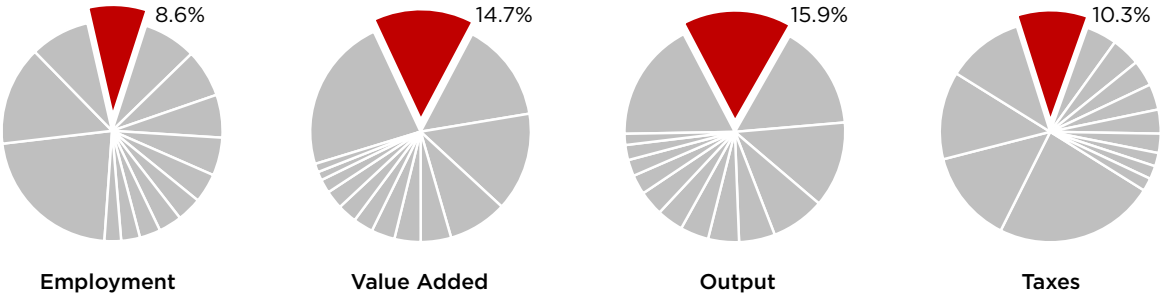
Chemical Manufacturing Sector in North Carolina

The Chemical Manufacturing sector in North Carolina includes a broad range of producing industries that utilize chemicals and processing to serve other industries and consumers. From soaps to plastics and perfumes to pesticides, the sector's downstream audience is diverse. It is also well represented across the state with more than 40,500 employees. It further supports an additional 24,290 jobs in wholesale trade, real estate, restaurants, and employment services. Much like the broader U.S. Chemical Manufacturing sector, industries operating in North Carolina face the ongoing challenge of regulations in an already highly regulated industry. Given the significant potential for environmental impact, pursuing more environmentally considerate products and processes will be important for the sector in North Carolina.

Consumer confidence is an important influencing factor for demand across the supply chain. So is rising disposable income. This combination leads analysts to expect growth for sectors such as toilet preparation manufacturing—more easily recognizable as the industry producing perfumes, shaving preparations, hair preparations, face creams, lotions including sunscreens, and other cosmetic preparations.[28] Yet factors such as a strong dollar, the cost of manufacturing, and the constant need to develop new, innovative products present challenges for the industry.

28. SIC Codes. "NAICS Code 325620, Toilet Preparation Manufacturing." 2015.

CHEMICAL MANUFACTURING VS. ALL SUPPLY CHAIN SECTORS



Firms such as Durham-based Burt's Bees have been successful in capturing growing demand in natural toilet preparation products, while expanding operations for companies like global cosmetics giant Coty in their Sanford manufacturing facility. Both are further positive signs from this important industry in North Carolina.[29]

Although the Chemical Manufacturing sector is comprised of 29 different industries for the purposes of this study, two of the most prominent are the petrochemical and pesticide manufacturing industries—accounting for nearly 20% of sector output. Global drivers for these industries reflect those of the broader sector, with crude oil price volatility, regulation, currency dynamics, and downstream demand from a range of industries from agriculture to residential housing. Petrochemical and pesticide manufacturing firms including Bayer, BASF, ExxonMobil, Dow, Syngenta, Bayer CropScience, and DuPont, all with operations in North Carolina, are vital to this sector's growth and viability. Consolidations within the industry are also a path chosen by many firms to maintain profitability.[30]

Some key economic drivers for the sector's supply chain in North Carolina have been the price of crude oil and per capita disposable income. Additionally, key supply industries for the chemical product manufacturing supply chain in North Carolina include inorganic and organic Chemical Manufacturing industries, paper mills and wood pulp mills. Conversely, major demand industries that are important to chemical product manufacturing include construction, manufacturing, office stationery wholesale, and even camera retailers.

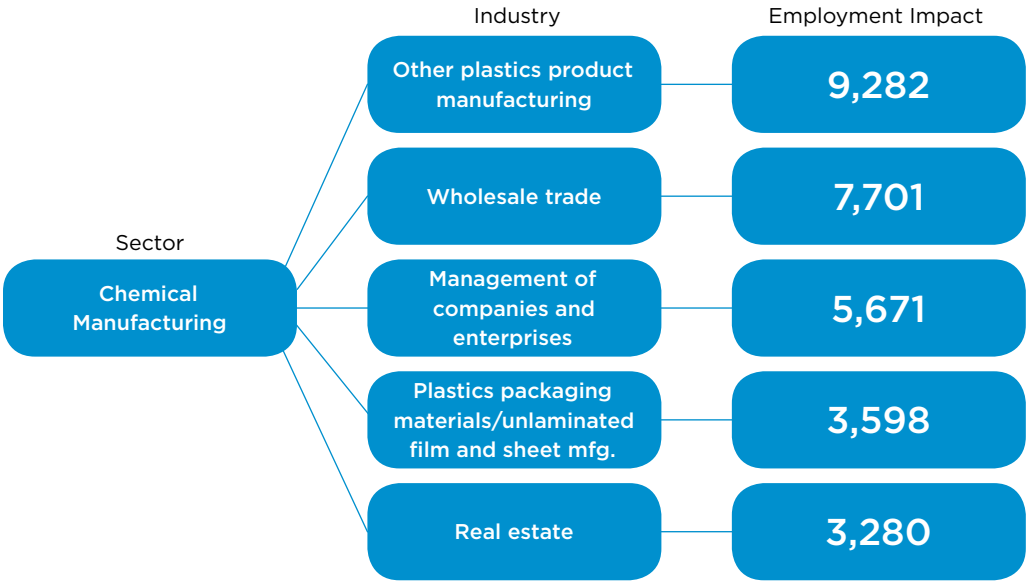
Economic Impact in North Carolina

The Chemical Manufacturing sector in North Carolina supports more than 41,000 employees directly engaged statewide with a labor income impact exceeding $3B. With average labor income of more than $70,339 per employee, Chemical Manufacturing is well above the statewide average compensation of $43,280. Sector production exceeded $34.7B in output in 2013. This translates to an overall tax impact of nearly $3.3B.

Among the top contributors in the Chemical Manufacturing sector, petrochemical manufacturing is joined by the diverse toilet preparation manufacturing industry. Together, these industries represent nearly 20% of the sector's output. Pesticide manufacturing, other plastics product manufacturing, and phosphatic fertilizer manufacturing contribute additional significant economic impact. Together, these top five industries within the sector account for GDP contributions of total value added in excess of $5.9B and employ nearly 6,600 statewide.

29. Hoyle, Amanda. "Coty Jobs Coming Back in Sanford." Triangle Business Journal. 2015.
30. Haider, Zeeshan. "Pesticide Manufacturing in the US (IBISWorld Industry Report 32532)." IBISWorld US. 2015.

Chemical Manufacturing



The industries of the Chemical Manufacturing sector drive demand across the entire economy. For the Chemical Manufacturing sector, these are the top five benefiting industries and associated employment impact.

Tax Contributions

With total tax contributions of $3.3B, or more than 10% of the $32.1B in taxes paid to state, local, and federal governments, the Chemical Manufacturing sector ranks 5th among supply chain industries in 2013. Taxes paid to state and local governments for the sector exceed $1.08B, while the $2.2B paid in federal assessments places it 4th across all supply chain sectors. Of this, sales, property, and personal income taxes represent more than 81% of state and local assessments for the year, with a combined total of more than $876M. The majority of federal taxes are payroll related, with social insurance contributions from employees and employers ($837M), followed by taxes on corporate profits ($852M), and personal income tax ($429M)—together more than 95% of the sector's federal exposure.

- 5th in state and local taxes paid (8.08% of total supply chain taxes paid, $1,081,347,395)
- 4th in federal taxes paid (11.95%, $2,238,042,455)

Broader Context: Chemical Manufacturing Sector in the U.S.

With more than 800,000 employees in the U.S., the Chemical Manufacturing sector is one of the largest domestic manufacturing industries. Companies within this industry transform both organic and inorganic materials, such as air, minerals, and oil, into a variety of chemical intermediaries. From these, 70% are later used by multiple industries to create further processed goods.[31] This includes products manufactured in the petrochemical industry, perfumes, fertilizers, paint, soap, adhesives, ink, film and more. In fact, "the U.S. chemical industry plays an essential part in improving standards of living as its products are intermediates for more than 96% of all U.S. manufactured products."[32] Demand from industries like plastics and resin manufacturing, tied to household goods and home construction, will ensure that analysts' predictions of growth materialize.[33]

As with many sectors, Chemical Manufacturing faces ongoing pressure to significantly reduce costs to remain competitive and sustain growth. These demands are made increasingly important as U.S. industries face the trade-weighted disadvantage of a strong dollar among world currencies. Leaner business models, plant shutdowns, and acquisitions are outcomes seen in the sector as a result of these pressures. In fact, "mergers,

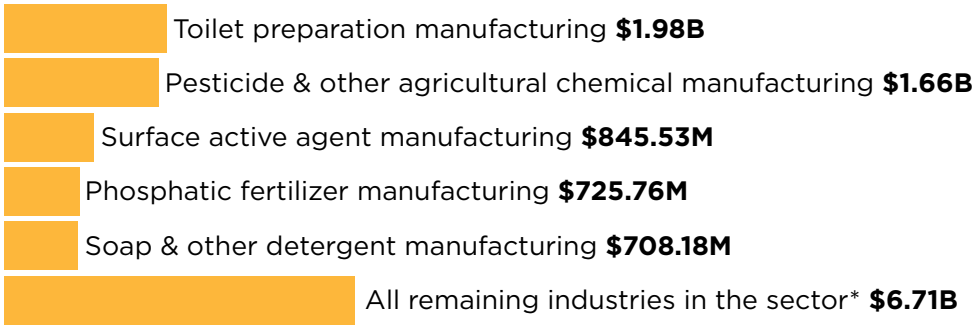
31. Haider, Zeeshan. "Pesticide Manufacturing in the US (IBISWorld Industry Report 32532)." IBISWorld US. 2015.
32. "North America Chemical Sectors." Mergent Online. 2015.
33. Blau, Gavan. "Petrochemical Manufacturing in the US (IBISWorld Report 32511)." IBISWorld. 2015.

acquisitions, and joint ventures are some of the most common, yet cost-effective and streamlined expansion methods for chemical makers."[34]

Many domestic manufacturing industries feel pressure from regions with less stringent regulatory environments and lower costs of production. Those conditions have spurred offshoring activity and the rising threat of low price imports. The U.S. Chemical Manufacturing industry, however, is currently enjoying a distinctly American advantage, with access to lower cost ethane and propane feedstocks from shale gas bolstering domestic margins. Global petrochemical manufacturers predominantly rely on volatile oil.[35]

With chemicals contributing to nearly the entire downstream or intermediate manufacturing industries, the regulatory environment is highly relevant for the sector. Regulations across the sector are subject to constant change, and these shifts impact aspects of development and production. For Chemical Manufacturing, regulations may even prove to be "'technology-forcing' to different degrees."[36] For example, a change in regulation may require a company to install newer or more efficient technology in order to comply with revised standards. This develops into a self-perpetuating pattern of innovation driving regulation. Regulation then creates a directive for competitive firms to further leverage technology.

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION



* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Chemical Manufacturing sector has been defined to include the following industries and their associated IMPLAN codes: Petroleum lubricating oil and grease manufacturing (159); Petrochemical manufacturing (161); Industrial gas manufacturing (162); Synthetic dye and pigment manufacturing (163); Other basic inorganic chemical manufacturing (164); Other basic organic chemical manufacturing (165); Plastics material and resin manufacturing (166); Synthetic rubber manufacturing (167); Artificial and synthetic fibers and filaments manufacturing (168); Nitrogenous fertilizer manufacturing (169); Phosphatic fertilizer manufacturing (170); Pesticide and other agricultural chemical manufacturing (172); Paint and coating manufacturing (177); Adhesive manufacturing (178); Soap and other detergent manufacturing (179); Polish and other sanitation good manufacturing (180); Surface active agent manufacturing (181); Toilet preparation manufacturing (182); Printing ink manufacturing (183); Photographic film and chemical manufacturing (186); Other miscellaneous chemical product manufacturing (187); Plastics packaging materials and unlaminated film and sheet manufacturing (188); Unlaminated plastics profile shape manufacturing (189); Plastics pipe and pipe fitting manufacturing (190); Laminated plastics plate, sheet (except packaging), and shape manufacturing (191); Polystyrene foam product manufacturing (192); Urethane and other foam product (except polystyrene) manufacturing (193); Plastics bottle manufacturing (194); Other plastics product manufacturing (195).

34. "North America Chemical Sectors." Mergent Online. 2015.
35. Tullo, Alexander. "Top 50 U.S. Chemical Producers." Cen.acs.org. 2015.
36. "Regulation and Technological Innovation in the Chemical Industry" Duke: Scholarship Law. 2015.

Industrial Machinery & Transportation Equipment

Aside from the assembly of passenger vehicles, North Carolina manufactures nearly everything on the road from the asphalt up. This includes tires, transmissions, and other automotive parts, as well as heavy trucks, buses, and construction machinery. Together with the aircraft engine and parts industry, the sector represents more than half a trillion dollars in total economic impact on the state.

Industrial Machinery & Transportation Equipment

Industrial Machinery & Transportation Equipment is enjoying a period of recovery and increased demand, but faces continued challenges from globalization and regulatory pressures. Pursuit of environmental and fuel efficiency, along with adaptation to the dynamics of international trade agreements, offers opportunity and new market growth for the sector. Defending against import penetration from low-cost, low-wage producers, while seeking out new or expanding markets for exports, are the keys for the sector. Industry in North Carolina faces similar challenges to the broader U.S. in this fully globalized sector. Consolidation and mobility for production also bring into play incentives for economic development as industry clusters develop in North Carolina and across the region. Accounting for more than 1/7th of the state's manufacturing workforce, the sector demonstrates above average labor income and wages, moderate productivity, and robust output. Sales, property, income, and social insurance taxes, as well as corporate contributions, lead all assessments for a total tax contribution of nearly $4.4B.

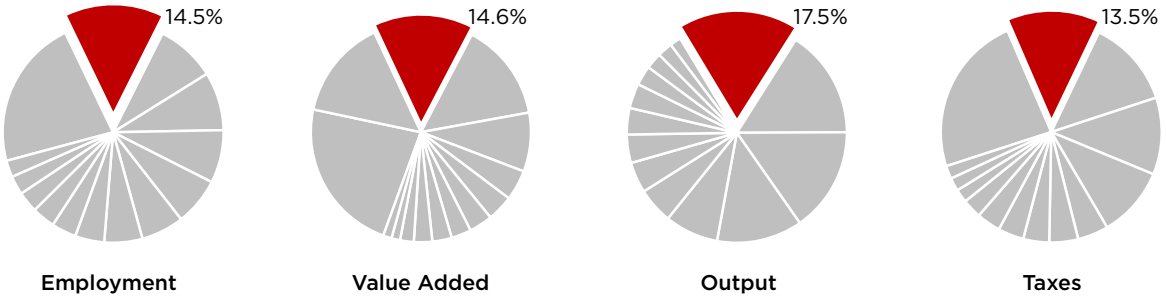
TOTAL ECONOMIC IMPACT OF THE SECTOR

Employment	Labor Income	Value Added	Output	Taxes
69,800 Direct	$5.48B Direct	$12.55B Direct	$38.40B Direct	$1.45B State & Local
125,520 Indirect & Induced	$6.18B Indirect & Induced	$10.42B Indirect & Induced	$19.05B Indirect & Induced	$2.92B Federal
195,320	**$11.66B**	**$22.97B**	**$57.45B**	**$4.37B**

Industrial Machinery & Transportation Equipment Sector in North Carolina

Aside from the assembly of passenger vehicles, North Carolina manufactures nearly everything that moves. This includes tires, transmissions, and other automotive parts, as well as heavy trucks, busses and construction machinery. Together with the aircraft engine and parts industry, the sector represents more than half a trillion dollars in total economic impact on the state. Global firms including Volvo Trucks, Daimler, Bridgestone-Firestone, Goodyear, Caterpillar, John Deere, Honda, General Electric, GE Engines, Spirit Aviation, Vertex, and Thomas Built all have significant operations

INDUSTRIAL MACHINERY & TRANSPORTATION EQUIPMENT VS. ALL SUPPLY CHAIN SECTORS



in North Carolina. The sector's impact on the state's economy reflects this. Positive trends impacting these industries are relevant to the broader health of the economy in North Carolina, and global demand presents opportunities for both the sector and the state.

Favorable revenue growth estimates in heavy trucks, tires, construction machinery, motor vehicle transmissions and powertrain parts, aircraft engines, and engine parts manufacturing suggest that the sector is—and will remain—healthy in the near future.[37] Even in areas of relative concern, such as construction equipment, revenue growth from firms like Caterpillar and Deere which control more than 46% of the domestic construction machinery manufacturing marketplace,[38] have sustained the industry's recovery in line with the broader economy.

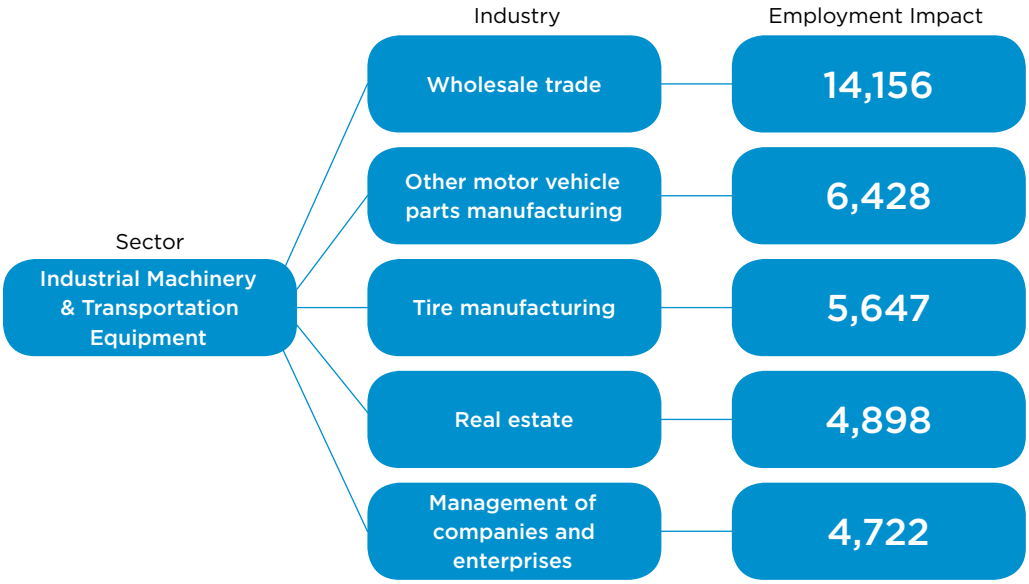
Across many industries, manufacturing in the Southeast offers a brighter horizon than that facing the entire domestic sector. NC State University Economist Mike Walden suggests that the trend of growth in the Southeast provides further opportunity for North Carolina to potentially expand its already significant footprint in motor vehicle parts manufacture.[39] Discussions about economic incentives will remain relevant as global manufacturers look to expand their presence in the U.S. As firms consolidate to better address import pressures and low-cost manufacturing regions, the landscape constantly shifts for this sector. Achieving further cost controls is important, but continued innovation will enable firms to achieve regulatory compliance and environmental sustainability.

Industries in North Carolina also benefit from the strength of the university and community college systems for research and development, and to secure the skilled labor needed to sustain global competitiveness. North Carolina's 58-campus community college system is "nationally recognized for its customized workforce training programs."[40] Labor remains a key driver for this broad sector. The nearly 70,000 employees in the Industrial Machinery & Transportation Equipment sector place it 2nd of all supply chain sectors in North Carolina with nearly 15% of the state's manufacturing workforce.

Economic Impact in North Carolina

For the industries considered, the Industrial Machinery & Transportation Equipment sector ranks 2nd in terms of total direct employment with an average labor income of nearly 118% of the state's manufacturing average.[41] This encompasses a total direct labor income impact of $5.48B

37. Note: 5.3% truck and bus; 5.5% aircraft; automotive parts 6.7%; construction 0.8%; tire 1.1%; transmission 4.7%.
38. Witter, David. "Construction Machinery Manufacturing (IBISWorld Report 33312)." IBISWorld US. 2015.
39. Walden, Michael. "Economic Perspective: The Auto Manufacturing Industry in North Carolina." NC State University. 2008.
40. Thrive NC (Economic Development Partnership of NC). "Education in North Carolina." 2016.
41. National Association of Manufacturers. "North Carolina Manufacturing Facts." 2013.



The industries of the Industrial Machinery & Transportation Equipment sector drive demand across the entire economy. For the Industrial Machinery & Transportation Equipment sector, these are the top five benefiting industries and associated employment impact.

and average labor income of more than $78,500, which is 181% of the 2014 statewide average compensation of $43,280.[42] Industrial Machinery & Transportation Equipment also impacts the local economy beyond direct transactions, spurring more than 13,800 jobs in real estate, employment services, and restaurants. Total output for the sector tops $38.3B, first of its peers. However, productivity is less impressive versus other supply chain industries, with only $550,159 of output to direct employee.

Within the sector, other motor vehicle parts manufacturing is the most significant industry for employment with more than 6,120 employees. It is followed closely by tire manufacturing, transmission and power train, and heavy truck manufacturing—each with 6% to 8% of the sector total. The top five industries in the sector represent nearly 36% of total employment, or more than 25,000 employees. For direct labor income impact, tire manufacturing leads the sector with $460M. Aircraft engine and engine parts manufacturing maintains the highest average labor income of more than $118,000 in an industry with more than 2,870 employees statewide. Heavy duty truck manufacturing leads output with $5.3B, while construction machinery manufacturing leads all industries in total value added with $1.05B in 2013.

Tax Contributions

With total tax contributions of nearly $4.4B, or 13.6% of the $32.1B in taxes paid to state, local, and federal coffers, the Industrial Machinery & Transportation Equipment sector ranks 2nd among North Carolina supply chain industries in 2013. Taxes paid to state and local governments for the sector number nearly $1.45B. The $2.9B paid in federal assessments places it 2nd among all supply chain sectors. Of this, sales, property, and personal income taxes represent almost 84% of state and local assessments for the year and a combined total of more than $1.2B. The majority of federal taxes are payroll-related, led by social insurance contributions from employees and employers ($1.35B), followed by taxes on corporate profits ($724M) and personal income tax ($687M)—together more than 94% of the sector's federal exposure.

42. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates." 2015.

- 3rd in state and local taxes paid (10.83% of total supply chain taxes paid, $1,449,321,995)
- 2nd in federal taxes paid (15.57%, $2,921,232,939)

Broader Context: Industrial Machinery & Transportation Equipment Sector in the U.S.

The largest of the supply chain sectors with 57 sub-sectors, Industrial Machinery & Transportation Equipment in North Carolina is a collection of heavy hitting industries with revenues topping more than $220B,[43] more than the GDP (nominal) of industrialized nations such as New Zealand, Romania, and Peru.[44] These global industries might just as well stand on their own for analysis; however, together, they offer broad perspective for the state of manufacturing.

Each of the industries comprising the sector is bolstered by demand recovery from a rebounding economy. Downstream demand is driving revenue growth for this robust industrial sector.[45] This includes rising orders from commercial airlines, booming trucking and transportation services, expanding residential and non-residential markets spurring construction, and increased exports from domestic automobile manufacturers. This is good news, offsetting challenges like a strong dollar, reduced U.S. military investment, and federal spending austerity.[46]

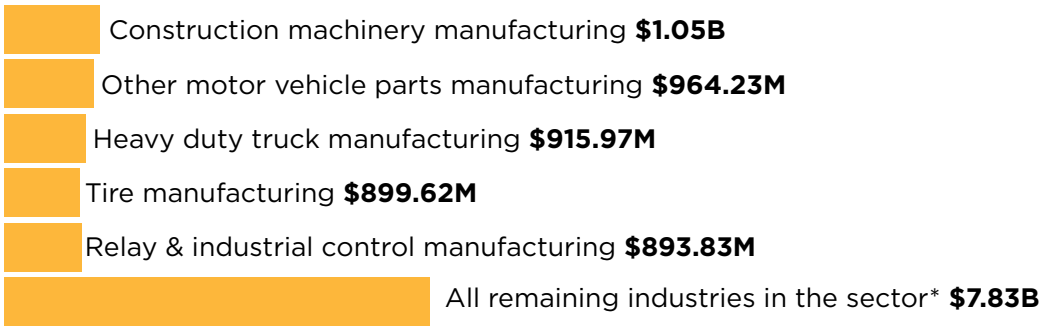
As in most manufacturing industries in the U.S., increasing global competition from lower-cost, lower-wage regions continues to pressure U.S. firms in the sector. Growth in Asia and South America, as well as in neighboring Mexico, is also directly impacting decisions made by firms investing in the U.S. Despite upward trending revenue, domestic industry participation is expected to decline as consolidations and offshoring become more prevalent. Challenges to employment arise as firms leverage improved productivity with outsourcing, and the trend is expected to continue for transportation equipment manufacturing.[47] Yet, just as the influence of free trade agreements offer opportunity for manufacturing growth in Mexico, they also help to expand export markets for U.S. manufactured products. Mexico and Canada account for more than 67% of exports for domestic tire manufacturers. Tariffs may also provide significant protection for U.S. tire manufacturers against competition from global producers like China, which currently controls almost a quarter of all imports to the U.S. These protective measures of import taxes range from 17% to 81% and have helped domestic firms maintain price stability.

Each of these industries is facing a rising tide of environmental regulations and consumer demand for more fuel-efficient products. There is, however, a silver lining to the regulatory environment. Demand for fuel efficient or alternative fuel vehicles from fleet and corporate consumers will spur purchases and reward firms which are successfully integrating new and developing technology into their product and manufacturing process.

Demand for fuel-efficiency is also driving innovation in these sectors. This includes the use of more lightweight composite materials to further hedge against oil price volatility and environmental concerns. Together with cost controls, development of export markets, and access to efficient technology and techniques, accommodating environmental requirements is a key success driver[48] for the entire Industrial Machinery & Transportation Equipment sector.

43. Note: Totals from IBISWorld for Truck & Bus (30.1B); Aircraft, Engine & Parts (85.3B or 39% of 215.9B), Tire mfg (18.6B), automobile transmission (42.1B), 30% of Automobile Engine & Parts. Each represents conservative estimates excluding passenger new motor builds.
44. Wikipedia. "List of Countries by GDP (Nominal)." 2016.
45. United States Census Bureau. New Passenger Vehicle Exports to the World in USD (USHS EXPORTS, Revised Statistics for 1989-2013). U.S. Department of Commerce, 2013.
46. Witter, David. "Construction Machinery Manufacturing (IBISWorld Report 33312)." IBISWorld US. 2015.
47. IHS Global Insight. The Economic Impact of the Motor Vehicle Parts Manufacturing Industry on the United States. Motor & Equipment Manufacturers Association, 2013.
48. Ruiz, Brandon. "Automobile Transmission Manufacturing in the US (IBISWorld Report 33635)." IBISWorld. 2015.

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION



* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Industrial Machinery & Transportation Equipment sector has been defined to include the following industries and their associated IMPLAN codes: Tire manufacturing (196); Rubber and plastics hoses and belting manufacturing (197); Farm machinery and equipment manufacturing (262); Lawn and garden equipment manufacturing (263); Construction machinery manufacturing (264); Mining machinery and equipment manufacturing (265); Food product machinery manufacturing (267); Semiconductor machinery manufacturing (268); Printing machinery and equipment manufacturing (270); All other industrial machinery manufacturing (271); Industrial mold manufacturing (278); Special tool, die, jig, and fixture manufacturing (279); Cutting tool and machine tool accessory manufacturing (280); Machine tool manufacturing (281); Rolling mill and other metalworking machinery manufacturing (282); Turbine and turbine generator set units manufacturing (283); Speed changer, industrial high-speed drive, and gear manufacturing (284); Mechanical power transmission equipment manufacturing (285); Other engine equipment manufacturing (286); Pump and pumping equipment manufacturing (287); Air and gas compressor manufacturing (288); Measuring and dispensing pump manufacturing (289); Conveyor and conveying equipment manufacturing (291); Overhead cranes, hoists, and monorail systems manufacturing (292); Industrial truck, trailer, and stacker manufacturing (293); Power-driven handtool manufacturing (294); Welding and soldering equipment manufacturing (295); Packaging machinery manufacturing (296); Industrial process furnace and oven manufacturing (297); Fluid power cylinder and actuator manufacturing (298); Fluid power pump and motor manufacturing (299); Power, distribution, and specialty transformer manufacturing (332); Motor and generator manufacturing (333); Switchgear and switchboard apparatus manufacturing (334); Relay and industrial control manufacturing (335); Storage battery manufacturing (336); Primary battery manufacturing (337); Automobile manufacturing (343); Heavy duty truck manufacturing (345); Motor vehicle body manufacturing (346); Truck trailer manufacturing (347); Travel trailer and camper manufacturing (349); Motor vehicle gasoline engine and engine parts manufacturing (350); Motor vehicle electrical and electronic equipment manufacturing (351); Motor vehicle transmission and power train parts manufacturing (353); Motor vehicle seating and interior trim manufacturing (354); Other motor vehicle parts manufacturing (356); Aircraft manufacturing (357); Aircraft engine and engine parts manufacturing (358); Other aircraft parts and auxiliary equipment manufacturing (359); Railroad rolling stock manufacturing (362); Ship building and repairing (363); Boat building (364); Motorcycle, bicycle, and parts manufacturing (365); Military armored vehicle, tank, and tank component manufacturing (366); All other transportation equipment manufacturing (367); Commercial and industrial machinery and equipment rental and leasing (445).

Tobacco & Foodstuffs

In 2012, North Carolina became the largest U.S. exporter of tobacco products by more than six times the production of the closest competition. The following year, North Carolina producers of flue-cured tobacco supplied nearly 80% of total U.S. production.

Tobacco & Foodstuffs

Tobacco & Foodstuffs face a shift in consumer demand towards more healthful or health-conscious products. For tobacco, this is nothing new, and gains captured in market share are gathered from a shrinking pie. International markets are attractive, but fiercely competitive and served more directly by regions with less stringent regulatory environments. Healthy decisions are driving the product mix demanded of foodstuffs, so manufacturers who adapt to this with innovation and agility may succeed in a growing market. One of the supply chain's largest contributors to GDP value added, the Tobacco & Foodstuffs sector demonstrates moderate labor income, moderate wages, high productivity, and robust output. Sales, excise, income, and social insurance taxes lead all assessments for a whopping total tax contribution of nearly $7.6B.

TOTAL ECONOMIC IMPACT OF THE SECTOR

Employment	Labor Income	Value Added	Output	Taxes
30,100 Direct	$1.83B Direct	$12.42B Direct	$27.49B Direct	$5.15B State & Local
79,070 Indirect & Induced	$4.14B Indirect & Induced	$7.75B Indirect & Induced	$14.83B Indirect & Induced	$2.40B Federal
109,170	**$5.97B**	**$20.17B**	**$42.32B**	**$7.55B**

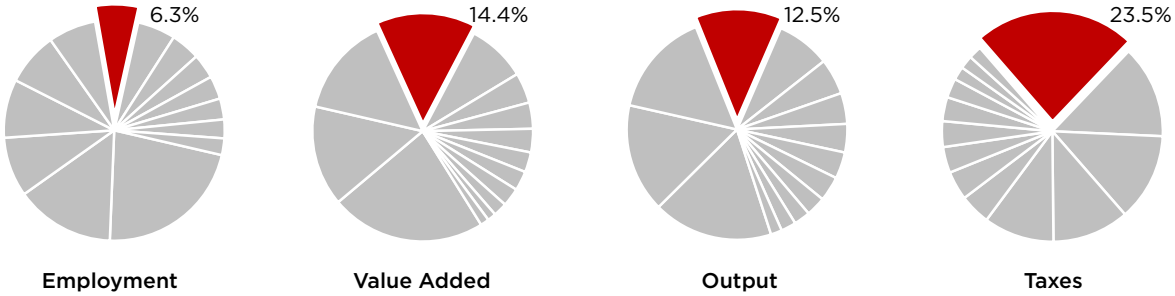
Tobacco & Foodstuffs Sector in North Carolina

Much like textiles and furniture, tobacco cultivation and production has long been associated with North Carolina. Rightfully so, given the fact that the state remains the United States' leading producer of this highly lucrative leaf, "harvesting 181,900 acres in 2013, according to the N.C. Department of Agriculture."[49] In 2013, North Carolina produced 360 million pounds of flue-cured tobacco in particular, representing 79% of total U.S. production.[50] In 2012, North Carolina became the largest U.S. exporter of tobacco products by more than six times the production of the closest competition, Florida.[51] The Tar Heel State controlled 61.2% of the overall domestic export in 2012. However, this is clearly a larger piece of a shrinking pie, as North Carolina's exports of tobacco products declined in the decade from 2002 to 2012 by more than 30% (from $461.83M in 2002 to $332.14M in 2012).[52]

Foodstuffs and food products manufacturing also enjoys a legacy in North Carolina—from the birthplace of Pepsi in New Bern, past the Hot & Now signs at Winston-Salem-based Krispy Kreme Donuts bakeries across the state, to the front door of snack and chip giant Snyder's-Lance's corporate

49. Mims, Bryan. "Tobacco Soldiers." Our State Magazine. August 2014.
50. Brown, Blake. 2015 Guide: Flue-Cured Tobacco. NC State University Cooperative Extension, 2015.
51. USA Trade Online. State-Level Exports to the World U.S. Tobacco Product (NAICS 3122) Exports to the World by State. 2012.
52. Duke University Center on Globalization, Governance & Competitiveness. "Workers & Wages: North Carolina in the Global Economy." 2012.

TOBACCO & FOODSTUFFS EQUIPMENT VS. ALL SUPPLY CHAIN SECTORS



headquarters in Charlotte. These more recognizable retail brands represent just a segment of the Tobacco & Foodstuffs sector.

Within the sector, bread and bakery product manufacturing is the most significant industry for employment impact, carrying more than 9,500 employees or nearly 32% of the sector's labor count. The entire sector employs more than 30,090 people in North Carolina, and accounts for three-quarters of 1% of the state's entire workforce.[53]

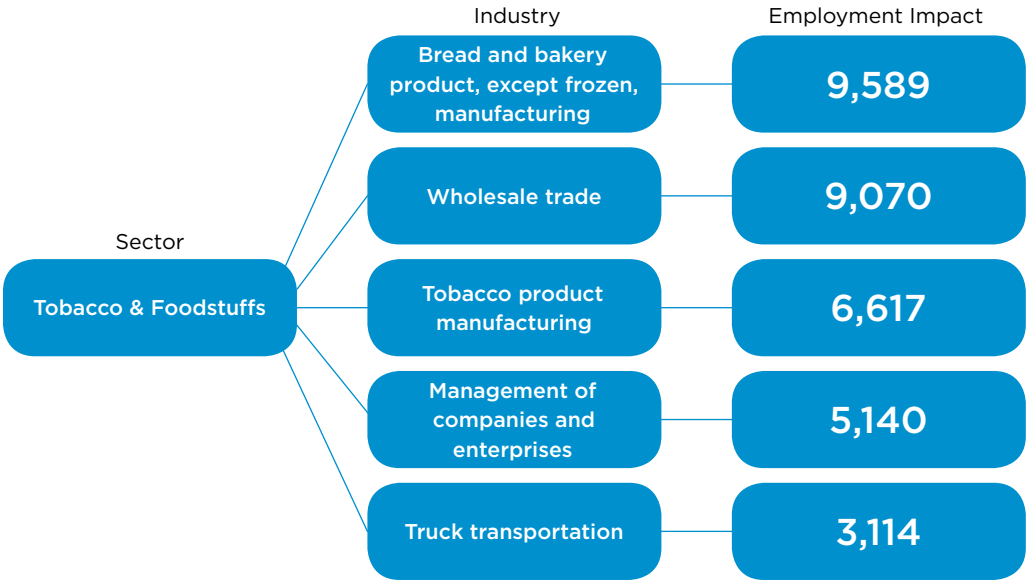
Economic Impact in North Carolina

Downward trends in tobacco consumption warn of a challenging future for this industry within Tobacco & Foodstuffs, however the sector remains a significant contributor to the economy in North Carolina. Representing 6.8% of the state's manufacturing workforce,[54] the sector contributes labor income of more than $1.8B, ranking 9th of the 14 supply chain related economic sectors analyzed for this report. Tobacco & Foodstuffs average labor income of more than $60,770, placing it above the 2014 statewide average compensation of $43,280,[55] but below the 2012 average manufacturing wage of $66,630.[56] The value of industry output from the Tobacco & Foodstuffs sector is impressive, placing it 4th amongst supply chain sectors, producing more than $27.4B in output in 2013, or 12.6% of the entire supply chain direct output for the state.

Similarities between tobacco and the associated foodstuffs industries are limited. For most regions, the two may show similar economic impact. However, given the unique legacy of tobacco in North Carolina (a state which features this world-famous golden leaf on everything from postcards to state-issued license plates) it is best to offer additional focused insight into this particular industry. Statistically, the differences between tobacco products manufacturing and the other categories in the sector are also significant with tobacco representing more than 63% of sector output and almost 80% of the total value added.

Tobacco products manufacturing is clearly the leading economic driver for this sector in all but one category, where it relinquishes top employer to bread and bakery product manufacturing. Tobacco products manufacturing is responsible for the direct employment of 5,960 workers statewide. North Carolina Tobacco Product manufacturing employment represents 45% of all U.S. employment in the industry.[57] For this sector, tobacco products manufacturing provides the highest percentage of

53. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates." 2015.
54. National Association of Manufacturers. "North Carolina Manufacturing Facts." 2013.
55. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates." 2015.
56. National Association of Manufacturers. "North Carolina Manufacturing Facts." 2013.
57. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates – NAICS 312200." 2015.



The industries of the Tobacco & Foodstuffs sector drive demand across the entire economy. For the Tobacco & Foodstuffs sector, these are the top five benefiting industries and associated employment impact.

contributions to GDP, contributing total value added with 79.9% of the direct impact, and nearly 20% of indirect impact for its sector.

The most impacted industries by the Tobacco & Foodstuffs sector clearly reflect the supply chain for tobacco products manufacturing, engaging the paperboard container manufacturing, truck transportation, and most importantly wholesale trade segments. Geographically, the tobacco industry is somewhat dispersed across numerous counties in North Carolina, with a general concentration in the more eastern-central counties. One identifiable cluster includes Wilson, Johnston, and Nash counties, with Pitt, Wake, Wayne, and Sampson counties adding to the eastern-central concentration.[58]

Further industries with relatively significant statewide impact include cookie and cracker manufacturing, canned fruits and vegetables, and other animal food manufacturing. However, non-tobacco industries represent only 20% of total value added, $6.3M in labor income, 13,700 employees, and just 17.8% of total sector output in North Carolina.

Tax Contributions

The tax impact of Tobacco & Foodstuffs in North Carolina on state, local, and federal tax revenues is perhaps the most impressive and unique of its contemporaries. With total tax contributions of $7.55B, the sector's contributions represent nearly one quarter of the $32.1B in taxes paid to state, local, and federal governments by supply chain industries in 2013. It ranks first in taxes paid to state and local governments, with more than $5.1B or 38.5% of the supply chain contribution. The $2.4B paid in federal assessments places it 2nd of all supply chain sectors. Of this, sales and property taxes provide the most significant contributions, totaling nearly 90% of state and local assessments for the year and a combined total of more than $4.6B. To a lesser degree, federal coffers also benefit from

58. Duke University Center on Globalization, Governance & Competitiveness. "Workers & Wages: North Carolina in the Global Economy." 2012.

the Tobacco & Foodstuffs sector. The majority of federal taxes are corporate tax ($608M) followed by excise tax payments ($5.1M) reflecting the stringent excise environment around tobacco products in particular. Employee and employer contributions to social insurance were also significant and together topped $6.65M in 2013.

- 1st in state and local taxes paid (38.51% of total supply chain taxes paid, $5,151,348,958)
- 2nd in federal taxes paid (12.82%, $2,404,484,084)

Broader Context: Tobacco & Foodstuffs Sector in the U.S.

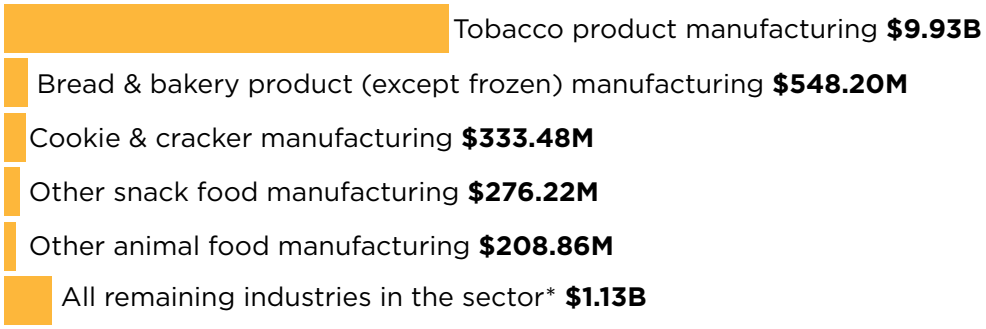
The health of Tobacco & Foodstuffs industries, like any industrial sector, relies on the dynamics of supply and demand. For tobacco in particular, downward domestic and European tobacco consumption trends are worrisome. Yet, an anticipated annual growth rate of 17% in Southeast Asia is noteworthy. In China alone, where the tobacco products market exceeds $209B,[59] the World Health Organization estimates that nearly 60% of men are smokers.[60] The tobacco products market represents an almost $783B market worldwide in 2013.[61]

Contrary to signs of growth globally, the U.S. has experienced a steady decrease in tobacco production, as well as a 38% decrease in the number of American tobacco farms since 2007. Beyond health reasons, competition from alternative products, such as electronic cigarettes and vapor-based nicotine devices, have also shown the tobacco industry that innovation and technology are relevant to its future. For domestic consumption and production, the U.S. remains a net importer of tobacco. As recently as 2011, the U.S. imported more than $752M in tobacco and related products from abroad. Leading providers to the domestic market include Brazil, Turkey, and Canada.[62] Despite these trends, farms in the U.S. produced almost 800 million pounds of tobacco in 2012.[63] Globally, the U.S. remains the fourth-largest tobacco producing nation in the world behind China, India, and Brazil. According to the CDC, tobacco was "grown in 19 U.S. states, with North Carolina, Kentucky, and Georgia accounting for nearly 80% of production."[64]

Foodstuffs and food product manufacturing industries have benefitted from increased demand in a strengthening domestic economy. With prices of key raw materials such as corn and wheat on the decline, profit margins for the sector have increased.[65] Further, with a shift in consumer preferences and habits towards healthier foods, "producers have introduced new varieties of existing products, such as reduced-fat and reduced-sodium brand extensions." These efforts, as well as the importance of innovation in product offerings, place the sector in a growth position. In snack food production alone, an annualized growth rate of more than 4% in revenues was expected in the half-decade before 2015.[66]

59. Brown, Blake, and Will Snell. U.S. Tobacco Situation and Outlook. NC State University Cooperative Extension, 2014.
60. Rapp, Nicholas, and Ryan Bradley. "Tobacco Trade Around the World." Forbes Magazine 2013.
61. Brown, Blake, and Will Snell. U.S. Tobacco Situation and Outlook. NC State University Cooperative Extension, 2014.
62. Huntrods, Diane. "Tobacco." Iowa State University Agricultural Marketing Research Center, 2013. Specialty Crops Profiles.
63. Loomis, Brett R. et al. "National and State-Specific Sales and Prices for Electronic Cigarettes—U.S., 2012–2013." American Journal of Preventive Medicine 50.1 (2015): 18-29.
64. U.S. Department of Agriculture. 2012 Census of Agriculture: United States Summary and State Data, Volume 1, Part 51. Washington: U.S. Department of Agriculture, National Agricultural Statistics Service, 2014.
65. Oston, Max. "Industry Report 31191: Snack Food Production." IBISWorld. 2015.
66. Ibid.

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION



* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Tobacco & Foodstuffs sector has been defined to include the following industries and their associated IMPLAN codes: Dog and cat food manufacturing (65); Other animal food manufacturing (66); Breakfast cereal manufacturing (73); Nonchocolate confectionery manufacturing (76); Chocolate and confectionery manufacturing from cacao beans (77); Confectionery manufacturing from purchased chocolate (78); Frozen fruits, juices and vegetables manufacturing (79); Frozen specialties manufacturing (80); Canned fruits and vegetables manufacturing (81); Canned specialties (82); Dehydrated food products manufacturing (83); Fluid milk manufacturing (84); Cheese manufacturing (86); Ice cream and frozen dessert manufacturing (88); Bread and bakery product, except frozen, manufacturing (94); Frozen cakes and other pastries manufacturing (95); Cookie and cracker manufacturing (96); Dry pasta, mixes, and dough manufacturing (97); Tortilla manufacturing (98); Roasted nuts and peanut butter manufacturing (99); Other snack food manufacturing (100); Coffee and tea manufacturing (101); Flavoring syrup and concentrate manufacturing (102); Mayonnaise, dressing, and sauce manufacturing (103); Spice and extract manufacturing (104); All other food manufacturing (105); Tobacco product manufacturing (111).

Transportation, Distribution & Logistics

North Carolina's Transportation, Distribution & Logistics sector employs more than 105,690 people, leading all supply chain sectors, and is positioned in the center of the nation's fastest growing region. The sector plays a critical role in supporting the domestic economy while connecting North Carolina to global markets.

Transportation, Distribution & Logistics

Transportation, Distribution & Logistics is the bloodstream of industry at the global, national, regional, and local level. Usually subject to an intense regulatory environment, as well as the dynamics of trade agreements and labor negotiations, the industries of the Transportation, Distribution & Logistics sector must thrive in constant change. As with many other sectors, rising focus on environmental impact and the pursuit of sustainable practices are relevant trends for air, ground, rail, and ocean transport industries. For the foreseeable future, consumer demand and global income are on the rise and the sector will enjoy growth on par with broader economic development. A strong dollar will benefit foreign producers, but with both rising imports and exports, the industries of the sector enjoy higher utilization. With nearly a quarter of all North Carolina manufacturing workforce, the Transportation, Distribution & Logistics sector represents outstanding labor income, average wages, and above average output. Sales, property, income, and social insurance assessments lead all taxes for a total tax contribution of nearly $3.6B.

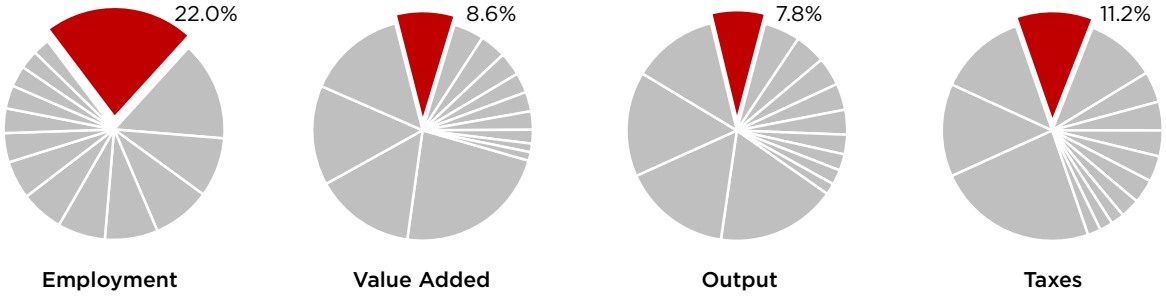
TOTAL ECONOMIC IMPACT OF THE SECTOR

Employment	Labor Income	Value Added	Output	Taxes
105,690 Direct	$5.69B Direct	$7.43B Direct	$17.21B Direct	$1.48B State & Local
101,940 Indirect & Induced	$4.41B Indirect & Induced	$7.59B Indirect & Induced	$13.14B Indirect & Induced	$2.15B Federal
207,630	**$10.10B**	**$15.02B**	**$30.35B**	**$3.63B**

Transportation, Distribution & Logistics Sector in North Carolina

North Carolina is home to a highly skilled and productive workforce with a strong manufacturing base. It serves as an important contributor and link to the global economy. The state's transportation network provides a conduit for the state's economy, allowing for the effective movement of goods across the state through sophisticated and interconnected air, ground, water, rail, warehousing, and distribution systems. The economic impact of the transportation network is far reaching. It touches nearly every aspect of business and life in the state. Positioned in the center of the nation's fastest growing region, North Carolina's transportation network plays a critical role in supporting the regional economy, and accessing global markets.

TRANSPORTATION, DISTRIBUTION & LOGISTICS VS. ALL SUPPLY CHAIN SECTORS

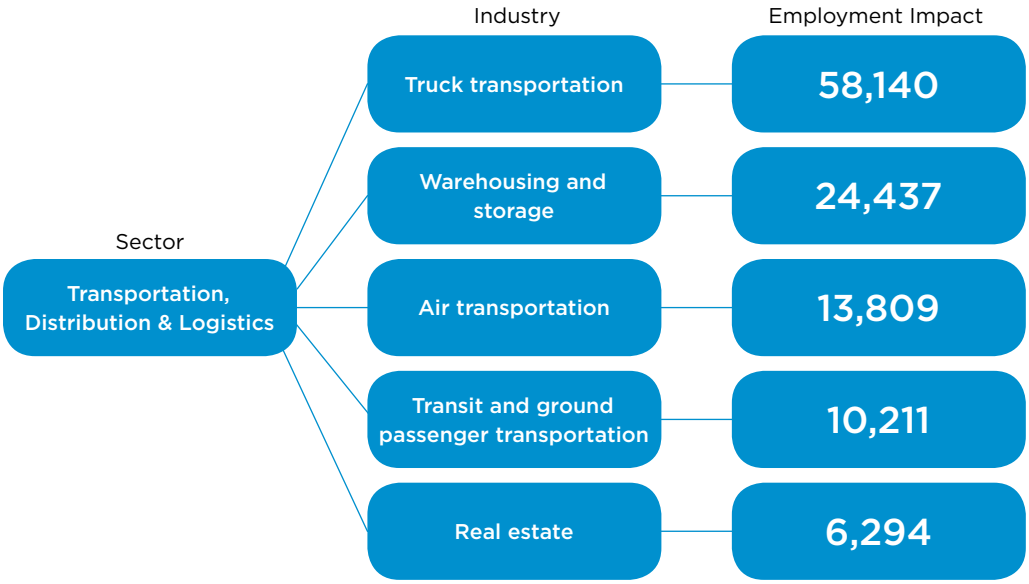


Each industry within the sector fills an important role in the overall network. Air transportation is one critical component for both freight and passengers. North Carolina's Charlotte/Douglas International airport is the world's 7th busiest airport by aircraft movements[67], and the nation's 8th largest airport hub by passenger enplanement (Charlotte/Douglas, CLT),[68] with more than 21.5M passengers in 2014. Raleigh-Durham (38th) and Greensboro's Piedmont Triad (93rd) are also ranked amongst the busiest passenger airports in the U.S.[69] Beyond these major facilities, there are 74 publicly owned airports and nearly 300 privately owned airports throughout the state. Of the nine that receive regularly scheduled airline service, four offer international service. North Carolina airports handle more than 56 million passengers each year.[70] Air cargo services are also a prominent and thriving part of the supply chain in North Carolina. Piedmont-Triad ranks 38th of U.S. airports in cargo volume, with Raleigh-Durham close behind at 49th. Together with Charlotte/Douglas (63rd), these three major airports support North Carolina's strong manufacturing base with more than 1.3B pounds (more than 603,000 metric tons) of air cargo shipped in 2014, up 1.46% from 2013.[71]

North Carolina's industrial community is also supported by the nation's second largest state-maintained highway system. Roughly 15,000 miles of highways, interstate, U.S., and state routes serve commerce, with more than 8 million vehicles registered in the state in addition to more than 16,000 trucking companies. Public transportation services are available in each of North Carolina's 100 counties.[72]

Railroads play a key role in North Carolina's infrastructure. Twenty-three freight railroads moved 47.9 million tons of cargo across more than 3,200 miles of rail in 2012.[73] Whether it is moving raw materials, intermediates, or finished product, railroads support the strong North Carolina manufacturing base. Passenger rail is also an important industry in the sector. Amtrak maintains 16 stations with six daily trains connecting cities from Charlotte to Rocky Mount. Five interstate train routes connect Tar Heel travelers to destinations from New York to Miami.

67. Airports Council International. ACI World Releases Preliminary World Airport Traffic and Rankings for 2014. 2014. Note: aircraft movements are defined as any aircraft take-off or landing at an airport, either commercial or non-commercial. For example, an arrival and a departure are two movements.
68. Ibid.
69. Federal Aviation Administration. "Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports." 2014.
70. North Carolina Department of Transportation. "Frequently Asked Questions." 2016.
71. Federal Aviation Administration. "Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports." 2014.
72. North Carolina Department of Transportation. 2014 Annual Performance Report. North Carolina Department of Transportation, 2014.
73. Thrive NC (Economic Development Partnership of NC). "Market Access in North Carolina (Rail, Port, Air, Interstate)." 2016.



The industries of the Transportation, Distribution & Logistics sector drive demand across the entire economy. For the Transportation, Distribution & Logistics sector, these are the top five benefiting industries and associated employment impact.

For industry and commercial firms, the warehousing and storage industry provides a critical capability for North Carolina's transportation network, as the ability to efficiently and economically store inventory contributes to a thriving manufacturing business. Warehouses are also a key player in making the multi-modal transit connections of the state work.

When Robeson County native Malcom McLean introduced his first intermodal shipping container and vessel in 1956, the world was changed forever. McLean's "box" and its impact on the global maritime trade represents, by far, one of the most significant transportation innovations of the modern era. From these auspicious beginnings, North Carolina and the world have adopted the infrastructure and ease-of-trade enabled by the intermodal container. Connecting to the global economy, the North Carolina Ports Authority operates both deep-water seaports at Wilmington, and a predominantly bulk and breakbulk facility at Morehead City. Both facilities are supported by rail service.[74] More than a dozen international carriers call on these two facilities, accounting for more than 230,000 twenty-foot equivalent unit (TEU)[75] movements in 2014.[76] Capacity for the seaport system in North Carolina is dynamic and robust, offering more than 500 annual port calls from roll-on/roll-off, bulk, and general cargo vessels in excess of 5.8M deadweight tonnage (DWT).[77] Tanker service is also available through these facilities. Inland terminals are relevant, too. The Charlotte and Piedmont Triad inland terminals connect the state to other regions via the intermodal terminal network.

For passengers on the water, the North Carolina Department of Transportation operates the nation's second largest ferry system, moving 850,000 vehicles and 2 million passengers each year across 22 boats and seven regular routes. The system operates across the Currituck and Pamlico Sounds, as well as the Cape Fear, Neuse, and Pamlico Rivers.[78]

74. North Carolina State Ports Authority. Special Train at Port of Wilmington Signals Completion of Carolina Corridor. 2009.
75. (Note: a TEU, or twenty-foot-equivalent unit is the common unit of measure in containerized trade, equivalent to a 20' x 8' x 8' shipping container.)
76. MARAD, United States Maritime Administration. "Data Statistics." United States Maritime Administration. 2014.
77. MARAD, United States Maritime Administration. "US Port Calls (2013)." United States Maritime Administration. 2014. Note: deadweight tonnage (DWT) is a measure of a vessel's capacity in weight.
78. US Department of Transportation. 2006. Washington, DC: US DOT, 2015. Transportation Asset Management Case Studies: Comprehensive Transportation Asset Management.

Economic Impact in North Carolina

A cornerstone of the supply chain, the Transportation, Distribution & Logistics sector is by far the leading direct employer of industries considered, with more than 105,680 employees or roughly 24% of the state's manufacturing workforce. Despite these robust employment figures, the sector lags nearly 20% behind the state's manufacturing wage, with average labor income of $53,814.[79] Transportation, Distribution & Logistics also impacts the local economy beyond direct transactions, creating more than 27,200 jobs in real estate, employment services, couriers, wholesale trade, sightseeing, and restaurants.

Total direct output for the sector tops $17.2B, 5th of supply chain sectors; however, productivity is less impressive versus other industries with $162,881 for each direct employee. Within the sector, truck transportation and warehousing and storage together account for nearly three-quarters of sector employment. The more than 770 workers in water transportation enjoy the highest average labor income of $112,139, which is 168% of the state manufacturing average. For direct labor income impact, once again truck transportation leads the sector with $2.97B; followed by air transportation with just over $1B in direct labor income. Not surprisingly, truck transportation and air transportation also lead the sector in GDP total value added contributions.

Tax Contributions

With total tax contributions of $3.6B, or 11.27% of the $32.1B in taxes paid to state, local, and federal coffers, the Transportation, Distribution & Logistics sector ranks 4th of supply chain industries in 2013. Taxes paid to state and local governments for the sector number nearly $1.48B, second highest of supply chain sectors, while the sector contributed $2.1B to the federal government. Of this, sales, property, and personal income taxes represent almost 88% of state and local assessments for the year and a combined total of more than $1.3B. The majority of federal taxes are payroll related, with social insurance contributions from employees and employers ($1.1B), followed by personal income tax ($600M)—together nearly 80% of the sector's federal exposure.

- 2nd in state and local taxes paid (11.04% of total supply chain taxes paid, $1,477,308,989)
- 5th in federal taxes paid (11.44%, $2,145,647,161)

Broader Context: Transportation, Distribution & Logistics Sector in the U.S.

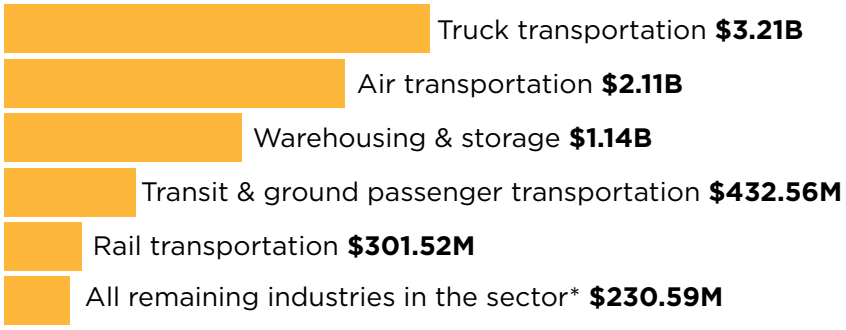
Home to one of the most advanced and robust multi-modal transportation networks in the world, the Transportation, Distribution & Logistics sector in the United States is vital to industry and commerce. With spending in 2014 in excess of $1.45T, the U.S. logistics and transportation industry delivers 8.3% of the nation's annual GDP.[80] The World Trade Organization's International Trade Statistics office ranks the United States as "the second-largest merchandise goods exporter behind China, making up 8.4% of the world total. The U.S. is also by far the largest goods importer, accounting for 12.3% of the total."[81] Globally, rising incomes and economic recovery lead to stronger demand.

79. National Association of Manufacturers. "North Carolina Manufacturing Facts." 2013.
80. Council of Supply Chain Management Professionals. "State of Logistics Report." 2015.
81. IBISWorld. Business Environment Report: Total Trade Value. IBISWorld, 2015.

The U.S. benefits greatly from the growth of global trade, but it also provides challenges to firms and industries in the sector to adapt to the changing landscape. Increasing consumer, industry, and governmental focus on sustainability and environmental impact are important areas for development in the U.S., but may also hinder competitiveness against producers in low-cost, low-wage regions. Labor relations and trade agreements have the potential to shape industry investment decisions, while disruptive technologies, e-commerce, and new distribution models will also impact every facet of the supply chain from the loading dock to the consumer's door. U.S. manufacturers will continue to expand current markets or seek new revenue. Leveraging accessible markets such as trading partners Canada and Mexico, the U.S. Transportation, Distribution & Logistics sector will facilitate domestic economic growth, and enjoy increased revenues from growing trade volumes.

Just as consumer demand will lead to higher utilization of Transportation, Distribution & Logistics assets, improvements in the labor economy will strengthen demand for rail transportation. The dynamics of containerization and the steamship industry can increase or diminish relevance for ports with rippling effects on regional economies. The industries of the Transportation, Distribution & Logistics sector deliver access to opportunity for nearly every other sector of the economy.

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION



* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Transportation, Distribution & Logistics sector has been defined to include the following industries and their associated IMPLAN codes: Air transportation (408); Rail transportation (409); Water transportation (410); Truck transportation (411); Transit and ground passenger transportation (412); Pipeline transportation (413); Warehousing and storage (416).

Metal Products

The Metal Products sector in North Carolina shows growth driven by the resurgence of residential and commercial construction, as well as intermediary manufacturing demand. Infrastructure projects represent additional opportunity for sector growth.

Metal Products

Metal Products manufacturing industries show growth driven by construction and intermediary manufacturing demand, yet the sector in North Carolina faces similar challenges as its supply chain contemporaries. From price pressures and rising imports, to the challenges of a strong dollar, sustained prosperity is not guaranteed for U.S. firms. Consolidations and offshoring of production remain trends relevant to the sector at both the national and state level. Innovation in product and improvement in manufacturing processes are among analysts' suggestions for continued success. Reducing raw material expenses and burdensome transportation costs may also help to protect shrinking margins. The Metal Products manufacturing sector in North Carolina demonstrates average wages, above average labor income, and moderate productivity and output. Sales, property, income, and social insurance taxes lead all assessments for a total tax contribution of nearly $1.45B.

TOTAL ECONOMIC IMPACT OF THE SECTOR

Employment	Labor Income	Value Added	Output	Taxes
33,550 Direct	$2.10B Direct	$3.83B Direct	$11.51B Direct	$474.9M State & Local
43,380 Indirect & Induced	$2.04B Indirect & Induced	$3.46B Indirect & Induced	$6.34B Indirect & Induced	$974.6M Federal
76,930	**$4.14B**	**$7.29B**	**$17.85B**	**$1.45B**

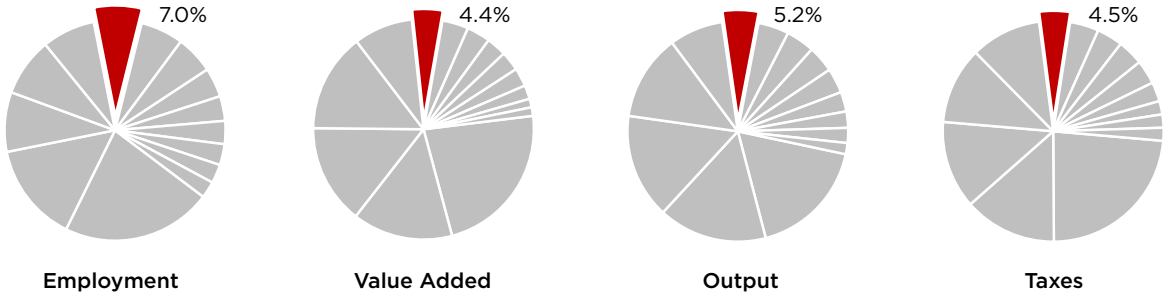
Metal Products Sector in North Carolina

Positive trends in residential construction will underpin growth for many of the industries in the Metal Product manufacturing sector in North Carolina. In the four years leading up to 2015, North Carolina welcomed nearly 400,000 new residents, a boon to residential construction.[82] Yet, for much of the sector, national trends such as import and pricing pressure are important considerations. Combined with broader economic recovery, the construction and development needed to accommodate population growth provide strong downstream demand for the Metal Product manufacturing sector in North Carolina.

Non-residential, industrial and commercial markets are also relevant for the sector. Growth in the non-residential space will support continued growth for industries like the fabricated structural metal manufacturing industry.[83] The sector is an important supplier for other industries, and many products manufactured in the sector continue to other intermediary manufacturing operations. Including manufacture of metal wiring, metal fabrication, valves and fittings, energy and communications

82. North Carolina Office of Budget & Management. "Annual North Carolina Population Growth." 2014.
83. Ruiz, Brandon. "Fabricated Structural Metal Manufacturing in the US (IBISWorld Report OD5967)." IBISWorld. 2015.

METAL PRODUCTS VS. ALL SUPPLY CHAIN SECTORS



wire, sheet metal, hardware, and hand tools, the sector in North Carolina also includes significant operations in iron and steel milling, aluminum production, and foundry activities.

Many firms in the Metal Products manufacturing sector are prominent in more than one industry. These powerful firms include recognizable names such as Nucor, Alcoa Foundation, ABB, and TE Connectivity, each with operations in North Carolina. Additionally, the nation's largest wire manufacturer, Southwire Company, is expanding its manufacturing footprint in North Carolina despite offshoring trends seen in the broader domestic and international sectors.[84] With almost 400 state Department of Transportation highway projects currently underway in North Carolina representing contracts of nearly $5.26B,[85] infrastructure investment will also be a factor in the health of the sector.

Economic Impact in North Carolina

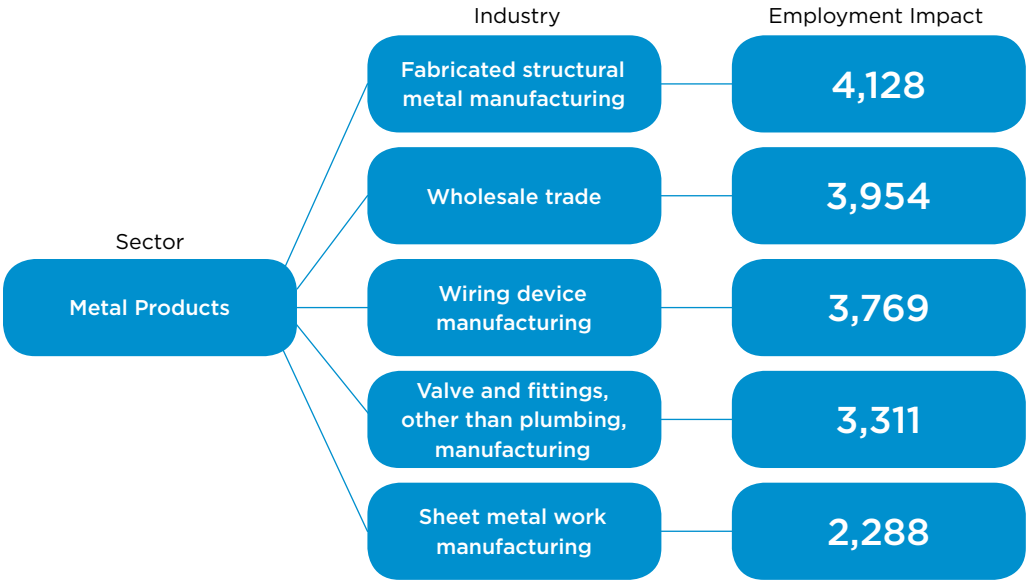
The Metal Products manufacturing sector in North Carolina supports more than 33,500 employees directly engaged statewide, as well as labor income impact of more than $2B in 2013. This translates into an average labor income of more than $62,600 per employee, nearly 1.5 times higher than the 2014 statewide average compensation of $43,280.[86] However, the average labor income in the sector remains below the state's manufacturing average. In fact, when compared to other supply chain related industries in North Carolina, Metal Products manufacturing ranks 5th, accounting for 6.8% of the state's total labor income. Producing direct output in excess of $11.5B in 2013, the sector delivers nearly 5.3% of total supply chain production statewide.

In addition to the number of direct employees, the sector is responsible for more than 20,500 indirect jobs, accounting for another $1.1B in labor income. The impact of local industries buying goods and services from other local industries, or indirect effects, can be seen in the additional $3.4B of output as well. Overall, the sector provides a GDP contribution value added of more than $3.8B while demonstrating productivity in excess of $343,000 per employee.

Tax Contributions

With assessments in excess of $1.4B, total taxes paid by the Metal Products sector rank 6th of all supply chain sectors. This also accounts for more than 4.5% of the more than $32.1B paid by supply chain industries to state, local, and federal governments in 2013. At the state and local level, Metal Products accounted for tax receipts of nearly $475M, while federal contributions exceeded $974M.

84. Southwire Company, LLC. Southwire Expanding High-Voltage Cable Production With Purchase of Manufacturing Facility in Huntersville, North Carolina. 2015.
85. North Carolina Department of Transportation. "Construction Progress Report." 2015.
86. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates." 2015.



The industries of the Metal Products sector drive demand across the entire economy. For the Metal Products sector, these are the top five benefiting industries and associated employment impact.

Of this, sales, property, and personal income taxes provide the most significant state and local contributions totaling more than 84% of assessments for the year and a combined total of nearly $388M. For federal taxes, social insurance payments made by employees and employers lead all categories, followed by personal income tax. These account for nearly $700M or 74% of all federal taxes paid by Metal Products manufacturing firms in 2013.

- 6th in state and local taxes paid (3.55% of total supply chain taxes paid, $474,872,585)
- 6th in federal taxes paid (5.19%, $974,558,428)

Broader Context: Metal Products Sector in the U.S.

The industries of the U.S. Metal Products manufacturing sector create a broad range of products, from wires to pipes and ball bearings to beverage cans. The diversified sector also includes hand tools, hardware, and major industrial categories like iron and steel mills. Many industries of the Metal Products sector serve intermediary manufacturers or represent a significant part of the supply chain for a diverse range of downstream production. Some industries address demand from wholesale and retail consumers as well as other manufacturers.

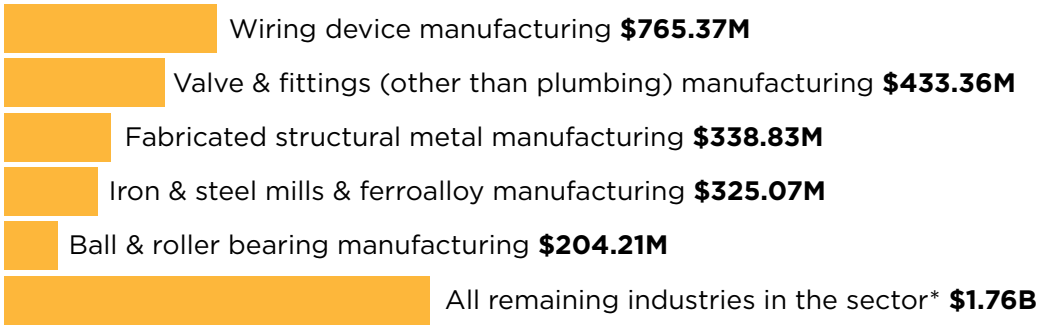
Conservatively, the U.S. Metal Products sector exceeds $200B in annual revenue, including major industries such as iron and steel manufacturing with more than $106B domestic revenues.[87] Industries within the sector are linked closely with residential and non-residential construction, providing many of the key components for electrical infrastructure, wiring devices and hardware. Raw material costs including aluminum, steel, iron ore, and copper impact margins in this competitive, globalized sector.

87. Ruiz, Brandon. "Fabricated Structural Metal Manufacturing in the US (IBISWorld Report OD5967)." IBISWorld. 2015.

With exports challenged by the trade-weight imbalance of a strong dollar, import penetration is a real concern for the sector in the U.S. Pricing pressure from low-cost producers such as China and Japan threaten domestic sustainability. As in many sectors within the supply chain, the Metal Products manufacturing sector will witness further consolidation by U.S. manufacturers.[88] Most industries in the sector face a mounting trade deficit, but in some cases—such as wiring device manufacturing or ferrous metal products—prohibitive transportation costs give domestic producers an edge. Growth in trade with neighboring markets in Canada and Mexico provide opportunity for the sector. However, tariff agreements that enable such trade also enable low-wage, low-cost manufacturing competition.

Regulations are important for the Metal Products manufacturing sector and compliance with environmental considerations increases cost. Access to and application of new technology and innovation in process rank high as analysts' success drivers for the sector. For some of the more capital intense industries in the sector, gaining further economies of scale will prove important to their domestic sustainability.

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION

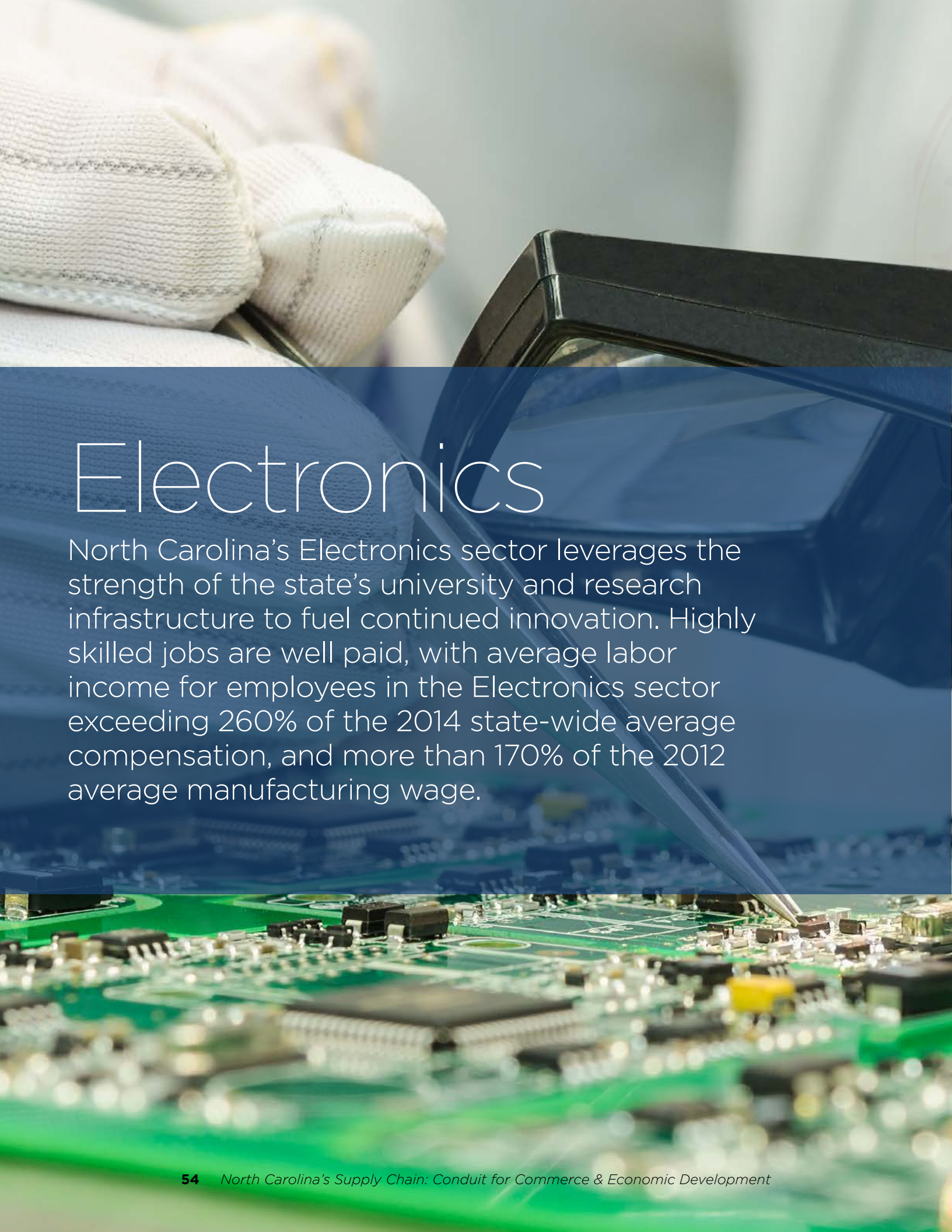


* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Metal Products sector has been defined to include the following industries and their associated IMPLAN codes: Iron and steel mills and ferroalloy manufacturing (217); Iron, steel pipe and tube manufacturing from purchased steel (218); Rolled steel shape manufacturing (219); Aluminum sheet, plate, and foil manufacturing (223); Crown and closure manufacturing and metal stamping (234); Cutlery, utensil, pot, and pan manufacturing (235); Handtool manufacturing (236); Prefabricated metal buildings and components manufacturing (237); Fabricated structural metal manufacturing (238); Plate work manufacturing (239); Metal window and door manufacturing (240); Sheet metal work manufacturing (241); Ornamental and architectural metal work manufacturing (242); Power boiler and heat exchanger manufacturing (243); Metal tank (heavy gauge) manufacturing (244); Metal cans manufacturing (245); Metal barrels, drums and pails manufacturing (246); Hardware manufacturing (247); Spring and wire product manufacturing (248); Turned product and screw, nut, and bolt manufacturing (250); Valve and fittings, other than plumbing, manufacturing (254); Ball and roller bearing manufacturing (256); Fabricated pipe and pipe fitting manufacturing (260); Other fabricated metal manufacturing (261); Other communication and energy wire manufacturing (339); Wiring device manufacturing (340).

88. Ibid.



Electronics

North Carolina's Electronics sector leverages the strength of the state's university and research infrastructure to fuel continued innovation. Highly skilled jobs are well paid, with average labor income for employees in the Electronics sector exceeding 260% of the 2014 state-wide average compensation, and more than 170% of the 2012 average manufacturing wage.

Electronics

The Electronics sector is poised for continued growth despite global pressures. A strong dollar and the rising threat of low-cost, low-regulation production centers abroad offer domestic manufacturing substantial headwinds. Adapting quickly to technology advancements and leveraging innovation are key elements of success for industries in this sector. University and research park connections will ensure North Carolina firms have access to the resources and research and development. Electronics proliferation in all industries will strengthen demand and revenues for the sector. Semiconductors and industrial process control instrument manufacturing lead this diverse sector, demonstrating strong labor income, moderate employment figures, and moderate productivity. Sales, property, income, and social insurance taxes lead all assessments for a total tax contribution of nearly $1.36B.

TOTAL ECONOMIC IMPACT OF THE SECTOR

Employment	Labor Income	Value Added	Output	Taxes
17,360 Direct	$1.97B Direct	$3.29B Direct	$9.10B Direct	$463.2M State & Local
39,500 Indirect & Induced	$1.89B Indirect & Induced	$3.21B Indirect & Induced	$5.85B Indirect & Induced	$895.5M Federal
56,680	**$3.86B**	**$6.50B**	**$14.95M**	**$1.36B**

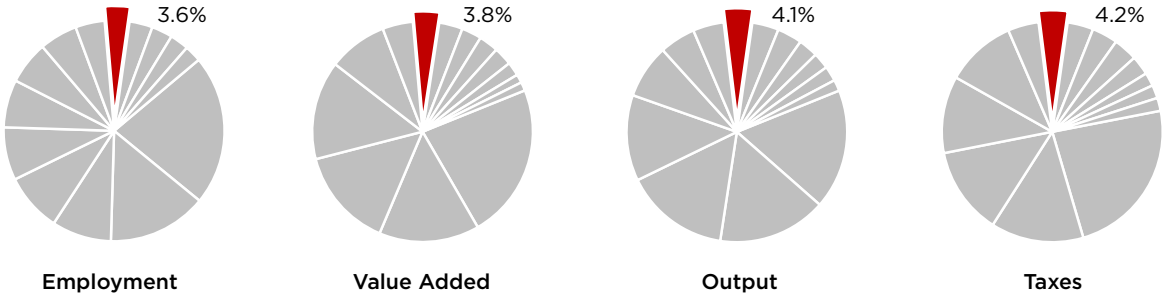
Electronics Sector in North Carolina

The Electronics sector in North Carolina includes the robust semiconductor manufacturing industry, as well as a range of process control and analytical instruments, circuit board, lighting, irradiation, electromedical, fluid, flow and environmental controls manufacturing. North Carolina is wired to support technology advancement. This includes a nationally recognized university system, and research parks across the state—from Wake Forest Innovation Quarter to the Gateway University Research Park to the pioneering innovation hub at Research Triangle Park. The connection between education, entrepreneurship, and the electronics sector is strong. Many companies in Electronics have grown into viable enterprises from initial campuses and incubation centers across North Carolina. Globally prominent firms such as Charlotte's SPX Corporation and the Triangle-based Cree are recognizable; however, North Carolina ranks 9th nationally in growth of high-technology establishments.[89]

With more than 17,360 employees across the state, it should be no surprise that the Electronics Sector creates in excess of $1.97B in labor income, nearly $9.1B of output and GDP value added contributions of almost $3.2B. It ranks 3rd of all supply chain related industries for average labor income.

89. North Carolina Technology Industry Report. "Top Rankings." 2015.

ELECTRONICS VS. ALL SUPPLY CHAIN SECTORS



Economic Impact in North Carolina

For the industries considered, the Electronics sector represents 3.9% of the state's manufacturing workforce,[90] ranking 10th in terms of total direct employment. The sector pays well, with average labor income of more than $113,700. At 262% of the 2014 statewide average compensation and more than 170% of the 2012 average manufacturing wage of $66,630,[91] the sector is a healthy contributor to the local economy. Indirect impacts include more than 6,400 additional jobs in restaurants, real estate, and employment services statewide. Productivity in the sector is midlevel for the supply chain industries, with nearly $524,000 of output for each direct employee. Within the sector, Industrial Process Variable Instruments manufacturing is the most significant industry for employment impact, carrying more than 4,200 employees, nearly a quarter of the sector's labor count and 37.9% of the sector's direct labor income. The powerful Semiconductor and Related Device manufacturing industry ranks second in employment, but leads the sector by delivering more than $4B in output, representing upwards of 44% of the sector's production. With a similar leadership position in value added, semiconductor and related device manufacturing contributes $1.2B or 38% of the sector total of $3.3B.

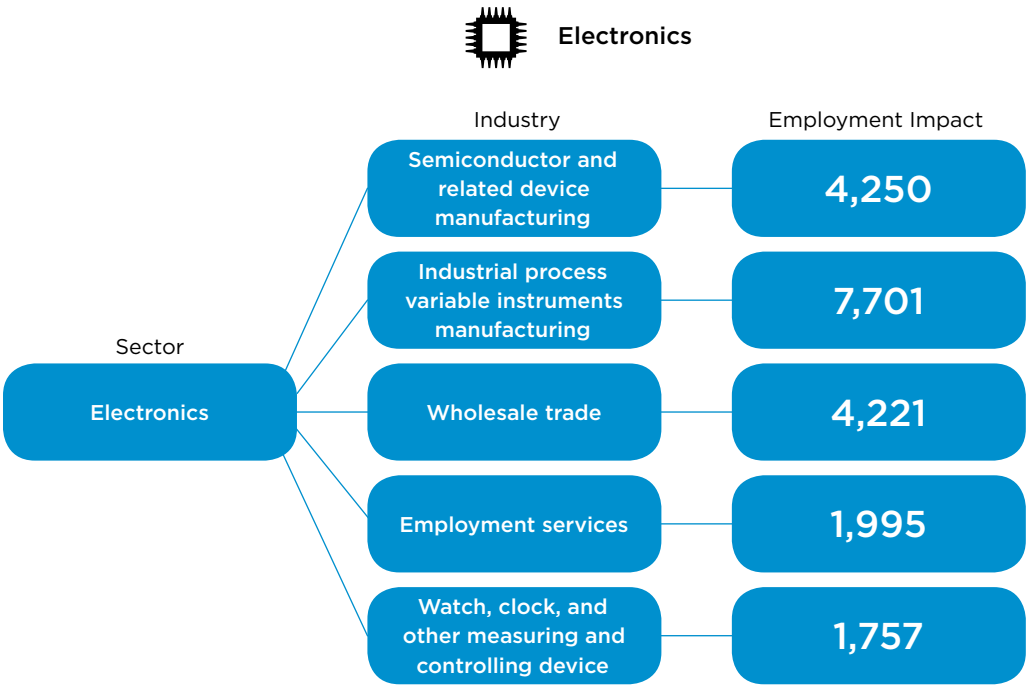
The most indirectly impacted industries for Electronics mirror the dynamics of the sector, with semiconductor and related device manufacturing and industrial process variable instruments manufacturing well-represented at the top of the industries affected register, while the highest ranking industry outside of the sector, wholesale trade, fields more than $234M in labor income impact.

Tax Contributions

With total tax contributions of $1.36B, the sector represents 4.2% of the $32.1B in taxes paid to state, local, and federal coffers, ranking Electronics 7th of supply chain sectors in 2013. In taxes paid to state and local governments, Electronics also ranks 7th, delivering nearly 3.5% of the supply chain contribution. Also, the $895M paid in federal assessments places it 7th of all supply chain sectors. Of this, sales, property, and personal income taxes represent the most significant contributions, totaling more than 85% of state and local assessments for the year and a combined total of more than $396M. The majority of federal taxes are payroll related, with social insurance contributions from employees and employers ($455M) followed by personal income tax ($227M), together more than 76% of the sector's federal exposure.

- 7th in state and local taxes paid (3.46% of total supply chain taxes paid, $463,217,664)
- 7th in federal taxes paid (4.77%, $895,549,532)

90. National Association of Manufacturers. "North Carolina Manufacturing Facts." 2013.
91. Ibid.



The industries of the Electronics sector drive demand across the entire economy. For the Electronics sector, these are the top five benefiting industries and associated employment impact.

Broader Context: Electronics Sector in the U.S.

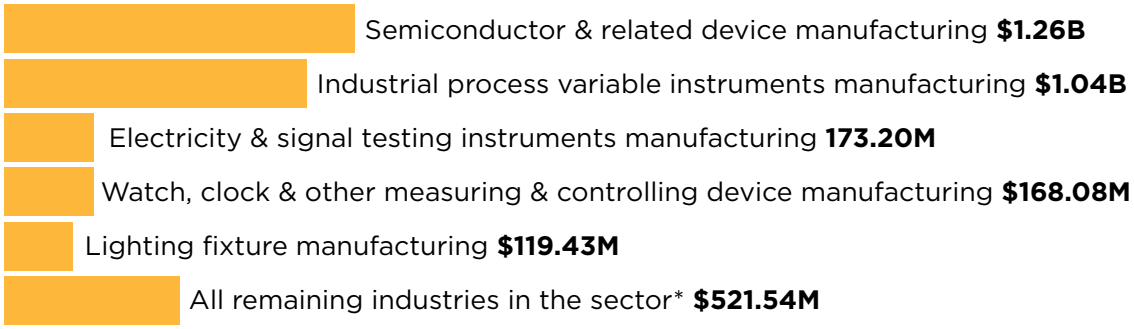
For the Electronics sector, technological advancement is nothing new. Yet, it remains a key driver for the industries of this fiercely competitive sector. Innovation and advancement drive this fully globalized industry where the United States maintains a strong leadership position. Illustrative of this, the U.S. Department of Commerce reports that the "U.S. semiconductor industry generated global sales of $151 billion out of a $292 billion total market in 2012."[92] Taking into account electronic parts manufacturing and industrial process instrumentation manufacturing, the 2015 global market is expected to top $690B.[93] Across all industries in this sector, the strong U.S. dollar will encourage a shift away from domestic manufacturing. This is in addition to the already enticing development of markets in Asia.

With downstream pressure on price, the international marketplace will see increased competition. However, 2013 marks the third year of consecutive growth in the global semiconductor and electronic parts manufacturing industry.[94] Demand from the proliferation of electronic devices in more products categories will most likely continue to support this positive trend.

Technological development has been integral to the growth of this sector, both domestically and internationally. Adapting to the newest technologies and market advancements will determine future success for industries in the sector. The growth of additive manufacturing and 3D printing are developments that are emerging today. Yet, they have the potential to disrupt the entire Electronics manufacturing sector as it exists today. Firms such as Boeing and Ford are already using 3D printing commercially within their manufacturing operations; this is not a trend limited to electronics. The benefits of additive manufacturing may significantly impact design prototyping, tooling, testing, and even final production within the sector.[95] Staying ahead of the curve in the use of new technology, ensuring access to highly skilled workers and hearty intellectual property protections are all important to the continued success of this sector.[96]

92. "The U.S. Semiconductors Industry." US Department of Commerce: SelectUSA. 2015.
93. Kahn, Sarah. "IBISWorld Industry Report C2524-GL: Global Semiconductor & Electronic Parts Manufacturing." 25 Nov 2015.
94. Ibid.
95. Shanmugam, Prem. "3D Printing—A Disruptive Technology Electronics Manufacturers Need to Master." Market Insights Frost & Sullivan.
96. Kahn, Sarah . "IBISWorld Industry Report C2524-GL: Global Semiconductor & Electronic Parts Manufacturing." 25 Nov 2015.

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION



* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Electronics sector has been defined to include the following industries and their associated IMPLAN codes: Bare printed circuit board manufacturing (308); Semiconductor and related device manufacturing (309); Capacitor, resistor, coil, transformer, and other inductor manufacturing (310); Electronic connector manufacturing (311); Printed circuit assembly (electronic assembly) manufacturing (312); Other electronic component manufacturing (313); Electromedical and electrotherapeutic apparatus manufacturing (314); Search, detection, and navigation instruments manufacturing (315); Automatic environmental control manufacturing (316); Industrial process variable instruments manufacturing (317); Totalizing fluid meter and counting device manufacturing (318); Electricity and signal testing instruments manufacturing (319); Analytical laboratory instrument manufacturing (320); Irradiation apparatus manufacturing (321); Watch, clock, and other measuring and controlling device manufacturing (322); Blank magnetic and optical recording media manufacturing (323); Electric lamp bulb and part manufacturing (325); Lighting fixture manufacturing (326).

Communications & Computer

North Carolina's Communications & Computer sector leads all supply chain sectors with average labor income of more than three times the state average. Highly skilled labor is a vital element to support the supply chain and research and development needs of the dynamic Communications & Computer sector.

Communications & Computer

Communications & Computer manufacturing service demand from nearly every corner of global and domestic economies. Connectivity speed, bandwidth, and instant communications are currency in both industry and commerce. Products of the Communications & Computer sector are ubiquitous in daily life. Firms in the sector must be quick to adapt to new consumer trends and innovations. Research and development investments are important to introducing products, while nimble, efficient, and technologically advanced manufacturing capabilities are just as important to get products to market successfully. Despite a significant trade deficit, rising disposable income and the proliferation of multi-functional communications devices, such as smart phones, create upward trending demand. Well suited to accommodate the supply chain and research and development needs of the sector, North Carolina skilled labor is also a vital element. The industries of Communications & Computer lead all supply chain sectors with wages more than three times the state average. The sector reflects moderate labor income, smaller overall workforce, average output, and above average productivity. Sales, property, income, and social insurance taxes lead all assessments for a total local, state, and federal tax contribution of $1.2B.

TOTAL ECONOMIC IMPACT OF THE SECTOR

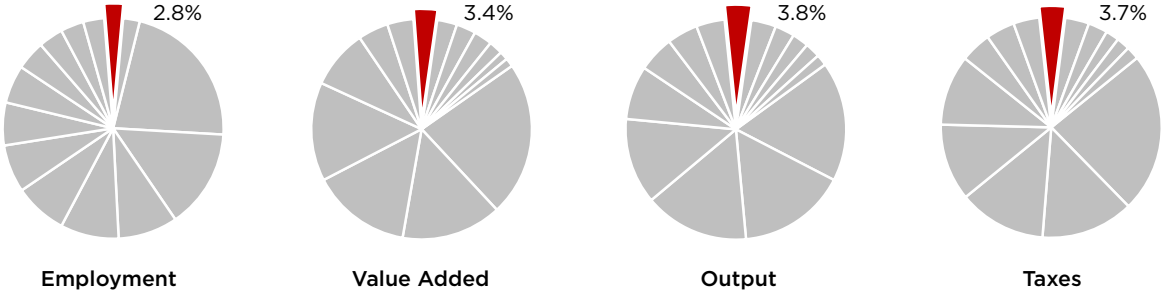
Employment	Labor Income	Value Added	Output	Taxes
13,210 Direct	$1.92B Direct	$2.96B Direct	$8.49B Direct	$395.1M State & Local
33,870 Indirect & Induced	$1.69B Indirect & Induced	$2.86B Indirect & Induced	$5.21B Indirect & Induced	$818.8M Federal
47,080	**$3.61B**	**$5.82B**	**$13.70B**	**$1.21B**

Communications & Computer Sector in North Carolina

Against the tide, Morrisville-based technology giant Lenovo celebrated the 2012 opening of a manufacturing facility in North Carolina. This helps the firm leverage proximity to research and development, as well as nearby distribution.[97] Yet, this occurrence for most operations in the sector is not a trend in development. Instead, firms across the sector face mounting pressure to offshore production to low-cost, low-wage regions such as Mexico, China, and Korea. For instance, North Carolina represents just 3.5% of the domestic computer manufacturing industry output. Companies

97. Shah, Agam. "Lenovo to Open First U.S. Manufacturing Plant in N.C.." Computerworld. 2012.

COMMUNICATIONS & COMPUTER VS. ALL SUPPLY CHAIN SECTORS



with a presence in the sector include General Dynamics, a major supplier for larger industrial sectors like aerospace, military, and utilities. Hickory-based CommScope is also active in Communications & Computer, working with telecommunications, utilities, transportation, and healthcare sectors.

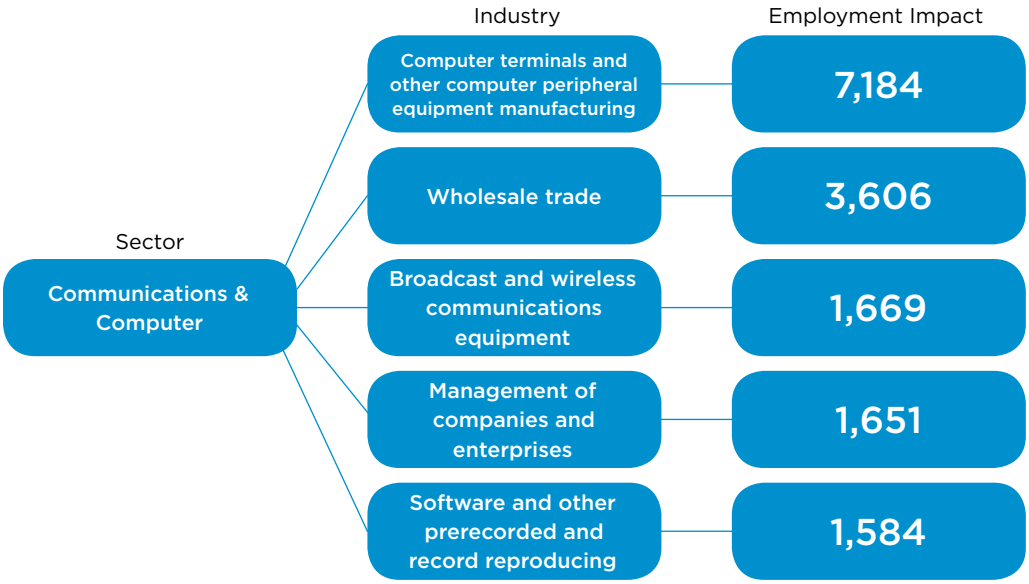
Industries in the sector across North Carolina benefit from the robust community college and university systems to deliver skilled labor and innovation. There is significant domestic market concentration. The top 50 companies in the industry control more than 90% of the revenue. To remain or grow competitively, firms in North Carolina must leverage every advantage, including a "58-campus community college system nationally recognized for its customized workforce training programs."[98] In both domestic and international markets, analysts point to having the human and operational resources to adapt to new and emerging consumer demands as important factors for success. Domestic communications equipment manufacturing is concentrated on the West Coast. However, southeastern firms, including those in North Carolina, benefit from less-costly access to downstream export markets in Brazil and Mexico through Caribbean shipping routes.

Economic Impact in North Carolina

The Communications & Computer sector in North Carolina supports more than 13,200 employees statewide. Outside of telephone apparatus and computer storage manufacturing, employment in the sector represents nearly 6% of the national industry labor force. With labor income of more than $1.9B, and average labor income per employee exceeding $145,000, wages for the sector lead all supply chain industries. The sector's employees enjoy more than triple the statewide income average, and exceed the state's manufacturing wage by more than 200%. Within the sector, North Carolina wages represent more than 1.5 times the national sector average.[99]

Nearly $8.5B in sector output, as well as more than $2.96B in value added contribution, place the Communications & Computer sector 9th and 8th respectively amongst the 14 supply chain industries. In addition to direct economic impact, the sector is indirectly responsible for upwards of 14,000 jobs, accounting for more than $920M in labor income. The impact of local industries buying goods and services from other local industries can be seen in the additional $2.8B of output.[100]

98. Thrive NC (Economic Development Partnership of NC). "Education in North Carolina." 2016.
99. United States Census Bureau. "American Factfinder." 2015.
100. IMPLAN.com. "Definitions: IMPLAN." 2015.



The industries of the Communications & Computer sector drive demand across the entire economy. For the Communications & Computer sector, these are the top five benefiting industries and associated employment impact.

Tax Contribution

The tax impact of the Communications & Computer sector in North Carolina on state, local, and federal tax revenues is average, ranking 9th for overall tax impact. On the state level, the sector accounts for receipts of more than $395M, or nearly 3% of total tax revenues generated from supply chain related sectors in 2013. Federal taxes from the sector account for more than $818M. Sales, property, personal income, and social insurance taxes account for the majority of assessments exceeding $977M or 80% of all contribution categories.

- 9th in state and local taxes paid (2.95% of total supply chain taxes paid, $395,147,462)
- 8th in federal taxes paid (4.36%, $818,759,259)

Broader Context: Communications & Computer Sector in the U.S.

Demand for the products of the Communications & Computer sector pull from nearly every corner of both the global and domestic economies. Connectivity speed, bandwidth, and instant communications are currency in both industry and commerce. The providers of the technology that enables the use of multi-functional devices will benefit if they can meet the market need. Research and development investments are important tools to stay current with emerging technologies and downstream preference. Advanced manufacturing and logistics capabilities are also important to successfully get products to market, as the industry is fully globalized.

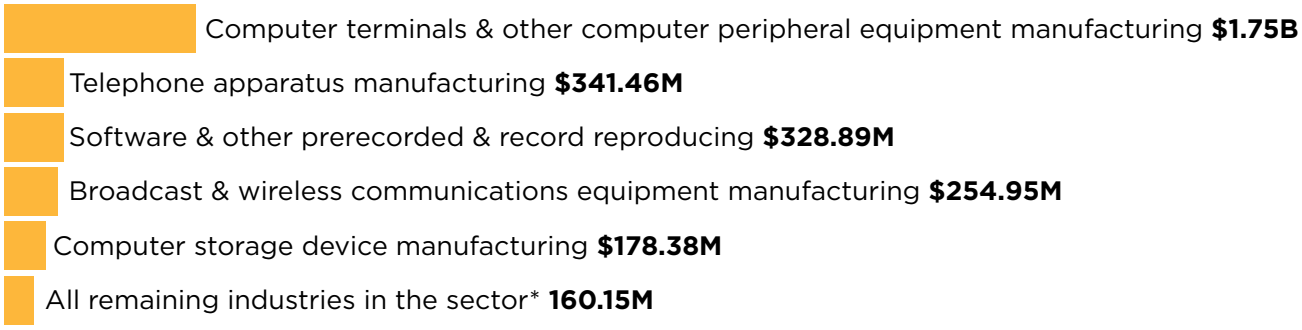
Often firms operate research, finance, and marketing operations domestically while manufacturing abroad. Global competition across the sector is fierce and American firms face a significant trade deficit that analysts expect to grow.[101] Add to this price pressure and thinning profit margins, consolidation and economies of scale will help achieve industry sustainability. All industries within

101. Ulama, Darryle. "Computer Manufacturing in the US (IBISWorld Report 33411a)." IBISWorld. 2015.

the sector are in pursuit of more efficient and less costly manufacturing, seeking the latter in markets like China, Korea, and Mexico.[102] Yet, keeping pace with product and technology development is a more important marker of future success. With tablets and smart, multi-functional mobile devices cannibalizing demand for computer terminals, personal computer firms have increased focus on innovative design and differentiating features to remain relevant.[103]

A silver lining tied to the development of cloud-based technology is increased demand for servers and other cloud-compatible infrastructure and equipment. With net demand on the rise, the sector is poised for continued growth. Protecting profit margins and domestic market share will depend on the decisions of the broad range of firms in the sector.

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION



* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Communications & Computer sector has been defined to include the following industries and their associated IMPLAN codes: Electronic computer manufacturing (301); Computer storage device manufacturing (302); Computer terminals and other computer peripheral equipment manufacturing (303); Telephone apparatus manufacturing (304); Broadcast and wireless communications equipment manufacturing (305); Other communications equipment manufacturing (306); Audio and video equipment manufacturing (307); Software and other prerecorded and record reproducing (324).

102. Ulama, Darryle. "Communication Equipment Manufacturing in the US (IBISWorld Report 33422)." IBISWorld. 2015.
103. Associated Press. "After Losing Sales to Smartphones and Tablets, PC Makers Shake Up Design to Woo Consumers Back." 2015.

Textiles

With 1 of every 9 textile workers in the U.S. employed in North Carolina, the sector is an integral part of the history and economic development of the state. Creating not only high employment, Textiles delivers fabrics, yarn, apparel, home furnishings, and most importantly, the American brand to domestic and international markets.

Textiles

Textiles in the United States remain globally competitive. This is a statement often greeted with looks of surprise. Yet export volume from industries in the domestic textiles sector continue to deliver fabrics, yarn, apparel, home furnishings, and, most importantly, the American brand internationally. In North Carolina, the Textile sector is an integral part of the history and economic development of the state. Today's research, development, and production of innovative fabrics, polymers, and materials combinations drive the sector. Broader application of textile solutions offers opportunity for firms in the sector. With 1 of every 9 textile workers in the U.S. employed in North Carolina, the sector is responsible for high employment, moderate labor income, moderate productivity and output, yet tepid wages. Sales, income, and social insurance taxes lead all tax contributions, federal, state, and local, of more than $1.2B.

TOTAL ECONOMIC IMPACT OF THE SECTOR

Employment	Labor Income	Value Added	Output	Taxes
41,920 Direct	$1.83B Direct	$2.51B Direct	$9.88B Direct	$420.3M State & Local
39,280 Indirect & Induced	$1.85B Indirect & Induced	$3.12B Indirect & Induced	$6.03B Indirect & Induced	$798.9M Federal
81,200	**$3.68B**	**$5.63B**	**$15.91B**	**$1.22B**

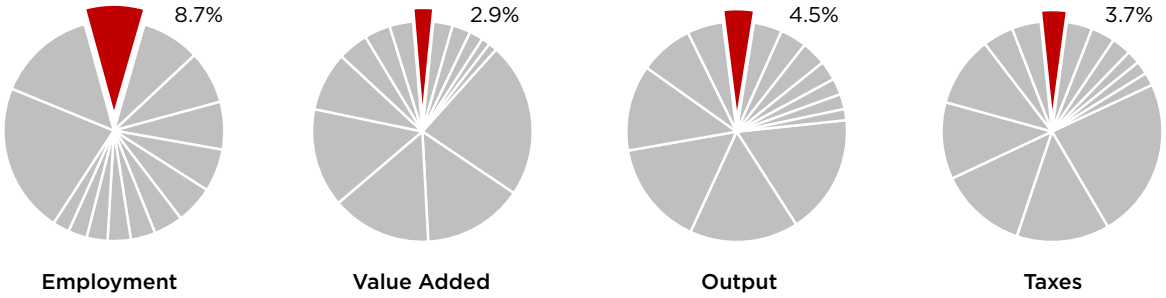
Textiles Sector in North Carolina

The textile industry has a long history in the state of North Carolina. Textile manufacturing was a significant driver in the industrial development of the state. According to the Center for Globalization, Governance & Competitiveness at Duke University, North Carolina "has several assets in the textile industry, ranging from a long history in textile production to being the location of several of the most important global companies, industry associations and educational resources."

North Carolina once anchored the thriving and beating heart of this sector. Leading firms like Greensboro-based Burlington Industries, by 1970 the world's largest textile manufacturer, helped draw sector growth in reputation and sheer number of firms. Even as recently as 1992, North Carolina ranked first among U.S. states for textile production.[104] However, international development in the industry and the rise of globalization have had a significant impact on the industry in the Old North State. Similar to manufacturing in general, textile industry job losses have been significant nationally. Employment in North Carolina reflects this changed landscape. Between 2002 and 2005 alone, North Carolina experienced an almost 30% job loss in the textile and textile product mills, and

104. Duke University Center on Globalization, Governance & Competitiveness. "Textiles." 2012.

TEXTILES VS. ALL SUPPLY CHAIN SECTORS



apparel sectors according to the North Carolina Department of Commerce and the U.S. Bureau of Economic Analysis.[105]

Today, the industry is on solid footing once again. Niche production and larger scale operations have both found viable paths forward in the short term. Longer sustainability for the sector will, like many others, rely on the development of new technology and processes. Research and development infrastructure for textiles in North Carolina is robust, and includes the resources of a 58-campus community college, the statewide university system, and prominent innovation centers like NC State University's College of Textiles in Raleigh. Improvements in manufacturing, product quality, efficiency, environmental impact, sustainability, and productivity can also create new market opportunities for the Textiles sector.

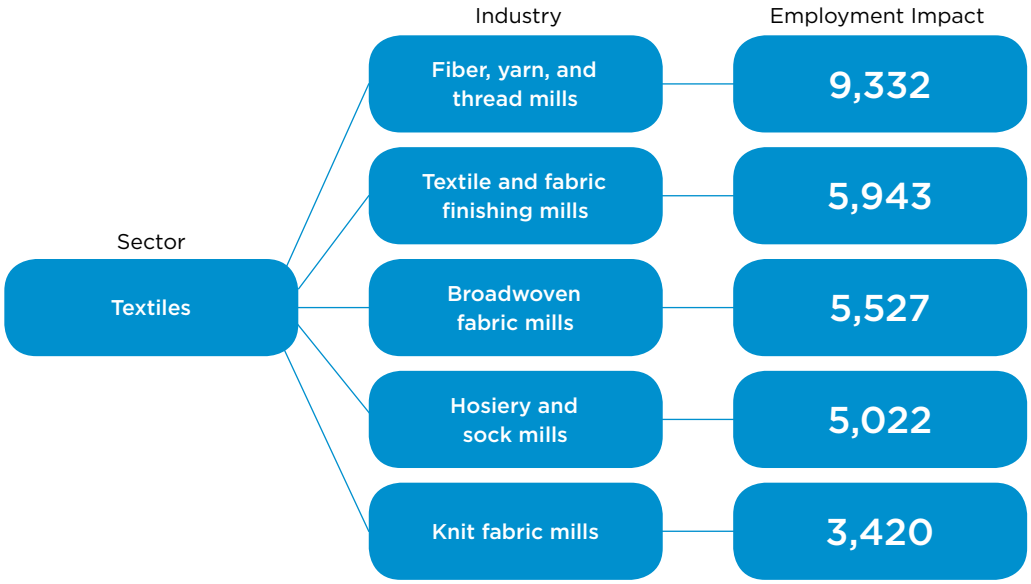
Economic Impact in North Carolina

Despite the challenges, rumors of the demise of textiles in North Carolina have been greatly exaggerated. Nationally, textiles are enjoying a "resurgence, especially in the Southern states with states such as North Carolina and Georgia offering favorable tax breaks, reliable utilities, modern airports and ports and a highly skilled, non-unionized workforce."[106] In fact, one in nine textile employees in the United States works in North Carolina, or 9% of U.S. employment in the field. The North Carolina Textiles sector remains relevant nationally, ranking as the 4th largest in the U.S. Textile workers account for 8.7% of all employees, or third largest by employment in statewide supply chain related economic sectors chosen and analyzed for this report.

The Textile sector in North Carolina supports almost 42,000 employees directly engaged statewide, as well as direct employment income impact of more than $1.8B. The Textiles sector represents more than 1% of all jobs in North Carolina, and almost 10% of all manufacturing employment in North Carolina. This translates into an average labor income of more than $43,760 per individual employed in textiles in North Carolina, on par with the 2014 statewide average compensation of $43,280.[107] However, if compared to other supply chain related industries in North Carolina, textiles rank 8th accounting for only 5.6% of the total labor income. The value of industry production from the Textiles sector is robust, as it produced more than $9.87B in direct output in 2013, delivering just over 4.5% of the entire supply chain output for the state.

Of the top industries considered in the Textiles sector analysis, fiber, yarn, and thread mills represent more than $422M or 16.8% of the sector's total economic impact by gross value added, a "measure

105. North Carolina Commission on Workforce Development. "State of the North Carolina Workforce An Assessment of the State's Labor Force Demand and Supply 2007 – 2017." 2015.
106. "Textile Mills Industry Profile: The United States." Textile Mills Industry Profile: United States (2015): 1-33. Business Source Complete. 2015.
107. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates." 2015.



The industries of the Textiles sector drive demand across the entire economy. For the Textiles sector, these are the top five benefiting industries and associated employment impact.

of the contribution to GDP made by an individual producer, industry or sector,"[108] and more than 19% of sector employment. Broadwoven fabric mills, and textile and fabric finishing mills, and nonwoven fabric mills round out the top industries in the Textiles sector in terms of total value added. Together with fiber, yarn, and thread mills representing almost 60% of the sector's total value added economic impact, almost 64% of output, and 51.9% of Textiles sectors employment across North Carolina. The textile industry is geographically concentrated in Guilford, Randolph, Alamance, Catawba, Gaston, and Mecklenburg counties.[109]

Tax Contributions

The impact of Textiles in North Carolina on state, local, and federal tax revenues is also significant, placing it within the top 10 supply chain related sectors for taxes paid. On the state level, Textiles account for 3.8% of total tax revenues generated from supply chain related sectors, with local and state taxes paid in excess of $420M in 2013. Of this, sales, property, and personal income taxes provide the most significant contributions, totaling more than 83% of assessments for the year and a combined total of more than $362M. Federal coffers also benefit from the Textile sector, with almost $800M paid in 2013 or 4.7% of all supply chain sectors. The vast majority of these taxes are personal income, followed by social insurance payments by employees and employers. These three categories account for more than $623M or 78% of all federal taxes paid in Textiles in 2013.

- 8th in state and local taxes paid (3.14% of total supply chain taxes paid, $420,328,349)
- 9th in federal taxes paid (4.26%, $798,906,151)

Broader Context: Textiles Sector in the U.S.

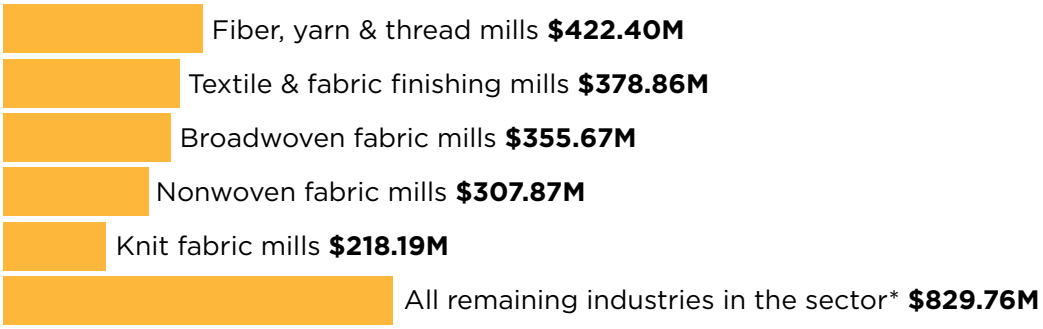
Contrary to popular perception, the U.S. Textile sector remains competitive on the global scale holding 4th position in global export value, behind only China, India, and Germany. There are further

108. IMPLAN.com. "Definitions: IMPLAN." 2015.
109. Duke University Center on Globalization, Governance & Competitiveness. "Textiles." 2012.

positive developments, as "the sector is experiencing growth as U.S. exports of textiles increased by 45 percent between 2009 and 2014, to $18.3 billion." According to the United States Department of Commerce, the Textile industry in the U.S. represents 2% of all American manufacturing jobs, numbering 232,000 nationally. The U.S. is competitive in the manufacture of textiles, including raw materials, fiber, yarn, and thread, as well as fabrics, both woven and non-woven, apparel, hosiery, home furnishings and other industrial uses. American strength in this industry includes "cotton, manmade fibers, and a wide variety of yarns and fabrics, including those for apparel and industrial end-uses."[110] In fact, according to the National Council of Textile Organizations (NCTO), an industry-advocacy organization, "consumption of domestic cotton totaled 1.7 billion pounds in 2014."[111]

Like many other areas of the industrial economy, the role of technology and innovation have become increasingly important to the Textile industry. With textiles included in everything from medical products to military uniforms, as well as innovation in the more standard applications of apparel and home furnishings, more technically skilled workers are needed for today's textile industry. As U.S. textile companies focus on "retooling their businesses, finding more effective work processes, investing in niche products and markets, and controlling costs," their capital expenditure has reflected this with investments of $1.6B in 2013.[112]

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION



* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Textiles sector has been defined to include the following industries and their associated IMPLAN codes: Fiber, yarn, and thread mills (112); Broadwoven fabric mills (113); Narrow fabric mills and schiffli machine embroidery (114); Nonwoven fabric mills (115); Knit fabric mills (116); Textile and fabric finishing mills (117); Fabric coating mills (118); Carpet and rug mills (119); Curtain and linen mills (120); Textile bag and canvas mills (121); Rope, cordage, twine, tire cord and tire fabric mills (122); Other textile product mills (123); Hosiery and sock mills (124); Other apparel knitting mills (125); Cut and sew apparel contractors (126); Men's and boys' cut and sew apparel manufacturing (127); Women's and girls' cut and sew apparel manufacturing (128); Other cut and sew apparel manufacturing (129); Apparel accessories and other apparel manufacturing (130); Footwear manufacturing (132); Other leather and allied product manufacturing (133).

110. "The Textiles Industry in the United States." US Department of Commerce: SelectUSA. 2015.
111. "U.S. Textile Industry - National Council of Textile Organizations." NCTO. 2015.
112. "The Textiles Industry in the United States." US Department of Commerce: SelectUSA. 2015.

Household Goods & Furniture

From the *Furniture Capital of the World* in Hickory, to the largest single-store furniture retailer in the world, North Carolina is well-known as a global center for Household Goods & Furniture. Today, the sector remains vibrant, viable, and the North Carolina brand continues to represent quality and craftsmanship in the marketplace worldwide.

Household Goods & Furniture

Household Goods & Furniture is an economic sector with a significant history and legacy in North Carolina. Today, the industries that make up the category benefit from the return of consumer confidence, rising disposable income, and growth in the housing market. Yet, like most sectors, it will face competition in the form of rising import volumes from China and other Asian producers. Consolidations, high-end or niche market development, and further integration of technology into products and process will be tools used by domestic industry to remain relevant. Further changes in consumer demographics will influence the product mix. Demand for firms manufacturing furniture, cabinets, countertops, shelving, and mattresses in the U.S. will shift as Baby Boomers and Millennials influence spending patterns. Although the sector is not what it was years ago, it remains viable and the state brand continues to represent quality and craftsmanship in the global marketplace. The Household Goods & Furniture sector delivers moderate labor income, moderate productivity, and moderate output. Sales, property, income, and social insurance taxes lead all assessments for a total tax contribution of more than $1.1B.

TOTAL ECONOMIC IMPACT OF THE SECTOR

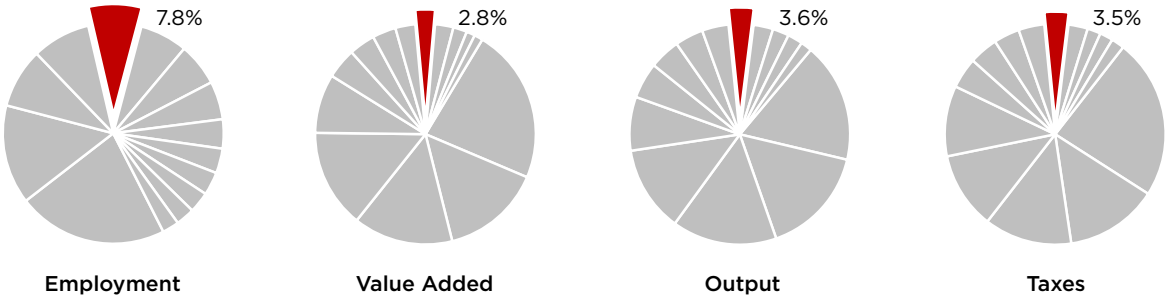
Employment	Labor Income	Value Added	Output	Taxes
37,210 Direct	$1.72B Direct	$2.45B Direct	$7.95B Direct	$364.1M State & Local
37,090 Indirect & Induced	$1.76B Indirect & Induced	$2.99B Indirect & Induced	$5.70B Indirect & Induced	$765.1M Federal
74,300	**$3.48B**	**$5.44B**	**$13.65B**	**$1.13B**

Household Goods & Furniture Sector in North Carolina

From the *Furniture Capital of the World* in Hickory, to the world's largest single-store furniture retailer located in Jamestown,[113] the state of North Carolina is well known as a global center for Household Goods & Furniture. From early industry development in the 1890s, furniture manufacturing in North Carolina grew rapidly, and together with textiles and tobacco, have historically been considered the major economic drivers for the state. Today, one in 10 furniture manufacturing workers is employed in North Carolina, and the state ranks 5th for number of firms,

113. Lynn, Seldon. "North Carolina, The Furniture Capital of the World." VisitNC.com. 2016.

HOUSEHOLD GOODS & FURNITURE VS. ALL SUPPLY CHAIN SECTORS



home to 5.2% of all U.S. firms in furniture manufacturing.[114] However, global competition continues to pressure the sector and employment in the state's furniture manufacturing industry has steadily decreased since 1992.

Household Goods & Furniture firms are focusing on staying competitive through new manufacturing strategies. A shift in emphasis to higher value, customized products weakens the advantages of foreign producers. Successful firms in the sector leverage competencies in "design, distribution, and marketing techniques [that] depend on intimate knowledge of consumers and domestic markets."[115] This approach, combined with advanced logistics and inventory management practices, is an important tool in sustaining competitiveness.

Economic Impact in North Carolina

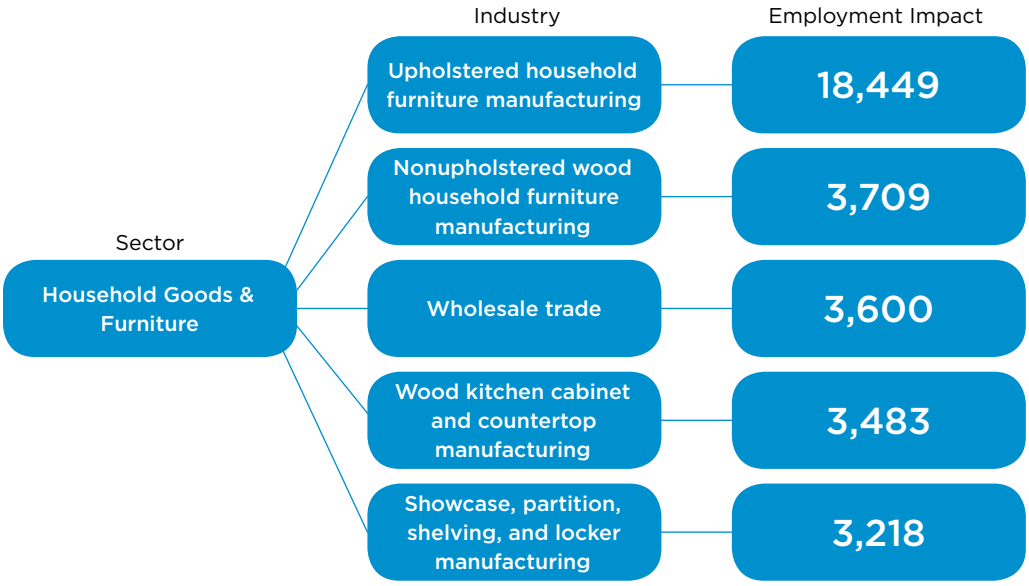
With more than 37,200 employees statewide, the Household Goods & Furniture sector ranks 5th in terms of direct employment, representing 8.4% of the state's manufacturing workforce. Total labor income for the sector is more than $1.7B in 2013, 10th of all supply chain sectors. Average labor income of $46,260 is just marginally higher than the state compensation average of $43,280,[116] and thousands below the state manufacturing average of $66,630.[117] The Household Goods & Furniture sector delivered nearly $8B in direct output in 2013, and a GDP value added contribution of $2.45B. The sector further impacts local economies statewide, spurring more than 7,700 additional jobs in wholesale trade, restaurants, and real estate.

Within the sector, upholstered household furniture manufacturing is the most significant industry for employment impact carrying more than 18,380 employees, nearly half of the sector's labor count and 44.2% of the sector's direct labor income total. The next closest industries are non-upholstered wood household furniture manufacturing and wood kitchen cabinet and countertop manufacturing, representing 9.94% and 9.34% respectively of sector direct employment. The Household Goods & Furniture sector is geographically concentrated in the "Piedmont Triad region of North Carolina, especially Catawba, Caldwell, Guilford, Randolph, Alexander, and Davidson counties. Major furniture manufacturing cities include Hickory, High Point, Thomasville, Greensboro, Asheboro, and Winston-Salem."[118]

Tax Contributions

With total tax contributions of $1.1B, the sector represents 3.51% of the $32.1B in taxes paid to state, local, and federal coffers by supply chain related sectors. The sector paid more than $364M in taxes to state and local governments, 2.7% of the supply chain contribution. The $765M paid in federal assessments places it

114. Duke University Center on Globalization, Governance & Competitiveness. "Employment & Wages - U.S. Furniture Industry Privately-Owned Establishments, 1992-2012." 2012.
115. Ibid.
116. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates." 2015.
117. National Association of Manufacturers. "North Carolina Manufacturing Facts." 2013.
118. Duke University Center on Globalization, Governance & Competitiveness. "Furniture." 2012.



The industries of the Household Goods & Furniture sector drive demand across the entire economy. For the Household Goods & Furniture sector, these are the top five benefiting industries and associated employment impact.

10th of all supply chain sectors. Similar to many sectors, sales, property, and personal income taxes are the most significant categories, totaling more than 85% of state and local assessments annually in this sector for a combined total of more than $310M. The majority of federal taxes are payroll related, with personal income ($205,523,824) followed by payroll related social insurance contributions from employees and employers ($401,371,306), together accounting for nearly 80% of the federal assessments paid.

- 10th in state and local taxes paid (2.73% of total supply chain taxes paid, $364,101,274)
- 10th in federal taxes paid (4.08%, $765,107,916)

Broader Context: Household Goods & Furniture Sector in the U.S.

For firms that make up the Household Goods & Furniture sector, rising competition from lower-cost global producers like China and rising import pressure will challenge their efforts to capture the nearly $83B domestic retail market for home furniture and bedding.[119] Across the country, more than 4,100 furniture manufacturers face this challenge daily, accounting for $22.8B in revenue.[120] Yet, participation in the industry is expected to shrink as firms consolidate to compete with international manufacturing able to produce comparable products at lower cost in a less stringent regulatory environment. Just as consolidation is a rising trend in the sector, U.S. manufacturers are leveraging innovation in design and manufacturing to adapt to the developing landscape.[121] Coupled with rising prices for raw materials, a strong U.S. dollar further hinders export growth and threatens the sector. However, positive signs for the sector offer opportunity. Rebounding consumer confidence, rising disposable income, and an increase in housing starts are expected to spur increased demand both retail and wholesale.

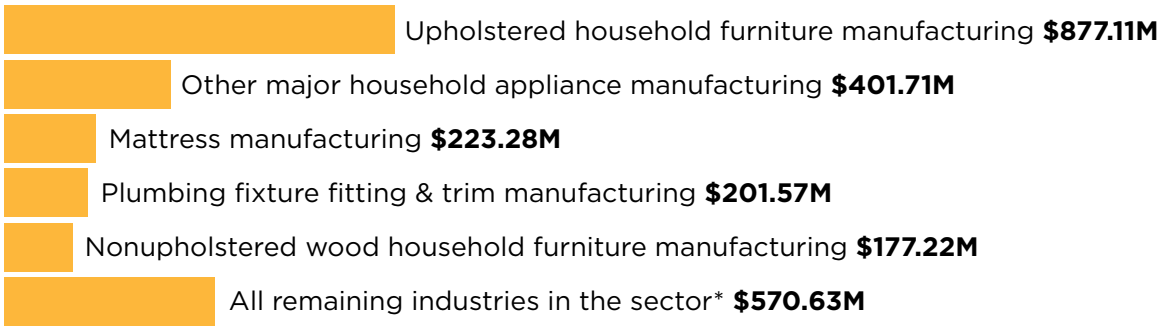
Cost challenges, pressure from imports, and consolidation are key trends for domestic furniture manufacturing, however, changing consumer demographics will also impact the industries within the sector. Industry analysts Anderson Bauman Tourtellot Vos suggest that as “baby boomers downsize”

119. Hoopes, Stephen. “The Retail Market for Home Furniture & Bedding in the US (IBISWorld Report OD6110).” IBISWorld. 2015.
120. McGinley, Devin. “Household Furniture Manufacturing in the US (IBISWorld Report 33712).” IBISWorld. 2015.
121. Dolega, Michael. Offshoring, Onshoring and the Rebirth of American Manufacturing. TD Economics, 2012.

new furniture purchase will drive demand. They also advise that further shifts in demographics and the increasing purchasing power of Millennials reinforces the need for the sector to advance integration of technology into product design.[122]

Sales and distribution channels will also become important as online and e-commerce transactions grow within the retail furniture market. As the domestic furniture market shifts to adapt to new market dynamics, jobs created in the sector will not simply replace those lost, but "will require less labor-content and consist of highly skilled, highly productive positions."[123] Access to skilled labor is a key to the future success of the Household Goods & Furniture sector in the U.S.

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION



* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Household Goods & Furniture sector has been defined to include the following industries and their associated IMPLAN codes: Small electrical appliance manufacturing (327); Household cooking appliance manufacturing (328); Other major household appliance manufacturing (331); Pottery, ceramics, and plumbing fixture manufacturing (199); Plumbing fixture fitting and trim manufacturing (255); Wood kitchen cabinet and countertop manufacturing (368); Upholstered household furniture manufacturing (369); Non-upholstered wood household furniture manufacturing (370); Other household non-upholstered furniture manufacturing (371); Institutional furniture manufacturing (372); Wood office furniture manufacturing (373); Office furniture, except wood, manufacturing (375); Showcase, partition, shelving, and locker manufacturing (376); Mattress manufacturing (377); Blind and shade manufacturing (378).

122. Arcieri, Katie. "Report: U.S. Furniture Industry Poised for Turnaround." Triad Business Journal. 2015.
123. Anderson Bauman Tourtellot Vos. The American Furniture Industry: 2014 Industry Watch Update. 2014.

Building Materials

Building Materials rises to meet a revitalized construction market driven by upward trends in home starts, as well as non-residential and commercial construction. Federal and state infrastructure projects also engage this dynamic sector across North Carolina.

Building Materials

Building Materials rises to meet a revitalized construction market driven by upward trends in home starts, as well as non-residential construction. Federal and state infrastructure projects also engage the sector, but profitability will be a challenge for the industry. With limited import pressure, domestic markets may ignite expansion in the heating, ventilating, and air conditioning industry. Rising private investment in residential renovation improves growth potential for stone and mineral products, and further raises construction demand. Industrial recovery, together with residential investment, also supports filter and purification demand—where North Carolina is home to a growing regional cluster. Yet, worrisome macro-economic indicators, such as North Carolina's rising unemployment, may moderate industrial growth. It's clear that the future of North Carolina's Building Materials sector is closely linked with broader trends in the domestic economy. The sector demonstrates average wages, moderate productivity, and delivers roughly 2% of the state's supply chain output. Sales, property, income, and social insurance taxes, as well as corporate contributions, lead all assessments for a total tax contribution of just over $629M.

TOTAL ECONOMIC IMPACT OF THE SECTOR

Employment	Labor Income	Value Added	Output	Taxes
14,700 Direct	$0.82B Direct	$1.73B Direct	$4.82B Direct	$205.3M State & Local
18,240 Indirect & Induced	$0.88B Indirect & Induced	$1.57B Indirect & Induced	$2.81B Indirect & Induced	$423.7M Federal
32,940	**$1.70B**	**$3.30B**	**$7.63B**	**$629M**

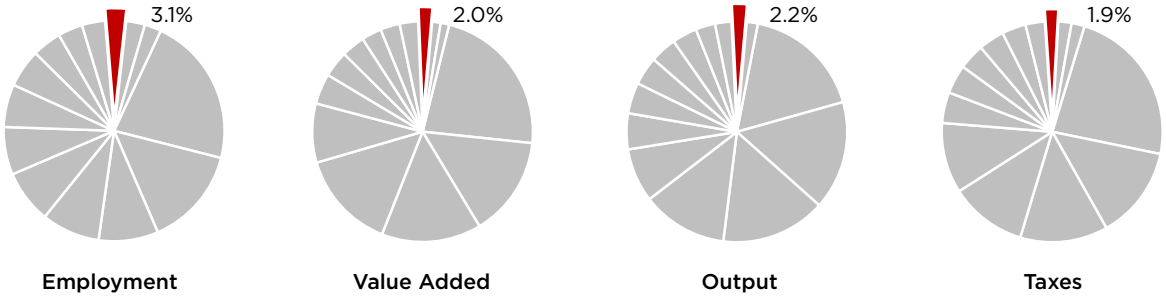
The Building Materials Sector in North Carolina

The Building Materials sector in North Carolina faces many of the same trends impacting the domestic supply chain. Yet, few are as closely tied to the fate of the residential and non-residential construction. As the U.S. economy experiences broader economic recovery, upward trends in home starts translate into demand for North Carolina firms. Strong construction growth also means strong demand for industries such as air conditioning, and refrigeration manufacturing, ready-mix concrete, as well as brick, tile, and other structural clay product manufacturing.

With almost 400 state Department of Transportation highway projects currently underway in North Carolina, representing contracts totaling $5.26B,[124] infrastructure investment will contribute to sector prosperity, too. Unlike many of the other sectors in this analysis, the Building Materials sector enjoys limited exposure to import pressure. Heavy or bulky products and costly transportation enable some shelter for U.S. manufacturers

124. North Carolina Department of Transportation. "Construction Progress Report." 2015.

BUILDING MATERIALS VS. ALL SUPPLY CHAIN SECTORS



in domestic markets. These issues also provide opportunity for export to neighboring trade partners Mexico and Canada for nearby firms. For all sector exports a strong dollar offers headwinds to growth.

There are troubling signs, however, that North Carolina's growth is not keeping pace with the broader domestic recovery. With reports from the 5th district of the U.S. Federal Reserve that North Carolina housing starts are down more than 6% from 2014 to 2015,[125] the sustainability of demand for residential construction in North Carolina is potentially unstable. Coupled with the state's higher-than-national-average unemployment rate, these factors represent a real threat to sector growth. In the non-residential arena, commercial vacancy rates in major metropolitan areas across the state are shrinking[126] and may eventually spur additional non-residential construction, expanding capacity for business growth in North Carolina and providing a boon to sector growth and revenue.

Many sectors across the supply chain face mounting pressure to improve environmental impact. Adding to construction demand, firms retooling or investing in capital projects drive demand for HVAC upgrades, as well as more advanced filtration products. In eastern North Carolina, a regional cluster has developed in this growing industry, with firms such as Flanders Filtration, Camfil Farr, and Stanadyne/Clarcor located in Washington, North Carolina.[127] Cluster development across the state provides interesting synergies. This trend is something seen in many of the supply chain sectors analyzed. Domestic demand for many of the industries in the sector is expected to expand, providing positive opportunities for the more than 14,700 employees and firms of North Carolina's Building Materials sector.

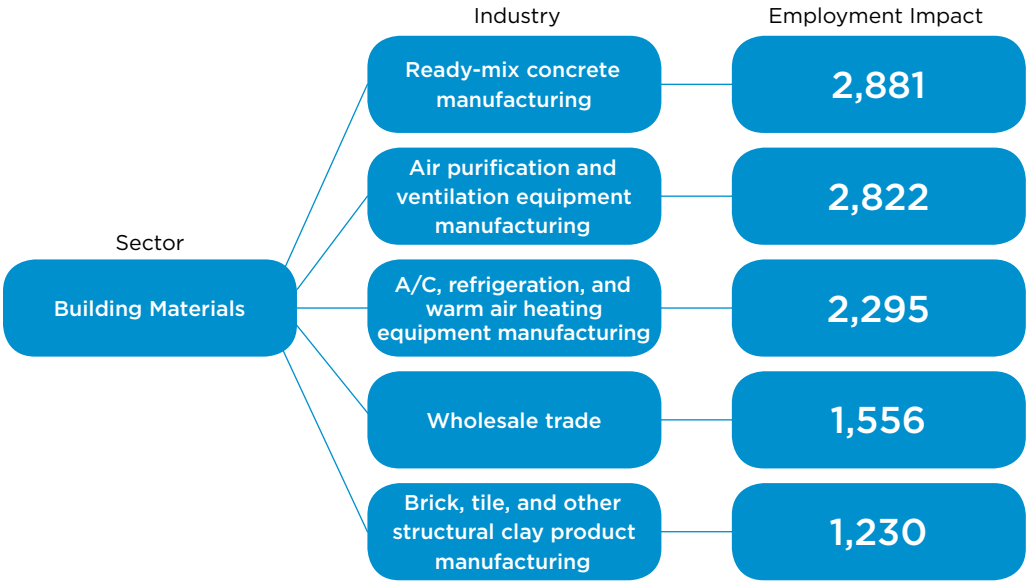
Economic Impact in North Carolina

For the industries considered, the Building Materials sector ranks 12th in terms of total direct employment, representing nearly 3.3% of the state's manufacturing workforce. With total labor income in excess of $817M and average labor income of $55,613, the sector beats the 2014 statewide average compensation of $43,280,[128] but falls nearly 17% below the average manufacturing wage.[129] Total direct output for the sector tops $4.8B, ranking 13th of its supply chain peers. The industries of the Building Materials sector also impact the local economy beyond direct transactions, spurring more than 3,300 jobs in wholesale trade, real estate, and restaurants.

Productivity is a brighter spot for the sector, ranking 9th overall with more than $327,780 of output for each direct employee. Within the sector, ready-mix concrete manufacturing is the most significant industry for employment, carrying 22.5% of Building Materials with jobs numbering more

125. Federal Reserve Bank of Richmond. Snapshot (North Carolina). Federal Reserve Bank of Richmond, 2015.
126. Ibid.
127. Walker, Jessica. "Filter Manufacturing Grows in Eastern North Carolina." Business Climate 2015.
128. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates." 2015.
129. National Association of Manufacturers. "North Carolina Manufacturing Facts." 2013.

Building Materials



The industries of the Building Materials sector drive demand across the entire economy. For the Building Materials sector, these are the top five benefiting industries and associated employment impact.

than 2,850 employees statewide. With air purification and ventilation equipment (21.85%) and air conditioning, refrigeration, and warm air heating equipment manufacturing (17.77%) close behind, the top three industries in the sector represent more than 62% of the sector's 12,700 employees. For direct labor income impact, ready-mix concrete leads the sector with $1.5M. The asphalt shingle and coating materials manufacturing industry maintains the highest average labor income of more than $100,200 for its 311 employees statewide. Air conditioning and refrigeration manufacturing leads in both output and total value added with nearly $953M and $340M respectively in 2013.

Tax Contributions

The Building Materials sector's total tax contribution of $629M represents nearly 2% of the $32.1B in taxes paid to state, local, and federal coffers. State and local government receipts for the sector exceed $205M, while the $423M paid in federal assessments places it 12th of all supply chain sectors in both categories. Of this, sales, property, and personal income taxes represent almost 84% of state and local assessments for the year and a combined total of more than $171M. The majority of federal taxes are payroll related, with social insurance contributions from employees and employers ($198M) followed by taxes on corporate profits ($102M) and personal income ($100M), together more than 94% of the sector's federal exposure.

- 14th in state and local taxes paid (1.53% of total supply chain taxes paid, $205,285,717)
- 12th in federal taxes paid (2.26%, $423,738,798)

Broader Context: Building Materials Sector in the U.S.

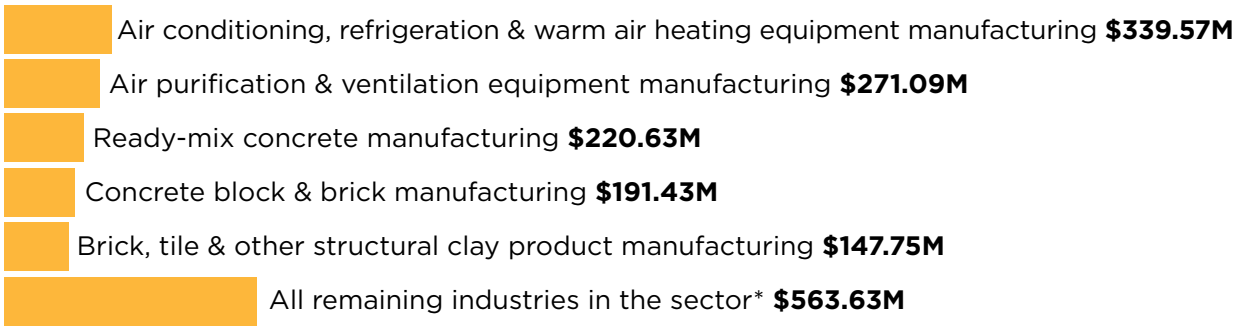
The dynamics of the domestic construction market drive the industries in this sector, for better or for worse. Yet, positive national macro-economic figures indicate that economic recovery is underway. With more than a 21% increase in new home starts in 2014, and non-residential construction up 14% year over year,[130] demand for building materials remains steady. New home starts, as well as increasing private spending on home improvement, will further strengthen demand for industries in the sector, such as cut stone and stone products, as well as gypsum and abrasives.[131] The "total dollar value of private and public construction work done in the

130. Moody's Investor Service. Outlook for North American Building Materials Industry Goes to Positive. 2014.
131. Blau, Gavan. "Mineral Product Manufacturing in the US (IBISWorld Report 32799)." IBISWorld. 2015.

United States"[132] [was] expected to grow at a 4.4% compound rate from 2010 through 2015, leaving analysts predicting "a persistent increase in U.S. construction activity."[133] Infrastructure investment, including programs like the federal Highway Trust Fund, have helped to stabilize industries within the sector. However, firms serving these projects are not immune to the impacts of government "budget deficits and potential cuts and policy changes at the state and federal levels."[134]

Although the sector generally enjoys some shelter from import penetration where transportation costs can be mitigated, pressure is building slowly. China alone now serves more than 30% of the U.S. ceramic brick market. Alternatively, rising income and wages in Asia may provide benefits for other industries in the sector who will see their domestic footprint increase. Lastly, environmental concerns, energy efficiency measures, and the increasing consumer focus on sustainable materials will be important trends for industries in the sector to follow. Each may offer further opportunity for sector growth, both domestic and through export markets.[135]

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION



* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Building Materials sector has been defined to include the following industries and their associated IMPLAN codes: Asphalt paving mixture and block manufacturing (157); Asphalt shingle and coating materials manufacturing (158); Brick, tile, and other structural clay product manufacturing (200); Ready-mix concrete manufacturing (206); Concrete block and brick manufacturing (207); Concrete pipe manufacturing (208); Other concrete product manufacturing (209); Gypsum product manufacturing (211); Abrasive product manufacturing (212); Cut stone and stone product manufacturing (213); Ground or treated mineral and earth manufacturing (214); Mineral wool manufacturing (215); Miscellaneous nonmetallic mineral products manufacturing (216); Air purification and ventilation equipment manufacturing (275); Heating equipment (except warm air furnaces) manufacturing (276); Air conditioning, refrigeration, and warm air heating equipment manufacturing (277).

132. IBISWorld. IBISWorld Business Environment Report: Value of Construction. IBISWorld, 2015.
133. Morea, Stephen. "Heating & Air Conditioning Equipment Manufacturing in the US (IBISWorld Report 33341)." IBISWorld. 2015.
134. Ibid.
135. Blau, Gavan. "Mineral Product Manufacturing in the US (IBISWorld Report 32799)." IBISWorld. 2015.

Paper Products

The Paper Products sector in North Carolina is intense in consumption of energy and materials. Success in this highly competitive sector demands vigilant pursuit of efficiency, reducing environmental impact, and driving product, process and technology innovation.

Paper Products

Paper Products manufacturing rises and falls with consumer demand and industrial output. Food and beverage, automotive, electronics, and other downstream industries rely on Paper Products for packaging. Requiring intense energy and material consumption for production, the sector must be vigilant about its environmental impact, as well as manage the dynamics of a highly competitive industry. Cost cutting and increases in productivity have reduced the overall labor demands for the sector. For North Carolina, economic development incentives have proven to be an effective tool to lure manufacturing investment in the state. In comparison to other supply chain sectors, Paper Products involves minimal international trade, yet enjoys a favorable trade balance. Finding additional markets with favorable tariffs is a key to sustaining current growth in export volume. The industries of the Paper Products sector employ nearly 11,700 people statewide, delivering relatively modest contributions in labor income and output. With average productivity and above average wages, the sector is one of the smallest of the supply chain sectors in North Carolina. Sales, property, income, and social insurance lead all assessments in the sector for total local, state, and federal tax contribution of nearly $610M.

TOTAL ECONOMIC IMPACT OF THE SECTOR

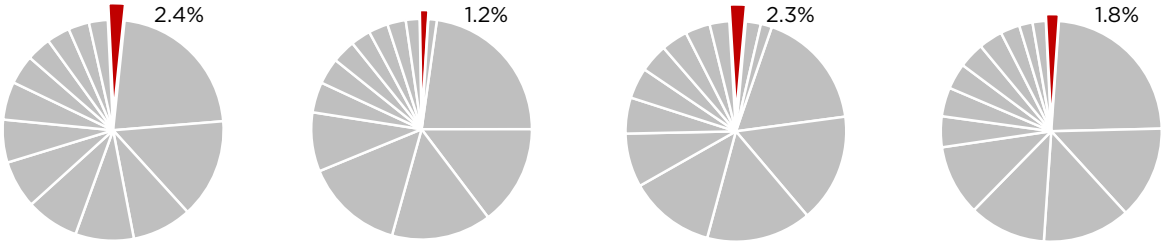
Employment	Labor Income	Value Added	Output	Taxes
11,670 Direct	$0.79B Direct	$1.08B Direct	$5.23B Direct	$220.6M State & Local
20,000 Indirect & Induced	$0.98B Indirect & Induced	$1.64B Indirect & Induced	$3.18B Indirect & Induced	$389.4M Federal
31,670	**$1.77B**	**$2.72B**	**$8.41B**	**$610M**

Paper Products Sector in North Carolina

Similar to the broader domestic sector, consumer spending and industrial production drive demand for Paper Products in North Carolina. The industries of the Paper Products sector process and make paper or converted paper products, including corrugated and paperboard containers, coated papers, bags and other paper-based products.

Major firms in the sector with operations in North Carolina include International Paper, Georgia-Pacific, Domtar, Weyerhaeuser, Blue Ridge Paper, Carolina Container, Cardinal Bag, and the state's largest producer of fully recycled paper products, Jackson Paper. For firms of all sizes, reliable

PAPER PRODUCTS VS. ALL SUPPLY CHAIN SECTORS



and low cost power are important as paper processing requires significant energy and chemical resources during manufacture. Sustained economic recovery has been a positive development for the sector, and several firms have begun or expanded operations in the state. Aside from the infrastructure, economic development incentives have proven to be an effective tool to lure manufacturing investment in the state.[136]

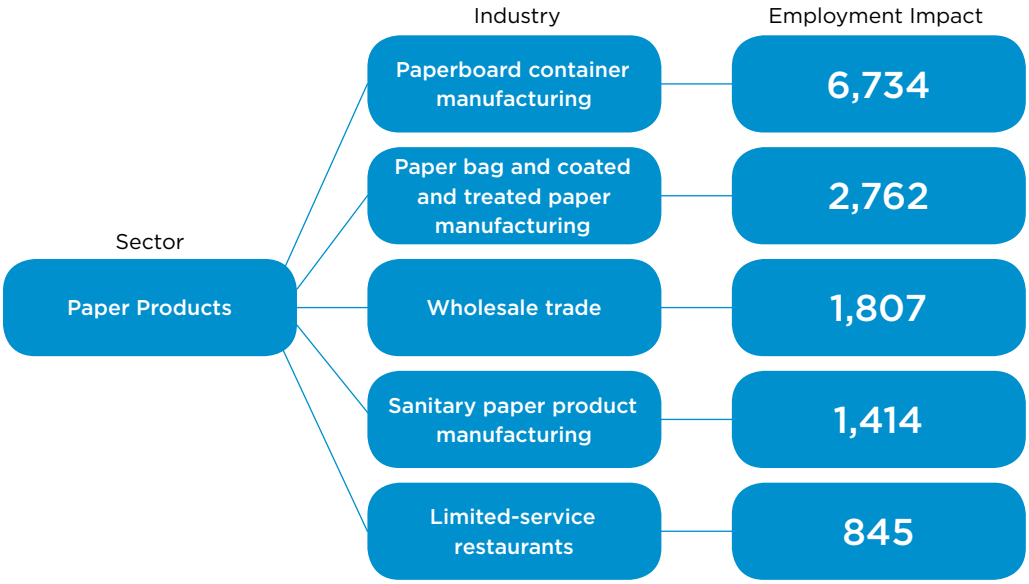
The sector's impact on local water and air quality are also relevant concerns for both industries and the communities that house manufacturing operations.[137] Consumer interest in the business and manufacturing practices of providers incentivizes firms in the industry to invest in efficiency and innovation to reduce the footprint of manufacture. A shifting focus on environmentally sustainable operations and products is not just public relations, as data also shows consumers weigh packaging in their purchase decisions. Polled in 2010, 60% of consumers believe that it is important the products they buy are in packaging made with renewable resources.[138] Some firms in the sector even provide messaging and information that includes mention of their sustainable practices on labels and advertising for their downstream customer.[139]

Economic Impact in North Carolina

The Paper Products sector in North Carolina is dominated by the paperboard container manufacturing industry, with more than 50% of the sector's employees, labor income, and output. The industry's more than 6,600 employees in North Carolina also represent nearly 4% of the domestic employment in paperboard container manufacturing.[140] As a whole, the Paper Products sector supports more than 11,660 employees and direct labor income of more than $791M. This translates into an average labor income of more than $67,800 per individual, above the 2014 statewide average compensation of $43,280, as well as the statewide manufacturing wage of $66,630.[141]

Despite higher than average labor income per employee, Paper Products is one of the smaller of the supply chain sectors in North Carolina, ranking in the bottom quarter in employment, labor income, value added, and output, as well as both state and federal taxes paid. Even so, the sector is responsible for more than 10,500 indirect jobs across North Carolina, accounting for another $603M in labor income. The impact of local industries buying goods and services from other local industries, indirect effects, can be seen in the additional $2B of output.

136. Office of the Governor, North Carolina. Shopping Bag Manufacturer Coming to Rutherford County, N.C. 2014.
137. Clean Water Action Council. "Environmental Impacts of the Paper Industry." 2015.
138. Natural Marketing Institute. Mainstreaming of Sustainability in the U.S. 2010.
139. Evergreen Packaging. "Environmental Messaging." 2010.
140. United States Census Bureau. "Industry Snapshot: Paperboard Container Manufacturing (NAICS 32221)." 2012.
141. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates." 2015.



The industries of the Paper Products sector drive demand across the entire economy. For the Paper Products sector, these are the top five benefiting industries and associated employment impact.

Tax Contributions

With a total state, local, and federal tax contribution of nearly $610M, the Paper Products sector is smaller than most sectors in the supply chain. On the state level, the sector accounts for just over 1.5% of total tax revenues, with local and state assessments paid in excess of $220M in 2013. Of this, sales, property, and personal income taxes provide the most significant receipts, totaling more than $191M or 87% of assessments for the year. Federal revenues also benefit from the Paper Product sector with more than $389M paid in 2013. The vast majority of these taxes are personal income, followed by social insurance payments by employees and employers.

- 12th in state and local taxes paid (1.65% of total supply chain taxes paid, $220,634,550)
- 13th in federal taxes paid (2.08%, $389,362,638)

Broader Context: Paper Products Sector in the U.S.

Like many supply chain industries, the health of the Paper Products sector in the U.S. is linked closely with both consumer demand and the level of industrial production from a host of other industries. Leading uses for products from the sector include food and beverage manufacturing. “Nearly half of all cardboard boxes and containers are used to package milk and other beverages and dry food such as snacks, cereals and crackers.” As the food and beverage sector expands, which is currently the case, paper products will see increased demand. Additional downstream consumers include automobile, electronics, paper, and clothing manufacturing.[142]

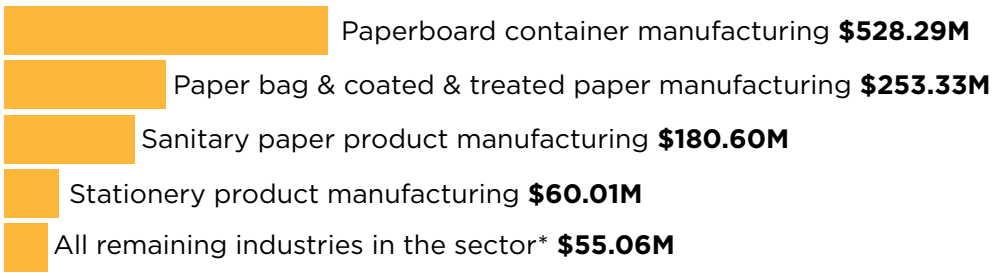
142. McCormack, Ryan. “Cardboard Box & Container Manufacturing in the US (IBISWorld Report 32221).” IBISWorld. 2015.

Rising consumer interest and demand for recyclable and biodegradable products benefits the Paper Products sector. Yet, plastic and wood represent popular substitutes that generally require less energy and chemical consumption during production. These environmental costs are a factor for the sector, but product innovation must also continue to compete with these substitutes on durability.

Even as demand is aligned with the general health of the industrial economy, profitability in this low-concentration sector depends on efficiency in costs and operations. Continued cost cutting and productivity improvements in the sector have reduced the overall labor demand. Economies of scale for larger firms are enjoyed in distribution and larger contracts, but niche product development can also be a competitive edge for smaller operations.[143] Investing in the innovation and technology to improve efficiency must be a prudent decision in a sector with strong competition and thin margins. Continued reductions in cost or improved process gains will help to stem shrinking profits. The domestic Paper Products sector accounts for 367,000 employees[144] and accounts for revenues exceeding $110B annually.[145]

Although the Paper Products sector enjoys a favorable trade balance, import pressure from Canada and Mexico threaten domestic revenues. As products in this sector are generally more expensive to ship than manufacture locally, the ease of transport and favorable tariffs benefit the first and third, respectively, most active exporters to the U.S. Alternatively, these markets also represent nearly 87% of growing U.S. exports for the sector.[146] The U.S. also enjoys duty free trade for paper products with other major export markets through additional agreements, such as the U.S.-Korea Free Trade Agreement signed in 2012.[147]

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION



* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Paper Products sector has been defined to include the following industries and their associated IMPLAN codes: Paperboard container manufacturing (149); Paper bag and coated and treated paper manufacturing (150); Stationery product manufacturing (151); Sanitary paper product manufacturing (152); All other converted paper product manufacturing (153).

143. Hoovers.com. “Paper Products: Industry Facts and Trends.” 2015.
144. United States Census Bureau. “Industries at a Glance: Wood Product Manufacturing: NAICS 321.” 2015.
145. “Topic: Paper Industry.” The Statistics Portal. 2015.
146. McCormack, Ryan. “Cardboard Box & Container Manufacturing in the US (IBISWorld Report 32221).” IBISWorld. 2015.
147. Office of the U.S. Trade Representative. “U.S. - Korea Free Trade Agreement.” 2015.

Wood Products

North Carolina's Wood Products sector is one of the leading producers in the Southeast, a region accounting for nearly a quarter of all firms in the U.S., as well as 30% of domestic industry revenues.

Wood Products

Wood Products manufacturing is closely linked with both residential housing growth and broader industrial manufacturing output. As both of these downstream factors are reflecting economic recovery, demand for wood products is building. For some within the sector, such as pallets that are integral to packing and shipping, increasing global trade is also a driver. Access to reliable, cost-effective raw materials is especially important for the Wood Products sector. Regulations for both the sector and its supply chain make environmental impact a metric to manage. The energy and material required for production within the sector is high, so efficiency gains and innovation of process are highly beneficial to the environment and the bottom line. Industries within the sector recognize this, and many leverage sustainable practices to differentiate their products in a nearly commoditized sector. Innovative products are also changing the landscape of demand, with engineered solutions gaining market share within the sector. For Wood Products, more than one quarter of all domestic production comes from the Southeast, where North Carolina and neighboring Tennessee are the major producers. The Wood Products sector represents more than 16,270 employees across North Carolina, demonstrating average wages and comparatively less significant total labor income, productivity, and output. For the sector, sales, property, income, and social insurance lead all assessments for total local, state, and federal tax contribution of more than $621M.

TOTAL ECONOMIC IMPACT OF THE SECTOR

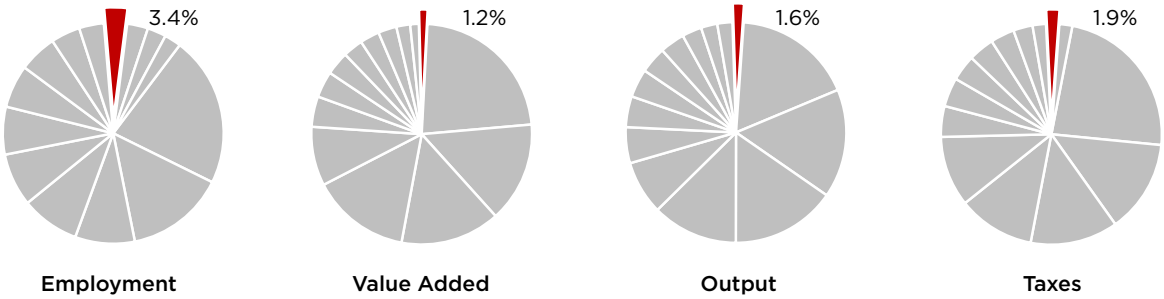
Employment	Labor Income	Value Added	Output	Taxes
16,270 Direct	$0.81B Direct	$1.07B Direct	$3.56B Direct	$217.8M State & Local
23,100 Indirect & Induced	$1.09B Indirect & Induced	$1.74B Indirect & Induced	$3.30B Indirect & Induced	$403.9M Federal
39,370	**$1.90B**	**$2.81B**	**$6.86B**	**$621.7M**

Wood Products Sector in North Carolina

North Carolina is one of the Southeast's leading producers in the Wood Products sector. As a region, the Southeast accounts for nearly a quarter of all firms in the U.S. sector, as well as 30% of revenue.[148] The largest of the state's Wood Products industries by output, reconstituted wood products, represent nearly 20% of all participation in this U.S. industry.[149] These standings are due in part to proximity to

148. Neville, Antall. "Wood Products Manufacturing in the US (IBISWorld Report 32199B)." IBISWorld, 2015.
149. United States Census Bureau."Industry Snapshot: Reconstituted Wood Product Manufacturing (NAICS 321219)." 2012.

WOOD PRODUCTS VS. ALL SUPPLY CHAIN SECTORS



growing housing markets and raw materials with nearly half of U.S. lumber operations in the South. Access to reliable, cost-effective raw materials is especially important for the Wood Products sector.

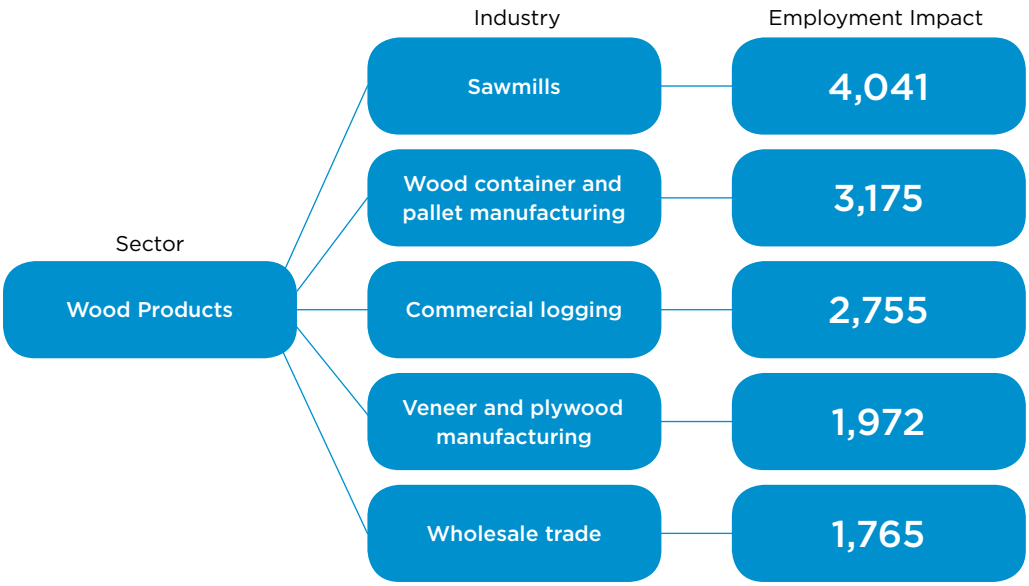
For industries within the sector, such as pellet manufacturing, growth in eastern and southeastern North Carolina will increase demand for "low-value hardwood stems." With multiple pellet mills scheduled for construction in the state, demand will increase competition for valuable small-diameter timber and raise prices for the sector.[150]

Demand for the sector in North Carolina reflects the dynamics of the domestic market. Residential construction and home starts are key drivers. The U.S. housing market witnessed a more than 21% increase in new home starts in 2014.[151] Despite these positive signs, North Carolina's growth has been slower than the broader domestic recovery. North Carolina housing starts declined more than 6% in 2014, so sustainability of demand for industries downstream is tentative—causing concern for the Wood Products.[152] Additionally, manufactured home production in North Carolina accounts for less than 10% of all industry output in the Wood Products sector and has been in steady decline following the 'great' recession.[153] Despite these challenges, increased gas exploration in eastern North Carolina will boost hardwood demand for crane mats and board road.[154]

Innovation in product design and process is also a relevant trend for Wood Products. Engineered lumber, such as strand-based products, is gaining market share within the sector. Flexible and able to be manufactured from smaller trees, these products, such as oriented strand board, provide equal or superior quality and strength as larger saw timber. According to Dr. Eric McConnell, professor and Wood Products specialist at NC State University, market share for engineered wood products is growing with production of strand-based 2x4s becoming "the profitable choice for sawmills."[155] Adapting to the newest technologies and shifting demands of the consumer marketplace will impact the landscape of the Wood Products sector in the future.

For markets further abroad, the industries of the Wood Products sector face an international trade deficit with China as the major global producer. Yet for some within the sector, such as pallets and skids that are integral to packing and shipping, increasing global trade is also a driver for growth. In the decade from 2004 to 2014, exports from North Carolina have increased by nearly 35%.

150. McConnell, Eric. (Interview) Wood Product Trends in North Carolina. 2015. (Electronic Inquiry)
151. Moody's Investor Service. Outlook for North American Building Materials Industry Goes to Positive. 2014.
152. Federal Reserve Bank of Richmond. Snapshot (North Carolina). Federal Reserve Bank of Richmond, 2015.
153. Manufactured Housing Institute, Manufactured Home Production by State (1990 - 2014). Institute for Building Technology and Safety, 2015.
154. McConnell, Eric. (Interview) Wood Product Trends in North Carolina. 2015. (Electronic Inquiry)
155. Ibid.



The industries of the Wood Products sector drive demand across the entire economy. For the Wood Products sector, these are the top five benefiting industries and associated employment impact.

Hardwood production within the sector has also refocused its primary market on foreign exports, reaching record levels in 2014.[156] McConnell also warns that uncertainty in the Chinese economy and a strong dollar remain important factors in sustaining export growth for North Carolina.

Overall, the Wood Products sector in North Carolina has enjoyed high export growth, contributing to the state's overall improvement.[157] Despite the opportunity the pallet and skids industry within Wood Products has experienced increasing competition from plastics and other alternative materials. Such materials are more amenable to fumigation and robust customs regulations. Substitute market share gains have moderated industry growth. Overall domestic participation in the pallet and skid production industry is also declining.[158]

Economic Impact in North Carolina

The Wood Products sector in North Carolina supports more than 16,270 employees directly engaged state-wide, with labor income totaling more than $813M. This translates into an average labor income of more than $49,976 per sector employee, exceeding the state's overall average wage but falling short of North Carolina's manufacturing average.[159] The Wood Products sector is a relatively small part of the broader supply chain, so it is not surprising that the sector ranks in the bottom quartile in each major economic impact category. With direct output of more than $3.5B in 2013, the sector delivers a mere 1.6% of the contribution of all supply chain sectors in North Carolina. Wood Products contributions to GDP value added exceed $1B. In addition to the direct impact on the economy, the Wood Products sector is responsible for 6,730 indirect jobs, accounting for another $362M in labor income across North Carolina. The impact of local industries buying goods and services from other local industries, indirect effects, can be seen as an additional $4.1B of output.

156. Ibid.
157. Office of the Governor of North Carolina. North Carolina Exports Grow by 7% in 2014: NC Growth More Than Double the National Rate. 2015.
158. McGinley, Devin. "Wood Pallets and Skids Production in the US (IBISWorld Report 32192)." IBISWorld, 2015.
159. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates." 2015.

Tax Contributions

The tax impact of Wood Products manufacturing in North Carolina on state, local, and federal tax revenues is also in the bottom quartile of all supply chain industries, just topping $621M in 2013. Local and state taxes paid exceed $217M, while sales, property, and personal income taxes provide the most significant contributions. totaling more than 86% of assessments for the year and a combined total of more than $188M. For federal taxes, Wood Products paid nearly $403M, with the majority being personal income and social insurance payments by employees and employers. These three categories alone account for nearly $327M or 81% of all federal taxes paid in Wood Products manufacturing in 2013.

- 13th in state and local taxes paid (1.63% of total supply chain taxes paid, $217,759,777)
- 13th in federal taxes paid (2.15%, $403,922,765)

Broader Context: Wood Products Sector in the U.S.

Accounting for 382,500 jobs in the U.S.,[160] the domestic Wood Products sector includes companies that manufacture a variety of wood products, including lumber, plywood, wood containers, wood flooring, wood trusses, and manufactured homes. Bolstered by the domestic economic recovery, industries in the U.S. Wood Products sector demonstrated annualized growth of as much as 4.8% between 2010 and 2015. The sector also relies on demand from industrial manufacturing output. With continued economic improvement, analysts expect growth to continue but at a slower pace.[161]

Much like others within the supply chain, the health of the domestic Wood Products sector is closely tied to housing growth and residential construction trends. Within Wood Products, the sawmill industry is important to providing lumber for residential and commercial construction, as well as a "primary raw material for many other forest products industries."[162] U.S. lumber market criteria are the benchmark by which timber landowners and producers decide on product mix and characteristics for the trees they grow and cultivate.

Regulations for both the Wood Products sector and its supply chain make environmental impact a metric to manage. The energy and material required for production within the sector is high. That means efficiency gains and process innovations are highly beneficial to the environment and the bottom line. Industries within the sector recognize this, and many leverage sustainable practices to differentiate their products in a nearly commoditized sector.

Despite an overall positive outlook for the sector, rising costs in commodities, fuel, and sawmill lumber will also mitigate profit margin growth.[163] In other industries within the sector, U.S. flooring faces price pressure and import penetration of products from low-cost producers bound for residential and commercial construction.[164] The continued strength of the U.S. dollar will also raise prices on exports and increase the appeal of low-cost imports.

160. Bureau of Labor Statistics (U.S.). "Industries at a Glance: Wood Product Manufacturing: NAICS 321." 2015.
161. Neville, Antall. "Wood Products Manufacturing in the US (IBISWorld Report 32199B)." IBISWorld, 2015.
162. McConnell, Eric. (Interview) Wood Product Trends in North Carolina. 2015. (Electronic Inquiry)
163. Neville, Antall. "Wood Products Manufacturing in the US (IBISWorld Report 32199B)." IBISWorld, 2015.
164. McConnell, Eric. (Interview) Wood Product Trends in North Carolina. 2015. (Electronic Inquiry)

Across the sector, trade deficits are expected to increase. However, successful industry efforts to develop new markets abroad means that manufacturers in the sector are also enjoying export growth. With developing economies seeking high-quality U.S. produced goods, the sector grew by an annualized rate of more than 16% from 2010 to 2015.[165] Renegotiation of a recently expired softwood lumber trade agreement with Canada is also important for U.S. firms seeking to limit the cost advantages of Canadian wood products due to government subsidies.[166] The agreement would bring price stability and predictability to the industry.

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION

* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Wood Products sector has been defined to include the following industries and their associated IMPLAN codes: Sawmills (134); Wood preservation (135); Veneer and plywood manufacturing (136); Engineered wood member and truss manufacturing (137); Reconstituted wood product manufacturing (138); Wood windows and door manufacturing (139); Cut stock, resawing lumber, and planing (140); Other millwork, including flooring (141); Wood container and pallet manufacturing (142); Manufactured home (mobile home) manufacturing (143); Prefabricated wood building manufacturing (144); All other miscellaneous wood product manufacturing (145).

165. Neville, Antall. "Wood Products Manufacturing in the US (IBISWorld Report 32199B)." IBISWorld, 2015.
166. Meissner, Dirk. "Canada-U.S. Softwood Lumber Deal Expires; No Talks on Horizon." The Globe and Mail. 2015.

Manufacturing Not Elsewhere Specified (N.E.S.)

Manufacturing Not Elsewhere Specified (N.E.S.) is a catch-all category that includes a broad and diverse range of industries that do no fit into one of the other major supply chain sectors.

Manufacturing Not Elsewhere Specified (N.E.S.)

Manufacturing Not Elsewhere Specified (N.E.S.) is a catch-all category that includes a broad and diverse range of industries without a coherent connection to one of the major supply chain sectors. Yet, manufacturing is healthy in North Carolina and these industries account for more than 20,500 employees across the state. Products range from sporting goods to fiber optic cable, from glassware to musical instruments, and from small arms and explosives to buttons and needles. Each faces unique challenges in the broader economy. Clear connections to other industries upstream and downstream make the firms of this sector invaluable to the supply chain of both the domestic and state economy. Comparisons in output, value added, labor income and taxes are challenging with such a range of industries involved, yet the sector total of nearly $6.3B in annual output is significant. Local, state, and federal tax receipts exceeded $909M for the year.

TOTAL ECONOMIC IMPACT OF THE SECTOR

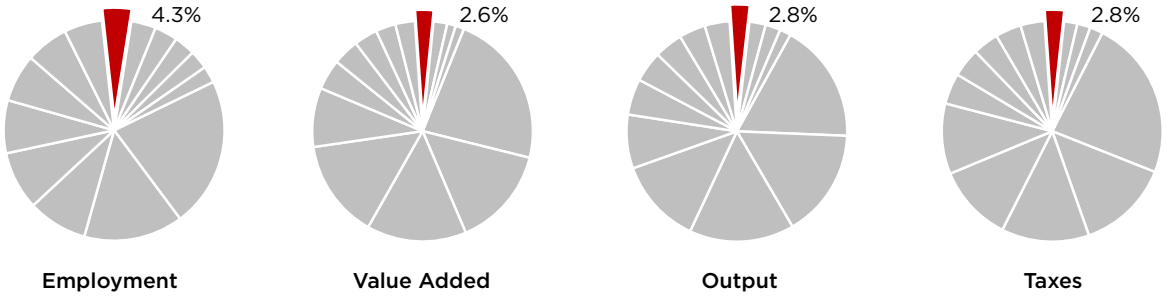
Employment	Labor Income	Value Added	Output	Taxes
20,550 Direct	$1.40B Direct	$2.32B Direct	$6.28B Direct	$294.7M State & Local
26,640 Indirect & Induced	$1.29B Indirect & Induced	$2.21B Indirect & Induced	$4.02B Indirect & Induced	$614.6M Federal
47,190	**$2.69B**	**$4.53B**	**$10.30B**	**$909.3M**

Manufacturing N.E.S. Sector in North Carolina

The industries that make up the Manufacturing N.E.S. sector in North Carolina represent a wide range of products and consumer product manufacturing markets. Despite the diversity of the sector, there are common trends facing nearly every manufacturing or supply chain industry in North Carolina. These include dealing with the implications of a strong dollar, which make U.S. exports more expensive to global consumers. Despite this, export growth in North Carolina continues, but longer exposure to strong U.S. currency may erode this progress.

Like manufacturing in general, firms in these industries face rising pressure from low-cost, low-wage centers of production abroad. For the rubber product manufacturing industry in particular, these challenges will expand the trade deficit as import penetration from China, Canada, and Mexico

MANUFACTURING N.E.S. VS. ALL SUPPLY CHAIN SECTORS



increases. This is typical of many industries across the supply chain. Companies may also find opportunity for export markets where U.S. industries maintain favorable trade status, such as partners Canada and Mexico. Domestic and global regulations and environmental concerns will also factor into the fate of these industries in North Carolina and the U.S.

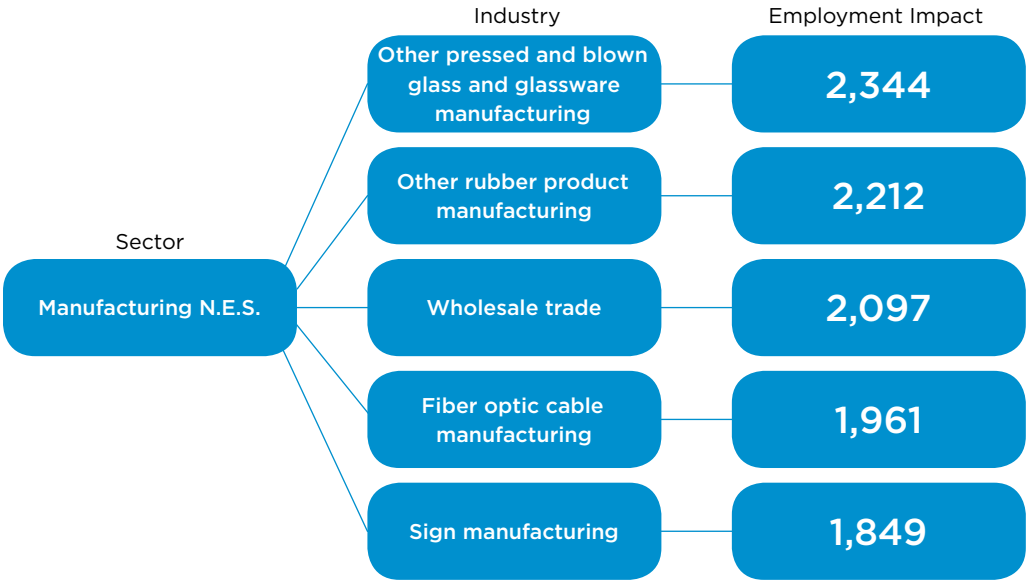
Technology improvements and innovation drive not only improvements in products and process, but also create growth opportunity for North Carolina firms operating in industries like fiber optic cable manufacturing. As wireless and broadband demands increase with the continued proliferation of smart phones and other devices, fiber optic cable production will increase to support this demand. The fiber optic cable manufacturing industry began in North Carolina when Superior Cable Company opened operations in Catawba County in 1953. Today, the area is home to major firms including Corning, CommScope, and Alcatel, representing a major cluster in fiber optic cable manufacturing in the U.S. Like other supply chain sectors, incentives have been helpful in attracting and keeping companies engaged in fiber optic cable manufacturing in North Carolina.[167] Additional fiber optic cable manufacturing facilities are located throughout North Carolina, including Asheville, Hickory, Fuquay-Varina, Raleigh, and Charlotte. Residential and commercial growth, especially industrial, will further strengthen this growth.

Beyond these leading industries in the Manufacturing N.E.S. sector, smaller industries such as sporting goods manufacturing and broom, brush, and mop manufacturing are also productive contributors to the more than $218B in output from all supply chain sectors in North Carolina.

Economic Impact

The Manufacturing N.E.S. sector in North Carolina supports more than 20,500 employees, with a direct employment income impact of nearly $1.4B. This translates into an average labor income of more than $68,000 per employee in these manufacturing subsectors across North Carolina, above the 2014 statewide average compensation of $43,280.[168] However, when compared to other supply chain related industries in North Carolina, Manufacturing N.E.S. accounts for only 4.3% of the total labor income. Value of industry production exceeds $6.2B in output, delivering nearly 2.9% of the entire supply chain output for the state. In addition, the Manufacturing N.E.S. sector is responsible for more than 12,000 indirect jobs across North Carolina, accounting for another $713M in labor income. The impact of local industries buying goods and services from other local industries, indirect effects, can be seen in the additional $2B of output.

167. Gerena, Charles. "Seeing the Light: Region Focus." *Richmond Federal Reserve*. 2003.
168. Bureau of Labor Statistics (U.S.). "North Carolina - May 2014 OES State Occupational Employment and Wage Estimates." 2015.



The industries of the Manufacturing N.E.S. sector drive demand across the entire economy. For the Manufacturing N.E.S. sector, these are the top five benefiting industries and associated employment impact.

Tax Contributions

The industries of the Manufacturing N.E.S. sector contributed more than $909M in taxes in 2013. On the state level, the sector accounts for just over 2.2% of total state and local tax revenues generated from supply chain-related sectors, with taxes paid in excess of $294M. Of this, sales, property, and personal income taxes provide the most significant contributions of nearly $250M, or roughly 85% of 2013 assessments. Federal government also benefits from the broad range of industries in the sector, with almost $615M in total federal receipts. The majority of these taxes are personal income and social insurance payments by employees and employers. These three categories alone account for more three quarters of all federal taxes paid by the sector in 2013.

- 11th in state and local taxes paid (2.20% of total supply chain taxes paid, $294,666,356)
- 11th in federal taxes paid (3.28%, $614,562,737)

Broader Context: Manufacturing N.E.S. Sector in the U.S.

Each of the industries included in the Manufacturing N.E.S. sector face a similar landscape as all sectors of the supply chain. The trends—both positive and negative—witnessed in other corners of the manufacturing world are relevant to each of the 26 industries included in the sector analysis.

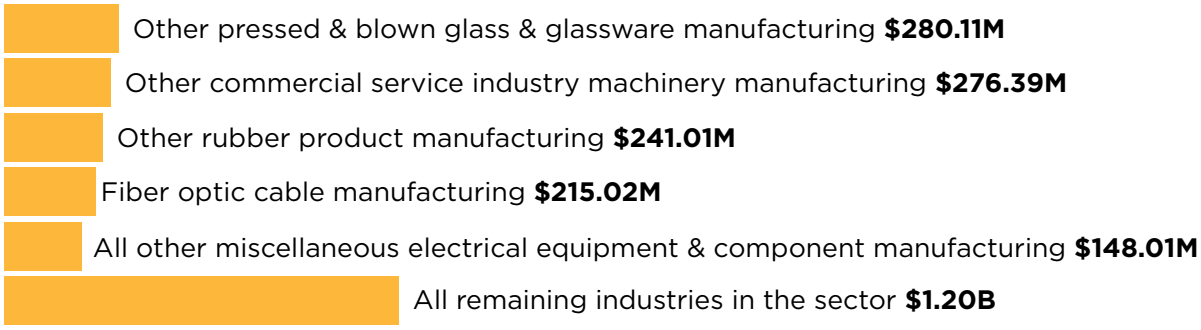
Each of the industries included also represent a small part of a larger domestic industry. For example, the other pressed and blown glass and glassware manufacturing industry accounts for domestic revenue in 2014 of $4.1B as the industry served as many as 156 export markets.[169] Another industry, doll, toy and game manufacturing—just 55 employees strong in North Carolina—is a $1.9B industry in the U.S.[170] This is yet another industry facing pricing pressure and growing trade deficit.

169. Reuters. "Research and Markets: Other Pressed and Blown Glass and Glassware Manufacturing Industry in the U.S. and Its International Trade [2015 Edition]." 2016.
170. Haider, Zeeshan. Toy, Doll & Game Manufacturing in the US (IBISWorld Industry Report 33993)." IBISWorld US. 2015.

Musical instruments, with domestic market revenues of just over $917M, face the challenge of a strong dollar while trying to grow internationally.[171] For the sporting goods manufacturing industry, rising disposable income and consumer demand will promote growth.[172]

Like other sectors across the supply chain, keeping up with new product development reinforces the importance of innovation for this industry. The same trend is reflected in the sign manufacturing industry, with proliferation of digital displays.[173] Rising industrial output bolsters scales and balance manufacturing,[174] while access to highly skilled labor is vital to success in the jewelry and silverware manufacturing industry.[175]

MOST SIGNIFICANT INDUSTRIES IN SECTOR BY GDP CONTRIBUTION



* For a complete listing, please reference the appendix

Scope

For the purposes of this analysis, the Manufacturing Not Elsewhere Specified (N.E.S.) sector has been defined to include the following industries and their associated IMPLAN codes: Explosives manufacturing (184); Other rubber product manufacturing (198); Flat glass manufacturing (201); Other pressed and blown glass and glassware manufacturing (202); Glass container manufacturing (203); Glass product manufacturing made of purchased glass (204); Small arms ammunition manufacturing (257); Ammunition, except for small arms, manufacturing (258); Small arms, ordnance, and accessories manufacturing (259); Photographic and photocopying equipment manufacturing (273); Other commercial service industry machinery manufacturing (274); Scales, balances, and miscellaneous general purpose machinery manufacturing (300); Fiber optic cable manufacturing (338); Carbon and graphite product manufacturing (341); All other miscellaneous electrical equipment and component manufacturing (342); Jewelry and silverware manufacturing (384); Sporting and athletic goods manufacturing (385); Doll, toy, and game manufacturing (386); Office supplies (except paper) manufacturing (387); Sign manufacturing (388); Gasket, packing, and sealing device manufacturing (389); Musical instrument manufacturing (390); Fasteners, buttons, needles, and pins manufacturing (391); Broom, brush, and mop manufacturing (392); Burial casket manufacturing (393); All other miscellaneous manufacturing (394).

171. Carusotto, Daniel. Acoustic & Electric Guitar Manufacturing in the US (IBISWorld Industry Report OD4644)." IBISWorld US. 2015.
172. Petrillo, Nick. "Athletic & Sporting Goods Manufacturing in the US (IBISWorld Report 33992a)." IBISWorld. 2015.
173. Khedr, Omar. "Billboard & Sign Manufacturing in the US (IBISWorld Report 33995)." IBISWorld. 2015.
174. Soshkin, Maksim. "Scale & Balance Manufacturing in the US (IBISWorld Report OD5721)." IBISWorld. 2015.
175. Haider, Zeeshan. Jewelry Manufacturing in the US (IBISWorld Industry Report 33991)." IBISWorld US. 2015.

Methodology

Methodology

IMPLAN Overview

For this report, *Impact Analysis for Planning*, more commonly known as IMPLAN, was used to analyze and adjust data relevant to the supply chain in North Carolina. IMPLAN is a widely accepted input-output analysis tool that quantifies the economic effects of a particular industry or change within an industry on a given region or economy. An input-output model is "a technique for quantifying interactions between firms, industries, and social institutions within a local economy." Such models are "driven by changes in final consumption (final demand)."[176]

Data for this analysis were obtained from North Carolina databases for 2013 licensed through MIG, Inc. The analysis also utilized multipliers and an Excel-based tool developed by Dr. Jesse Daystar of Duke University's Center for Sustainability & Commerce and Dr. Eric McConnell of NC State University's Department of Forest Biomaterials. Further calculations were completed using spreadsheets and pivot tables.

Created in 1976 by the Minnesota IMPLAN Group, now known as MIG, Inc., IMPLAN was originally created as a tool for forest management in response to mandates for planning outlined in the Forest Management Act. This tool helps to better understand economic impact. In 1988, IMPLAN was expanded to non-forest service users. The data in IMPLAN stems from a variety of government sources, including the Departments of Agriculture, Commerce, and Labor, making it a credible and reliable source. IMPLAN's input-output model currently reports on 517 unique industries, including 426 private sectors, nine government enterprise sectors, six administrative government sectors, and more.[177] These industries are comparable to those cataloged in the North American Industry Classification System (NAICS).

Taking multipliers into account, data was processed through the IMPLAN program to determine actual output, employment, tax, and other effects on the North Carolina economy for a multitude of industries. This step in the process is crucial, as it eliminates inaccuracies attributable to double counting, removing any multicollinearities that exist between the industries under review. When variables in the analytical model are highly correlated, it introduces redundancy and degrades the quality of the model output.[178] It is also able to generate inter-industry collinearities and effects, such as sales and purchases among a variety of industries.

IMPLAN generates adjusted economic impact values such as employment, value added, labor income, output and taxes. Employment is represented by all jobs within the given industry, including full and part time. Value added, often considered a measure of GDP contribution, consists of labor income (i.e. employee compensation and sole proprietor income), other property type income, and indirect business taxes. It is also important to note that IMPLAN's output model is categorized as direct, indirect, induced, and total effect. Additionally, IMPLAN's default multipliers, as used in

176. Mulkey, David, and Alan W. Hodges. "Using IMPLAN to Assess Local Economic Impacts." Edis.ifas.ufl.edu. 2016.
177. IMPLAN.com. "Definitions: IMPLAN." 2015.
178. Note: ArcGIS provides a good explanation on multicollinearities: http://bit.ly/multicollinear.

the induced effect calculations, recognize that labor income is not directly linked with the local economy, but rather is recirculated through household spending which further stimulates the local economy.

Each category is defined by IMPLAN as follows:[179]

- **Direct:** Series of production changes or expenditures made by producers/consumers as a result of an activity or policy.
- **Indirect:** The impact of local industries buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain until all money leaks from the local economy, either through imports or by payments to value added. The impacts are calculated by applying direct effects to the type I multipliers.
- **Induced:** The response by an economy to an initial change (direct effect) that occurs through re-spending of income received by a component of value added.
- **Total:** The sum of direct, indirect and induced effects.

Our Process

In developing this study, a concerted effort was made to consider report reproducibility in other regions. Throughout the process, the definitions, industry sector groupings, analysis methodology, and even the final report have all been structured in a way that is easy to understand and replicate with similar resources—regardless of state or geography.

The report itself is built to be consistent and formulaic in its structure, yet also provide a compelling narrative for the 14 industrial sectors considered in the analysis. Similar statistics were captured for each sector, compared in a regular format, and discussed consistently in the economic impact summaries of each sector. Further, unique trends and dynamics specific to each sector, as well as broader trends across the supply chain, are captured in each sector summary.

An early step was to define the supply chain as it is most relevant and understood for our audience or geography. When replicating our process, take into consideration that the broader and more inclusive your definition, the more industries you will have to consider in the final report. This is not advice to pursue a conservative or broad definition of supply chain, but a suggestion to consider the complexity of the final groupings and analysis. Consult regional or locally relevant supply chain activity-related organizations or companies for their perspective on how to best define supply chain. Be sure to take into account the audience for your report when defining the supply chain, and thereby set the parameters for your analysis.

Next, using the complete industry list provided through IMPLAN, we reviewed and identified those industry codes that fit within the articulated supply chain definition. This initial grouping does not take a significant amount of time, depending on the breadth of analysis scope. For this report, preference was given to manufacturing, transportation, distribution, and warehousing industries. For

179. IMPLAN.com. “Definitions: IMPLAN.” 2015.

others, selections may include a broader range of activities; it may be more appropriate to include just transportation, distribution, and warehousing for supply chain definitions more aligned with logistics rather than including manufacturing, for example. This initial list may be revised and some industries will drop when you learn more about them, while others will be added for the same reason.

Once the initial screening of industries has been completed, a second round of review will produce initial subgroupings, referred to in this report as sectors. For each of these sectors, we grouped industries together that share characteristics, such as product categories, final consumer markets, similar inputs or raw materials, functional business patterns, industrial relationships, shared regulatory landscape, and other attributes. This phase of the process takes a significant amount of time, as some industry labels do not offer detail on the activities of the sector or additional research may be required to better understand and determine relevance. For example, the toilet preparation manufacturing industry may, from an initial glance, be considered similar to other household goods or residential construction industries. However, this industry is actually more closely aligned with chemical manufacturing.

Comparison to other industrial classification systems is also helpful at this stage, such as NAICS or SIC codes, but recognize that your groupings may not fully align with these systems. In the end, the final sector groupings chosen for this report were comparable to NAICS, but not exactly aligned. Instead, they are independent to this study, and may be tailored to the characteristics of different states and the industries relevant to the chosen geographic scope. Discussing the different industry codes and your proposed groupings with available subject matter experts may also help ensure this process is thorough, eliminating the potential for significant revisions later in the process. If it is clearly identified, the audience for the report may have input on suggested groupings; however, with any grouping, be sure to have a coherent reason for inclusion should you have to defend decisions or assumptions.

In general, we gave preference to the groupings that made the most sense to our target audience and geography. This phase may be an iterative process with a larger number of initial sectors combined upon further review to simplify analysis. For this report, 14 sectors were identified, with the largest sector including more than 60 industries and the smallest sector including only five. Both were coherent and functional for the purposes of this analysis. The choice of 14 sectors is also numerically arbitrary, and was simply an outcome of how many coherent groups were organized as a result of this project phase. Also, recognize that these initial sector groupings should be subject to change depending on your research. If you decide to change these sector groupings later in the process, however, it may impact your data analysis and require IMPLAN scenarios to be rerun.[180]

Once final sector groupings were determined, we processed these industries in individual reports through IMPLAN. After multipliers were accounted for in each sector, output from this program can be analyzed in Excel or another spreadsheet program. Within each sector, we identified leading industries, assigning rankings for the different output categories including employment, labor income, value added, output, and taxes paid. We also determined the percentage each industry represents within the sector for each of these categories. This results in a better understanding

180. Note: Initially, we had 16 sectors in an effort to make analysis and research manageable. However as a result of our research, we found that industries in 2 of the sectors were better fits in other groups and reassigned them. The overall impact of making revisions in the groups was considered significant and all data were reprocessed after each reorganization.

of the key industries in the sector as they relate to economic impact in your chosen geography. Additional analysis of the data is important; consider developing a pivot table to make the analysis more efficient and less labor intensive. It will also be more accurate given one interface versus numerous spreadsheet tabs.

Creating a summary spreadsheet to compare and contrast each sector's statistics versus the others was especially helpful in determining what segments of the supply chain are most important to overall economic impact. This rank, however, may be influenced by the number of industries included in the final sector groupings. Sectors with more industries may deliver a greater bottom line impact than smaller sectors, but makes no judgment about efficiency or sector health. IMPLAN returns adjusted data in three categories: direct, indirect and induced. For the purposes of our report, we chose to focus on the use of direct statistics for comparative situations to ensure a conservative estimate of overall impact. The report does, however, use indirect statistics to highlight each sector's impact on other industries, another element of data provided by the IMPLAN process.

For data on both the industry and sector level, it was helpful to build a set collection of statistics or comparative information to be included in the summary report text. For example, our stats worksheet included comparison of each sector's number of employees versus the statewide manufacturing employment total, and the state's entire non-farm employment for comparable years. This allowed for the report to clearly articulate context for sectors by comparison to the broader state economy. The non-IMPLAN figures used for comparison were sourced from reputable sources, such as the U.S. Bureau of Labor Statistics or the North Carolina Department of Commerce. These will depend on what is available in different states, but should be clearly attributed. In general, avoid cross comparison of data from IMPLAN with other sources without clearly identifying the scope of the non-IMPLAN data and articulating any assumptions made when analyzing.

IMPLAN gave sufficient insight into the numerical analysis of the supply chain, but more information was needed for the qualitative aspect of the report. To support our analysis beyond the data and output from IMPLAN models, we relied on supplementary research to provide context and background for each sector, as well as important industries within each sector. Identifying industry dynamics helps better inform the data. For example, it was important to recognize through our research that excise taxation for the Tobacco & Foodstuffs sector is the reason this sector catapults into first position for overall state and local taxes paid, while falling behind other sectors in every other category of comparison.

Supplementary research also helped us develop a better understanding of trends happening within each sector, or those facing the entire supply chain. Trade or other niche industry publications and periodicals also provided sector or industry-specific information and context, which was especially helpful in building each sector report. For some sectors where there was little information available through research databases, periodicals, or other sources, contacting subject matter experts within the field proved to be an effective method to capture trends or key issues relevant to that sector.

Secondary sources beyond IMPLAN that were used consistently include, but are not limited to, the following:

- **U.S. Bureau Labor of Statistics (BLS)**
  - BLS was used to find data for individual industries, including current employment statistics, wages by area/occupation, occupations, occupational outlooks, industry trends, etc.
- **Bureau of Economic Analysis (BEA)**
  - A subsidiary of the U.S. Department of Commerce, this is an easy-to-use collection of reports on macroeconomic data, such as GDP for both domestic and state level; it includes data on trade, as well as industry statistics.
- **SelectUSA**
  - Maintained by the U.S. Department of Commerce, SelectUSA is a "searchable guide of federal programs and services available to businesses operating in the United States."[180] It also provides some broad industry overviews with perspective on the competition and trends within the sector. These sectors did not necessarily align with our groupings, but the guide is informative.
- **Ibis World Source**
  - Ibis World is an extensive research platform used to gather information and context for each sector or smaller industries within the sector. Ibis World is also a useful reference for information such as industry trends, outlook, growth/decline, industry characteristics, and industry overviews.
- **Bloomberg LP**
  - The Bloomberg Terminal, as it is most widely known, is a financial data research and analysis tool that provides real-time financial information about companies and industry.
- **Frost & Sullivan**
  - Provides in-depth market analysis for global industry grouped by sector. Though not widely used in this report, it does help provide some context and is worth screening each sector for relevant information and data.
- **OneSource**
  - This resource provides company profiles, financial information, leadership biographies, and news for international companies available through a search-based database.

- **Subject Matter Expert (SME) Interviews**
  - Multiple SME surveys were conducted to gather more knowledge on individual sectors/ industries. For example, Dr. Eric McConnell was questioned regarding the wood product industry. By identifying SMEs within separate industries, it is possible to get more in-depth knowledge in one area as opposed to a broad knowledge of a bigger subject or topic. From these interviews, trends, historical data and facts, industry overviews, and insights into which industries should compose a sector were also gained.
- **Other sources which may be relevant include:**
  - Relevant faculty at local universities
  - State Department of Commerce
  - State Economic Development Region publications
  - Local, regional, or state Chambers of Commerce
  - Financial industry publications and periodicals
  - Industry or niche associations and publications
  - Case studies/white papers/theses
  - CIA World Fact Book
  - *The Wall Street Journal*
  - Other economic impact studies or reports

Process Overview: DIY

Recreating an economic impact analysis in five easy steps

Define & Categorize

- Define supply chain as it relates to your state and audience.
- Decide which industries fit the definition and should be included in the analysis.
- Group relevant industries into sectors based on shared characteristics.
- Be prepared to regroup or rearrange, if necessary, based on your research and analysis.

Gather Data

- Use IMPLAN input-output model to process primary data from chosen industries by sector.
- Augment your research and understanding of these supply chain industries through supplemental sources such as BLS, Ibis World, Subject Matter Experts, etc.

Run IMPLAN Scenarios

- Upload template results to IMPLAN activities and run scenario for each sector.
- Be sure to consider multipliers and their implications on resulting data.

Analyze Data

- Compile sector scenario outputs from IMPLAN into spreadsheet.
- Rank sectors by relevant factors such as total tax, direct output, direct employment, etc.
- Read and consider implications of the data, relationships, correlations, and figures that stand out as significant.

Compile Report

- Combine new scenario data and auxilary research to write chapters about each sector.
- Contextualize sector in U.S. and state, while comparing to other sectors and the overall supply chain.

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Appendix

1.1 For the purposes of this analysis, the various supply chain sectors as noted below have been defined to include the following industries and their associated IMPLAN codes:

Pharmaceutical, Biologics & Medical Products

Medicinal and botanical manufacturing (173); Pharmaceutical preparation manufacturing (174); In-vitro diagnostic substance manufacturing (175); Biological product (except diagnostic) manufacturing (176); Optical instrument and lens manufacturing (272); Surgical and medical instrument manufacturing (379); Surgical appliance and supplies manufacturing (380); Dental equipment and supplies manufacturing (381); Ophthalmic goods manufacturing (382).

Chemical Manufacturing

Petroleum lubricating oil and grease manufacturing (159); Petrochemical manufacturing (161); Industrial gas manufacturing (162); Synthetic dye and pigment manufacturing (163); Other basic inorganic chemical manufacturing (164); Other basic organic chemical manufacturing (165); Plastics material and resin manufacturing (166); Synthetic rubber manufacturing (167); Artificial and synthetic fibers and filaments manufacturing (168); Nitrogenous fertilizer manufacturing (169); Phosphatic fertilizer manufacturing (170); Pesticide and other agricultural chemical manufacturing (172); Paint and coating manufacturing (177); Adhesive manufacturing (178); Soap and other detergent manufacturing (179); Polish and other sanitation good manufacturing (180); Surface active agent manufacturing (181); Toilet preparation manufacturing (182); Printing ink manufacturing (183); Photographic film and chemical manufacturing (186); Other miscellaneous chemical product manufacturing (187); Plastics packaging materials and unlaminated film and sheet manufacturing (188); Unlaminated plastics profile shape manufacturing (189); Plastics pipe and pipe fitting manufacturing (190); Laminated plastics plate, sheet (except packaging), and shape manufacturing (191); Polystyrene foam product manufacturing (192); Urethane and other foam product (except polystyrene) manufacturing (193); Plastics bottle manufacturing (194); Other plastics product manufacturing (195).

Industrial Machinery & Transportation Equipment

Tire manufacturing (196); Rubber and plastics hoses and belting manufacturing (197); Farm machinery and equipment manufacturing (262); Lawn and garden equipment manufacturing (263); Construction machinery manufacturing (264); Mining machinery and equipment manufacturing (265); Food product machinery manufacturing (267); Semiconductor machinery manufacturing (268); Printing machinery and equipment manufacturing (270); All other industrial machinery manufacturing (271); Industrial mold manufacturing (278); Special tool, die, jig, and fixture manufacturing (279); Cutting tool and machine tool accessory manufacturing (280); Machine tool manufacturing (281); Rolling mill and other metalworking machinery manufacturing (282); Turbine

and turbine generator set units manufacturing (283); Speed changer, industrial high-speed drive, and gear manufacturing (284); Mechanical power transmission equipment manufacturing (285); Other engine equipment manufacturing (286); Pump and pumping equipment manufacturing (287); Air and gas compressor manufacturing (288); Measuring and dispensing pump manufacturing (289); Conveyor and conveying equipment manufacturing (291); Overhead cranes, hoists, and monorail systems manufacturing (292); Industrial truck, trailer, and stacker manufacturing (293); Power-driven handtool manufacturing (294); Welding and soldering equipment manufacturing (295); Packaging machinery manufacturing (296); Industrial process furnace and oven manufacturing (297); Fluid power cylinder and actuator manufacturing (298); Fluid power pump and motor manufacturing (299); Power, distribution, and specialty transformer manufacturing (332); Motor and generator manufacturing (333); Switchgear and switchboard apparatus manufacturing (334); Relay and industrial control manufacturing (335); Storage battery manufacturing (336); Primary battery manufacturing (337); Automobile manufacturing (343); Heavy duty truck manufacturing (345); Motor vehicle body manufacturing (346); Truck trailer manufacturing (347); Travel trailer and camper manufacturing (349); Motor vehicle gasoline engine and engine parts manufacturing (350); Motor vehicle electrical and electronic equipment manufacturing (351); Motor vehicle transmission and power train parts manufacturing (353); Motor vehicle seating and interior trim manufacturing (354); Other motor vehicle parts manufacturing (356); Aircraft manufacturing (357); Aircraft engine and engine parts manufacturing (358); Other aircraft parts and auxiliary equipment manufacturing (359); Railroad rolling stock manufacturing (362); Ship building and repairing (363); Boat building (364); Motorcycle, bicycle, and parts manufacturing (365); Military armored vehicle, tank, and tank component manufacturing (366); All other transportation equipment manufacturing (367); Commercial and industrial machinery and equipment rental and leasing (445).

Tobacco & Foodstuffs

Dog and cat food manufacturing (65); Other animal food manufacturing (66); Breakfast cereal manufacturing (73); Nonchocolate confectionery manufacturing (76); Chocolate and confectionery manufacturing from cacao beans (77); Confectionery manufacturing from purchased chocolate (78); Frozen fruits, juices and vegetables manufacturing (79); Frozen specialties manufacturing (80); Canned fruits and vegetables manufacturing (81); Canned specialties (82); Dehydrated food products manufacturing (83); Fluid milk manufacturing (84); Cheese manufacturing (86); Ice cream and frozen dessert manufacturing (88); Bread and bakery product, except frozen, manufacturing (94); Frozen cakes and other pastries manufacturing (95); Cookie and cracker manufacturing (96); Dry pasta, mixes, and dough manufacturing (97); Tortilla manufacturing (98); Roasted nuts and peanut butter manufacturing (99); Other snack food manufacturing (100); Coffee and tea manufacturing (101); Flavoring syrup and concentrate manufacturing (102); Mayonnaise, dressing, and sauce manufacturing (103); Spice and extract manufacturing (104); All other food manufacturing (105); Tobacco product manufacturing (111).

Transportation, Distribution & Logistics

Air transportation (408); Rail transportation (409); Water transportation (410); Truck transportation (411); Transit and ground passenger transportation (412); Pipeline transportation (413); Warehousing and storage (416).

Metal Products

Iron and steel mills and ferroalloy manufacturing (217); Iron, steel pipe and tube manufacturing from purchased steel (218); Rolled steel shape manufacturing (219); Aluminum sheet, plate, and foil manufacturing (223); Crown and closure manufacturing and metal stamping (234); Cutlery, utensil, pot, and pan manufacturing (235); Handtool manufacturing (236); Prefabricated metal buildings and components manufacturing (237); Fabricated structural metal manufacturing (238); Plate work manufacturing (239); Metal window and door manufacturing (240); Sheet metal work manufacturing (241); Ornamental and architectural metal work manufacturing (242); Power boiler and heat exchanger manufacturing (243); Metal tank (heavy gauge) manufacturing (244); Metal cans manufacturing (245); Metal barrels, drums and pails manufacturing (246); Hardware manufacturing (247); Spring and wire product manufacturing (248); Turned product and screw, nut, and bolt manufacturing (250); Valve and fittings, other than plumbing, manufacturing (254); Ball and roller bearing manufacturing (256); Fabricated pipe and pipe fitting manufacturing (260); Other fabricated metal manufacturing (261); Other communication and energy wire manufacturing (339); Wiring device manufacturing (340).

Electronics

Bare printed circuit board manufacturing (308); Semiconductor and related device manufacturing (309); Capacitor, resistor, coil, transformer, and other inductor manufacturing (310); Electronic connector manufacturing (311); Printed circuit assembly (electronic assembly) manufacturing (312); Other electronic component manufacturing (313); Electromedical and electrotherapeutic apparatus manufacturing (314); Search, detection, and navigation instruments manufacturing (315); Automatic environmental control manufacturing (316); Industrial process variable instruments manufacturing (317); Totalizing fluid meter and counting device manufacturing (318); Electricity and signal testing instruments manufacturing (319); Analytical laboratory instrument manufacturing (320); Irradiation apparatus manufacturing (321); Watch, clock, and other measuring and controlling device manufacturing (322); Blank magnetic and optical recording media manufacturing (323); Electric lamp bulb and part manufacturing (325); Lighting fixture manufacturing (326).

Communications & Computers

Electronic computer manufacturing (301); Computer storage device manufacturing (302); Computer terminals and other computer peripheral equipment manufacturing (303); Telephone apparatus manufacturing (304); Broadcast and wireless communications equipment manufacturing (305); Other communications equipment manufacturing (306); Audio and video equipment manufacturing (307); Software and other prerecorded and record reproducing (324).

Textiles

Fiber, yarn, and thread mills (112); Broadwoven fabric mills (113); Narrow fabric mills and schiffli machine embroidery (114); Nonwoven fabric mills (115); Knit fabric mills (116); Textile and fabric finishing mills (117); Fabric coating mills (118); Carpet and rug mills (119); Curtain and linen mills (120); Textile bag and canvas mills (121); Rope, cordage, twine, tire cord and tire fabric mills (122); Other textile product mills (123); Hosiery and sock mills (124); Other apparel knitting mills (125); Cut and

sew apparel contractors (126); Men's and boys' cut and sew apparel manufacturing (127); Women's and girls' cut and sew apparel manufacturing (128); Other cut and sew apparel manufacturing (129); Apparel accessories and other apparel manufacturing (130); Footwear manufacturing (132); Other leather and allied product manufacturing (133).

Household Goods & Furniture

Small electrical appliance manufacturing (327); Household cooking appliance manufacturing (328); Other major household appliance manufacturing (331); Pottery, ceramics, and plumbing fixture manufacturing (199); Plumbing fixture fitting and trim manufacturing (255); Wood kitchen cabinet and countertop manufacturing (368); Upholstered household furniture manufacturing (369); Non-upholstered wood household furniture manufacturing (370); Other household non-upholstered furniture manufacturing (371); Institutional furniture manufacturing (372); Wood office furniture manufacturing (373); Office furniture, except wood, manufacturing (375); Showcase, partition, shelving, and locker manufacturing (376); Mattress manufacturing (377); Blind and shade manufacturing (378).

Building Materials

Asphalt paving mixture and block manufacturing (157); Asphalt shingle and coating materials manufacturing (158); Brick, tile, and other structural clay product manufacturing (200); Ready-mix concrete manufacturing (206); Concrete block and brick manufacturing (207); Concrete pipe manufacturing (208); Other concrete product manufacturing (209); Gypsum product manufacturing (211); Abrasive product manufacturing (212); Cut stone and stone product manufacturing (213); Ground or treated mineral and earth manufacturing (214); Mineral wool manufacturing (215); Miscellaneous nonmetallic mineral products manufacturing (216); Air purification and ventilation equipment manufacturing (275); Heating equipment (except warm air furnaces) manufacturing (276); Air conditioning, refrigeration, and warm air heating equipment manufacturing (277).

Paper Products

Paperboard container manufacturing (149); Paper bag and coated and treated paper manufacturing (150); Stationery product manufacturing (151); Sanitary paper product manufacturing (152); All other converted paper product manufacturing (153).

Wood Products

Sawmills (134); Wood preservation (135); Veneer and plywood manufacturing (136); Engineered wood member and truss manufacturing (137); Reconstituted wood product manufacturing (138); Wood windows and door manufacturing (139); Cut stock, resawing lumber, and planing (140); Other millwork, including flooring (141); Wood container and pallet manufacturing (142); Manufactured home (mobile home) manufacturing (143); Prefabricated wood building manufacturing (144); All other miscellaneous wood product manufacturing (145).

Manufacturing Not Elsewhere Specified (N.E.S.)

Explosives manufacturing (184); Other rubber product manufacturing (198); Flat glass manufacturing (201); Other pressed and blown glass and glassware manufacturing (202); Glass container manufacturing (203); Glass product manufacturing made of purchased glass (204); Small arms ammunition manufacturing (257); Ammunition, except for small arms, manufacturing (258); Small arms, ordnance, and accessories manufacturing (259); Photographic and photocopying equipment manufacturing (273); Other commercial service industry machinery manufacturing (274); Scales, balances, and miscellaneous general purpose machinery manufacturing (300); Fiber optic cable manufacturing (338); Carbon and graphite product manufacturing (341); All other miscellaneous electrical equipment and component manufacturing (342); Jewelry and silverware manufacturing (384); Sporting and athletic goods manufacturing (385); Doll, toy, and game manufacturing (386); Office supplies (except paper) manufacturing (387); Sign manufacturing (388); Gasket, packing, and sealing device manufacturing (389); Musical instrument manufacturing (390); Fasteners, buttons, needles, and pins manufacturing (391); Broom, brush, and mop manufacturing (392); Burial casket manufacturing (393); All other miscellaneous manufacturing (394).

1.2 Data: the following data table summarizes all direct economic impact for each of the 14 sectors of the supply chain in North Carolina. All figures represent 2013 IMPLAN data.

Direct Economic Impact

Sector Name	Employment	Emp % of All Sectors	Labor Income	Labor Income % All Sectors	Value Added	Value Add % of All Sectors	Output	Output % of All Sectors
Pharmaceutical, Biologics & Medical Products	26,746	5.57%	$3,153,897,205	9.70%	$19,540,715,199	22.77%	$33,574,081,056	15.38%
Chemical Manufacturing	41,034	8.55%	$3,011,360,828	9.26%	$12,624,767,037	14.71%	$34,794,558,658	15.94%
Industrial Machinery & Transportation Equipment	69,798	14.55%	$5,480,873,040	16.85%	$12,548,372,459	14.62%	$38,399,750,862	17.59%
Tobacco & Foodstuffs	30,098	6.27%	$1,829,049,651	5.62%	$12,424,287,573	14.48%	$27,486,073,434	12.59%
Transportation, Distribution & Logistics	105,686	22.03%	$5,687,426,195	17.49%	$7,432,434,983	8.66%	$17,214,269,195	7.89%
Metal Products	33,552	6.99%	$2,095,416,988	6.44%	$3,828,366,123	4.46%	$11,509,640,187	5.27%
Electronics	17,364	3.62%	$1,974,631,539	6.07%	$3,292,640,968	3.84%	$9,098,056,653	4.17%
Communications & Computer	13,211	2.75%	$1,916,095,961	5.89%	$2,961,328,023	3.45%	$8,488,718,260	3.89%
Textiles	41,917	8.74%	$1,834,510,759	5.64%	$2,512,755,287	2.93%	$9,876,800,202	4.52%
Household Goods & Furniture	37,210	7.76%	$1,721,428,070	5.29%	$2,451,528,777	2.86%	$7,950,568,550	3.64%
Manufacturing N.E.S.	20,550	4.28%	$1,397,461,006	4.30%	$2,316,270,531	2.70%	$6,278,754,487	2.88%
Building Materials	14,700	3.06%	$817,516,016	2.51%	$1,734,110,275	2.02%	$4,818,473,653	2.21%
Paper Products	11,669	2.43%	$791,448,569	2.43%	$1,077,356,729	1.26%	$5,225,636,431	2.39%
Wood Products	16,273	3.39%	$813,247,631	2.50%	$1,070,325,147	1.25%	$3,558,283,921	1.63%
TOTALS	**479,809**	**100%**	**$32,524,363,458**	**100%**	**$85,815,259,111**	**100%**	**$218,273,665,549**	**100%**

Tax Analysis Data

Sector	State Local Tax % of All Sectors	State Local	Federal % of All Sectors	Federal Tax	Total Tax % of All Sectors	Total Tax
Tobacco & Foodstuffs	38.51%	$5,151,348,958	12.82%	$2,404,484,084	23.51%	$7,555,833,042
Industrial Machinery and Transportation Equipment	10.83%	$1,449,321,995	15.57%	$2,921,232,939	13.60%	$4,370,554,934
Pharmaceutical, Biologics & Medical Products	8.68%	$1,161,688,578	15.82%	$2,968,848,978	12.85%	$4,130,537,556
Transportation, Distribution & Logistics	11.04%	$1,477,308,989	11.44%	$2,145,647,161	11.27%	$3,622,956,150
Chemical Manufacturing	8.08%	$1,081,347,395	11.93%	$2,238,042,455	10.33%	$3,319,389,850
Metal Products	3.55%	$474,872,585	5.19%	$974,558,428	4.51%	$1,449,431,013
Electronics	3.46%	$463,217,664	4.77%	$895,549,532	4.23%	$1,358,767,196
Textiles	3.14%	$420,328,349	4.26%	$798,906,151	3.79%	$1,219,234,500
Communications & Computer	2.95%	$395,147,462	4.36%	$818,759,259	3.78%	$1,213,906,721
Household Goods & Furniture	2.72%	$364,101,274	4.08%	$765,107,916	3.51%	$1,129,209,190
Manufacturing N.E.S.	2.20%	$294,666,356	3.28%	$614,562,737	2.83%	$909,229,093
Building Materials	1.53%	$205,285,717	2.26%	$423,738,798	1.96%	$629,024,515
Wood Products	1.63%	$217,759,777	2.15%	$403,922,765	1.93%	$621,682,542
Paper Products	1.65%	$220,634,550	2.08%	$389,362,638	1.90%	$609,997,188
TOTALS	**100%**	**$13,377,029,649**	**100%**	**$18,762,723,841**	**100%**	**$32,139,753,490**

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