



2014

Economic Impact of the Oklahoma Manufacturing Sector

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Manufacturing

Technology has transformed manufacturing in America, making it leaner, smarter, innovative, more creative and highly-productive. According to the U.S. Census Bureau, manufacturing is the 4th largest employer, employing over 11 million people with average annual wage of \$52,300, and about six in ten U.S. export dollars come from manufacturers.¹

In an era of excitement in a high-tech society, it is often forgotten that a majority of the country's scientists, engineers and even mathematicians work for manufacturers. According to U.S. News, growth of the advanced manufacturing industry is also a priority for the Obama administration, and the President's Council of Advisors on Science and Technology issued a report in 2011 outlining a plan for America to revitalize its advanced manufacturing sector. To encourage educators, students and parents to explore career opportunities in modern manufacturing, Discovery Education and Alcoa Foundation—the philanthropic branch of the metals manufacturing company—are rolling out a new initiative to “Manufacture Your Future.” It's a strategy to “create high-quality manufacturing jobs and enhance America's global competitiveness,” according to a White House press release. Klaus Kleinfeld, chairman and CEO of Alcoa, is one of the executives who serves on the steering committee for the initiative. It's a glimpse at the future of manufacturing in America. “The fact is that advanced manufacturing is increasingly what the U.S. has -- and will have,” says Mark Muro, director of policy for the Metropolitan Policy Program at the Brookings Institution.²

Manufacturing's rebound plays a crucial role in the recovery. The pace of growth in U.S. manufacturing escalated to a new high in August as PMI® (Purchasing Manager Index) registered at 59 percent to its highest level since March 2011, an increase of 1.9 percentage points when compared to July's reading of 57.1 percent, according to Institute for Supply Management. A reading above 50 percent serves as an indicator that the manufacturing economy is generally expanding.

Growing sales in U.S.-made goods in the retail industry has fueled production lines and jump-started the manufacturing sector. Walmart announced it would spend \$50 billion more on U.S.-made goods. As the world largest retailer, Walmart wields tremendous market power and proclaimed to achieve \$250 million in U.S. purchases, a commitment it made aiming to create more American jobs by supporting the U.S. manufacturing.³ Effort in re-shoring or moving jobs back to the United States from abroad has suggested economic growth would receive a boost in the manufacturing sector.

Manufacturing has contributed to Oklahoma being one of the nation's fastest growing states, with GDP increasing 4.2 percent, outpacing the U.S. and all other states except North Carolina, Wyoming, and West Virginia in 2013.⁴ Manufacturing also makes up almost 10 percent of Oklahoma's Gross State Product and 6.9 percent of employment during the same period of time.⁵ With more than 4,000 establishments, manufacturers in Oklahoma hiked their payrolls by more than 19 percent in 2012 compared to 2009, according to Oklahoma Employment Security Commission.

Oklahoma ranked 1st among other states in terms of cost of living and ranked 2nd best in term of cost of doing business. Tax burden per capita ranked 6th and remained as one of the lowest compared to other states in the U.S., and the manufacturing sector has continued to prosper by an added 2 percentage points on hourly wages over the last year.⁶

Although oil and gas exploration has been a part of the Oklahoma economy since the 1920s, “Manufacturers have really emerged as the first in line to drive that extraction,” said Russell Evans, executive director of the Stephen C. Agee Economic Research and Policy Institute at Oklahoma City University.⁷ The number of drilling rigs actively exploring for oil or natural gas in Oklahoma increased by four this week to 204, according to Baker Hughes Inc. The tally is up 28 from 176 a year ago.⁸

The Oklahoma manufacturing sector supports millions of jobs in other sectors on the state and will improve living standards as it continues to thrive in the future decades.

Population, Labor Force, & Employment Summary

Population in any given year is determined by adding the net natural change and the migration change to the previous year's population. The natural change is caused by births and deaths, while migration occurs for economic and non-economic reasons. Population reflects the mid-year estimates of people, including births, special populations, and survivors from the previous year, economic migrants, international migrants, and retired migrants. It is affected by changes in total population, special population (e.g. active military, active military dependents, college students and prisoners), natality and survival rates.

Labor Force includes the total number of people employed and those who seek employment in a given region, calculated with participation rates and age cohort. Calculation of labor force is derived by taking the total population multiplied by the participation rate. An increase in population or participation rate will result in an increased labor force in the region. The labor force participation rate represents the proportion of population that is in the labor force and may vary according to age cohort. These participation rates also respond to changes in employment relative to the potential labor force and to changes in the real after tax wage rate.

Employment includes the number of full-time and part-time jobs by place of work in the REMI model. REMI's employment data came from the Bureau of Economic Analysis. State and regional employment are estimated on a full-time and part-time basis on equal weight because of the limitations of the available source data. While employees, sole proprietors, and active partners are included in the estimate, unpaid family workers and volunteers are not included.

Population data is given for age, gender, and ethnic category, with birth and survival rates for each group. Labor force is determined by the size and labor force participation rate of each group within a region's population. For example, if there were 1000 people within a region's population and 567 people are within the working age population (16-64 years), then the labor force estimate is 56.7 percent of the total population. Migration flow could also shape population base and labor force supply. Oklahoma ranked 25th in the nation in terms of the ability to attract out-of-state migrants, such as economic migrants.⁹ Oklahoma scored 39.3 percent, in the measure of the current state population born in another state, placing Oklahoma in the middle of magnetism measure, as one of the less magnetic states.⁹

Employment estimates measure the number jobs. It can be measured either as a count of workers or as a count of jobs. In the former case, an employed worker is counted only once; in the latter case, all jobs held by the worker are counted. The state and regional employment estimates in this report count the number of jobs, full-time and part-time, by place of work. A worker's activity in each industry and location of employment is reflected in the measure, and thus employment estimates can be higher compared to population and labor force estimates. It is common for the workers to hold more than one job, especially in the manufacturing sector that offers plenty of part-time jobs. Place of residence of the workers can also affect population estimates. Some workers commute into the region to work during the day, but live outside of the region near bordering states. Thus, these workers are only reflected in employment estimates but not in the population estimates

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Executive Summary

The State Chamber of Oklahoma Research Foundation has approached the Center for Economic and Business Development at Southwestern Oklahoma State University for an updated study of the economic impact on Oklahoma's manufacturing sector.

The manufacturing sector has been a key driver in strengthening Oklahoma's economy and manufacturing jobs have thrived in the state in recent years. This study examines and predicts the underlying economic impacts of the manufacturing sector on Oklahoma's economy. The study utilizes the Regional Economic Models, Inc. (REMI) model, a dynamic input-output model that incorporates several modeling approaches, which include general equilibrium, multi-equation, econometric, and economic geography. Using data from the REMI baseline, the input-output model predicts the fundamental economic impacts of the manufacturing sector in Oklahoma.

The study found that *the economic impact of the manufacturing sector on Oklahoma is significant* and cascades throughout the entire state's economy. The table below is a synopsis of average economic impacts of the manufacturing sector on statewide economy from 2014 to 2034.

Average Annual Economic Impacts	
Gross State Product	\$60.4 billion
State Output	\$142.6 billion
Real Disposable Personal Income	\$33 billion
Income Taxes	\$882 million
Employment	397,950 jobs
Residential Capital Stock	\$55.6 billion
Non-Residential Capital Stock	\$30.7 billion
Labor Force	292,204 people
Population	515,221 people
Proprietors' Income	\$5.5 billion

Project Information & Assumptions

The purpose of this study is to quantify and forecast the significance of the manufacturing sector to Oklahoma's economy. Key scenarios and assumptions that serve as primary inputs into the REMI model are demonstrated in this section to estimate the incremental impact of manufacturing on Gross Regional Product (GRP), Output, Employment, Income, Capital Stock, Taxes, and more.

As a dynamic input-output modeling software, the REMI model incorporates several different aspects of modeling approaches, which include input-output model, general equilibrium, econometrics, and economic geography that generate forecasts based on historical data. The primary national, state, and county data came from the Bureau of Economic Analysis (BEA). Other major sources of historical data were obtained from the U.S. Census Bureau, Bureau of Labor Statistics (BLS), State Employment Security Agencies (ESAs), Energy Information Administration and other related sources that serve as the foundation upon which to forecast future economic and socioeconomic variables.

The model measures the importance of the manufacturing sector by predicting the loss of jobs, output, real disposable personal income and other vital economic variables if the sector were removed from the state's economy. In order to model the economic impact of the manufacturing sector that presently exists in the economy, it is necessary to remove data associated with this sector from the modeling software in the current year and the projected future years. As a result, the subsequent forecast produces negative impact when compared to the control forecast. This approach is known as a "Counterfactual Modeling." In order to explain the positive impact of the manufacturing on the economy, the results obtained were multiplied by negative one, which later refers to as a "counterfactual positive" simulation. This type of simulation assumes any dollars/ jobs removed from the model will not be re-spent or re-employed elsewhere in the economy.

The study used the employment data from the REMI baseline to serve as the primary data inputs. The primary employment data source for REMI Policy Insight is the Bureau of Economic Analysis (BEA). The BEA employment series for the state and local areas comprises estimates of number of jobs, full-time and part-time, by place of work. Both full-time and part-time jobs are counted at equal weight. Employees, sole proprietors, and active partners are included, but unpaid family workers and volunteers are not included. The employment estimates are counted as the number of jobs at which the earnings estimates and worker's activity in each industry or location of employment is reflected in the measure.

The employment numbers for the manufacturing sector included workers covered by the State Unemployment Insurance (UI) laws and federal civilian workers covered by the Unemployment Compensation for the Federal Employees (UCFE) program. The estimates of about 95 percent of wage and salary employment are derived from tabulations by the state employment security agencies (ESAs) from their state employment security reports. These tabulations summarize the data from the quarterly UI contribution reports filed with a state ESA by the employers subject to the state's UI laws.

Using the employment data from the REMI baseline, one complementary scenario (OKC MSA, Tulsa MSA, Northwest Oklahoma, Northeast Oklahoma, Southwest Oklahoma, and Southeast Oklahoma) was built and modeled as "counterfactual positive" simulation, based on a forecast time frame from 2014 to 2034.

As previously mentioned, the REMI model relies on historical data to forecast the economic impact. This data was obtained from different sources and each of these sources use different measurements to report the monetary figures. BEA has reported Gross Domestic Product (GDP) and its aggregate final demand components in chained real dollars, while BLS uses

fixed real dollars for data that are at the most 'detailed' level. In order to reconcile these two sets of variables, all real dollar concepts used in the model are based on fixed weights. This allows the industry value added and final demand totals to remain balanced. In order to avoid any confusion, all monetary figures of the economic impact reported in this study are present in 'current' dollars. Current dollar is the value of a dollar at the time at which it is measured.

The first section of the report discusses the economic impact of manufacturing on Oklahoma's economy as a whole; and the second section of the report addresses the same issues, but focuses on the regional levels of the six sub-state regions. All economic impact reported represents the aggregated impact of direct, indirect, and induced impacts of the manufacturing sector on Oklahoma's economy.

The REMI control forecast predicts the economic and demographic variables into the future, if nothing changes (*ceteris paribus*) in the economy. The REMI alternative forecast predicts the same variables for the economy with a given economic stimulus, which is the manufacturing sector employment data input. The difference between the two (control forecast and alternative forecast) concludes the economic impact of the manufacturing sector upon the state and the regional economies. The aggregated economic impact is an estimate of what would have occurred in the study region over the study time period, if manufacturing had been the only stimulus that occurred in the economy and *ceteris paribus*.

NAICS	Category	Employment 2013
311	Food Manufacturing	18,488
312	Beverage, and Tobacco Manufacturing	2,818
313-314	Textile Mills, and Textile Product Mills	1,047
315-316	Apparel, Leather, and Allied Product Manufacturing	1,602
321	Wood Manufacturing	2,338
322	Paper Manufacturing	2,815
323	Printing, and Related Support Activities	3,251
324	Petroleum and Coal Product Manufacturing	2,355
325	Chemical Manufacturing	3,873
326	Plastic and Rubber Product Manufacturing	10,203
327	Nonmetallic Mineral Product Manufacturing	7,703
331	Primary Metal Manufacturing	4,977
332	Fabricated Metal Product Manufacturing	26,100
333	Machinery Manufacturing	31,099
334	Computer and Electronic Product Manufacturing	5,097
335	Electrical Equipment and Appliance Manufacturing	3,080
3361-3363	Motor vehicles, Body, Trailers, and Parts Manufacturing	6,853
3364-3369	Other Transportation Equipment Manufacturing	6,795
337	Furniture and Related Product Manufacturing	2,371
339	Miscellaneous Manufacturing	5,024
Total		147,887

Gross State Product

Gross State Product (GSP)

As a value added concept is analogous to the national concept of Gross Domestic Product. It is equal to output excluding the intermediate inputs. It represents compensation and profits.

Affected by:

- Consumption
- Net Exports
- Investment
- State & Local Government Spending

Affects:

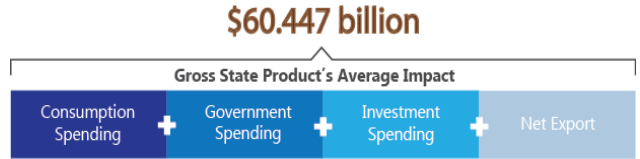
- Commodity Access Index
- Change in Local Supply
- Employment
- Output

Gross State Product (GSP) is analogous to the nation’s Gross Domestic Product (GDP), and to the region’s Gross Regional Product (GRP). It is the total value of all goods and services produced within a region during a given time period. In general, it can be used as a barometer to gauge a region’s economic well-being.

Excluding the manufacturing sector from the state’s economy, GSP would account for \$156.5 billion in 2014. With the addition of manufacturing, this amount is predicted to grow to as much as \$196.9 billion, representing a 20.5% increase or \$40.4 billion of GSP impact.

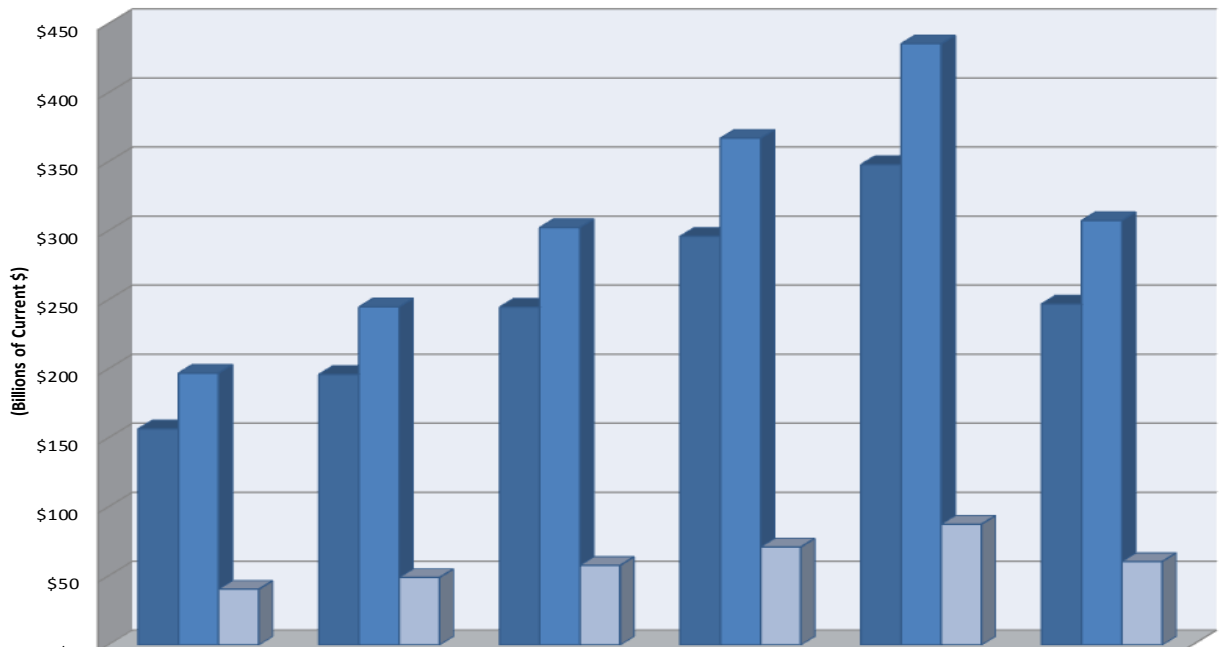
Without manufacturing, the GSP is predicted to amount to \$348 billion in 2034. Adding manufacturing into the state’s economy grows the GSP to \$435.5 billion, a 20.9% increase or \$87.5 billion of GSP impact.

Over the years, average manufacturing GSP impact is projected to be \$60.4 billion annually;



19.7% more than without the manufacturing sector. Manufacturing activities stimulate the economy to grow GSP by roughly 4% annually, on average, throughout the study time period, which is an upsurge of total GSP to an estimated \$1.3 trillion.

Economic Impact of Manufacturing on Gross State Product



	2014	2019	2024	2029	2034	Average
Without Manufacturing	\$156,509,872,436	\$195,992,614,746	\$244,668,563,843	\$296,035,064,697	\$347,967,712,403	\$247,018,854,050
With Manufacturing	\$196,918,670,654	\$244,882,202,148	\$302,364,379,883	\$367,021,179,199	\$435,454,895,020	\$307,465,819,586
Economic Impact	\$40,408,798,218	\$48,889,587,402	\$57,695,816,040	\$70,986,114,502	\$87,487,182,617	\$60,446,965,536

State Output

State Output

The amount of production in dollars, including all intermediate goods purchased as well as value-added (compensation and profit). Can also be thought of as sales (Output = Self-Supply – Export + Intraregional Trade – Exogenous Production).

Affected by:

- Consumption
- International Exports
- Investment
- State & Local Government Spending
- Intermediate Inputs
- Share of Domestic Markets

Affects:

- Commodity Access Index
- Change in Local Supply
- Employment
- Intermediate Inputs

State Output, reflecting broader economic activities that include the amount of production, is comprised of all the intermediate goods purchased as well as value-added (compensation and profit). Briefly, it is the sum of Gross State Product plus intermediate goods and services.

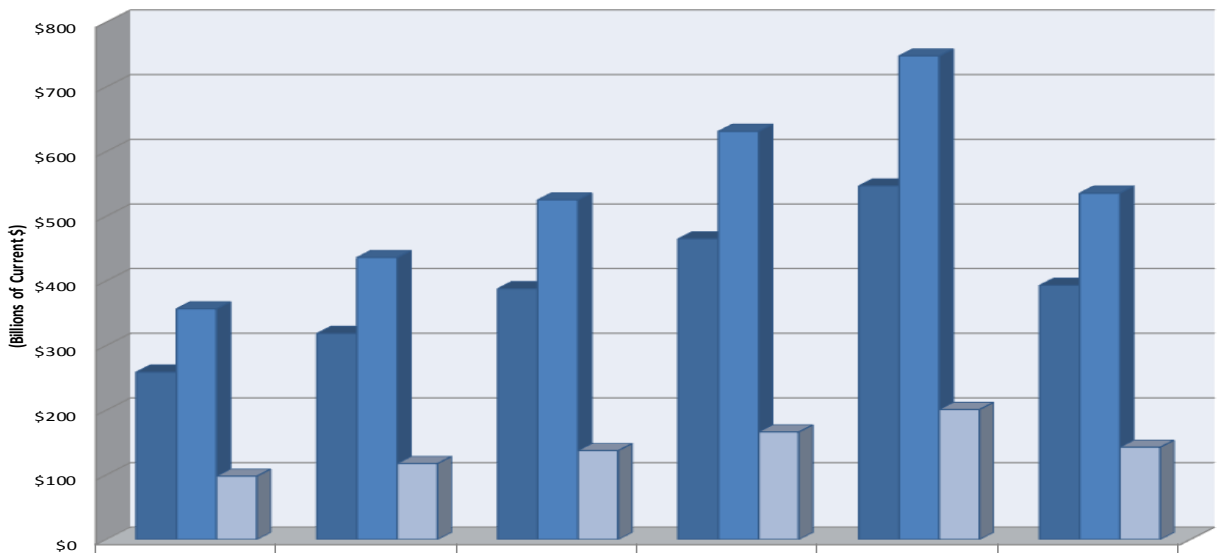
Output is affected by changes in industry demand in all regions in the nation, the home region’s share of each market, and international exports from the region. Variables affecting and affected by the state output are the same variables affecting and affected by GSP, except that state output includes the measurement of intermediate inputs.

Excluding the manufacturing sector from the state’s economy, state output is predicted to account for \$258.8 billion in 2014. With the addition of manufacturing, this amount is predicted to grow to as much as \$356.7 billion, representing a 55% increase or \$97.9 billion of state output impact.

Without manufacturing, the state output is predicted to amount to \$546.8 billion in 2034. Adding manufacturing into the state’s economy grows the state output to \$747.8 billion, a 26.9% increase or \$201 billion of state output impact.

State output impact will continue to grow in subsequent years at an average speed of 4% annually. The average output impact is projected to be \$142.6 billion per year; 26.6% more than without manufacturing. Over the years of the forecasted time frame, the aggregated impact on state output accounts for approximately \$3 trillion.

Economic Impact of Manufacturing on State Output



	2014	2019	2024	2029	2034	Average
Without Manufacturing	\$258,750,122,071	\$318,555,450,439	\$387,735,229,492	\$464,875,305,175	\$546,786,376,953	\$393,002,739,316
With Manufacturing	\$356,670,013,428	\$435,981,445,312	\$525,128,967,285	\$631,111,511,230	\$747,793,090,820	\$535,652,175,177
Economic Impact	\$97,919,891,357	\$117,425,994,873	\$137,393,737,793	\$166,236,206,055	\$201,006,713,867	\$142,649,435,861

Real Disposable Personal Income

Real Disposable Personal Income

Disposable personal income deflated by the PCE-Price Index (the personal consumption expenditure price index).

Affected By:

- Employment
- Commuter Income or Outflow
- Property Income Transfers
- Taxes
- Social Security Payments
- Compensation
- Consumer Prices

Affects:

- Consumption
- Optimal Residential Capital Stock

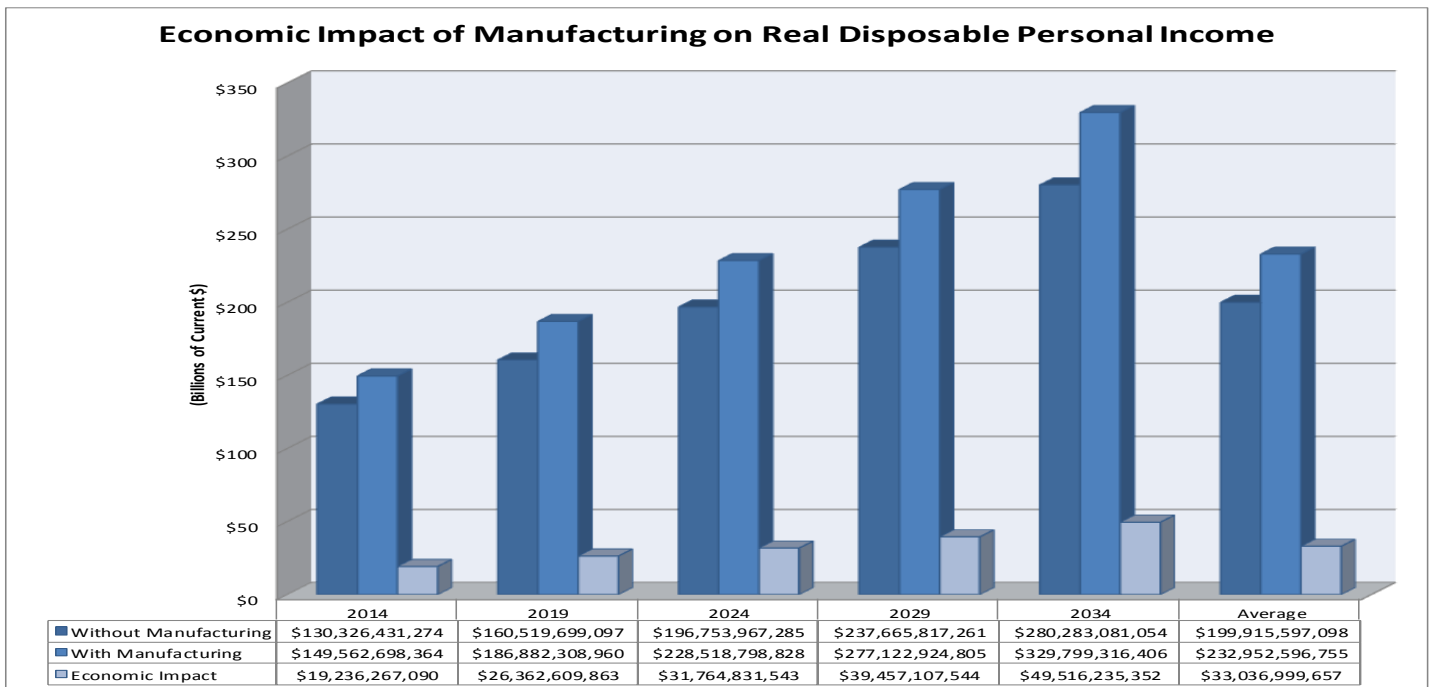
Real Disposable Personal Income represents the after tax, inflation adjusted income that can be spent or saved by income earners. Real Disposable Personal Income is directly affected by Disposable Personal Income, so a change in Real Disposable Personal Income will lead to a change in Personal Consumption.

In REMI’s terms, Real Disposable Personal Income equals Disposable Personal Income deflated by the PCE-Price Index. Briefly, an increase in real disposable personal income can be caused by an increase in disposable personal income or a decrease in the PCE-Price index.

Excluding the manufacturing sector from the state’s economy, Real Disposable Personal Income would account for \$130.3 billion in 2014. With the addition of manufacturing, this amount is predicted to grow to as much as \$149.6 billion, representing a 12.9% increase or \$19.2 billion of Real Disposable Personal Income impact.

Without manufacturing, the Real Disposable Personal Income is predicted to amount to \$280.3 billion in 2034. Adding manufacturing into the state’s economy grows the Real Disposable Personal Income to \$329.8 billion, a 15% increase or \$49.5 billion of Real Disposable Personal Income impact.

Over the years, average manufacturing Real Disposable Personal Income impact is projected to be \$33 billion annually; 142% more than without the manufacturing sector. Manufacturing activities stimulate the economy to grow Real Disposable Personal Income by roughly 5% annually, on average, throughout the study time period, which is an upsurge of total Real Disposable Personal Income to an estimated \$693.8 billion.



Personal Income Taxes

Income Taxes

A BEA (Bureau of Economic Analysis) concept of personal income taxes, which when subtracted from personal income (income received by persons from all sources), results in disposable personal income (total after tax income received by persons; it is the income available to persons for spending or saving)

Affected By:

- Personal Income

Affects:

- Disposable Personal Income

Personal Income Tax is derived from Personal Income. When this amount is subtracted from Personal Income, it will result in Disposable Personal Income. It is important to note that the income tax impact present in this study represents the revenues (through the spillover effects from manufacturing employment) received by the state of Oklahoma.

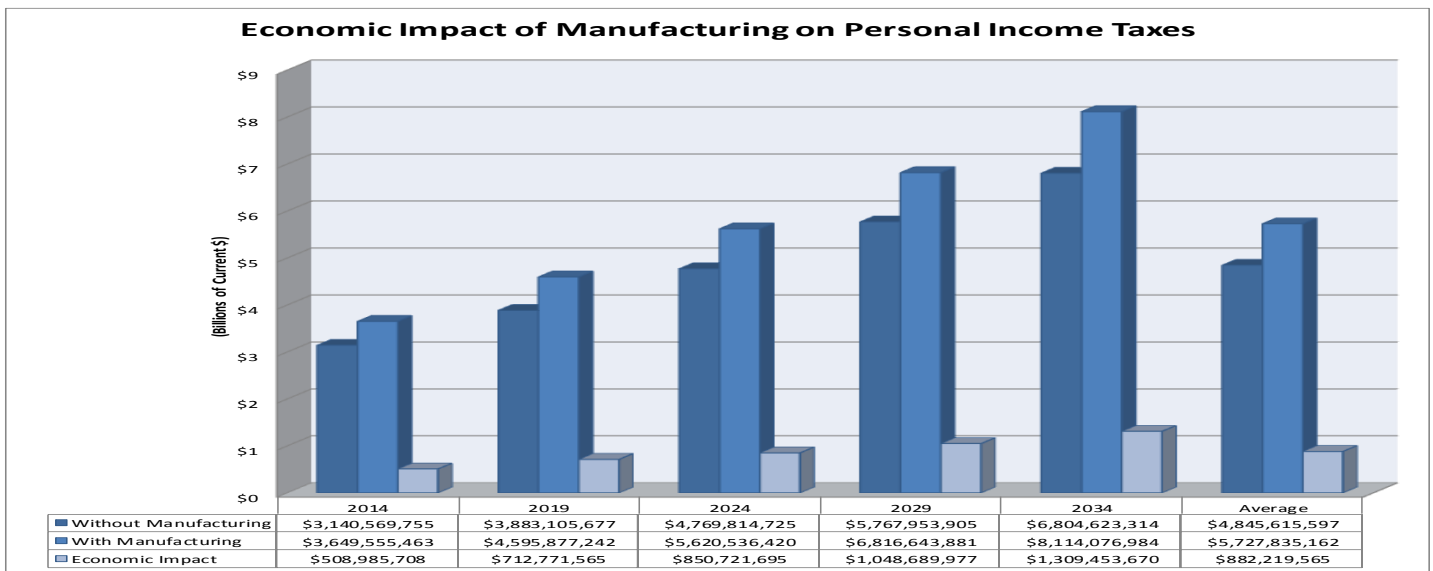
The composition of personal income tax revenue has to be traced back to Personal Income. Personal Income is calculated as the sum of wage and salary disbursements, supplements to wages and salaries, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustments, personal dividend income, personal interest income, and personal current transfer receipts, less contributions for government social insurance.¹⁰

The personal income of an area is the income that is received by, or on behalf of, all the individuals who live in the area; therefore, the estimates of personal income are presented by the place of residence of the income recipients.

Excluding the manufacturing sector from the state's economy, personal income taxes would account for \$3.1 billion in 2014. With the addition of manufacturing, this amount is predicted to grow to as much as \$3.6 billion, representing a 14% increase or \$509 million of personal income tax impact.

Without manufacturing, personal income taxes are predicted to amount to \$6.8 billion in 2034. Adding manufacturing into the state's economy grows personal income taxes to \$8.1 billion, a 16.1% increase or \$1.3 billion of personal income tax impact.

Over the years, average manufacturing personal income tax impact is projected to be \$882 million annually; 15.4% more than without the manufacturing sector. Manufacturing activities stimulate the economy to grow personal income taxes by roughly 9% annually, on average, throughout the study time period, which is an upsurge of total personal income taxes to an estimated \$18.5 billion.



Employment

Employment

Bureau of Economic Analysis (BEA) concept based on place of work; includes full-time and part-time employees.

Affected By:

- Labor / Output Ratio
- Output
- Labor Productivity

Affects:

- Capital Stock
- Real Disposable Income
- Employment Opportunity
- Wage Rate

Employment includes the number of full-time and part-time jobs by place of work, with full-time and part-time jobs carrying equal weight in the REMI model. While employees, sole proprietors, and active partners are included in the estimate, unpaid family workers and volunteers are not included.

The state has an employment multiplier of 2.7. This means, with every 10 new jobs created in Manufacturing, an additional 17 jobs will be created.

Every 10 Direct Jobs Supports An Additional 17 Indirect and Induced Jobs



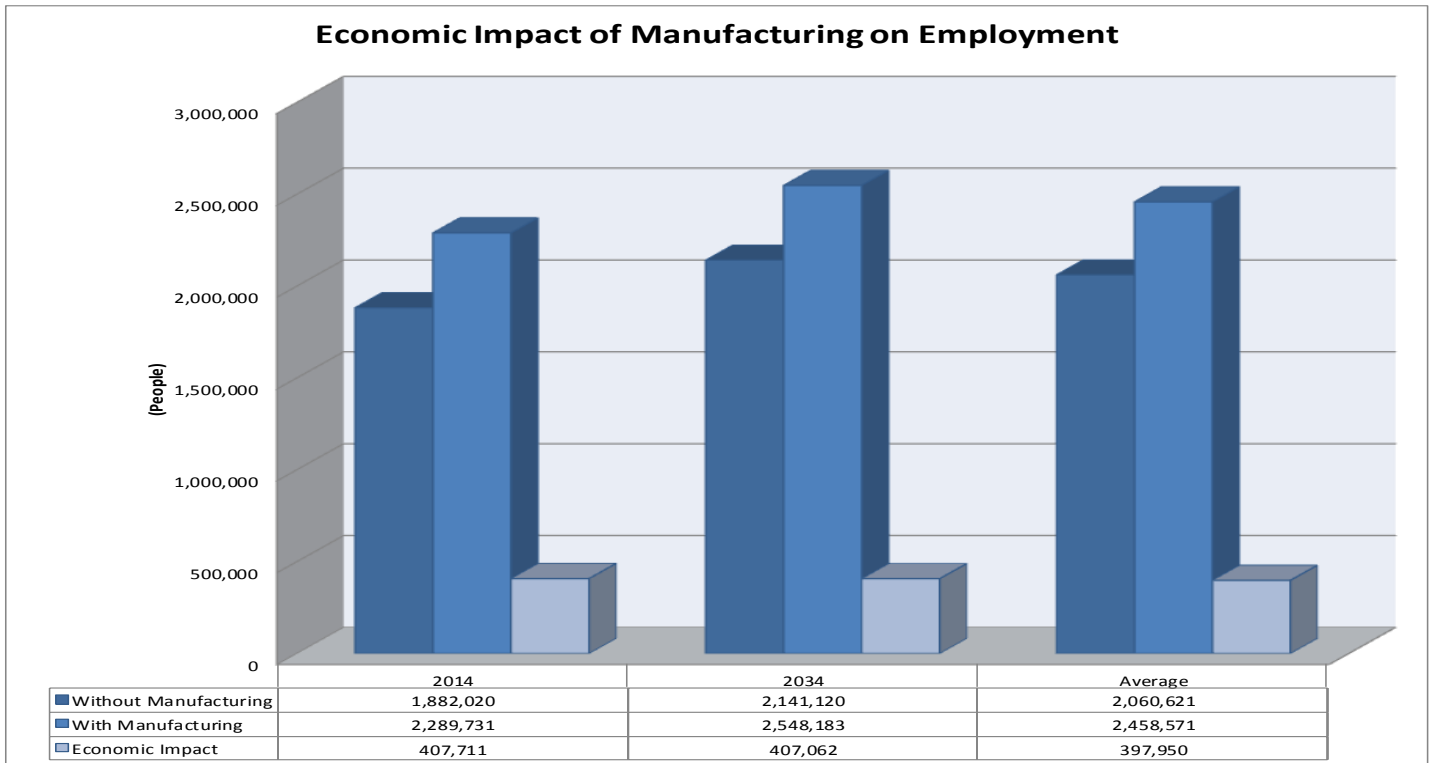
As noted in the graph, without Manufacturing in the economy, 2014 employment would be 1.9 million jobs. The existence of Manufacturing in the economy would drive the statewide employment up 17.8% to 2.3 million jobs in 2014; a difference of 407,711 jobs.

Without manufacturing, employment is predicted to be 2.1 million jobs in 2034.

Adding manufacturing into the state's economy grows employment to 2.5 million jobs, a 16% increase or an impact of 407,062 jobs.

Employment is expected to grow by an average of 397,950 jobs per year. With this growth, the Private, Non-Farm sector has the largest share (86.5% or 344,185 jobs) of the average employment impact; followed by the Government sector (13.5% or 53,766 jobs).

Economic Impact of Manufacturing on Employment



Residential Capital Stock

Residential Capital Stock

The amount of residential capital (housing structures) existing in the economy. It is further divided into Residential Actual Capital Stock and Non-Residential Actual Capital Stock.

Affected By:

- Cumulative effects of Investment

Affects:

- Gap between Actual & Optimal Capital Stock
- Investment Spending

Capital Stock is divided into two major categories. These include Residential Capital Stock and Non-Residential Capital Stock. Each of these categories is further disaggregated into actual or optimal capital stock. As a reminder, all reported Actual Capital Stock is the cumulative impact that would occur in the state, which is triggered by the jobs supported in Manufacturing. Only the actual capital stocks are graphed to show the actual amount of capital stock impacted by manufacturing in the economy.



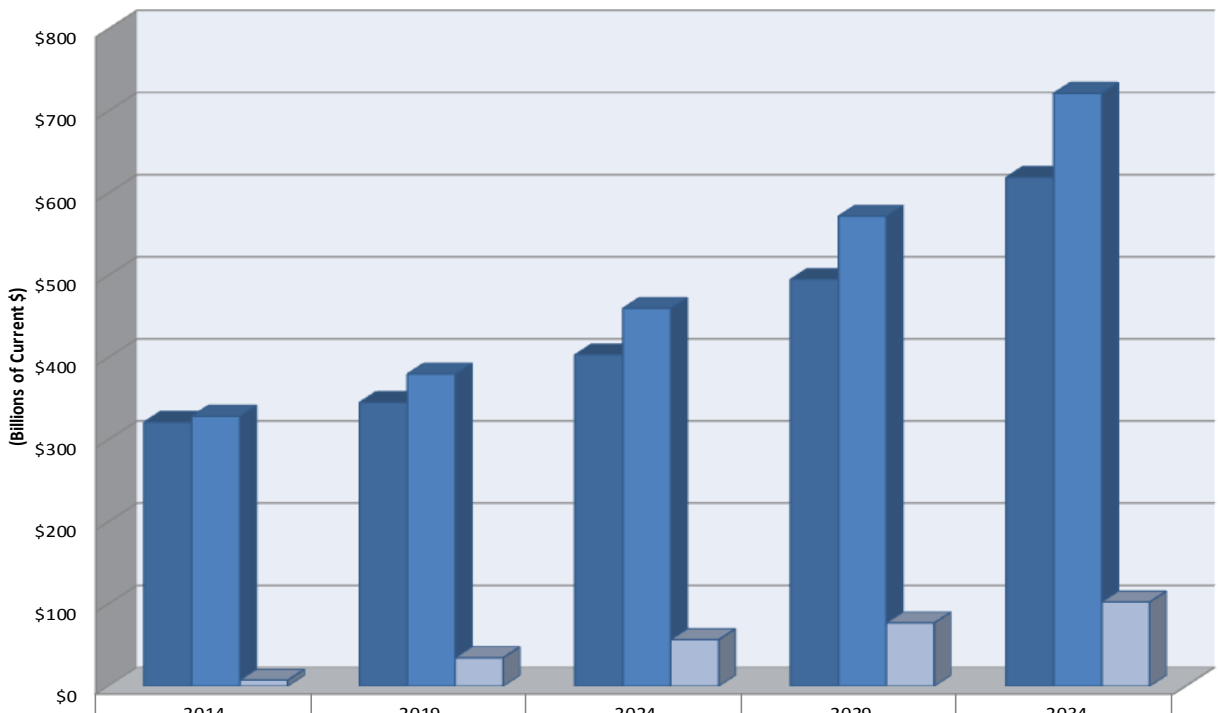
Average Residential Actual Capital Stock

\$55.647 Billion

Oklahoma Residential Actual Capital Stock is the amount of residential capital (housing structures) in the region accumulated over time net of depreciation. Oklahoma Residential Actual Capital Stock is affected by changes in residential investment.

In 2014, the manufacturing sector’s impact on total Actual Capital Stock is forecasted to be \$7.3 billion. This amount would increase to as much as \$102.4 billion by 2034. The average annual growth rate for Residential Capital Stock is predicted to be 85.9%, resulting in an average impact of \$55.6 billion per year brought about by manufacturing.

Economic Impact of Manufacturing on Residential Capital Stock



Non-Residential Capital Stock

Non-Residential Capital Stock

The amount of non-residential capital stock (non-housing structures) existing in the economy. It is further divided into Residential Actual Capital Stock and Non-Residential Actual Capital Stock.

Affected By:

- Cumulative effects of Investment

Affecting:

- Gap between Actual & Optimal Capital Stock
- Investment Spending

Capital Stock is divided into two major categories. These include Residential Capital Stock and Non-Residential Capital Stock. Each of these categories is further disaggregated into actual or optimal capital stock. As a reminder, all reported Actual Capital Stock is the cumulative impact that would occur in the state, which is triggered by the jobs supported in Manufacturing. Only the actual capital stocks are graphed to show the actual amount of capital stock impacted by manufacturing in the economy.

Average Non-Residential Actual Capital Stock

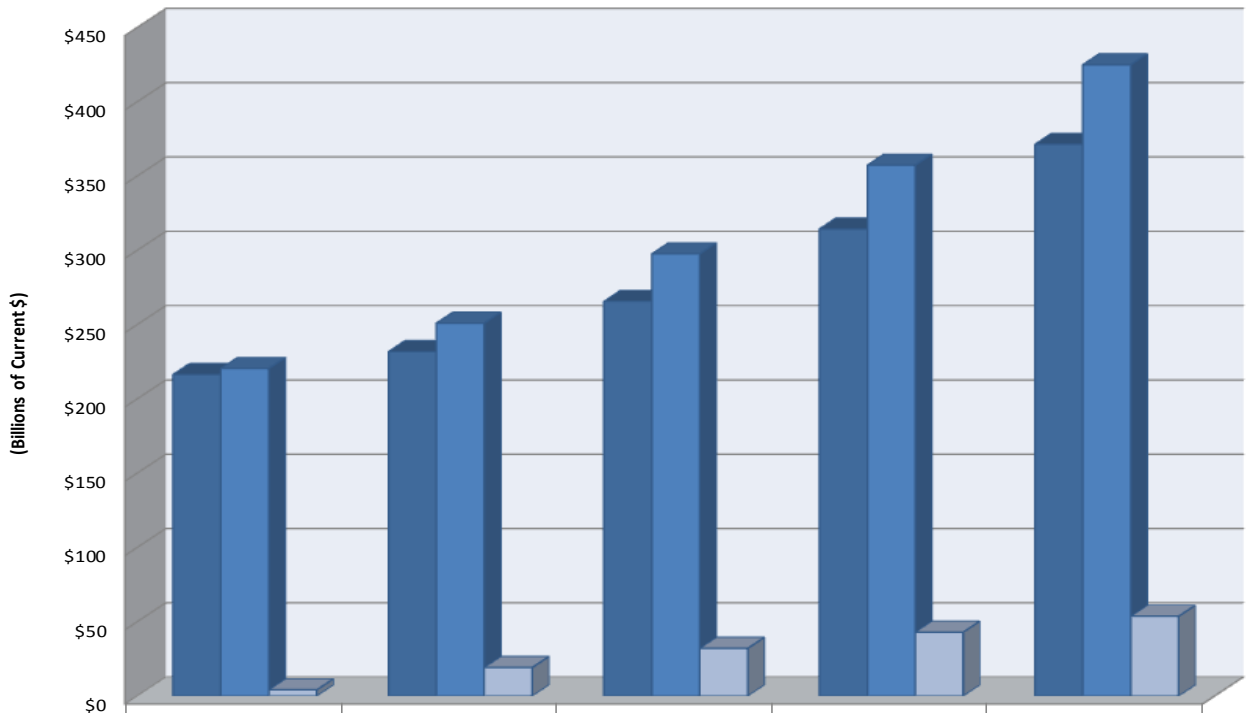
\$30.699 Billion



Oklahoma Non-Residential Actual Capital Stock is the amount of non-residential capital (non-housing structures) in the region accumulated over time net of depreciation.

In 2014, the state's total Actual Capital Stock is forecasted to grow by an additional \$4.1 billion. This amount would increase to as much as \$53.6 billion by 2034. The average annual growth rate for Non-Residential Capital Stock is predicted to be 86.2%, resulting in an average impact \$30.7 billion per year brought about by manufacturing.

Economic Impact of Manufacturing on Non-Residential Capital Stock



Labor Force

Labor Force

The number of people in the labor force, i.e., employed or seeking work.

Affected By:

- Population and Participation Rate

Affects:

- Employment Opportunity
- Wage Rate

Labor force includes the total number of people employed and those who seek employment in a given region, calculated with the participation rates and age cohort.

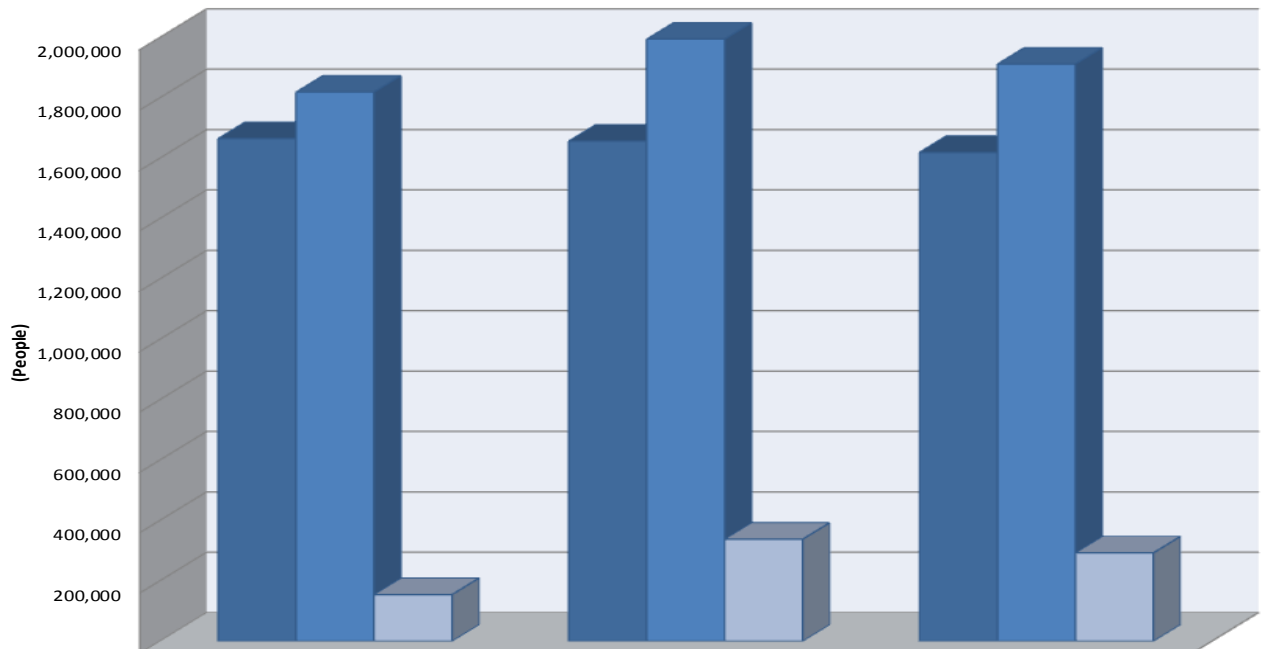
Calculation of the labor force is derived by taking the total population multiplied by the participation rate. An increase in population or participation rate will result in an increased labor force in the region, and vice versa.

Excluding the manufacturing sector from the state’s economy, labor force would account for 1.7 million employees in 2014. With the addition of manufacturing, this amount is predicted to grow to 1.8 million employees, representing an 8.5% increase or 154,076 jobs of labor force impact.

Without manufacturing, labor force would remain at 1.7 million employees in 2034. With the addition of manufacturing in the economy, labor force is projected to be 2 million employees in 2034, which is a 16.9% increase, or an impact of 337,768 jobs.

Over the years, average manufacturing labor force impact is projected to be 292,204 jobs annually; 15.3% more than without the manufacturing sector. Manufacturing activities stimulate the economy to grow labor force by roughly 94.6% annually, on average, throughout the study time period, which is an upsurge of total labor force to an estimated 6.1 million employees. The labor force is predicted to grow by 292,204 people per year.

Economic Impact of Manufacturing on Labor Force



	2014	2034	Average
Without Manufacturing	1,664,640	1,656,398	1,619,166
With Manufacturing	1,818,716	1,994,166	1,911,369
Economic Impact	154,076	337,768	292,204

Population

Population

Mid-year estimates of population, including survivors from the previous years, births, special populations, and three types of migrants (economic, international, and retired).

Affected By:

- Total Migration
- Special Population
- Natality Rates
- Survival Rates

Affects:

- Potential Labor Force
- Labor force
- Local / State Government Spending
- Consumption Spending
- Housing Prices

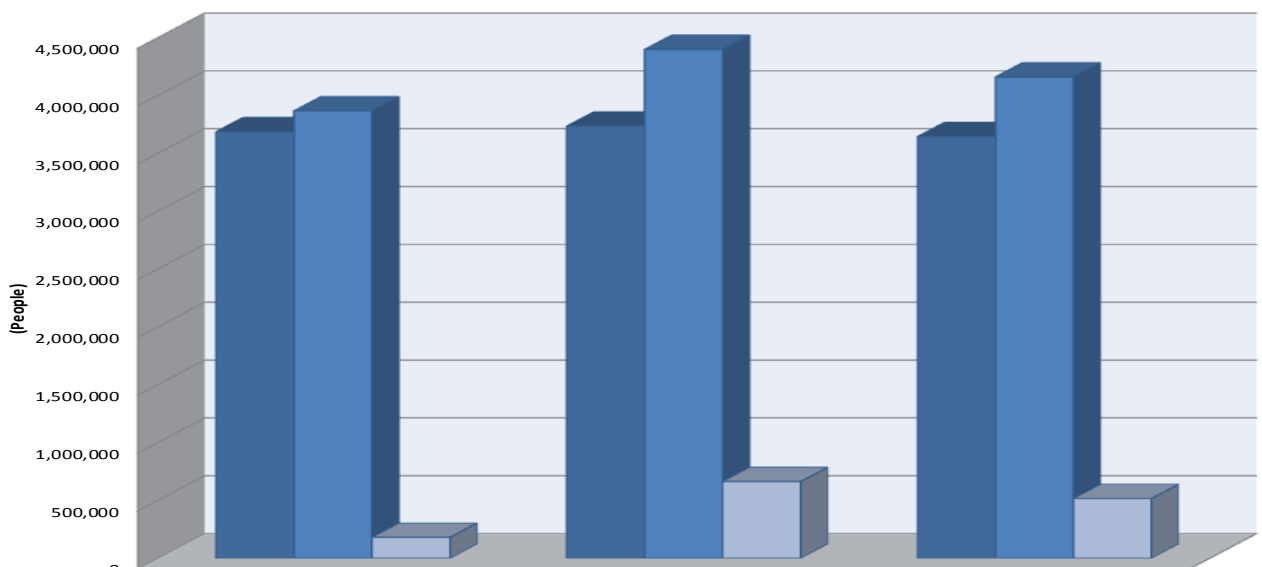
Population reflects the mid-year estimates of people, including births, special populations, survivors from the previous year, economic migrants, international migrants, and retired migrants. It is affected by changes in total migration, special populations, natality and survival rates.

Population appears not only as a determinant of Real Disposable Personal Income Per Capita, but also as a determinant of Consumption, State and Local Government Spending, and the Relative Housing or Land Prices. A change in Population will result in a change of these variables.

The major determinant of Population itself is Economic Migration. Economic migrants are migrants under age 65 (who were part of the civilian population the preceding year) who respond to economic and amenity factors. Increased amenity factors translate into a higher economic migrant impact with more people moving into the region. A positive economic migration becomes indicative of the growing population impact. It should be noted that economic migrants present in the graph are non-cumulative impact. The number of economic migrants would eventually taper off over time as the stimulus (Manufacturing) approaches the end of the forecast time period, and more economic migrants are anticipated to leave the state.

From 2014 to 2034, manufacturing’s impact on population is predicted to grow from 180,412 people to 663,068 people, an average annual growth of 515,221 people.

Economic Impact of Manufacturing on Population



	2014	2034	Average
Without Manufacturing	3,687,531	3,735,781	3,645,034
With Manufacturing	3,867,943	4,398,850	4,160,255
Economic Impact	180,412	663,068	515,221

Proprietors' Income

Proprietors' Income

A BEA (Bureau of Economic Analysis) concept, including income in kind of sole-proprietorships, partnership, and tax-exempt cooperatives, excludes dividends, monetary interest received by nonfinancial business, and rental income received by persons not primarily engaged in the real estate business.

Affected By:

- Wage Rate
- Prices
- Costs

Affects:

- Personal Income

Proprietors' Income with Inventory and Capital Consumption Adjustments is the current production income of sole proprietorships, partnership, and tax-exempt cooperatives. Corporate directors' fees are included in proprietors' income, but the imputed net rental income of owner occupants of all dwellings is included in the rental income of persons.

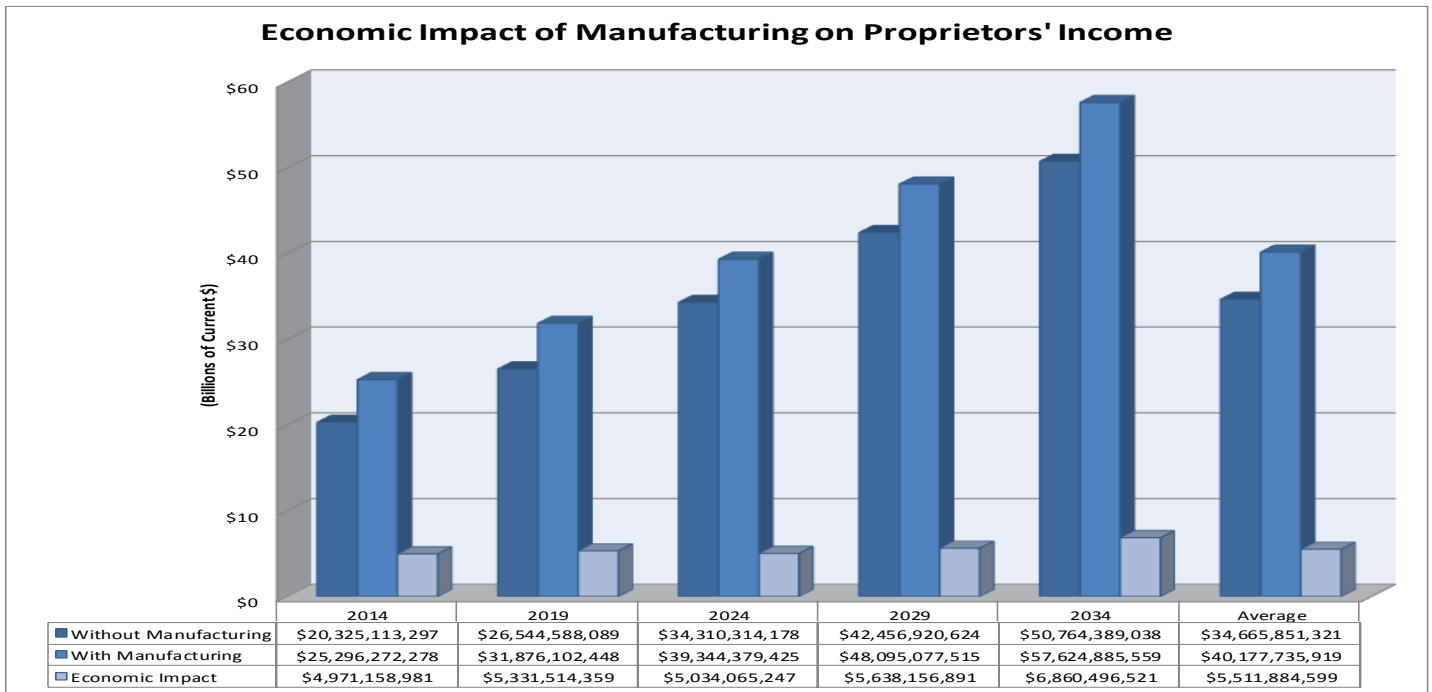
Proprietors' income excludes dividends and monetary interest received by non-financial business and rental incomes received by persons not primarily engaged in the real estate business; these incomes include dividends, net interest, and rental income of persons, respectively.

Excluding the manufacturing sector from the state's economy, proprietors' income would account for \$20.3 billion in 2014. With the addition of manufacturing, this amount is predicted to grow to as much as \$25.3 billion, representing a 19.7% increase or \$5 billion of proprietors' income impact.

Without manufacturing, the proprietors' income is predicted to amount to \$50.8 billion in 2034. Adding manufacturing into the state's economy grows the

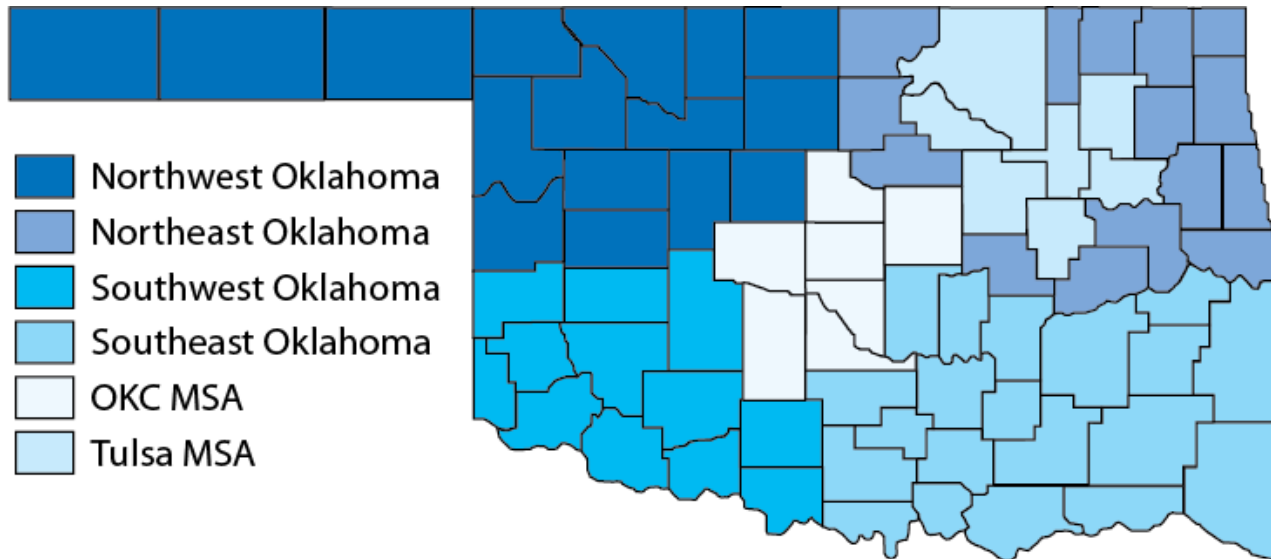
proprietors' income to \$57.6 billion, an 11.9% increase or \$6.9 billion of proprietors' income impact.

Over the years, average manufacturing proprietors' income impact is projected to be \$5.5 billion annually; 13.72% more than without the manufacturing sector. Manufacturing activities stimulate the economy to grow proprietors' income by roughly 2.1% annually, on average, throughout the study time period, which is an upsurge of total proprietors' income to an estimated \$115.7 billion.



Regional Economic Impacts

To analyze the economic impact of the manufacturing sector at the regional level, the state of Oklahoma is divided into 6 sub-state regions. The magnitude of economic impact for each region differs depending on the volume of economic activity stimulated by manufacturing, and stems from the nature of the economic structure, activities, and labor market condition of the region.

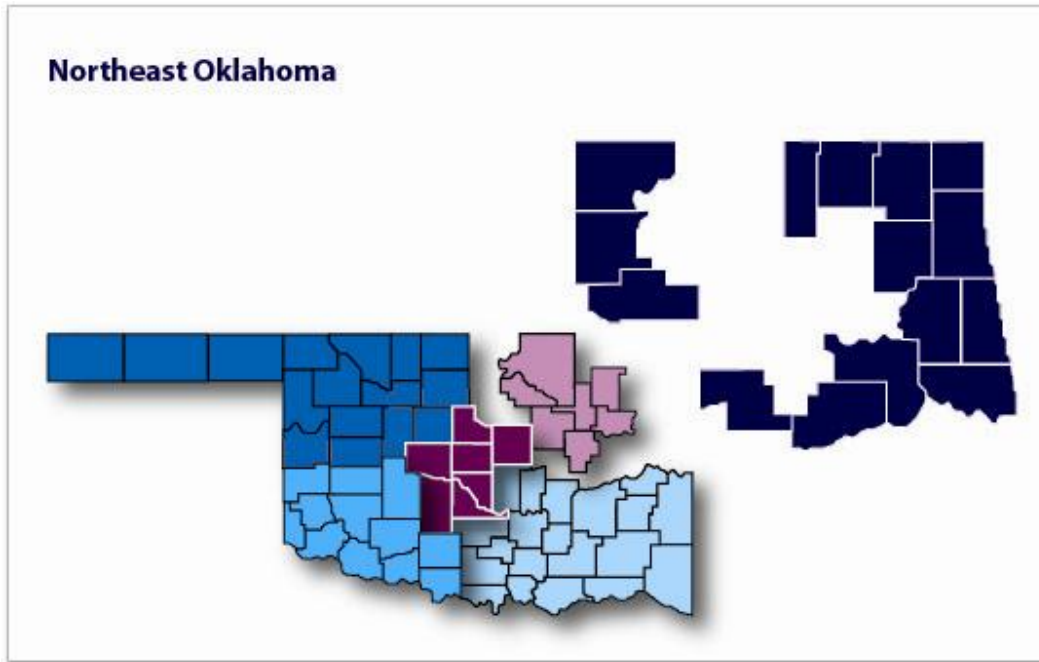


- Northwest Oklahoma
- Northeast Oklahoma
- Southwest Oklahoma
- Southeast Oklahoma
- OKC MSA
- Tulsa MSA

Northwest Oklahoma	Northeast Oklahoma	OKC MSA	Tulsa MSA	Southwest Oklahoma	Southeast Oklahoma
Alfalfa Beaver Blaine Cimarron Custer Dewey Ellis Garfield Grant Harper Kingfisher Major Roger Mills Texas Woods Woodward	Adair Cherokee Craig Delaware Kay McIntosh Mayes Muskogee Noble Nowata Okfuskee Ottawa Payne Sequoyah Washington	Canadian Cleveland Grady Lincoln Logan McClain Oklahoma	Creek Okmulgee Osage Pawnee Rogers Tulsa Wagoner	Beckham Caddo Comanche Cotton Greer Harmon Jackson Jefferson Kiowa Stephens Tillman Washita	Atoka Bryan Carter Choctaw Coal Garvin Haskell Hughes Johnston Latimer Le Flore Love McCurtain Marshall Murray Pittsburg Pontotoc Pottawatomie Pushmataha Seminole

**PROVIDING ECONOMIC
IMPACT ANALYSIS FOR
OKLAHOMA AND SIX
DISTINCT REGIONS**

Northeast Oklahoma

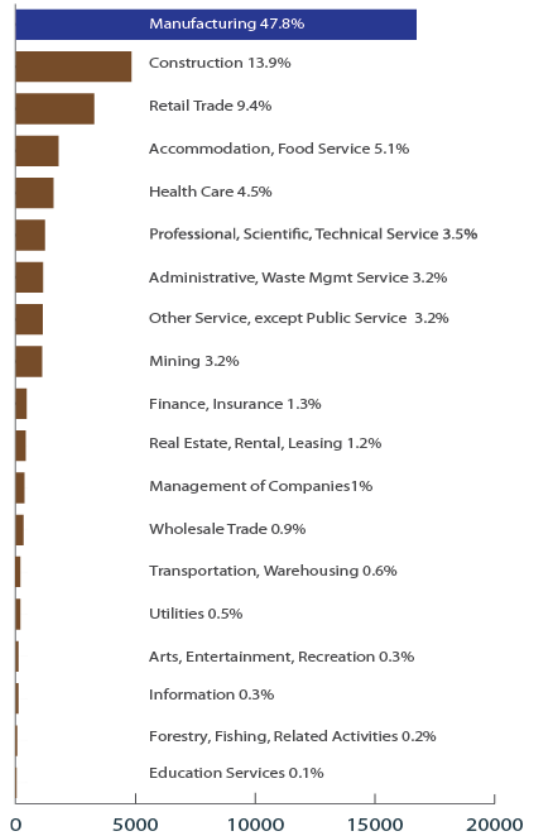


In 2013, there were 538 manufacturing employers¹¹ in the northeast region supporting 16,764 manufacturing jobs, both full and part time. Together, these jobs in the region accounted for 40% of total employment in the region, and manufacturing comprised 51.8% of the total industry establishment.

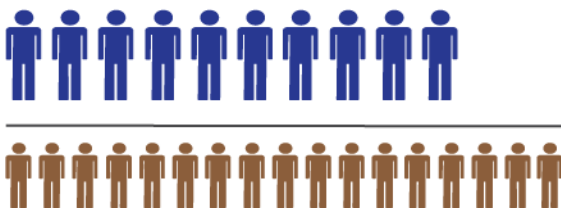
The chart to the right outlines the projected average employment by sector for the duration of the forecast period.

The region has an employment multiplier of 2.7. This means, with every 10 new jobs created in Manufacturing, an additional 17 jobs will be created.

Employment Impact by Sector



Every **10** Direct Jobs
Supports An Additional **17** Indirect and Induced Jobs

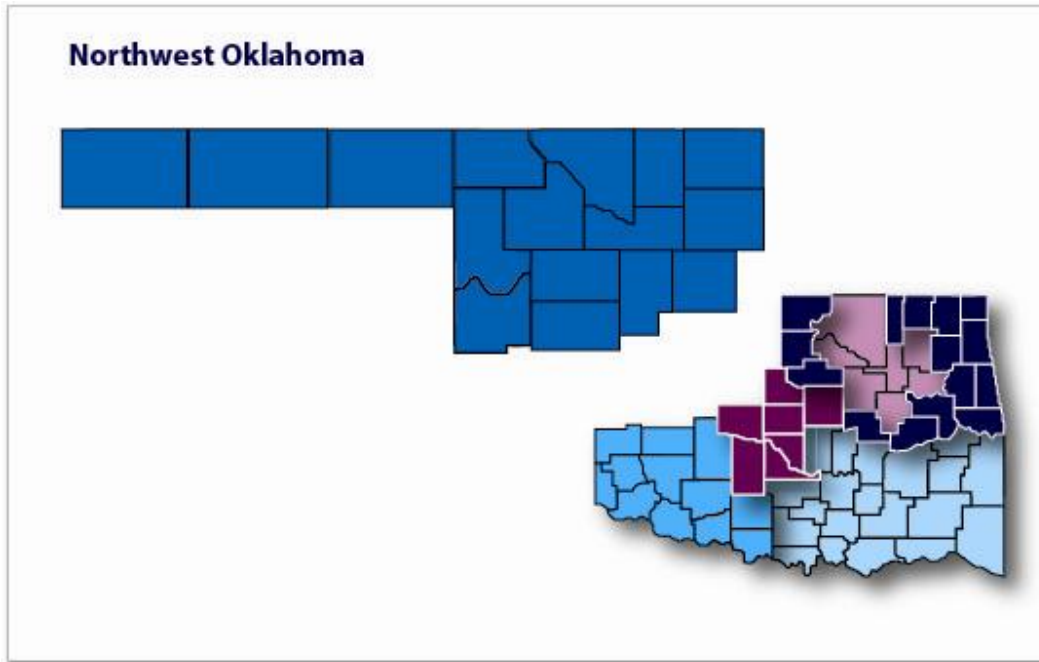


Northeast Oklahoma Manufacturing Economic Impact			
	2014	2034	Average
Gross Regional Product	\$4,281,135,559	\$9,268,512,726	\$6,402,078,628
Consumption	\$1,532,984,734	\$4,543,327,332	\$2,949,141,321
Real Disposable Personal Income	\$1,905,447,006	\$5,356,990,814	\$3,490,662,438
Regional Output	\$12,187,181,473	\$24,757,785,797	\$17,665,778,660
Proprietor's Income	\$323,207,140	\$425,821,781	\$340,036,937
Income Taxes	\$50,659,570	\$140,014,071	\$92,386,307
Residential Actual Capital Stock	\$803,997,040	\$12,270,210,266	\$6,521,629,697
Nonresidential Actual Capital Stock	\$449,504,852	\$5,552,951,813	\$3,245,321,274
Employment (People)	45,173	46,874	45,400
Labor Force (People)	22,268	48,256	41,522
Population (People)	26,039	93,756	73,018

The manufacturing sector's **Gross Regional Product** impact for the northeast region is forecasted to be an average of \$6.4 billion per year, resulting in an average growth rate of 3.9%. Regional **output** impact is projected to be \$17.7 billion annually; a 3.6% growth rate. Regional **real disposable personal income** impact is forecasted to realize an average of \$3.5 billion per year, which is an average growth rate of 5.4% yearly. Manufacturing's impact upon **regional proprietors' income** would average \$340 million annually, resulting in a 1.9% annual growth rate.

Manufacturing's average annual impact on regional **residential actual capital stock** would increase to \$6.5 billion (a 14.4% increase per year), while the sector's impact on regional **non-residential actual capital** stock is expected to be \$3.2 billion per year (up 13.5% annually). The manufacturing sector's average annual impact on the region's **population** should be 73,018 people, with an **employment** impact of 45,400 jobs and 41,522 employees in the **labor force**.

Northwest Oklahoma

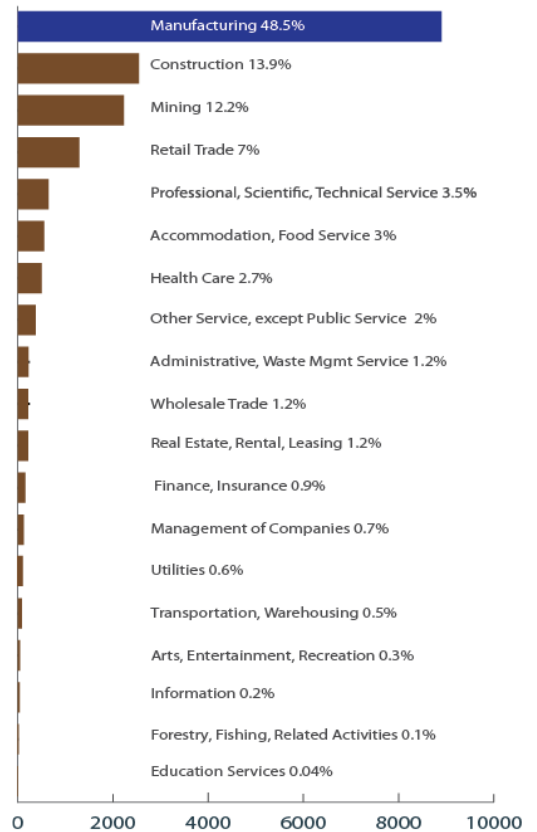


In 2013, there were 225 manufacturing employers¹¹ in the northwest region supporting 8,978 manufacturing jobs, both full and part time. Together, these jobs in the region accounted for 49% of total employment in the region, and manufacturing comprised 43% of the total industry establishment.

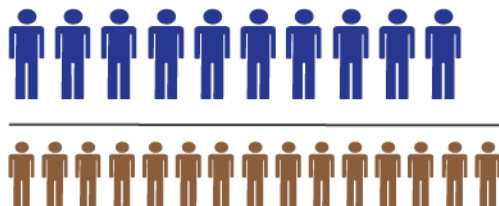
The chart to the right outlines the projected average employment by sector for the duration of the forecast period.

The region has an employment multiplier of 2.5. This means, with every 10 new jobs created in Manufacturing, an additional 15 jobs will be created.

Employment Impact by Sector



Every **10** Direct Jobs
Supports An Additional **15** Indirect and Induced Jobs

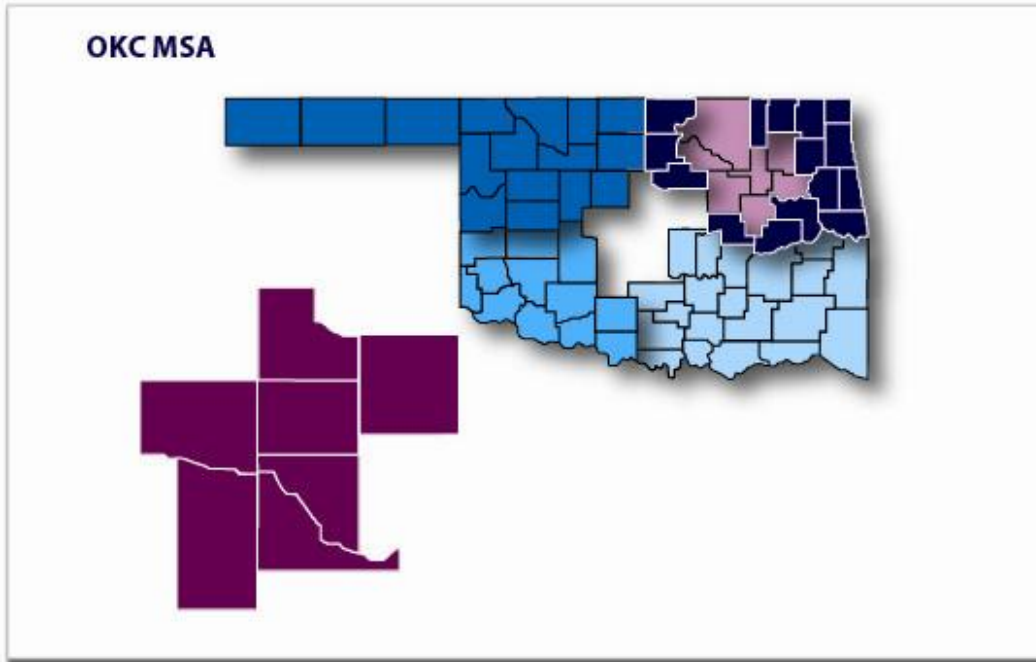


Northwest Oklahoma Manufacturing Economic Impact			
	2014	2034	Average
Gross Regional Product	\$2,531,976,700	\$4,616,594,315	\$2,696,622,849
Consumption	\$744,992,256	\$1,825,223,923	\$873,081,398
Real Disposable Personal Income	\$906,417,847	\$2,150,840,759	\$1,057,345,104
Regional Output	\$7,647,357,941	\$13,741,718,292	\$8,125,086,594
Proprietor's Income	\$231,048,107	\$265,686,512	\$236,698,270
Income Taxes	\$23,600,416	\$55,968,620	\$27,874,566
Residential Actual Capital Stock	\$450,801,849	\$5,935,554,504	\$1,134,392,166
Nonresidential Actual Capital Stock	\$347,234,726	\$3,993,486,404	\$835,781,479
Employment (People)	22,520	20,493	22,710
Labor Force (People)	8,616	16,803	12,386
Population (People)	9,145	29,650	15,275

The manufacturing sector's **Gross Regional Product** impact for the northwest region is forecasted to be an average of \$2.7 billion per year, resulting in an average growth rate of 3.1%. Regional **output** impact is projected to be \$8.1 billion annually; a 3% growth rate. Regional **real disposable personal income** impact is forecasted to realize an average of \$1.1 billion per year, which is an average growth rate of 4.6% yearly. Manufacturing's impact upon **regional proprietors' income** would average \$237 million annually, resulting in a 1.1% annual growth rate.

Manufacturing's average annual impact on regional **residential actual capital stock** would increase to \$1.1 billion (a 13.8% increase per year), while the sector's impact on regional **non-residential actual capital** stock is expected to be \$836 million per year (up 13.2% annually). The manufacturing sector's average annual impact on the region's **population** should be 15,275 people, with an **employment** impact of 22,710 jobs and 12,386 employees in the **labor force**.

Oklahoma City MSA

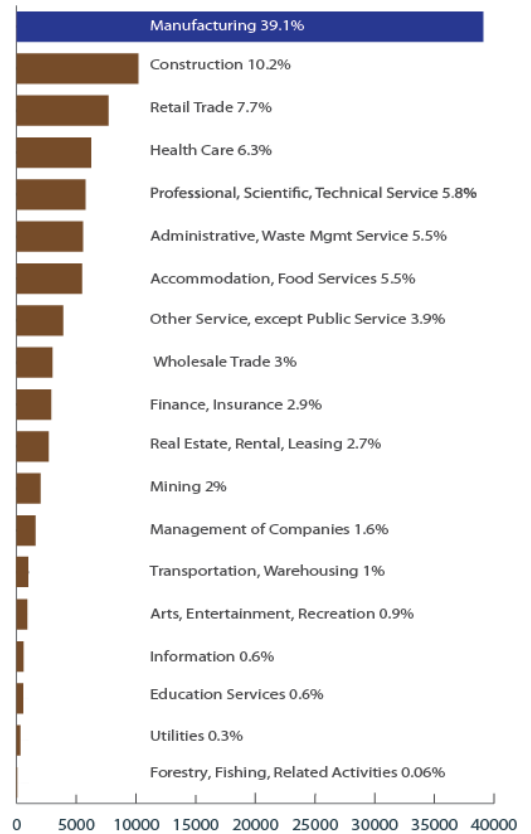


In 2013, there were 1,329 manufacturing employers¹¹ in the Oklahoma City MSA region supporting 39,751 manufacturing jobs, both full and part time. Together, these jobs in the region accounted for 42.2% of total employment in the region, and manufacturing comprised 37.5% of the total industry establishment.

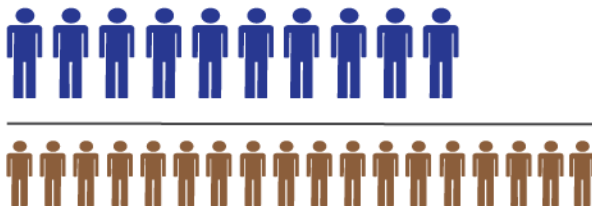
The chart to the right outlines the projected average employment by sector for the duration of the forecast period.

The region has an employment multiplier of 2.8. This means, with every 10 new jobs created in Manufacturing, an additional 18 jobs will be created.

Employment Impact by Sector



Every **10** Direct Jobs
Supports An Additional **18** Indirect and Induced Jobs

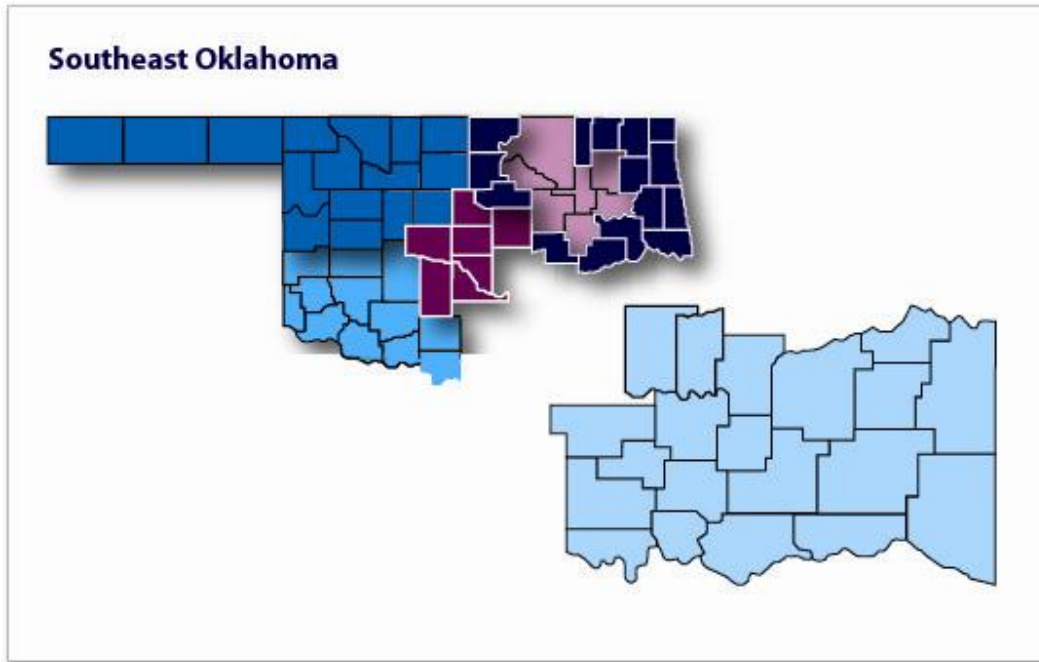


OKC MSA Manufacturing Economic Impact			
	2014	2034	Average
Gross Regional Product	\$11,248,901,367	\$25,459,915,161	\$17,287,117,731
Consumption	\$4,141,475,677	\$10,745,330,811	\$7,202,976,408
Real Disposable Personal Income	\$5,271,522,522	\$13,654,861,450	\$9,042,540,777
Regional Output	\$24,285,125,732	\$52,050,811,768	\$36,352,469,308
Proprietor's Income	\$1,328,410,149	\$1,760,402,679	\$1,440,915,516
Income Taxes	\$140,936,684	\$368,361,340	\$246,308,979
Residential Actual Capital Stock	\$1,902,694,702	\$26,710,540,771	\$14,436,111,813
Nonresidential Actual Capital Stock	\$910,812,378	\$12,424,575,806	\$7,124,345,325
Employment (People)	114,119	117,163	112,780
Labor Force (People)	33,810	80,957	68,235
Population (People)	39,110	158,697	119,811

The manufacturing sector's **Gross Regional Product** impact for the Oklahoma City MSA region is forecasted to be an average of \$17.3 billion per year, resulting in an average growth rate of 4.2%. Regional **output** impact is projected to be \$36.4 billion annually; a 3.9% growth rate. Regional **real disposable personal income** impact is forecasted to realize an average of \$9 billion per year, which is an average growth rate of 5% yearly. Manufacturing's impact upon **regional proprietors' income** would average \$1.4 billion annually, resulting in a 1.8% annual growth rate.

Manufacturing's average annual impact on regional **residential actual capital stock** would increase to \$14.4 billion (a 14.1% increase per year), while the sector's impact on regional **non-residential actual capital** stock is expected to be \$7.1 billion per year (up 13.9% annually). The manufacturing sector's average annual impact on the region's **population** should be 119,811 people, with an **employment** impact of 112,780 jobs and 68,235 employees in the **labor force**.

Southeast Oklahoma

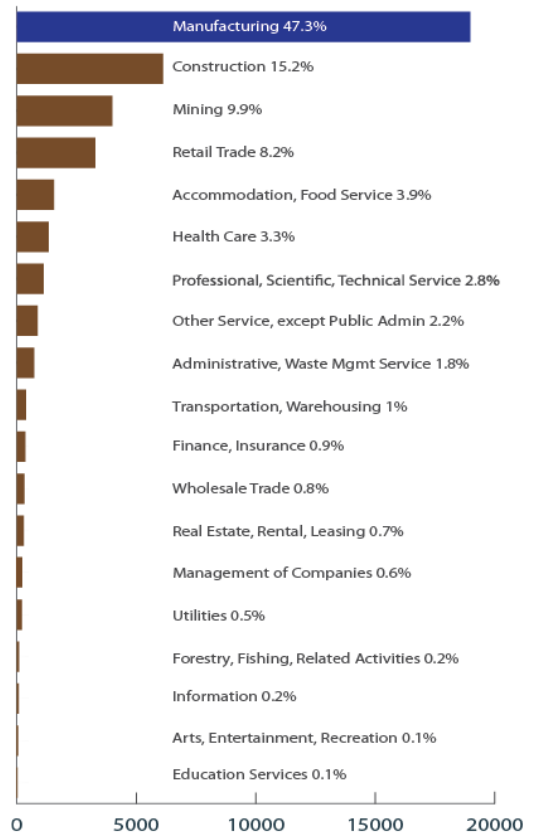


In 2013, there were 508 manufacturing employers¹¹ in the southeast region supporting 19,623 manufacturing jobs, both full and part time. Together, these jobs in the region accounted for 51.3% of total employment in the region, and manufacturing comprised 39.8% of the total industry establishment.

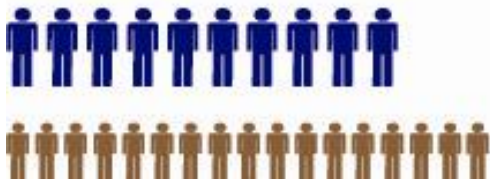
The chart to the right outlines the projected average employment by sector for the duration of the forecast period.

The region has an employment multiplier of 2.6. This means, with every 10 new jobs created in Manufacturing, an additional 16 jobs will be created.

Employment Impact by Sector



Every 10 Direct Jobs
Supports An Additional **16 Indirect and Induced Jobs**

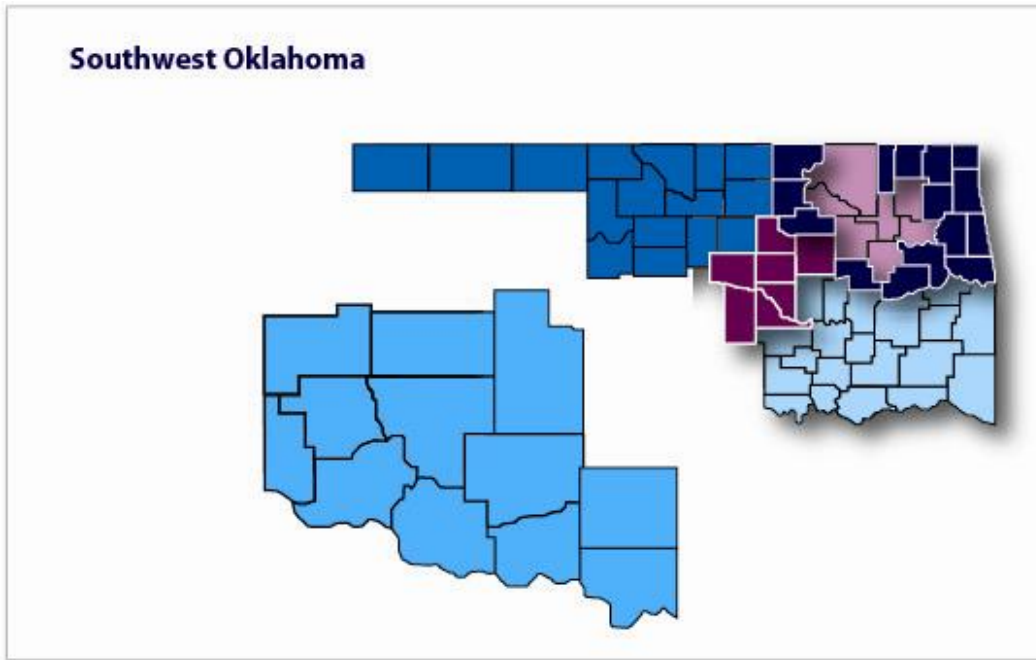


Southeast Oklahoma Manufacturing Economic Impact			
	2014	2034	Average
Gross Regional Product	\$5,125,382,423	\$10,298,568,726	\$7,437,383,288
Consumption	\$1,746,219,635	\$8,591,067,314	\$3,268,881,798
Real Disposable Personal Income	\$2,176,713,943	\$5,763,265,610	\$3,888,225,873
Regional Output	\$14,507,709,503	\$28,202,285,767	\$20,541,275,751
Proprietor's Income	\$454,558,730	\$608,280,897	\$495,195,729
Income Taxes	\$57,475,567	\$148,912,721	\$101,666,605
Residential Actual Capital Stock	\$852,142,334	\$12,537,216,187	\$6,796,667,553
Nonresidential Actual Capital Stock	\$782,920,837	\$11,003,936,768	\$6,096,757,435
Employment (People)	53,018	51,581	51,879
Labor Force (People)	25,857	53,632	47,601
Population (People)	29,798	104,447	83,262

The manufacturing sector's **Gross Regional Product** impact for the southeast region is forecasted to be an average of \$7.4 billion per year, resulting in an average growth rate of 3.6%. Regional **output** impact is projected to be \$20.5 billion annually; a 3.4% growth rate. Regional **real disposable personal income** impact is forecasted to realize an average of \$3.9 billion per year, which is an average growth rate of 5.1% yearly. Manufacturing's impact upon **regional proprietors' income** would average \$495,196 million annually, resulting in a 1.9% annual growth rate.

Manufacturing's average annual impact on regional **residential actual capital stock** would increase to \$6.8 billion (a 14.3% increase per year), while the sector's impact on regional **non-residential actual capital** stock is expected to be \$6.1 billion per year (up 14.1% annually). The manufacturing sector's average annual impact on the region's **population** should be 83,262 people, with an **employment** impact of 51,879 jobs and 47,601 employees in the **labor force**.

Southwest Oklahoma

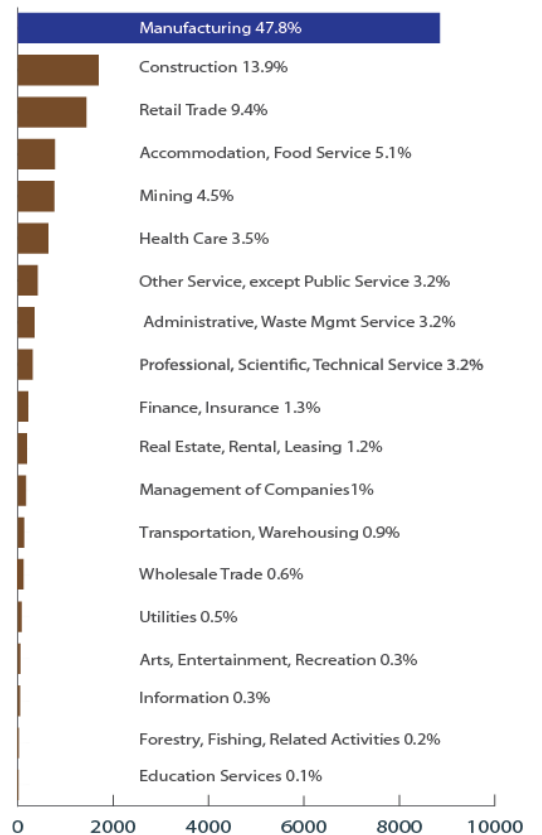


In 2013, there were 223 manufacturing employers¹¹ in the southwest region supporting 9,077 manufacturing jobs, both full and part time. Together, these jobs in the region accounted for 58.5% of total employment in the region, and manufacturing comprised 50.4% of the total industry establishment.

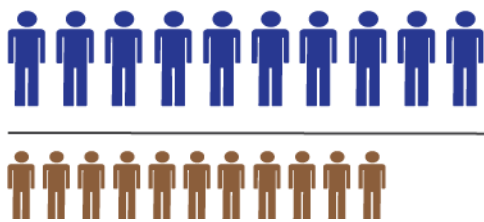
The chart to the right outlines the projected average employment by sector for the duration of the forecast period.

The region has an employment multiplier of 2.1. This means, with every 10 new jobs created in Manufacturing, an additional 11 jobs will be created.

Employment Impact by Sector



Every **10** Direct Jobs
Supports An Additional **11** Indirect and Induced Jobs

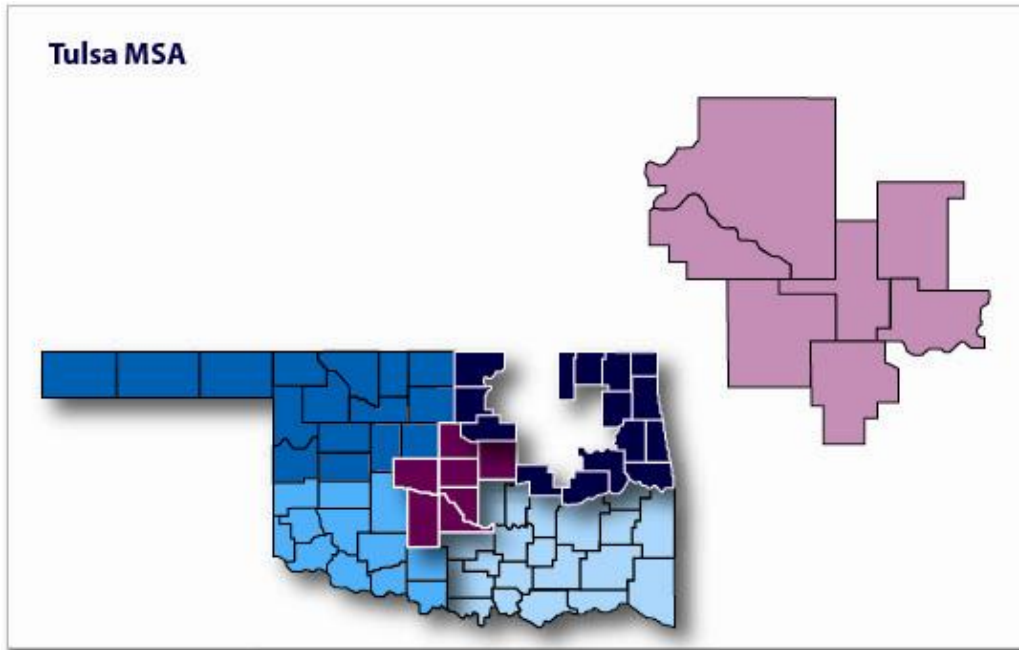


Southwest Oklahoma Manufacturing Economic Impact			
	2014	2034	Average
Gross Regional Product	\$2,006,659,508	\$4,504,085,541	\$3,066,619,510
Consumption	\$732,614,040	\$2,227,981,567	\$1,434,934,139
Real Disposable Personal Income	\$905,413,628	\$2,611,810,684	\$1,684,010,279
Regional Output	\$5,549,322,128	\$11,621,871,948	\$8,185,864,131
Proprietor's Income	\$155,640,602	\$177,368,164	\$149,209,761
Income Taxes	\$23,660,012	\$66,997,434	\$43,680,664
Residential Actual Capital Stock	\$319,383,621	\$4,965,003,967	\$2,612,059,729
Nonresidential Actual Capital Stock	\$205,055,237	\$2,520,603,180	\$1,463,561,921
Employment (People)	17,998	20,182	19,176
Labor Force (People)	9,916	21,974	18,792
Population (People)	12,200	45,179	34,622

The manufacturing sector's **Gross Regional Product** impact for the southwest region is forecasted to be an average of \$3.1 billion per year, resulting in an average growth rate of 4.1%. Regional **output** impact is projected to be \$8.2 billion annually; a 3.7% growth rate. Regional **real disposable personal income** impact is forecasted to realize an average of \$1.7 billion per year, which is an average growth rate of 5.5% yearly. Manufacturing's impact upon **regional proprietors' income** would average \$149,300 million annually, resulting in a 1.1% annual growth rate.

Manufacturing's average annual impact on regional **residential actual capital stock** would increase to \$2.6 billion (a 14.5% increase per year), while the sector's impact on regional **non-residential actual capital** stock is expected to be \$1.5 billion per year (up 13.5% annually). The manufacturing sector's average annual impact on the region's **population** should be 34,622 people, with an **employment** impact of 19,176 jobs and 18,792 employees in the **labor force**.

Tulsa MSA

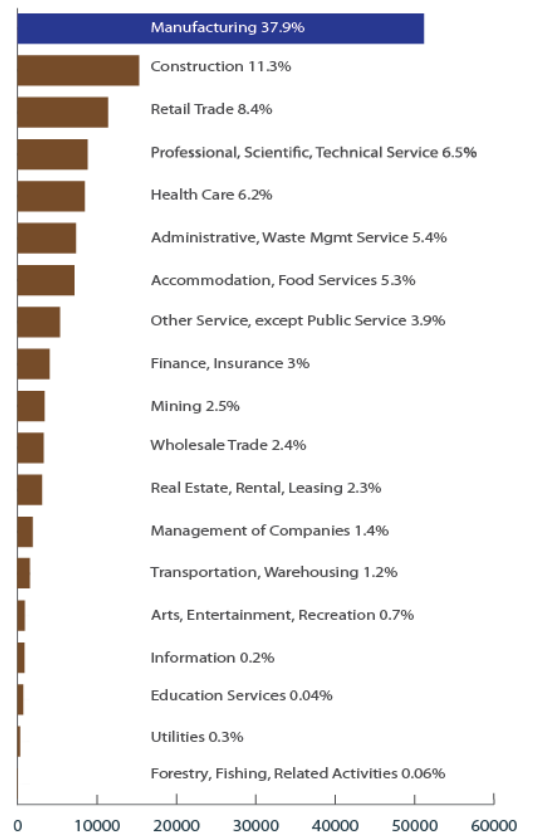


In 2013, there were 1,575 manufacturing employers¹¹ in the Tulsa MSA region supporting 53,694 manufacturing jobs, both full and part time. Together, these jobs in the region accounted for 41.1% of total employment in the region, and manufacturing comprised 37.8% of the total industry establishment.

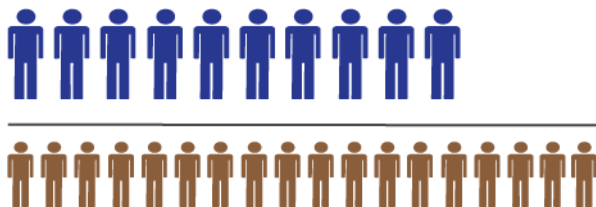
The chart to the right outlines the projected average employment by sector for the duration of the forecast period.

The region has an employment multiplier of 2.8. This means, with every 10 new jobs created in Manufacturing, an additional 18 jobs will be created.

Employment Impact by Sector



Every **10** Direct Jobs
Supports An Additional **18** Indirect and Induced Jobs



Tulsa MSA Manufacturing Economic Impact			
	2014	2034	Average
Gross Regional Product	\$15,214,744,568	\$33,339,485,168	\$22,868,985,857
Consumption	\$6,325,115,204	\$15,772,148,132	\$10,772,978,646
Real Disposable Personal Income	\$8,070,747,375	\$19,978,469,849	\$13,456,366,221
Regional Output	\$33,743,247,986	\$70,632,247,925	\$49,759,866,624
Proprietor's Income	\$2,478,292,942	\$3,622,938,156	\$2,864,930,221
Income Taxes	\$212,653,751	\$529,199,025	\$359,492,355
Residential Actual Capital Stock	\$2,955,642,700	\$40,022,476,196	\$21,968,763,079
Nonresidential Actual Capital Stock	\$1,368,709,564	\$18,115,905,762	\$10,409,285,227
Employment (People)	153,828	150,769	147,885
Labor Force (People)	53,609	116,146	100,833
Population (People)	64,119	231,339	180,174

The manufacturing sector's **Gross Regional Product** impact for the Tulsa MSA region is forecasted to be an average of \$22.9 billion per year, resulting in an average growth rate of 4%. Regional **output** impact is projected to be \$49.8 billion annually; a 3.8% growth rate. Regional **real disposable personal income** impact is forecasted to realize an average of \$13.5 billion per year, which is an average growth rate of 4.8% yearly. Manufacturing's impact upon **regional proprietors' income** would average \$2.9 billion annually, resulting in a 2.4% annual growth rate.

Manufacturing's average annual impact on regional **residential actual capital stock** would increase to \$22 billion (a 13.9% increase per year), while the sector's impact on regional **non-residential actual capital** stock is expected to be \$10.4 billion per year (up 13.8% annually). The manufacturing sector's average annual impact on the region's **population** should be 180,174 people, with an **employment** impact of 147,885 jobs and 100,833 employees in the **labor force**.

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9. Pew Research Social & Demographic Trends, Magnet or Sticky? A State by State Typology, 2009
10. The Oklahoma Tax Commission (<http://www.oktax.state.ok.us>) reports \$3,494,967,725 of income tax was collected in 2013. The Bureau of Economic Analysis (<http://www.bea.gov>) reports personal income in Oklahoma equaled \$159,905,318,000 in 2013. The proportion of income tax collected to personal income equals 2.185 percent The calculation for Oklahoma tax revenue applies to the same proportion (income tax collected/ personal income = 2.185 percent) to the personal income figure reported by the REMI model.
11. Manufacturing Employment Data from the Oklahoma Employment Security Commission