APPENDIX D

TRANSPORTATION CHARACTERISTICS OF SELECTED INDUSTRIES

This section profiles the economy of the SEMCOG region to help build capabilities for planning freight transportation and spurring economic development. Economic trends over the last decade and employment forecasts for the local economy are presented. Industry-specific trends, issues, and opportunities for targeted industries are also examined to allow the capability of the region's freight system to support economic growth. The information presented can help SEMCOG and its partners determine how, when and where to make infrastructure investments to retain and attract industries. The section also considers the criteria that companies use to choose locations for doing business and the supply chain characteristics of existing and targeted industries.

ANALYSIS PROCESS

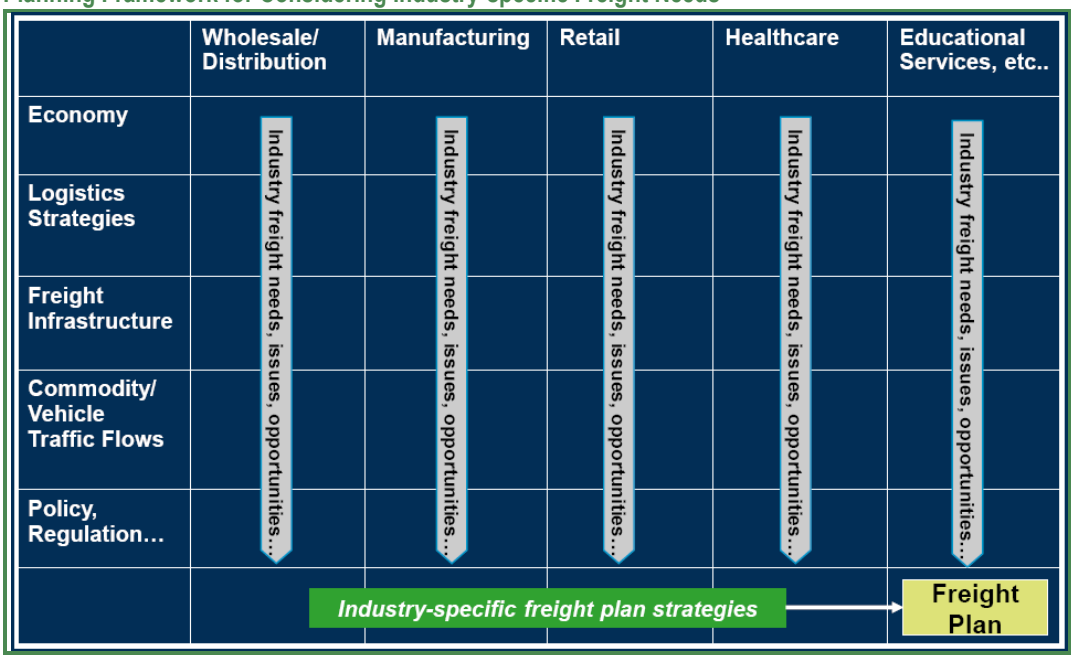
The SEMCOG Freight Analysis is part of a knowledge/information building process to address freight transportation and associated planning capabilities. It also provides input to support project selection as well as programming processes to accommodate the freight needs of targeted economic development. The economic analysis process used for this section mirrors the one envisioned in SEMCOG's recently completed Freight Planning Framework Study. That study recommended that the SEMCOG region consider the industry-specific needs in terms of:

- Economy;
- Freight Logistic Patterns;
- Freight Infrastructure;
- Commodity/Traffic Flows; and,
- Policy and Regulations.

As shown in Figure D-1, each of these areas could be considered independently. However, a vertical analysis was conducted to consider the specific freight needs of each industry. It focused on the economy (by targeting growing industries or industries in which the region has a competitive advantage or concentration) and industry patterns (by examining supply chains, distribution networks, and business locations). This analysis compliments the review of the freight infrastructure and commodity/traffic flows detailed in prior sections of this report.

The column headings in Figure D-1 list a few high-level ("two-digit") industries. However, SEMCOG and its partners decided to target the analysis on industries that are heavily dependent on freight transportation, in which the region has a competitive advantage or concentration, and that are likely to grow.

Figure D-1
Planning Framework for Considering Industry-specific Freight Needs



Source: Lance Grenzebak, presentation to SEMCOG, December 1, 2009.

The analysis was conducted in four primary steps:

- **STEP 1: EXAMINE LOCAL ECONOMIC TRENDS**. Historical employment data were collected from the U.S. Census Bureau and analyzed along with draft SEMCOG employment forecasts through 2040 to examine the composition of the local economy. "Bubble charts" that compare the industry employment, concentration, and growth provided input for selecting promising industries.

- **STEP 2: SELECT TARGET INDUSTRIES**. SEMCOG and its partners have led several previous efforts to identify target industries. SEMCOG and the Study Advisory Committee (SAC) used input from these studies and the analysis of industry concentration and growth to select appropriate industries for considering site selection and supply chain issues. A brief summary of the previous studies is included in Appendix B.

- **STEP 3: RESEARCH SUPPLY CHAIN CHARACTERISTICS AND SITE SELECTION CRITERIA**. Industry profiles were developed using published data as well as responses to the project's survey. The profiles describe how targeted industries choose their business locations and industry supply chain characteristics. Additionally, data from the U.S. Bureau of Transportation Statistic's Commodity Flow Survey (CFS) provides a snapshot of freight flows in the region, and insight on the type, origins and destinations, values, weights, and modes of commodities shipped.

- **STEP 4: DOCUMENT PRESENT PRACTICES AND ANTICIPATED TRENDS**. The industrial profiles also examine industry-wide and regional trends that may affect growth, site selection, and supply chains. The findings include information from published data, trade journals, and previous studies. Industry-wide findings were compared to responses to the survey questionnaire, which also includes questions on anticipated trends.

The approach leveraged the extensive research and outreach that had already occurred and was ongoing in the region. For example, as part of the efforts to prepare a comprehensive strategy for increasing jobs and economic development in Southeast Michigan, SEMCOG and the Metropolitan Affairs Coalition (MAC) conducted interviews with economic development partners to identify target industries. Likewise, Michigan State University (MSU) recently conducted an assessment of supply chain opportunities for the Detroit Regional Chamber.

Information from previous work was collected and synthesized with additional research conducted to fill gaps and to verify findings. Newly collected information includes annual County Business Patterns data from 1998 through 2008 for the seven-county primary economic region plus additional counties in Northwest Ohio as well as some data for three counties in Southwest Ontario.

TRENDS – 2010 TO 2040

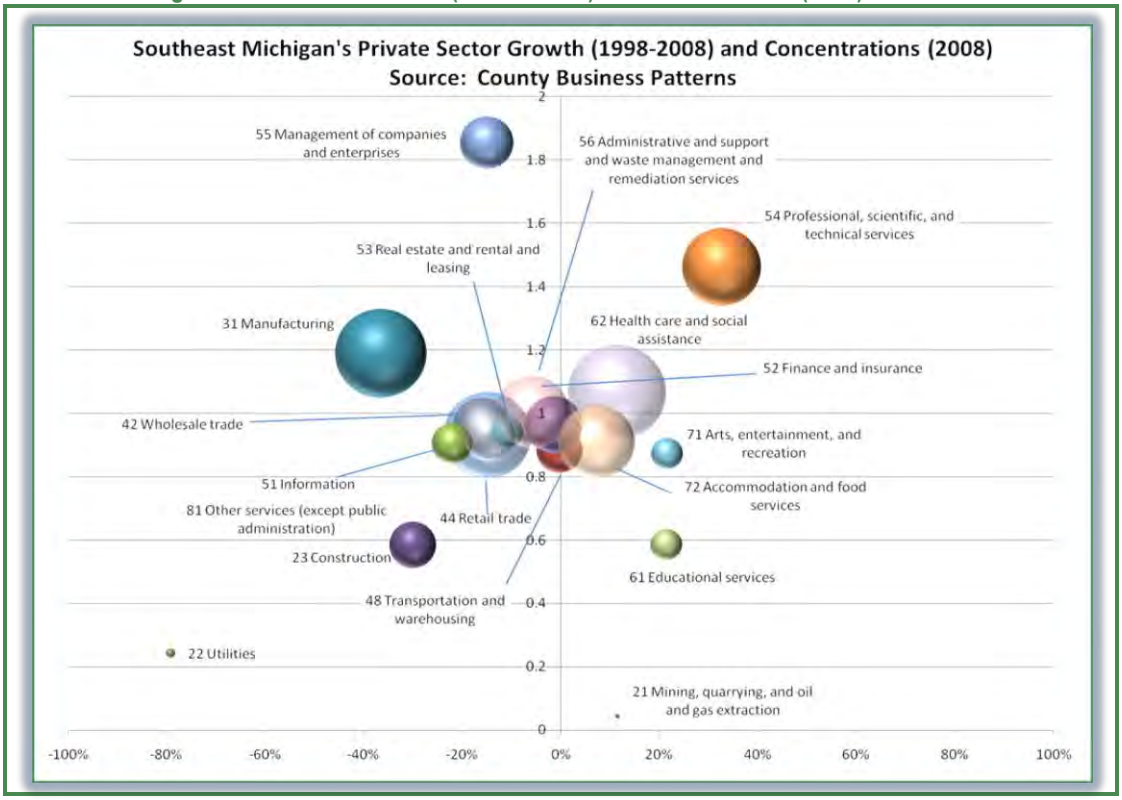
"Bubble charts" summarize trends and the composition of the regional economy by highlighting industry employment, concentration and growth. Figure D-2 provides an example of a bubble chart for Southeast Michigan using historical employment data from the U.S. Census Bureau County Business Patterns. The chart compares employment in Southeast Michigan with national employment in several industrial sectors using the North American Industry Classification System (NAICS) at the two-digit level.

Each bubble in the chart represents a separate industrial sector. The size of the bubble is based on employment in the SEMCOG region, so larger bubbles indicate industrial sectors with more employees. The X-axis (or vertical scale) on the chart represents industry concentration. This is measured using a standard regional economic measure – the "location quotient," which compares the percentage of total employment comprised by an industry in the SEMCOG region with the percentage of employment that the industry comprises in the overall U.S. economy. The following formula represents this concept:

$$\text{Location Quotient} = \frac{\text{Percent Employment in Industry, SEMCOG}}{\text{Percent Employment in Industry, U.S.}}$$

If an industrial sector has a location quotient above 1.0, the sector is more concentrated in the SEMCOG region (i.e., makes up more of the regional economy) than in the nation as a whole. For example, the SEMCOG region has a concentration in the Management of Companies and Enterprises (NAICS 55) nearly double the U.S. average (top-most bubble in Figure D-2).

Figure D-2
Southeast Michigan Private Sector Growth (1998 to 2008) and Concentration (2008)



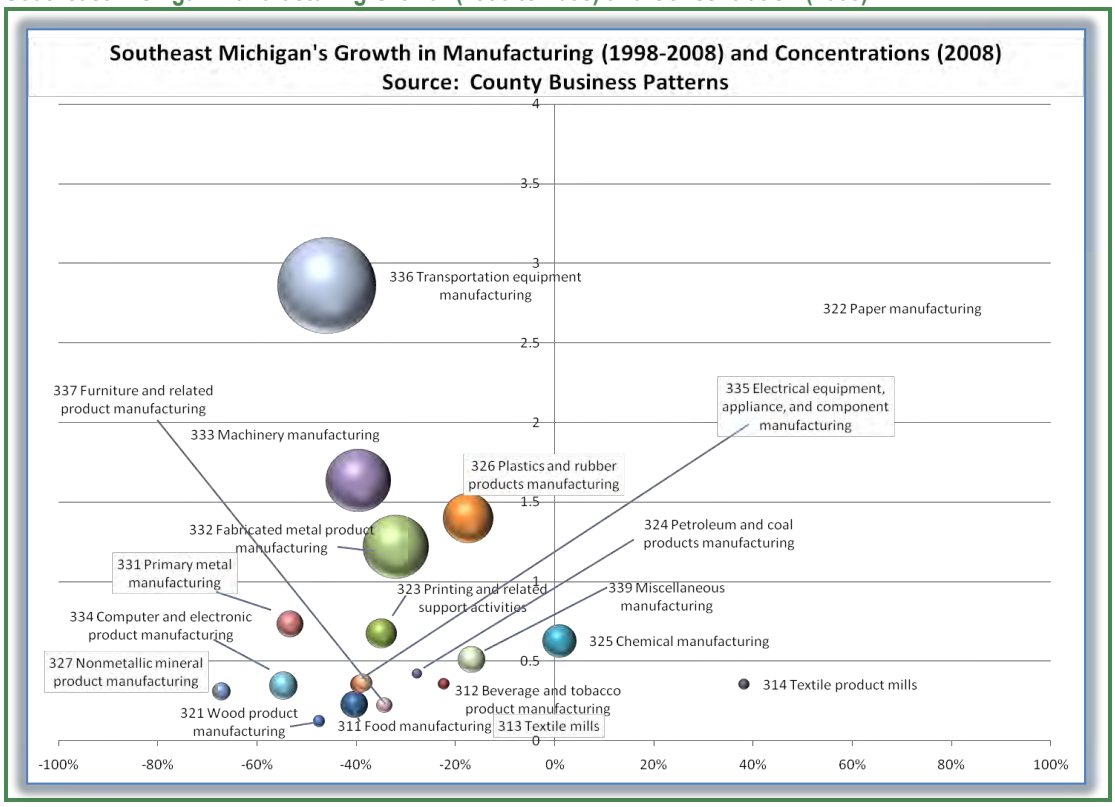
The Y-axis (or horizontal scale) on the chart represents the percent growth in the industrial sector. Figure D-2 shows the percent growth from 1998 to 2008. Employment shrank over the last decade in industrial sectors with negative percentages and grew in sectors with positive percentages.

By reviewing these data, it can be seen that the employment trends in the SEMCOG region are similar to the rest of the nation. Health Care (NAICS 62), Manufacturing (NAICS 31), and Retail Trade (NAICS 44) rank as the three largest industries in the SEMCOG region. These are also the nation's top three industries with retail trade taking the number two spot and manufacturing the number three spot for the largest industries.

Manufacturing (NAICS 31) and Professional Services (NAICS 54) are both large employers and highly concentrated in the SEMCOG region. However, these two sectors have been on different trajectories over the last decade. While manufacturing employment declined by 30 to 40 percent, employment in Professional and Technical Services grew. Likewise, Health Care (NAICS 62) employment is large, is concentrated and grew slightly over the last decade.

Figure D-3 shows similar information for the more detailed manufacturing subsectors (three-digit NAICS). As can be seen in the exhibit, Transportation Equipment Manufacturing (NAICS 336) is the primary employer in the SEMCOG region. While this subsector includes automobile manufacturers, a number of suppliers or companies included in the broader automobile industry are found in related subsectors, such as Machinery Manufacturing (NAICS 333), Plastics and Rubber Manufacturing (NAICS 326), and Fabricated Metal Product Manufacturing (NAICS 332). Southeast Michigan has a concentration and large employment in each of these subsectors, but employment declined over the last decade.

Figure D-3
Southeast Michigan Manufacturing Growth (1998 to 2008) and Concentration (2008)

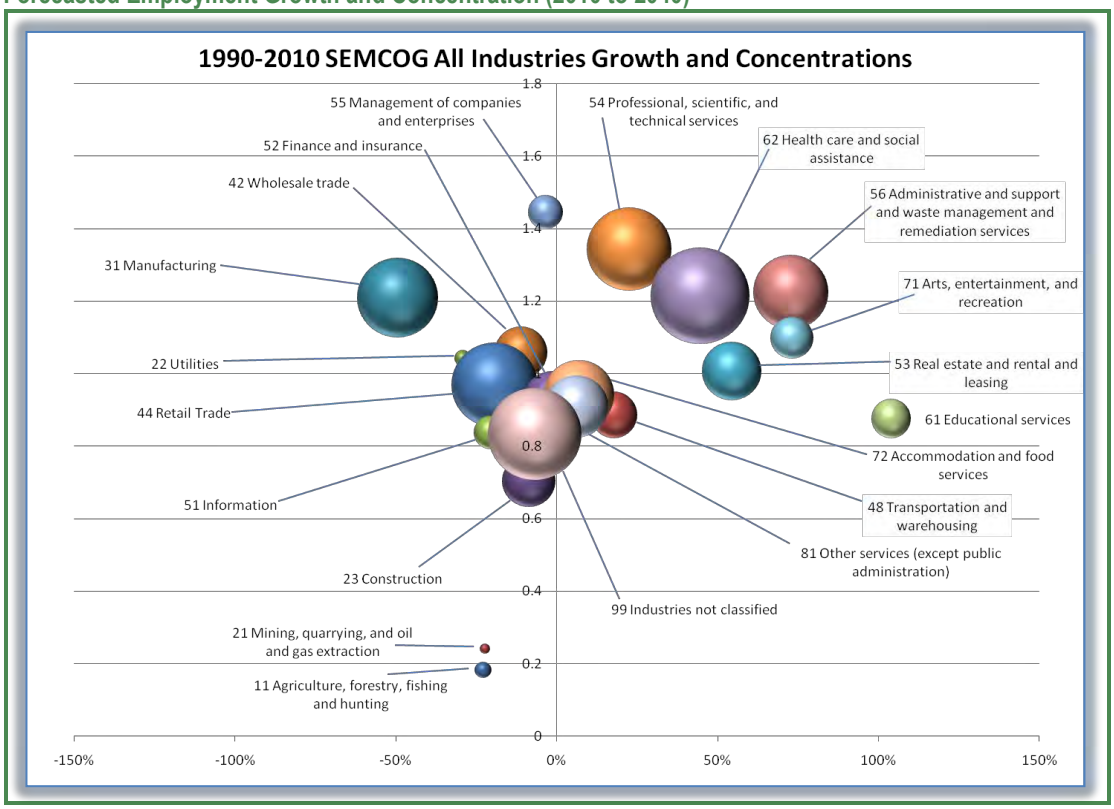


The next several pages show additional bubble charts developed using SEMCOG employment forecasts for 2010, 2020, 2030, and 2040. The analysis is conducted at two industry levels:

- Industry sectors (two-digit NAICS) in Figure D-4
- Manufacturing subsectors (three-digit NAICS) in Figure D-5.

Comparing charts for several years shows continued growth and concentration in Professional Services (NAICS 54), Health Care (NAICS 62) and Administrative Services (NAICS 56). The manufacturing industries continue to decline, but there is some employment growth in Machinery Manufacturing (NAICS 333) and Fabricated Metal Product Manufacturing (NAICS 332).

Figure D-4
Forecasted Employment Growth and Concentration (2010 to 2040)



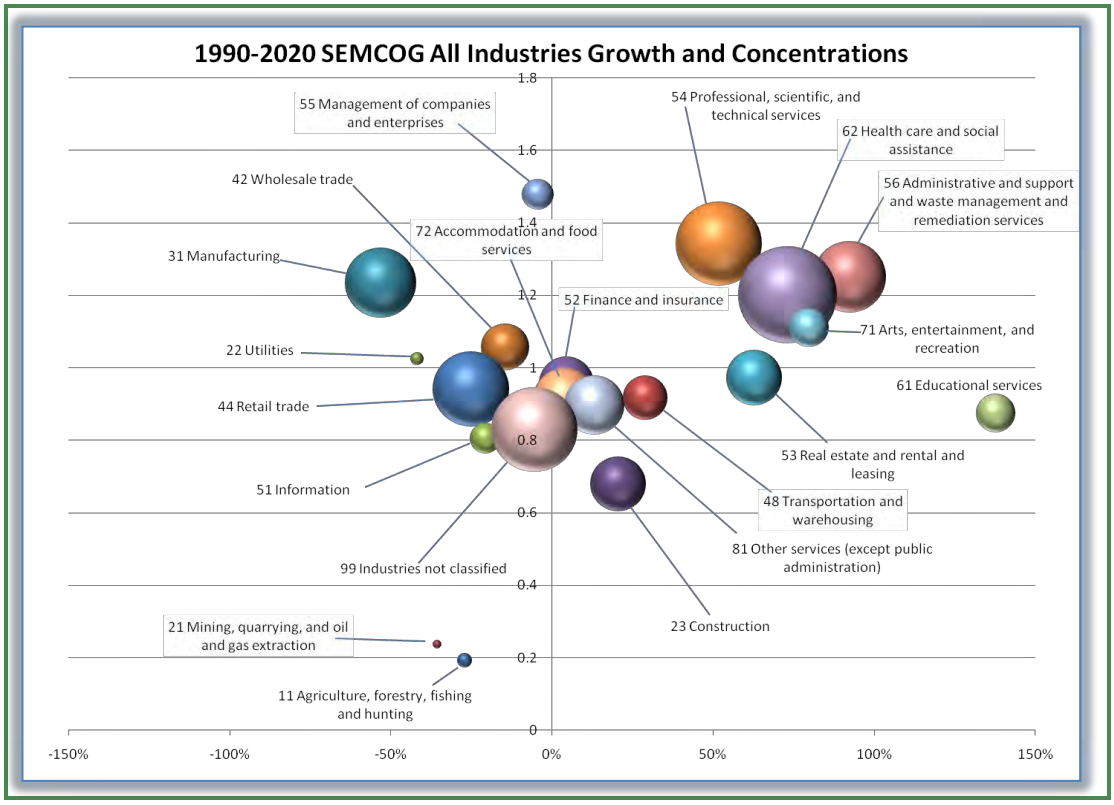
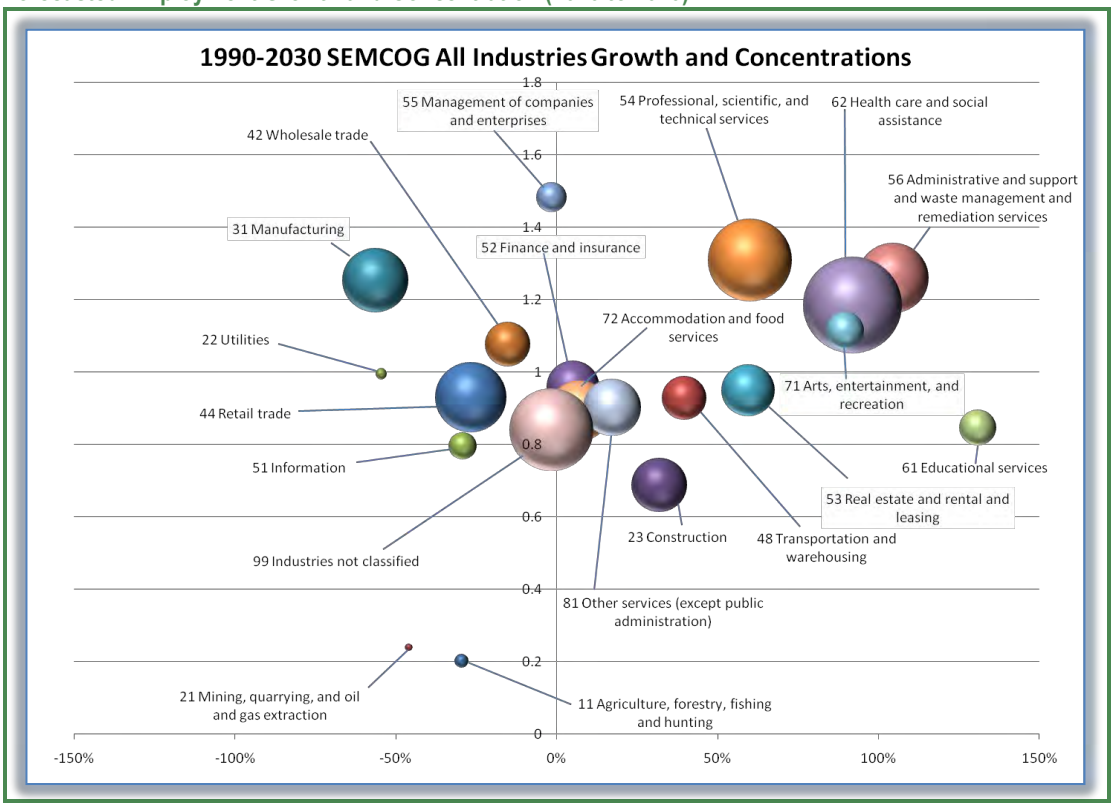


Figure D-4 (continued)
Forecasted Employment Growth and Concentration (2010 to 2040)



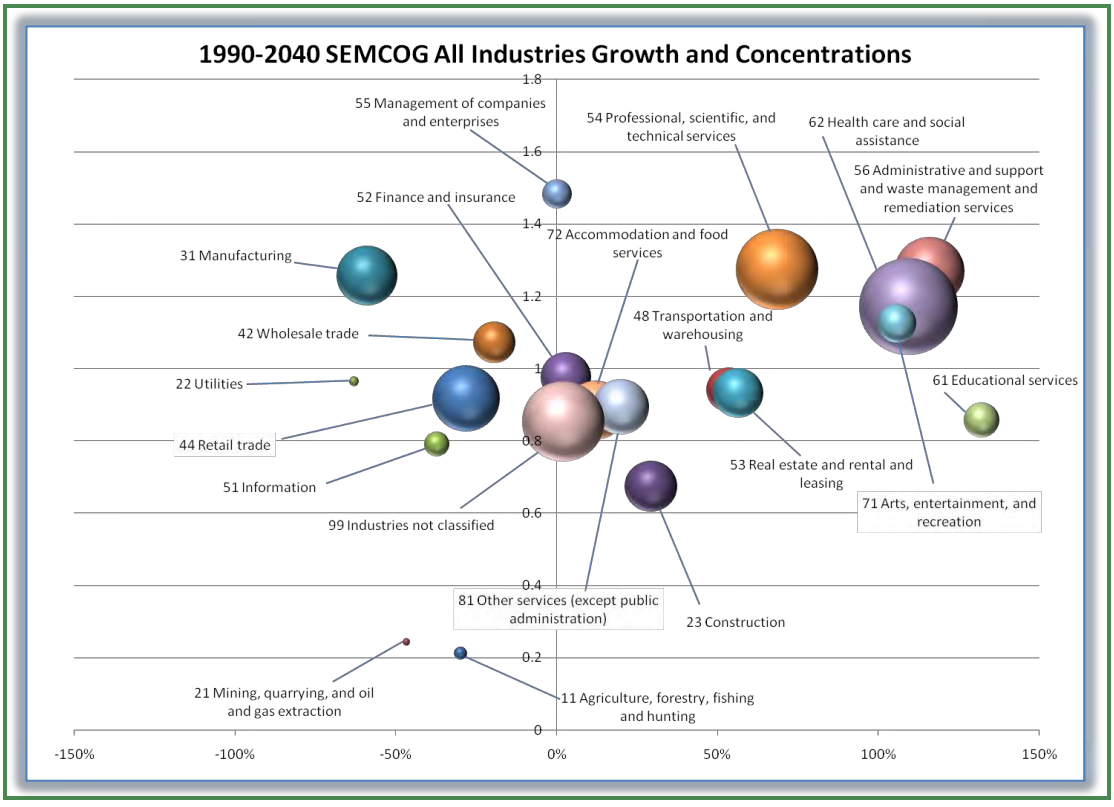
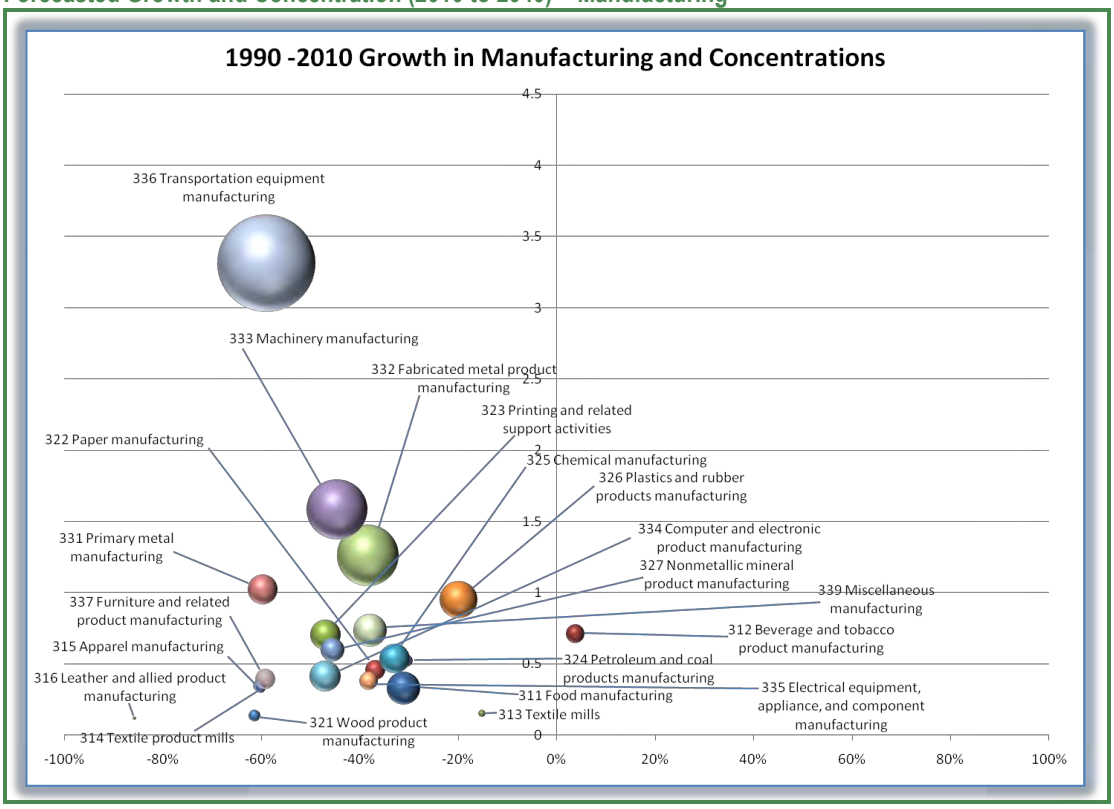


Figure D-5
Forecasted Growth and Concentration (2010 to 2040) – Manufacturing



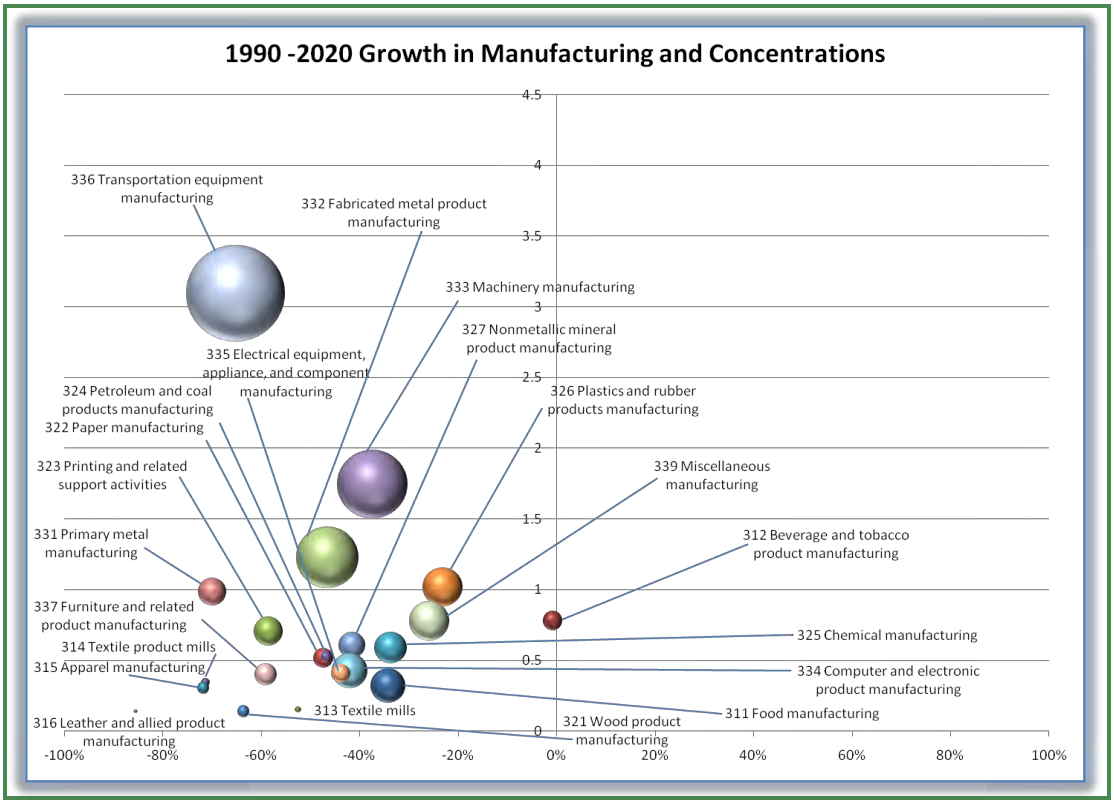
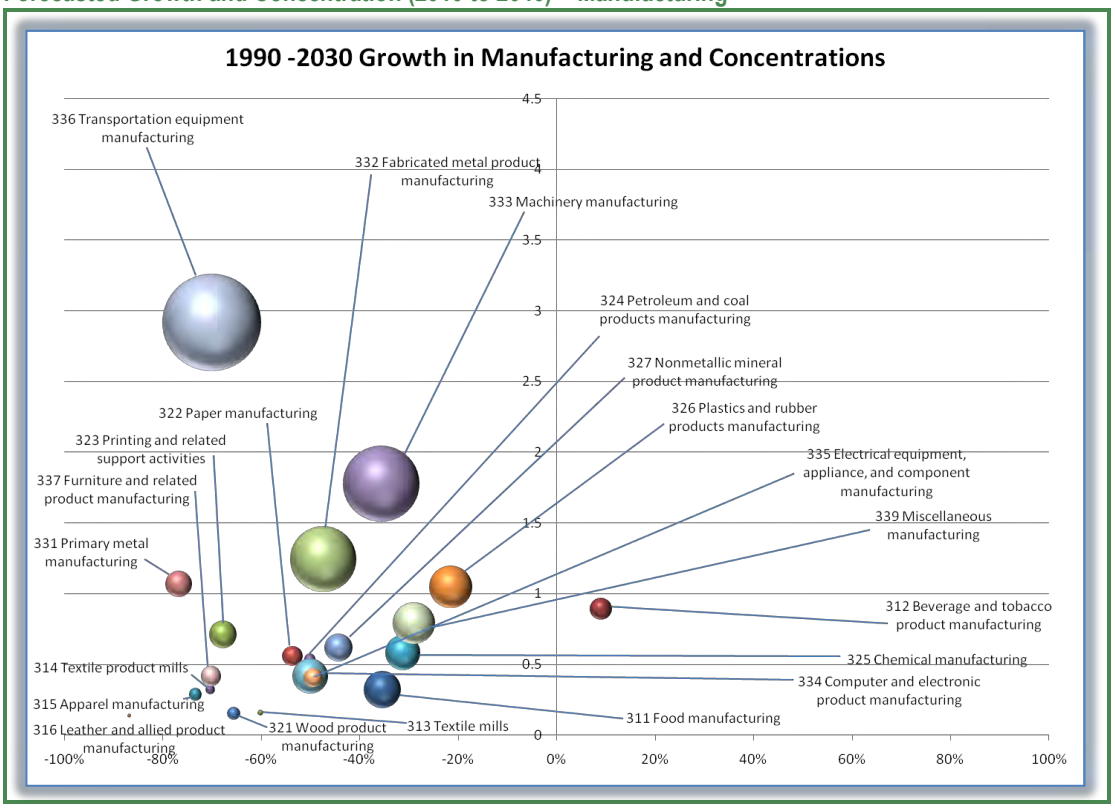
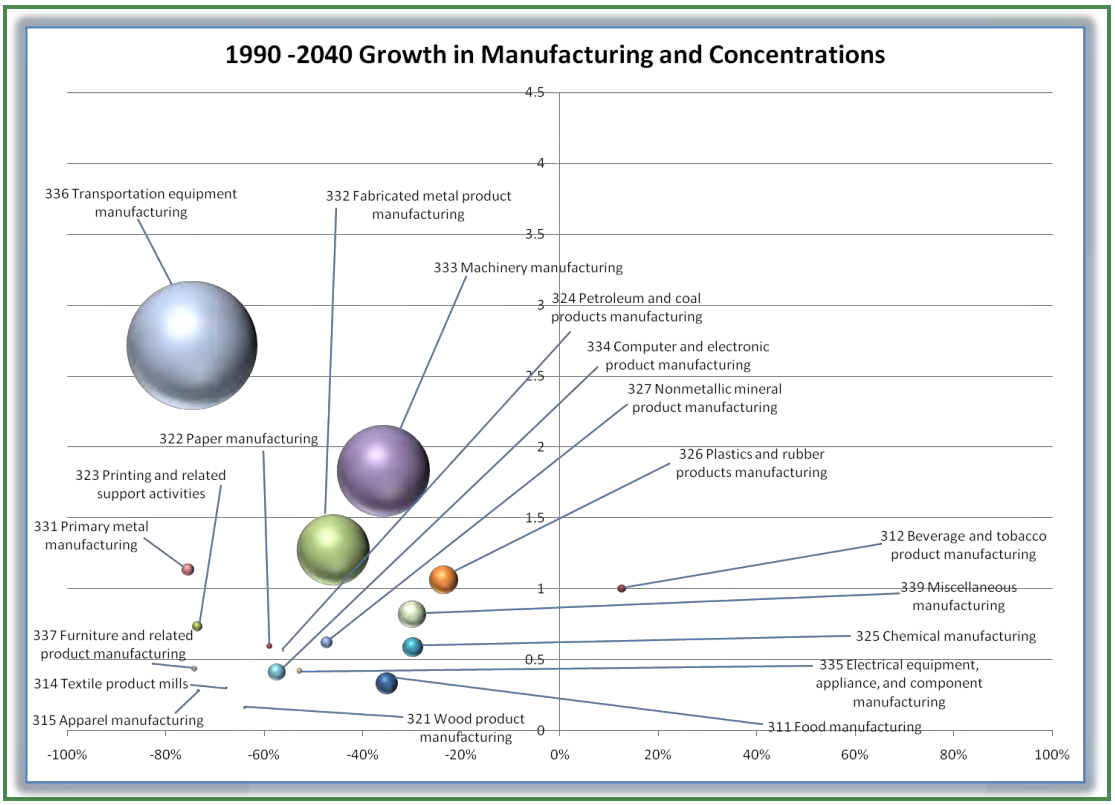


Figure D-5 (continued)
Forecasted Growth and Concentration (2010 to 2040) – Manufacturing





CHARACTERISTICS OF TARGET INDUSTRIES

The trends shown in the bubble charts helped to identify target industries for further detailed review. Target industries are likely to be those with large regional employment or growth nationally, emerging businesses with large job multipliers, or industries that build on skills readily available in the SEMCOG region. The goal for the region is to focus on retaining and attracting industries with these characteristics.

A number of recent studies provide additional background to identifying target industries:

- SEMCOG Freight Planning Framework Study;
- Increasing Jobs and Prosperity in Southeast Michigan;
- Translinked documentation; and,
- Supply Chain Opportunity Assessment.

While these studies differ in the definition of the region and the scope of industries considered, all share the common goal of identifying a strategy for re-shaping the regional economy so it can compete globally for business and jobs. Each study has been completed in the last two years and included public and private sector participants in developing findings and recommendations.

The SEMCOG Freight Planning Framework Study outlines a strategy and provides a framework for a freight transportation and economic development program. The final report indicates that the region's current transportation system does not fully meet industry freight needs, impeding the growth of specific industries, and ultimately preventing a more diverse economy from emerging. It also notes that the region's economy is shifting from a manufacturing focus to a service focus (particularly health care due to the aging population). The study also offers policy recommendations to promote investments in freight transportation.

The SEMCOG and MAC report on Increasing Jobs and Prosperity in Southeast Michigan outlines broad strategies and action steps to promote economic capacity in the region. One of the eleven strategies calls for enhancing transportation connections by investing in projects that further international trade and freight capabilities. The Freight Planning Framework Study supports this strategy. Other strategies include promoting education, advancing innovation, increasing capital funding, and designing a competitive tax structure.

Translinked is a program of the Detroit Regional Chamber to create a regional cluster around transportation, distribution, and logistics. It has support from the Michigan Economic Development Corporation (MEDC) and the New Economy Initiative. As part of Translinked, the Detroit Regional Chamber worked with Michigan State University to develop a Supply Chain Opportunity Assessment, which focuses on the SEMCOG area's strong hub capabilities as a key factor for economic growth. In addition to the seven-county primary economic region, the study includes the areas of Northwest Ohio and Southwest Ontario that form the extended economic region. The Supply Chain Management (SCM) Strategy involves building differentiated hubs that can attract heavy manufacturing, light manufacturing, and distribution or value-added services.

The Translinked 75-day Plan presents a business case for increased freight activity and investment in the region. It is built on three pillars: private sector engagement, freight study completion, and external outreach.

Additional analyses have also been conducted by Drs. Taylor and Belzer at Wayne State University. For example, while not specifically identifying target industries, Dr. Belzer examined the potential for a major inland intermodal port or logistics center in the SEMCOG region.

Table D-1 summarizes the potential target industries identified in the above-referenced studies. They are separated into industries with shipping activity (according to the CFS) and those without major shipping activity. However, some, such as health care services, may have supply chain requirements. The table also identifies approximate NAICS codes because these were not identified in the studies. The industry groupings are a combination of NAICS sectors and industry clusters identified in the previously-mentioned studies.

Table D-1
Potential Target Industries Identified in Previous Efforts

Potential Target Industries	Studies			
	SEMCOG	SEMCOG and Metropolitan Affairs Coalition (MAC)	Detroit Regional Chamber	Michigan State University (MSU) and Detroit Regional Chamber
	SEMCOG Freight Planning Framework Study	Increasing Jobs and Prosperity in Southeast Michigan	Translinked Initiative	Supply Chain Opportunity Assessment
With Shipping Activity				
Transportation and Warehousing (NAICS 48-49)	X	X	X	X
Manufacturing (NAICS 31-33)		X		
Heavy Manufacturing				
Alternative Energy (NAICS 334/335)	X			X
Automobile Renewal (NAICS 336)				X
Chemical Processing (NAICS 325)				X
Carbon Fiber Manufacturing (NAICS 335991)				X
Defense (NAICS 336992)				X
Electronics – Industrial (NAICS 334/335)				X
Light Manufacturing				
Food Processing (NAICS 311)				X
Medical Technologies/Devices (NAICS334510/3391)				X
Water Technologies (NAICS 2213)				X
Distribution and Value-Added Services				
Retail Importing (NAICS 424)				X
Beverage and Alcohol Distribution (NAICS 4248)				X
Waste Management (NAICS 562)				X
Without Shipping Activity				
Health Care and Social Assistance (NAICS 62)	X	X		
Information Economy (NAICS 51) (data transmission, communications, internet, movie industry)		X		
Education (NAICS 61)	X			
Professional and Technical Services (NAICS 54)		X		
Scientific Research and Development (NAICS 5417)	X			
Management of Companies (NAICS 55)		X		

In general, Table D-1 suggests that SEMCOG and its partners could focus on the following types of industries with shipping activities:

- Heavy Manufacturing
- Light Manufacturing
- Transportation and Warehousing
- Distribution and Value-Added Services.

The four studies and their target industries are described more fully in Appendix D-1. Using the information from these previous studies and the economic trends described earlier (i.e., employment, concentration, and growth), SEMCOG and the Study Advisory Committee decided to focus on seven industries defined by two-digit or three-digit NAICS codes.

Table D-2 summarizes the key characteristics of these industries. They generally have large employment in the region and have either shipping activity or growth in the region. Industries without major shipping activity are less likely to require improvements to transportation infrastructure.

Table D-2
Summary of Characteristics of Selected Industries

Selected Industry	High Concentration	Large Employment	Growing	Shipping
Transportation Equipment Manufacturing (NAICS 336)	●	●		●
Machinery Manufacturing (NAICS 333)	●	●		●
Plastics and Rubber Parts Manufacturing (NAICS 326)	●	●		●
Fabricated Metal Products Manufacturing (NAICS 332)	●	●		●
Wholesale Trade (NAICS 42)	●			●
Health Care (NAICS 62)	●	●	●	
Accommodation and Food Services (NAICS 72)			●	

INDUSTRY PROFILES

Detailed profiles were prepared for each of the seven industries identified in Table D-2, including the following information:

- **DESCRIPTION OF INDUSTRY** – The description explains the important processes and products of the industry. It also lists the NAICS codes that comprise the industry.

- **IMPORTANCE TO REGION** – This provides a general overview of the importance of the industry to the SEMCOG region. A location quotient describes how specialized or concentrated the industry is in the region. Current employment statistics and SEMCOG employment forecasts are also provided. An economic multiplier indicates how much economic activity the industry produces through its direct and indirect purchases and activities. Major employers are also listed.

- **ECONOMIC TRENDS** – The profile highlights recent establishment, employment, and wage trends in the region, the extended economic region, and Michigan compared to the United States. Information on the number of establishment is also provided for three Canadian counties, which are part of the extended economic region.

- **LABOR FORCE SKILLS** – Occupational employment data are compared to the industry and total occupation to identify specialized labor force skills. Ten-year projections of employment in the major occupations are also provided.

- **OTHER SITE SELECTION CRITERIA** – Some respondents to the study's survey indicated criteria used for site selection.

- **SUPPLY CHAIN CHARACTERISTICS** – This section summarizes purchasing patterns and transportation used within the industry's production process. Shipments are also characterized in terms of mode, type of commodity, distance, and weight.

- **INDUSTRY OUTLOOK** – An overview of the industry's economic cycles is presented along with SEMCOG forecasts and vital infrastructure improvements identified in the study's survey.

The profiles use information from a variety of sources. The major sources are described below:

- **COUNTY BUSINESS PATTERNS** – This is an annual data series developed by the U.S. Census Bureau, which provides economic data by industry and county. County Business Patterns provides information on employment, establishments, and average wages.

- **CANADIAN BUSINESS PATTERNS** – This is an annual series similar to County Business Patterns that provides information on employment and establishments. Canadian Business Patterns is produced by Statistics Canada from the Business Register Database.

- **COMMODITY FLOW SURVEY (CFS)** – The CFS is the primary source of national and state-level data on domestic freight shipments by American establishments in mining, manufacturing, wholesale trends, selected retail and service trade industries (e.g., electronic shopping and mail-order houses, fuel dealers, and publishers), and auxiliary establishments (i.e., warehouses and managing offices). The survey is conducted every five years by the U.S. Bureau of Transportation Statistics (BTS) as part of the Economic

Census. It provides information on the types, origins and destinations, values, weights, modes of transport, distance shipped, and ton-miles of commodities shipped.

- **OCCUPATIONAL EMPLOYMENT STATISTICS (OES)** – Through the OES program, the U.S. Bureau of Labor Statistics produces employment and wage estimates for over 800 occupations. Information is provided on the number of people employed and wages paid in each occupation as well as a short-term outlook.

- **TRANSPORTATION SATELLITE ACCOUNTS (TSA)** – The BTS and the U.S. Bureau of Economic Analysis (BEA) jointly develop these accounts. The TSA are a supplement to the standard U.S. input-output accounts and measure the contribution of transportation services to the national economy. The 1997 accounts are the most recent available.

- **DUNN AND BRADSTREET** – This is a private research company that provides information on companies and industries. Dunn and Bradstreet offers industry overviews and forecasts through its Hoovers subsidiary.

- **SEMCOG INDUSTRY FREIGHT SURVEY** – The study's survey questions related to supply chain, site selection, and business competitiveness. In addition, the survey includes questions about business' perceptions of industry trends.

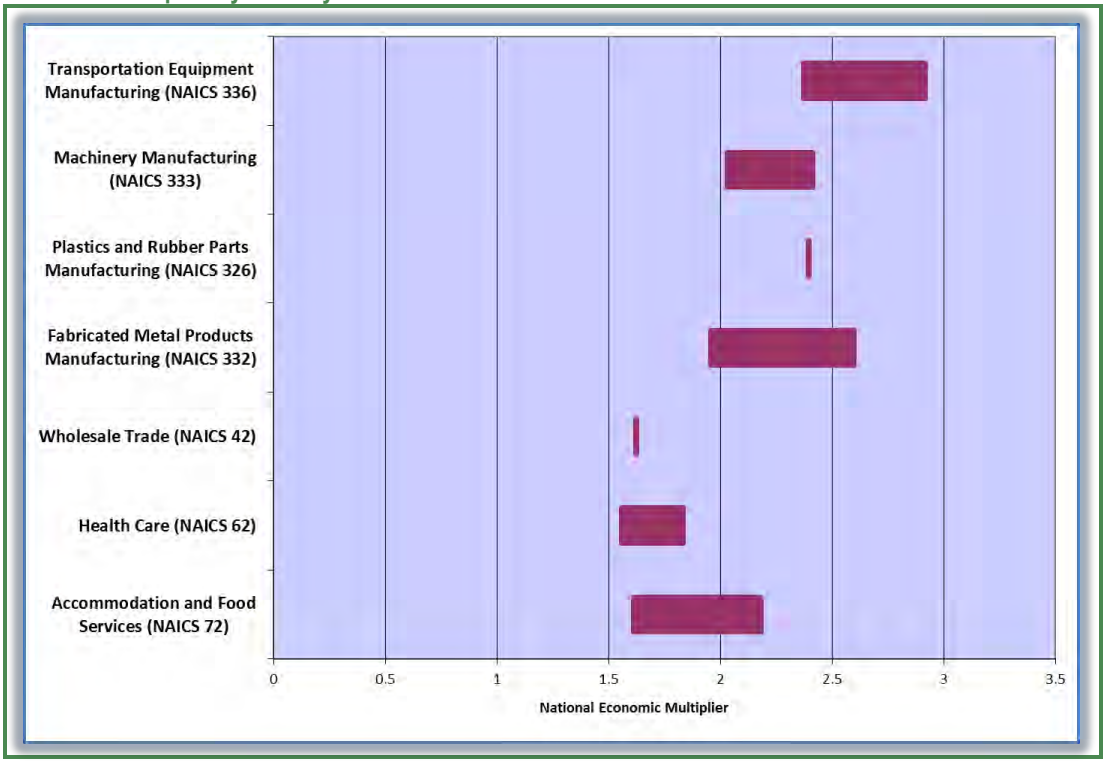
The detailed industry profiles are found in Appendix D-1. SEMCOG and its partners can use these as part of the planning process to understand industry needs and trends. The profiles are particularly useful as an overview before meeting with industry representatives. SEMCOG and its partners can produce additional industries profiles with the sources described above using the profiles in the appendix as templates. An overview of the industry profiles is provided next.

IMPORTANCE TO REGION

Figure D-6 provides the economic multiplier reported in the Transportation Satellite Accounts for each of the seven target industries. The multiplier indicates how much economic activity is generated by output in a particular industry. For example, Plastics and Rubber Products Manufacturing (NAICS 326) has a fairly high economic multiplier of 2.39. This means that producing $1.00 of output in the sector will generate $2.39 of activity throughout the economy. By comparison, an average or typical industry has a multiplier of only about 2.0. Figure D-6 shows a range of multipliers because many industries are composed of sub-industries with different multipliers.

The manufacturing industries have multipliers greater than the average of 2.0. Motor Vehicle Manufacturing (NAICS 3361), which is part of Transportation Equipment Manufacturing (NAICS 336) has second highest economic multiplier of all industries. This means that the automobile industry produces substantial activity throughout the economy.

Figure D-6
Economic Multiplier by Industry



ECONOMIC TRENDS

Table D-3 presents a summary of economic trends in terms of employment, wages, and the average business size over the last ten years for the seven target industries. A downward arrow indicates that the measure (i.e., employment, wages, or workers per establishment) declined, an upward arrow indicates the measure grew, while an equal sign (=) indicates it held steady.

Table D-3 also provides a comparison to U.S. national trends. The "greater than (>)" sign indicates that the measure grew faster than the U.S. average, while the "less than (<)" and equal (=) signs indicate the measure grew slower or equal to the U.S. average, respectively. The workers per establishment column also reports the average business size for the industry in the SEMCOG region.

Employment in the four manufacturing industries and Wholesale Trade (NAICS 42) declined over the last decade. While employment in these industries declined nationally, the decline in the SEMCOG region was faster than the U.S. average. Employment in Health Care (NAICS 62) and Accommodation and Food Service (NAICS 72) grew, but somewhat slower than the national average.

Table D-3
SEMCOG Region Economic Trends: 1999 to 2009

Selected Industry	Employment	Wages	Workers per Establishment
Transportation Equipment Manufacturing (NAICS 336)	↓, > US	=, < US (> wages)	↓, 120
Machinery Manufacturing (NAICS 333)	↓, > US	↑, < US (> wages)	↓, 28
Plastics and Rubber Parts Manufacturing (NAICS 326)	↓, >US	↑, = US	↓, 51
Fabricated Metal Products Manufacturing (NAICS 332)	↓, > US	↑, < US	↓, 19
Wholesale Trade (NAICS 42)	↓, > US	↑, < US	=, 14
Health Care (NAICS 62)	↑, < US	↑, = US	=, 21
Accommodation and Food Services (NAICS 72)	↑, <US	↑, = US	=, 18

Source: County Business Patterns

Wages grew in nearly every industry, although somewhat less than the U.S. average. Wages remained steady in the Transportation Equipment Manufacturing (NAICS 336) sector in the SEMCOG region, while they grew nationally. Although wage trends in Transportation Equipment Manufacturing (NAICS 336) and Machinery Manufacturing (NAICS 333) were slower than the U.S. average, wages remained higher than the U.S. national average.

Manufacturing business tend to have more workers per establishment. However, the size of the average businesses has declined with industry employment.

SKILLS USED

Table D-4 summarizes the labor skills used in each target industry. The majority of occupations in the manufacturing industries are related to production. In the cases of Transportation Equipment Manufacturing (NAICS 336) and Machinery Manufacturing (NAICS 333), the industries are the major employers of the occupation. Employees transferring to other industries may need to change occupations.

Food preparation and serving occupations make up 80 percent of employment in Accommodations and Food Services (NAICS 72) and the industry is the primary employer for these skills. Likewise, the Health Care (NAICS 62) requires specialized labor skills used primarily within the industry.

Table D-4
Labor Skills Used Nationally

Selected Industry	Primary Occupations	Employment of Occupation
Transportation Equipment Manufacturing (NAICS 336)	Production (53%)	Major employer (20%)
Machinery Manufacturing (NAICS 333)	Production (55%)	Major employer (10-20%)
Plastics and Rubber Parts Manufacturing (NAICS 326)	Production (61%)	Minor employer (<10%)
Fabricated Metal Products Manufacturing (NAICS 332)	Production (62%)	Major employer for metal workers (>20%)
Wholesale Trade (NAICS 42)	Sales (27%), Admin (24%), Trans/Mat (20%)	Major employer (10-20%)
Health Care (NAICS 62)	Health practitioners (38%), Service (32%)	Specialized skills
Accommodation and Food Services (NAICS 72)	Food prep and serving (80%)	Primary employer

Source: Occupational Employment Statistics

SITE SELECTION CRITERIA

Table D-5 summarizes responses about site selection criteria (other than labor skills) that respondents noted in the study's survey. Generally, respondents indicated a need to be close to customers, clients, suppliers or transportation services.

Table D-5
Site Selection Criteria other than Labor Skills

Selected Industry	Reason for Located in SEMCOG Region
Transportation Equipment Manufacturing (NAICS 336)	Near customers and assembly plants, workforce availability, tax incentives, property features
Machinery Manufacturing (NAICS 333)	Major highways, Detroit Airport
Plastics and Rubber Parts Manufacturing (NAICS 326)	Near clients and population centers, business opportunities
Fabricated Metal Products Manufacturing (NAICS 332)	Near customers and service centers
Wholesale Trade (NAICS 42)	Detroit Airport, U.S.-Canadian border, distribution areas, St. Lawrence Seaway
Health Care (NAICS 62)	Not covered in survey
Accommodation and Food Services (NAICS 72)	Not covered in survey

Source: SEMCOG Freight Industry Survey

SUPPLY CHAIN CHARACTERISTICS

The industrial profiles provide a summary of the supply chain characteristics for the target industries using published statistics. In addition, there are other resources available for further research into supply chain issues.

For example, Gartner Research is an information technology research and advisory company that produces an annual report called the "Supply Chain Top 25." Supply Chain Management Review prepares white papers. Some recent white papers relevant to the Freight Analysis Study include:

- Global Supply Chain Survey: Key Challenges and Opportunities in the High Technology Sector

- Freight Management Today: More Freight, Fewer Trucks and Drivers
- Seven Reasons Shipping to Canada Shouldn't Be a Pain in the Neck
- Reverse Logistics: From Black Hole to Untapped Revenue Stream
- Consumer Goods Manufacturers Seek Greater Supply Chain Flexibility.

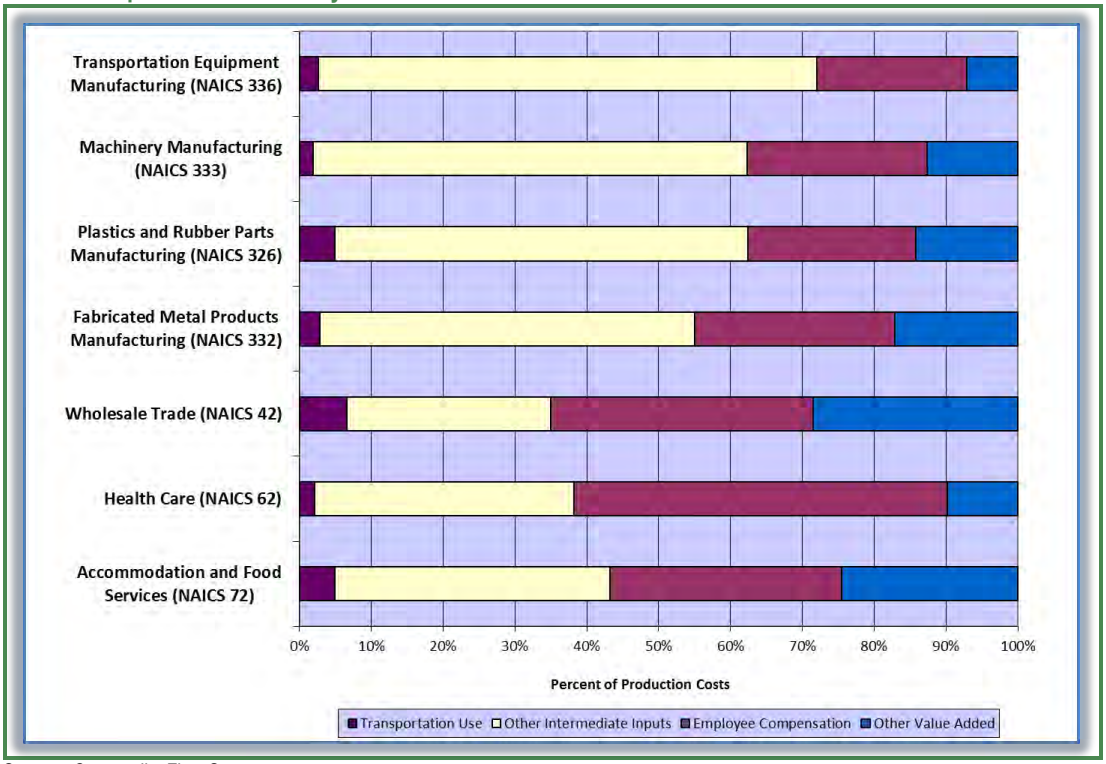
Several universities, such as Michigan State University (MSU), maintain supply chain management centers. For example, the University of Arkansas Center for Integrated Healthcare Logistics may have relevant research and issue papers for the Health Care industry. Other relevant programs include Stanford Business School's Global Supply Chain Management Forum and Arizona State University's W.P. Carey Department of Supply Chain Management. Stanford's Global Supply Chain Management Forum is a research institute that has partnered with 25 industrial organizations to identify, document, research, develop, and disseminate best practices in a global business economic environment. The Forum is particularly known for its emphasis on high technology industries.

The Arizona State University Department of Supply Chain Management offers undergraduate and graduate programs in supply chain management, and houses three research centers dedicated to supply chain issues: CAPS Research, the Center for Supply Network, and the Health Sector Supply Chain Research Consortium. CAPS Research prepares focus studies, benchmarking reports, critical issues reports, and best practices articles. The rest of this section summarized the data from published sources.

Figure D-7 shows the percentage of production costs associated with transportation, intermediate products, employment, and other value added. Transportation accounts for no more than seven percent of production costs in any industry with the highest usage being in Wholesale Trade (NAICS 42). The manufacturing industries devote a large proportion of costs to the intermediate inputs that are the raw materials for the production process. Employee compensation is a larger proportion of production costs in the non-manufacturing industries, particularly in Health Care (NAICS 62) with employee compensation more than 50 percent of production costs. Value added can be viewed as an indication of profitability. The highest value added occurs in Wholesale Trade (NAICS 42) and Accommodation and Food Services (NAICS 72).

Table D-6 shows the transportation modes used by each target industry as reported in the Transportation Satellite Accounts. While these are national statistics, they provide an indication of the transportation costs by mode incurred in the SEMCOG region. A fuller circle indicates more production costs are devoted to that particular mode. Businesses derive greater benefits from infrastructure investments that reduce costs in a mode they use heavily. For example, the manufacturing industries rely heavily upon truck transportation, but they also use rail and air. The fuller circles for air compared to rail transportation reflect the higher costs of air transportation.

Figure D-7
Industrial Inputs Used Nationally



Source: Commodity Flow Survey

Table D-6
Use of Transportation by Mode Nationally

(estimated by percent of production costs)

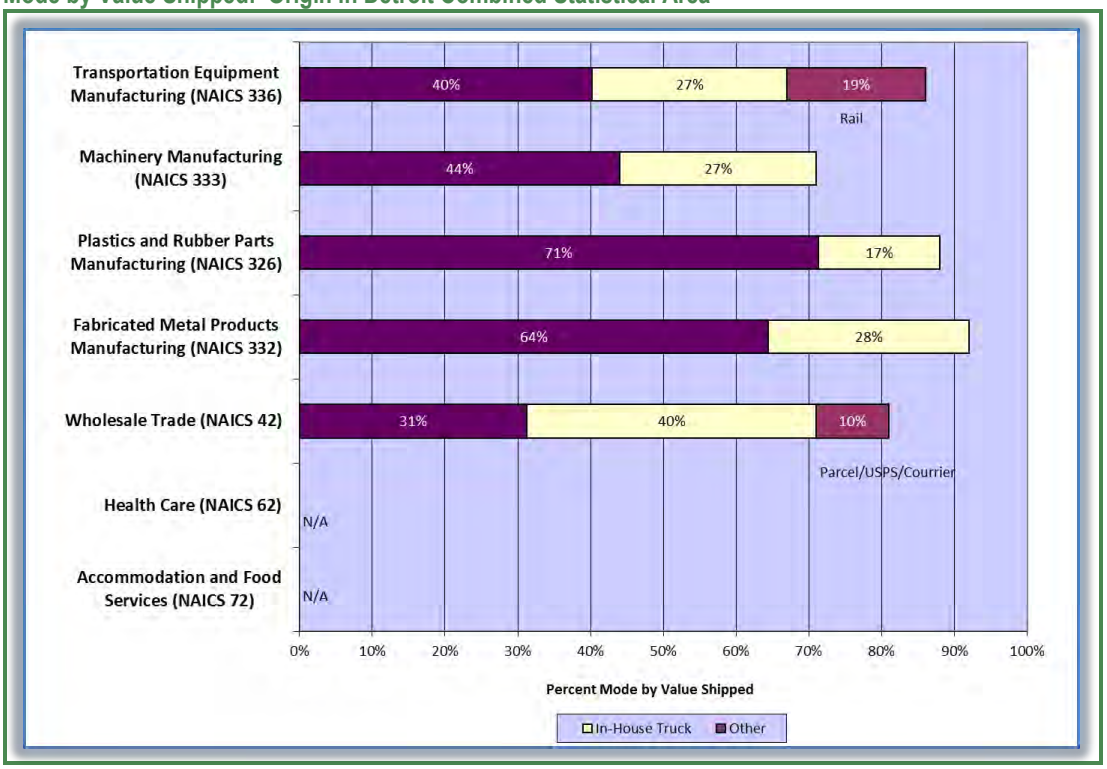
Selected Industry	Truck		Rail	Air
	For Hire	In-house		
Transportation Equipment Manufacturing (NAICS 336)	●	○	○	◎
Machinery Manufacturing (NAICS 333)	●	◎	○	◎
Plastics and Rubber Parts Manufacturing (NAICS 326)	●	◎	◎	◎
Fabricated Metal Products Manufacturing (NAICS 332)	●	◎	○	○
Wholesale Trade (NAICS 42)		●●		○
Health Care (NAICS 62)	○	●		◎
Accommodation and Food Services (NAICS 72)	○	●		○

Source: Transportation Satellite Accounts

Information on Table D-6 distinguishes truck usage between for hire and in-house services. The manufacturing industries generally use for-hire truck service, but do use some in-house services. In contrast, the non-manufacturing industries, particularly the Wholesale Trade (NAICS 42) industry, use in-house services. The double circles for Wholesale Trade indicate the industry's heavy reliance on in-house trucking.

Figure D-8 shows the modes used for shipments originating in the Detroit Combined Statistical Area (CSA) as reported in the Commodity Flow Survey. These statistics are aggregated based on the value of goods shipped. The Detroit CSA is larger than then SEMCOG region and includes Genesee and Lapeer counties. Missing categories represent multiple or other modes. Statistics are not available for Health Care (NAICS 62) and Accommodation and Food Services (NAICS 72), because these industries are not covered in the CFS.

Figure D-8
Mode by Value Shipped: Origin in Detroit Combined Statistical Area

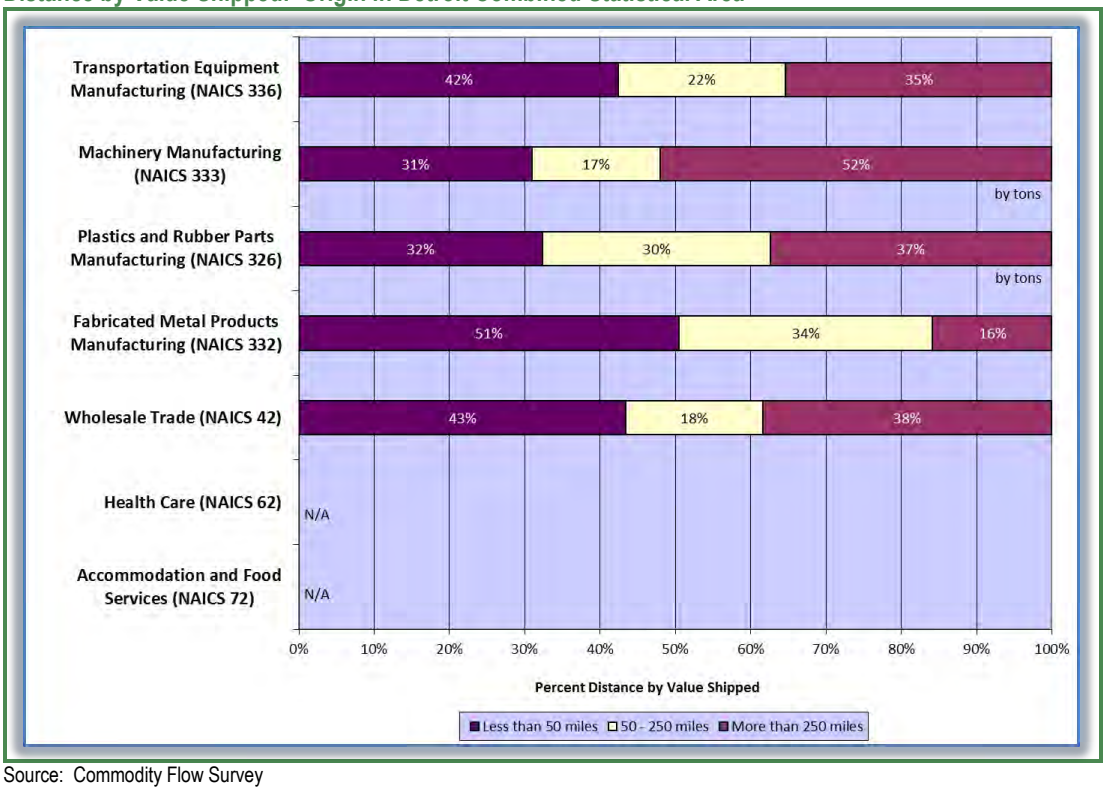


Source: Commodity Flow Survey

Consistent with the data in Table D-6, in-house trucking is the largest trucking mode for Wholesale Trade (NAICS 42). Wholesale Trade also uses parcel and courier services. The manufacturing industries use in-house trucking, but Transportation Equipment Manufacturing (NAICS 336) uses a sizeable proportion of rail transportation as well.

Figure D-9 summarizes the distances products are shipped with origins in the Detroit CSA, according to the Commodity Flow Survey. The statistics for most industries are aggregated by value, but the statistics for Machinery Manufacturing (NAICS 333) and Plastics and Rubber Parts Manufacturing (NAICS 326) are weighted by tons shipped due to data availability. Statistics are not available for Health Care (NAICS 62) and Accommodation and Food Services (NAICS 72).

Figure D-9
Distance by Value Shipped: Origin in Detroit Combined Statistical Area



Source: Commodity Flow Survey

A greater proportion of Machinery Manufacturing (NAICS 333) products ship more than 250 miles than in other industries. A greater proportion of Fabricated Metal Products Manufacturing (NAICS 332) goods ship less than 50 miles compared to other industries.

INDUSTRY OUTLOOK

TRANSPORTATION EQUIPMENT MANUFACTURING (NAICS 336). The Motor Vehicle Manufacturing subsector (NAICS 3361) includes over 350 establishments in the United States, but the Detroit Three account for the majority of revenues. The top five states for Motor Vehicle Manufacturing as a percent of U.S. employment are: Michigan (28

percent), Ohio (16 percent), Kentucky (13 percent), Indiana (13 percent), and Alabama (12 percent). The demand for automobiles is driven by factors that affect consumer purchasing power – employment and interest rates. The health of individual companies can depend on manufacturing efficiency, product quality, and marketing. Fuel efficiency concerns have driven a shift in demand from trucks to automobiles. The demand for heavy trucks is driven by production in the Agriculture, Manufacturing, Construction, and Retail sectors. The subsector can experience rapid changes in demand in response to economic conditions.

The Motor Vehicle Parts Manufacturing subsector (NAICS 3363) includes over 5,000 establishments nationally. Some of the largest companies are headquartered in Southeast Michigan, including ArvinMeritor, Inc. and Delphi Automotive, LLP in Troy, the Lear Corporation in Southfield, the and Visteon Corporation in Van Buren Township. The top five states for Motor Vehicle Parts Manufacturing as a percent of U.S. employment are: Michigan (19 percent), Ohio (14 percent), Indiana (11 percent), Tennessee (7 percent), and Kentucky (6 percent). Because motor vehicle parts are an intermediate input for Motor Vehicle Manufacturing, the demand for parts is driven by the strength of new vehicle sales. The consolidation of Motor Vehicle Manufactures and the demand for more complicated component assemblies have resulted in fewer and larger parts manufacturers.

The draft SEMCOG employment forecasts suggest that the region's concentration in the Transportation Equipment Manufacturing subsector will decline slightly over the next 30 years. The Bureau of Labor Statistics projects that national employment in the subsector will drop by 11.5 percent between 2008 and 2018. The largest declines will be among production workers, particularly assemblers, fabricators, and plastic and metal workers. Respondents to the SEMCOG survey listed the following improvements to freight infrastructure as vital to Transportation Equipment Manufacturing: increased rail availability, better roads, and grade separation between rail lines and roads to accommodate double stack shipments.

MACHINERY MANUFACTURING (NAICS 333). The Machinery Manufacturing subsector is comprised of several concentrated industries. Like many other manufacturing subsectors, the products of Machinery Manufacturing are used by other industries as intermediate inputs. The health of the subsector depends on other industries, such as agriculture, construction, motor vehicle manufacturing, and power generation. As a result, the demand for machinery can rise and drop rapidly with the business cycles. In addition, recent increases in fuel prices have created a demand for more fuel-efficient machinery.

The draft SEMCOG employment forecasts suggest that region's concentration in the Machinery Manufacturing subsector will grow over the next 30 years. Employment in the subsector is concentrated in production occupations. The Bureau of Labor Statistics forecasts that national employment in metal and plastic worker occupations will decline by 8 percent between 2008 and 2018. The largest decline in employment opportunities will be among machine tool cutting setters and operators. Respondents to the SEMCOG survey listed several improvements to freight infrastructure as vital to the industry: improved border crossing and highway improvements.

PLASTICS AND RUBBER PARTS MANUFACTURING (NAICS 326). Many firms in the Plastics and Rubber Products Manufacturing subsector focus on niche products. While large companies have economies of scale in purchasing

intermediate commodities, small companies compete through specialization, resulting in a fragmented subsector. Because the products of the subsector are used as intermediate inputs to other industries, production levels and the health of the subsector are tied closely to the national economy and the industries the subsector supplies.

In recent years, motor vehicle and parts manufacturers as well as aerospace product and parts manufactures have replaced aluminum and other metal components with low-weight plastics. Demand will continue as long as the industry innovates with high-performance materials. The draft SEMCOG employment forecasts suggest that region's concentration in the subsector will diminish slightly as SEMCOG's economy diversifies over the next 30 years. However, one of the respondents to the SEMCOG survey projects 50-percent growth in the Plastics and Rubber Products Manufacturing subsector in the next five to 20 years.

FABRICATED METAL PRODUCTS MANUFACTURING (NAICS 332). The subsector is fairly fragmented overall with specialized manufacturing processes geared towards the manufacturing of specific parts. Industry concentration is high in the manufacturing of some products, such as springs. Because the products of the subsector are used as intermediate inputs to other industries, production levels and the health of the subsector are tied closely to the national economy and the industries the subsector supplies. The health of individual firms depends on technical expertise and the efficiency of manufacturing practices. The introduction of new metal alloys has allowed fabricated metal manufacturers to introduce new and upgraded products.

The Bureau of Labor Statistics forecasts that national employment in relevant occupations will contract by 8 percent between 2008 and 2018. Employment among metal and plastic workers is expected to decline by close to 11 percent. The draft SEMCOG employment forecasts suggest that region's concentration in the subsector will remain steady over the next 30 years. Two of four respondents to the SEMCOG survey believe that their businesses will grow over 25 percent in five to 20 years.

WHOLESALE TRADE (NAICS 42). The Wholesale Trade sector is highly fragmented with over 400,000 establishments nationwide. Wholesale distributors specialize by product, such as pharmaceuticals, farm products, and electronic goods. The profitability of individual companies can depend on their efficiency in managing inventory and fulfilling orders. The cost of production for Wholesale Trade is influenced by fuel costs and inventory carrying costs. Just-in-time delivery and improved logistics have helped to reduce carrying costs. Transportation improvements that increase travel time reliability can also reduce carrying costs.

The sector provides a large portion of the employment opportunities available to workers in transportation and material-moving occupations. The Bureau of Labor Statistics projects that employment in the sector will increase nationally by 4 percent from 2008 to 2018, while opportunities in the transportation and material-moving occupations grow more slowly. The draft SEMCOG employment forecasts suggest that the region's concentration in the Wholesale Trade sector will grow slightly over the next 30 years. The majority of SEMCOG survey respondents anticipated positive growth in their business over the next five to 20 years.

HEALTH CARE (NAICS 62). Demand in the Health Care and Social Services sector is driven by demographics – aging populations need more health care services – and advances in medical care. The sector is very labor-intensive. Employee compensation accounts for about 50 percent of production costs nationally, which is well above the all-industry average. The sector has economies of scale – larger organizations have advantages in negotiating insurance contracts, buying supplies, accessing research, and offering a range of services. Recent health care reform is changing the Health Care and Social Services sector. Although the sector relies on specialized distributors, there is a growing trend for large health care providers to own their own warehouses. This has opened an opportunity for providers of medical supply management.

The draft SEMCOG employment forecasts suggest that the region's employment in the Health Care and Social Services sector will grow about 45 percent over the next 30 years. The region's concentration in the sector will remain roughly constant despite this employment growth. The Bureau of Labor Statistics forecasts robust growth in national employment of over 22 percent between 2008 and 2018. The employment opportunities are expected to be shared across all occupations.

ACCOMMODATION AND FOOD SERVICES (NAICS 72). The Accommodation and Food Services sector is highly diverse with separate factors driving the Accommodation and Food Services industries. Commodity prices for food supplies can significantly impact the Food Services industry. Changing lifestyles and tastes can also affect industry health. Since food safety can affect consumer demand, developing warehouse management systems that support traceability and recall is becoming a major issue.

Business and tourist travel drive demand in the Accommodation industry. Since the demand for travel is affected by fuel prices, these prices also determine demand in the Accommodations industry. The industry is highly sensitive to changes in personal income (for personal travel) and corporate profits (for business travel). The Accommodation industry is subject to economies of scale in marketing and consolidation is occurring.

The SEMCOG region is slightly less specialized in the Accommodation and Food Services sector than the nation as a whole. The draft SEMCOG employment forecasts suggest that the region's concentration in the sector will remain about the same over the next 30 years. Close to 80 percent of employment within the Accommodation and Food Services sector is concentrated in food preparation and serving related occupations.

FINDINGS

Employment trends in the SEMCOG region are similar to the rest of the nation. Health Care, Manufacturing, and Retail Trade rank as the three largest industries in the SEMCOG region. These are also the nation's top three industries with Retail Trade taking the No. 2 spot and Manufacturing the No. 3 spot for the largest industries.

Manufacturing and Professional Services are both large employers and highly concentrated in the SEMCOG region. However, these sectors have been on different trajectories over the last decade. While manufacturing employment declined by 30 to 40 percent, employment in Professional and Technical Services grew. Likewise, Health Care employment is large, concentrated and grew slightly over the last decade.

Transportation Equipment Manufacturing is the primary employer in the SEMCOG region and has the second largest economic multiplier nationally. This subsector includes automobile manufacturers, but a number of suppliers or companies included in the broader automobile industry are found in related subsectors, such as Machinery Manufacturing, Plastics and Rubber Manufacturing, and Fabricated Metal Product Manufacturing. Southeast Michigan has a concentration and large employment in these subsectors, but employment has declined over the last decade.

The study developed industrial profiles for seven target industries that are highly concentrated, large employers, or growing in the region:

- Transportation Equipment Manufacturing
- Machinery Manufacturing
- Plastics and Rubber Parts Manufacturing
- Fabricated Metal Products Manufacturing
- Wholesale Trade
- Health Care
- Accommodation and Food Services.

The industry profiles developed in this study can assist SEMCOG and its partners in understanding industry issues and prepare for field visits to discuss specific impacts and needs. Field visits can help make the case for a freight transportation/economic development program and identify target industries. For freight-related projects, these may include visits to economic development agencies, potential warehouse or locations for logistics operations, ports and intermodal facilities, developers, and freight carriers.

The Simplified Economic Analysis Tool developed in the study combines benefit-cost modeling with rules of thumb derived from regional economic modeling to estimate the long-term user impacts as well as the economic impact in terms of jobs, personal income, and Gross Regional Product. The tool is intended to be used to assess the user benefits and economic impacts of individual projects, groups of projects, or programs of projects that can be modeled in the SEMCOG travel demand model. The tool can also be used to assess the overall benefits of projects, chose among alternatives, or prioritize projects.

Appendix D-1 RECENT RELATED EFFORTS

Recent Related Efforts

The next few pages describe recent efforts conducted by SEMCOG and its partners that helped to identify target industries for the Freight Analysis Study.

SEMCOG Freight Planning Framework Study

The Freight Planning Framework Study outlines a strategy to link freight transportation to economic development. The study was conducted by Cambridge Systematics during 2008 with the final report presented in January 2009. The study was also presented at a SEMCOG-sponsored freight workshop in December 2009.

The study provides an overview of freight transportation issues in the Detroit region as well as general trends in freight transportation. According to the study, the key freight transportation issues in the SEMCOG region are:

- Reshaping the regional economy with new industries
- Supporting the shift from an automobile and manufacturing economy to a more diversified and knowledge-based economy, which will require more truck and air transport and less water and rail transport
- Targeting transportation investment to the new economy by improving urban freight flows, improving highway access to regional distribution centers, improving cross-border connectivity on highways and rail, and improving national rail access
- Adopting new public-sector institutional roles and responsibilities to match the new economic geography
- Financing transportation improvements through new funding sources and partnerships.

In general, trucking has dominated freight transportation in both the weight and the value of goods moved. Although trucking dominates long-haul transportation, fuel and labor cost increases will make rail transportation more competitive. A related issue will be the growth of bottlenecks, which are increasing congestion and travel times, while decreasing travel time reliability.

Detroit's freight rail system serves primarily general merchandise and carload train traffic, but the biggest growth in rail traffic nationally has been in long-haul intermodal service. The intermodal service for the Midwest is centered in Chicago, which is being challenged by other cities with hub capacity. With the freight rail network nearing capacity west and south of Chicago, costs could increase for Detroit shippers and receivers.

Los Angeles and New York have dominated container port traffic, but access to these ports is constrained. Growth in container port traffic may provide opportunities for alternate port and Detroit may benefit from access to these emerging ports. The Freight Planning Framework Study lists several emerging ports relevant to Detroit: Prince Rupert, Montreal, Halifax, the proposed Melford Terminal in Nova Scotia's Strait of Canso, Hampton Roads, and Wilmington, North Carolina. These are shown in Figure D-1-1.

Figure D-1-1: Emerging Ports and Rail Connectivity to Detroit

Source: SEMCOG

The Freight Planning Framework Study identifies four growth opportunity industries:

- *Green technologies* (e.g., alternative energy, research and development) that build on the region's automobile industrial base, trained labor, entrepreneurial skills, and freight transportation system
- *Healthcare services* that build on the region's healthcare expertise, public transportation system, and airport access
- *Warehousing and distribution industries* that build on the region's logistics industries, intermodal terminals and inland ports, and proximity to Canada
- *Education industry* that builds on the region's base of universities, community colleges, business training centers, and highway and transit access.

According to the study, these industrial shifts would mean more freight moved by truck and air and less by rail and water.

Increasing Jobs and Prosperity in Southeast Michigan

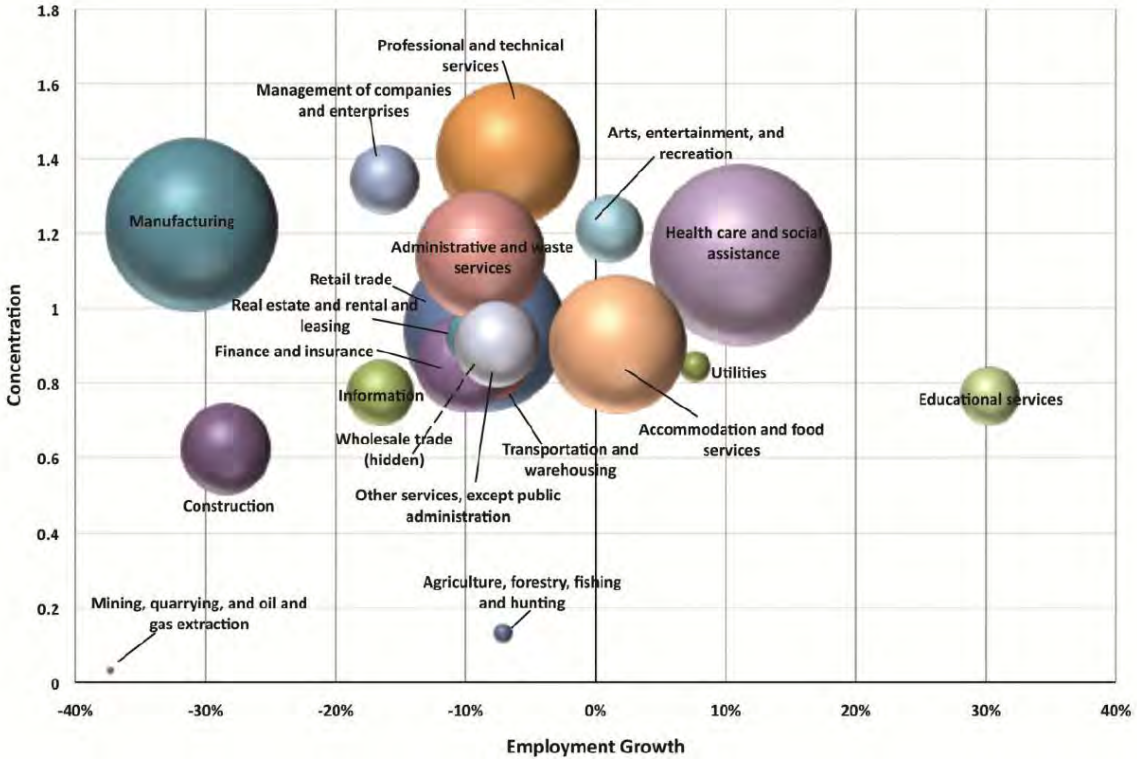
SEMCOG and the Metropolitan Affairs Coalition (MAC) formed an Economic Development Strategy Task Force to prepare a comprehensive strategy for increasing jobs and economic development in Southeast Michigan. The task force released its final report in August 2010. The final report identifies several of the SEMCOG region's assets that can be leveraged for economic development:

- Twice as many engineers as the national average

- Abundant natural resources (Great Lakes provide 20 percent of the world's freshwater supply for commerce and recreation)
- Ranked sixth for patents granted
- Located on one of the busiest international trade corridors
- Expertise in logistics and supply chain management
- World class airports
- Low cost of living.

To identify potential target industries, the task force examined recent industrial growth as well as the relative concentration of various industries in the region. Figure D-1-2 presents the results of that analysis. Employment growth is estimated as the percent change in employment growth from 2002 to 2008, while concentration is measured as the location quotient relative to the US national average. As shown in Figure D-1-2, one of the largest and most concentrated regional clusters, manufacturing, has been in decline over the past several years, while a nearly equally large and concentrated industry, health care, has been growing.

Figure D-1-2: Southeast Michigan's Private Sector Growth (2002-2008) and Concentrations (2008)



Source: SEMCOG and MAC, Increasing Jobs and Prosperity in Southeast Michigan, August 2010.

Historically, the SEMCOG region's three most highly concentrated clusters are linked to automotive industry. Combined, these three sectors lost 132,000 jobs (22 percent decline) between 2002 and 2008. However, the existing industrial concentrations provide opportunities for the region in these three clusters:

- *Professional and Technical Services* – These jobs require a high level of education and include engineers, advertisers, computer service providers, researchers, designers, accountants, and lawyers. While many of these jobs are found in the automotive industry and suppliers, there are also a number of supporting establishments in this sector.

- *Management of Companies* – While the region has the headquarters for the three major domestic automotive manufacturers, the region also has the headquarters for other, younger companies.
- *Manufacturing* – This sector reflects the heavy concentration of automotive manufacturing in the region. Several economic evaluations have focused on manufacturing as a potential growth industry due to the skilled labor force, land availability, and supplier support base. The SEMCOG region may benefit from advanced manufacturing opportunities and high-tech processes (such as 3D printing) as well as the opportunity to manufacture new products like advanced materials or medical devices.

The task force identified three industrial clusters that deserve attention for attracting future growth:

- *Health Care and Social Assistance* – The demand for health services is expected to grow as the region's population ages. The number of households with people over 60 increased by more than 89,000 between 2000 and 2008. In 2008, households with people over 60 years old comprised almost 32 percent of the regional total.
- *Transportation and Warehousing* – Southeast Michigan has opportunity to grow into a transportation and logistics hub given the region's expertise in distribution, logistics, and supply chain management. This expertise could be transferred to other emerging industries, such as the distribution of batteries for hybrid and electric vehicles.
- *Information* – This cluster includes establishments involved in the production or distribution of cultural products, data transmission or communication, and data processing. The cluster could support information economy employers and the movie industry.

An appendix to the report provides the results of interviews with economic development partners. During the interviews, the economic development partners identified their target industries for business attraction, geographically specific locations for attracting growth, and the current, out of region locations of target industries.

Translinked

Translinked is a freight logistics effort of the Detroit Regional Chamber to target specific industries and spur economic growth. The initiative is working to create a regional industry cluster that focuses on transportation, distribution, and logistics. The intent is also to ensure that the transportation infrastructure continues to meet anticipated growth in international trade and freight by providing a transportation and logistics hub in Southwest Michigan.

By creating a regional focus on the logistics supply chain, the Translinked strategy is intended to cultivate the logistics business culture within the SEMCOG region. Translinked has support from the Michigan Economic Development Corporation (MEDC) and the New Economy Initiative, which is a philanthropic effort to accelerate transition to an innovation-based economy in Southeast Michigan.

Supply Chain Opportunity Assessment

The Broad College of Business at Michigan State University (MSU) recently supported the Detroit Regional Chamber in assessing supply chain opportunities as part of the New Economy Initiative. The work was conducted in early 2010 with a final report dated May 2010. The final supply chain assessment outlines a potential Supply Chain Management (SCM) Strategy to promote regional economic growth by building differentiated hubs that take advantage of the region's strong hub capabilities and supply chain management capabilities. In the MSU analysis,

SCM incorporates all activities related to the procurement, manufacturing, customer service, logistics, warehousing, transportation, and inventory management. This SCM Strategy to build differentiated hubs and promote regional economic growth forms the core of the Translinked initiative.

According to the SCM Strategy, Southeast Michigan should focus on attracting industries to a supply chain hub. The hub would be developed through a public/private partnership and facilitate air-to-motor freight transport, rail-to-motor freight transport, and value-added services. This is consistent with the observation in the Freight Planning Framework Study that truck goods movement is growing.

In preparing the report, MSU hosted three workshops that were attended by over 30 stakeholders representing users of supply chain services, providers of supply chain services, economic development personnel, and researchers. The first workshop focused on identifying the unique capabilities and benefits for a regional supply chain hub and reviewing potential industries which might be attracted to the hub. Unique hub capabilities found in the Detroit region include:

- Location is between Toronto and Chicago, two over-capacity centers.
- Location supports multiple modes that can increase shipping speed, while reducing cost (e.g., Southeast Michigan has reduced travel time to many global locations using the Article Circle route).
- Location allows for an increase in the speed of moving goods while decreasing cost, which can be done by multiple modes.
- Location is on the busiest border, but the border-crossing infrastructure is the most antiquated and substandard in North America.

The second workshop provided a preliminary assessment of the economic potential of supply chain related industries in the seven SEMCOG counties, Northwest Ohio, and Southwest Ontario. The targeted industry sectors for the supply chain hub were evaluated in terms of:

- Uniqueness of capability
- Economic development and job creation within the industry sector
- Potential sector growth opportunity.

The final workshop outlined tasks for project implementation.

In the MSU analysis, twelve industry sectors were prioritized and grouped into three major clusters:

- *Heavy manufacturing* attracted to the hub for resource efficiency and differentiation
- *Light manufacturing* attracted to the hub for resource efficiency and differentiation
- Warehouse and consumer-based industry attracted to hub market location for *distribution and value-added services*.

MSU estimates that heavy manufacturing has the potential to generate $5 billion for the regional economy and create 41,000 job, while light manufacturing and distribution/value-added services has the potential to generate $5.5 billion and create 25,500 new jobs. These types of industries are expected to have the ability to take advantage of the highly skilled labor, available land, supplier support, and freight infrastructure found in Southeast Michigan.

Table D-1-1 shows the list of twelve industry sectors identified by MSU. This list combines target lists developed by the Detroit Regional Chamber and the MEDC:

- *Detroit Regional Chamber target industries:* transportation and logistics, alternative energy, aerospace, medical devices, homeland security and defense, advanced manufacturing
- *MEDC target industries:* alternative energy, automotive engineering, life sciences, homeland security and defense, advanced manufacturing, film industry.

Table D-1-1: Target Industries Identified by Michigan State University

Industry Cluster	Industries
Heavy manufacturing	Automobile renewal Alternative energy Carbon fiber manufacturing Chemical processing Defense Electronics – industrial
Light manufacturing	Food processing Medical technologies Water technologies
Distribution and value-added services	Beverage and alcohol distribution Retail importing and value added Waste management

Source: Michigan State University's Broad College of Business, Supply Chain Opportunity Assessment: Economic Development for SE Michigan Final Report," May 31, 2010.

The SCM Strategy includes an evaluation of the growth potential of target industries. It also identifies several critical elements, such as ability to serve global markets and competitive tax climate. However, MSU notes that the region needs to look at the supply chain and site selection criteria. The key policy to enable economic development is to tie the economic development and site location to transportation assets. Addressing congestion on the freight network will be critical to facilitate the supply chain.

Appendix D-2 TARGET INDUSTRY PROFILES

Target Industry Profiles

This appendix provides detailed industry profiles for the seven target industries identified in the study:

- Transportation Equipment Manufacturing (NAICS 336)
- Machinery Manufacturing (NAICS 333)
- Plastics and Rubber Parts Manufacturing (NAICS 326)
- Fabricated Metal Products Manufacturing (NAICS 332)
- Wholesale Trade (NAICS 42)
- Health Care (NAICS 62)
- Accommodation and Food Services (NAICS 72).

The sections below define the geographic areas and economic terms used in the profiles.

Geographic Areas

Figure D-2-1 identifies the geographic regions referenced in the industry profiles. Several different regions are defined due to limitations in the available data:

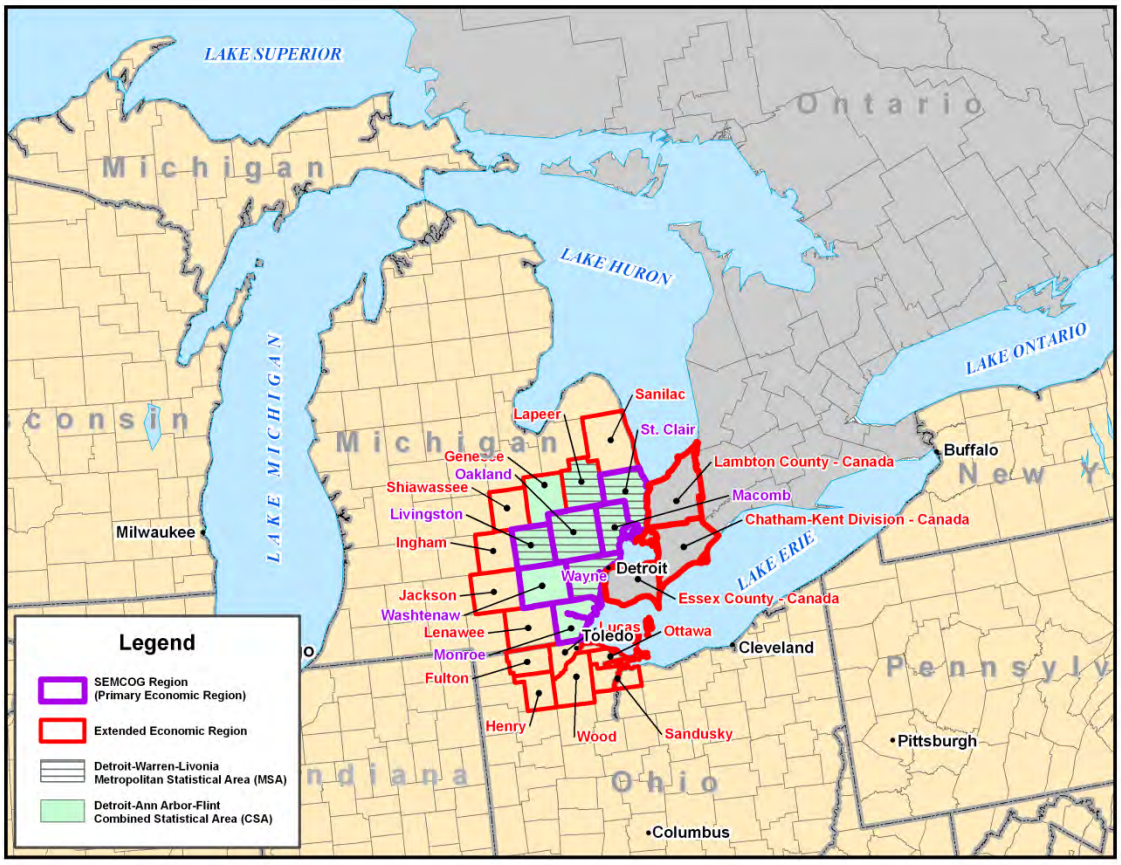
- *SEMCOG Region* includes counties that are members of the Southeast Michigan Council of Governments

- *Extended Economic Region (EER)* covers a wider region that includes additional counties in Michigan and Ohio (note: SEMCOG includes three counties in Canada in the EER, but economic data are not readily available for the Canadian counties.)

- *Detroit-Warren-Livonia Metropolitan Statistics Area (MSA)* is the metropolitan area as defined by the US Census Bureau

- *Detroit Combined Statistical Area (CSA)* is a larger metropolitan that includes Genesee and Lapeer counties, as defined by the US Census Bureau.

Figure D-2-1: Geographic Areas Used in Industry Profiles



Definitions of Economic Terms

Location Quotient (LQ) compares the regional share of economic activity in a particular industry to the national share of economic activity in the same industry. The result reveals the degree of regional specialization in each industry. If the location quotient for a particular industry is between zero and one, the region is less specialized than the nation, while location quotients greater than one reveal greater specialization of the industry in the local economy than in the national economy. For example, if 15 percent of employment in the SEMCOG region is in Industry X but this industry has 10 percent of employment nationally, the SEMCOG region has a location quotient of 1.5 in Industry X (i.e., 15 divided by 10). Industries with a location quotient above 1.0 form the economic base of the SEMCOG region.

Economic Multiplier measures how much economic activity is required to produce output in a particular industry. Each industry has intermediate inputs required to make its products and each of those intermediate inputs require additional inputs. The economic multiplier (also called "total requirements") tracks each of these effects through the economy. For example, if Industry X has an economic multiplier of 2.5, producing $1 of output in Industry X generates $2.50 in economic activity through intermediate inputs (and their inputs, etc.). Industries with larger economic multipliers generate more economic activity. An average industry has a multiplier of about 2.0.

1. Transportation Equipment Manufacturing

DESCRIPTION

Industries in the Transportation Equipment Manufacturing subsector produce equipment for transporting people and goods. The US Census Bureau devotes an entire subsector to this activity because of the significance of its economic activity in North America. Establishments in this subsector utilize production processes similar to those of other machinery manufacturing establishments - bending, forming, welding, machining, and assembling metal or plastic parts into components and finished products. However, the assembly of components and subassemblies and their further assembly into finished vehicles tend to be a more common production process in this subsector than in the Machinery Manufacturing subsector.

The industries included as part of the Transportation Equipment Manufacturing subsector involve the manufacture of equipment for road, rail, air and water modes of transport. Parts for motor vehicles warrant a separate industry group because of their importance and because parts manufacture requires less assembly, and the establishments that manufacture only parts are not as vertically integrated as those that make complete vehicles. The industries included in this subsector are listed by NAICS code:

3361 Motor Vehicle Manufacturing
3362 Motor Vehicle Body and Trailer Manufacturing
3363 Motor Vehicle Parts Manufacturing
3364 Aerospace Product and Parts Manufacturing
3365 Railroad Rolling Stock Manufacturing
3366 Ship and Boat Building
3369 Other Transportation Equipment Manufacturing

IMPORTANCE TO REGION

- According to County Business Patterns, the SEMCOG region has a high location quotient of 2.8 in this subsector. This suggests that the SEMCOG region is more specialized in this subsector than the nation (nearly three times the employment concentration).
- Transportation Equipment Manufacturing has the highest location quotient of all manufacturing industries in the SEMCOG region.
- According to Dunn and Bradstreet, Ford has close to 12,000 employees in plants located Dearborn, Flat Rock, Livonia, Sterling Heights Wayne, and Woodhaven. General Motors employs about 2,400 workers at plants in Detroit and Warren. Chrysler also employs over 8,000 workers at plants in Auburn Hills, Detroit, Sterling Heights, Trenton, and Warren.
- Dunn and Bradstreet also lists two major motor vehicle parts manufactures in Novi: Cooper-Standard Automotive with about 17,800 employees and Tower Automotive with about 11,000 employees.
- The draft SEMCOG forecast of employment suggests that region's concentration in the subsector will decline slightly to 2.7 by 2040.
- In the SEMCOG region, the Transportation Equipment Manufacturing subsector comprised 29 percent of all manufacturing jobs, or 3 percent of all jobs, in 2009. The SEMCOG region contains about half of all the state's jobs in this subsector.
- Transportation Equipment Manufacturing has extraordinarily high economic multipliers. The lowest multiplier in the sector is 2.37 for both the aerospace and "other transportation equipment" industries. This

means that producing $1.00 of output in these industries will generate $2.37 of activity in the economy. In comparison, the average industry has a multiplier of only about 2.0.

- The manufacturing of motor vehicles has the highest economic multiplier at 2.92. The only industry that has a higher multiplier across the entire US economy is Animal Products. The Motor Vehicle Parts industry also has a high economic multiplier at 2.55.

ECONOMIC TRENDS

- The SEMCOG region comprised 57 percent of the state's transportation equipment manufacturing employment in 1999, 54 percent in 2004, and 51 percent in 2009. This trend shows that the region lost a greater proportion of transportation equipment manufacturing jobs than the state as a whole. Of the 48,500 transportation equipment manufacturing jobs lost in Michigan from 1999 to 2004, 68 percent were in the SEMCOG region.
- Michigan comprised 13 percent of the country's transportation equipment manufacturing employment in 1999 and 2004, and 9 percent in 2009. However, it comprised 22 percent of all the transportation equipment manufacturing jobs lost in the country from 1999 to 2009.
- The SEMCOG region lost 22 percent of its transportation equipment manufacturing jobs from 1999 to 2004 and 48 percent of its jobs from 2004 to 2009 (for a combined total of 87,880 jobs). The country lost 15 percent of its jobs from 1999 to 2004 and 22 percent of its jobs from 2004 to 2009.
- In the United States, there was an increase in average wages in this industry from 1999 to 2004 (10 percent) and from 2004 to 2009 (4 percent). The SEMCOG region reported an average wage increase of 5 percent from 1999 to 2004, but a decrease of 5 percent from 2004 to 2009.

SEMCOG Region's Transportation Equipment Manufacturing Subsector

	1999	2004	2009
SEMCOG Region			
Employment	148,273	114,990	60,393
# of Establishments	593	575	505
Average Wage	63,027	66,459	63,313
Employees per Establishment	250	200	120
SEMCOG Extended Economic Region (excluding Canada)			
Employment	201,511	162,415	82,047
# of Establishments	771	756	672
Average Wage	58,941	65,403	62,169
Employees per Establishment	261	215	122
Canadian Extended Ecconomic Region (Chatham-Kent, Essex, Lambton)			
# of Establishments	n/a	132*	115*
Michigan			
Employment	260,446	211,931	119,170
# of Establishments	1,079	1,048	945
Average Wage	56,395	59,171	55,687
Employees per Establishment	241	202	126
United States			
Employment	1,906,216	1,625,742	1,273,221
# of Establishments	13,042	12,705	12,091
Average Wage	47,533	52,363	56,041
Employees per Establishment	146	128	105

* 2005 and 2010 data are reported for Canadian counties

Sources: US Census Bureau, County Business Patterns
Statistics Canada, Canadian Business Patterns

LABOR FORCE SKILLS

- Over half (53 percent) of the employment in the Transportation Equipment Manufacturing subsector is in production-related occupations. Many of these workers are either assemblers/fabricators (24 percent) or metal/plastic workers (18 percent).
- Nearly 20 percent of all assemblers and fabricators nationally work in transportation equipment manufacturing. The sector also accounts for over 13 percent of all metal and plastic workers nationally.
- Professional and management employees account for another 15 percent and 9 percent of employment in the industry, respectively.
- The Bureau of Labor Statistics projects that employment in the subsector will drop by 11.5 percent by 2018. The largest declines in number of jobs will be among production workers, but the largest decline in percentage terms (19 percent) will be among executives.
- Respondents to the SEMCOG survey cited the size of the skilled labor pool and shortage of drivers as impediments to business growth.

National Employment in the Transportation Equipment Manufacturing Subsector by Occupation
Actual 2008 and Projected 2018

Occupation		2008		Percent Change
		Percent of Industry	Percent of Occupation	
00-0000	Total, All Occupations	100.00	1.06	-10.53
11-1300	**Management, Business, and Financial Occupations**	9.19	0.94	-6.35
11-0000	Management Occupations	4.08	0.74	-11.48
11-1000	Top executives	1.00	0.73	-18.77
11-3000	Operations specialties managers	1.72	1.79	-10.63
11-9000	Other management occupations	1.35	N/A	N/A
13-0000	Business and Financial Operations Occupations	5.11	1.20	-2.25
15-2900	**Professional and Related Occupations**	15.05	N/A	N/A
15-0000	Computer and mathematical science occupations	2.48	1.12	1.57
17-0000	Architecture and engineering occupations	11.79	7.18	-2.81
	Other professional and related occupations	0.8	N/A	N/A
51-0000	**Production Occupations**	53.40	8.51	-12.66
51-1000	Supervisors, production workers	3.06	7.22	-12.54
51-2000	Assemblers and fabricators	23.76	19.57	-10.70
51-4000	Metal workers and plastic workers	17.58	13.08	-15.50
51-9000	Other production occupations	9.00	N/A	N/A
	Other	22.4	N/A	N/A

Source: Bureau of Labor Statistics, Occupational Employment Statistics

OTHER SITE SELECTION CRITERIA

- Respondents to the SEMCOG survey that operate in this subsector located in the region for various reasons – proximity to customers, proximity to assembly plants, workforce availability, tax incentives, and building and property features.

SUPPLY CHAIN CHARACTERISTICS

Purchasing Patterns

- The Transportation Equipment Manufacturing subsector is capital intensive. According to the most recent Transportation Satellite Accounts, the purchase of intermediate inputs (other than transportation) account for 63 to 82 percent of industry costs. In the Motor Vehicle industry, intermediate goods account for 82 percent of costs. This compares to an average of only 42 percent across all industries.
- The Transportation Equipment Manufacturing sector uses labor less intensively than other sectors. While employee compensation accounts for about 31 percent of production costs in the average industry, it accounts for 23 to 26 percent in most Transportation Equipment Manufacturing industries. The Motor Vehicle industry is the least labor intensive with employee compensation accounting for only about 8 percent of total production costs.
- Other value-added is much less than in other industrial sectors. The average value added is 7 to 8 percent for Transportation Equipment Manufacturing industries compared to 24 percent for all industries. The other value-added for motor vehicle bodies, trailers, and parts is lowest at just under 5 percent.

National Purchasing Patterns in Transportation Equipment Manufacturing (1997)

Input to Industry Production	3361 Motor vehicles	336A Motor vehicle bodies, trailers, and parts	3364 Aerospace products and parts	336B Other transportation equipment
Use of Transportion				
Truck For-Hire	1.3%	1.3%	0.6%	1.3%
In-House	0.4%	0.4%	0.3%	0.3%
Rail For-Hire	0.2%	0.3%	0.1%	0.2%
In-House	0.0%	0.0%	0.0%	0.4%
Air For-Hire	0.6%	0.4%	0.8%	0.4%
In-House	0.1%	0.3%	0.5%	0.0%
Transit and Ground Transport	0.0%	0.0%	0.0%	0.0%
Other (incl. water and pipeline)	0.0%	0.0%	0.0%	0.0%
Total Transportation Use	2.7%	2.7%	2.4%	2.7%
Other Intermediate Inputs	81.8%	70.0%	63.1%	62.6%
Employee Compensation	8.2%	22.6%	26.4%	26.3%
Other Value Added	7.3%	4.7%	8.2%	8.4%
TOTAL	100.0%	100.0%	100.0%	100.0%

Source: Bureau of Transportation Statistics (BTS), Transportation Satellite Accounts

Transportation Usage

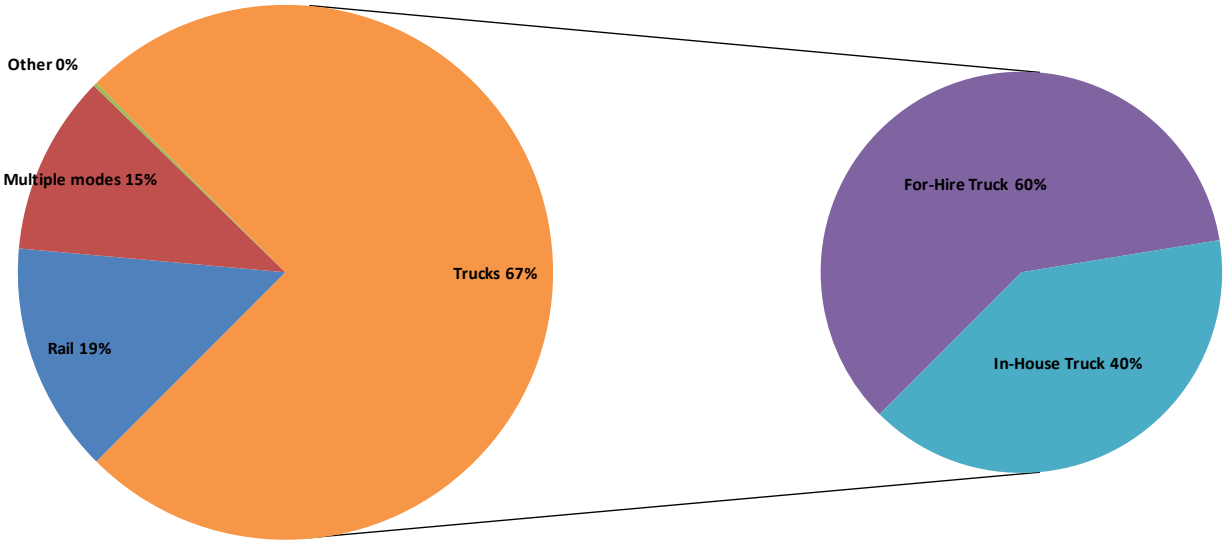
- The Transportation Equipment Manufacturing subsector uses transportation (as a percent of production costs) less intensively than other industries. Transportation accounts for about 2.7 percent of production costs in most transportation equipment industries compared to an average across all industrial sectors of about 3.8 percent. This lower percentage reflects the high costs of other intermediate inputs and the capital-intensiveness of the manufacturing process.
- The industry tends to rely on truck transportation. Motor vehicle manufacturing, in particular, spends about 1.7 percent of production costs on truck transportation. About 80 percent of these costs are for hiring outside trucking services.
- The use of in-house fleets in motor vehicle manufacturing is not as prevalent as in other industries. Only about 0.4 percent of production costs (or about 20 percent of the truck costs) are due to the use of in-house trucking. This compares to a cross-industry average of 2.2 percent. The hiring of outside trucking services for motor vehicle manufacturing (1.7 percent) is much higher than the cross-industry average (0.7 percent).
- All Transportation Equipment Manufacturing industries tend to use air transportation more intensively (0.4 to 1.3 percent of costs) than the average of 0.4 percent across industries. Understandably, the aerospace industry uses air transportation the most intensively (1.3 percent), but air transportation accounts for about 0.7 percent of costs in the motor vehicle and parts manufacturing industries.
- Most Transportation Equipment Manufacturing industries use rail on par with the cross-industry average of 0.2 percent of costs. The Other Transportation Equipment Manufacturing industry uses a higher 0.6 percent of costs since it include railway equipment manufacturing.

Characteristics of Shipments

Mode

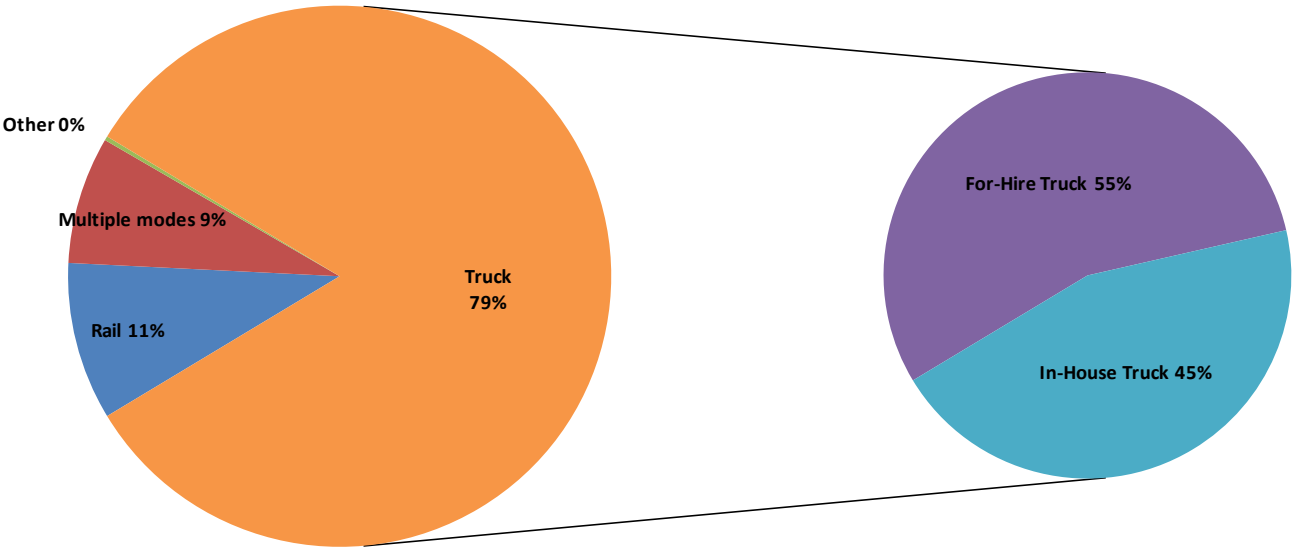
- By value and tonnage, the majority of goods shipped from the Detroit Combined Statistical Area, which includes Flint and Ann Arbor, are transported by trucks (67 percent and 79 percent, respectively). Of those transported by trucks, more than half of the transport is carried by outside trucking companies, while the remaining is shipped in-house.
- Rail moves goods longer distances (1,250 miles per average shipment) compared to trucks (370 miles per average shipment). This suggests that transportation equipment is predominately shipped within the region by truck. The shipments that move greater distances are likely shipped by rail.
- The Transportation Equipment Manufacturers that responded to the SEMCOG survey indicated that they did not have rail access. However, they also believed that better rail would not benefit their businesses.
- The majority of businesses that responded to the survey have access to truck docks and only one respondent believed that better highway access would benefit the business.

Mode of Shipment by Value for the Transportation Equipment Manufacturing Industry
Detroit-Warren-Flint Area of Origin (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

Mode of Shipment by Tons for the Transportation Equipment Manufacturing Industry
Detroit-Warren-Flint Area of Origin (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

Average Miles per Shipment by Mode
Origin in Detroit Combined Statistical Area (2007)

Mode	Average miles per shipment
Rail	1252
Multiple modes	934
Truck	368
For-Hire	478
In-House	149

Source: US Census Bureau and BTS, Commodity Flow Survey

Make of Commodities

- Within the Transportation Equipment Manufacturing subsector, "motorized and other vehicles" is the most heavily shipped commodity, comprising 79 percent of total value of all commodities shipped, or 59 percent of total tons of all commodities shipped.
- The subsector also ships machinery (about 12 percent by value and 6 percent by weight).
- The remaining commodities produced nationally by the sector include: forgings and stampings; HVAC and commercial refrigeration equipment; metal-working machinery; audio, video, and communications equipment; electronic instruments; and other electrical equipment and components.
- The composition of the other commodities illustrates the inter-related skills and activities in the industrial cluster based on transportation equipment manufacturing.

Transportation Equipment Manufacturing Shipment Characteristics by Commodity
Origin in Detroit-Warren-Flint Area (2007)

Commodity Description	Value		Tons		Ton-miles		Average miles per shipment
	2007 (million $)	Percent of total	2007 (thousands)	Percent of total	2007 (millions)	Percent of total	
All Commodities	$88,204	100%	16,975	100%	7,719	100%	551
34 Machinery	$10,567	12%	1,370	8%	438	6%	504
36 Motorized and other vehicles (including parts)	$70,024	79%	10,051	59%	6,372	83%	639
Other	$7,613	9%	5,554	33%	909	12%	

Source: US Census Bureau and BTS, Commodity Flow Survey

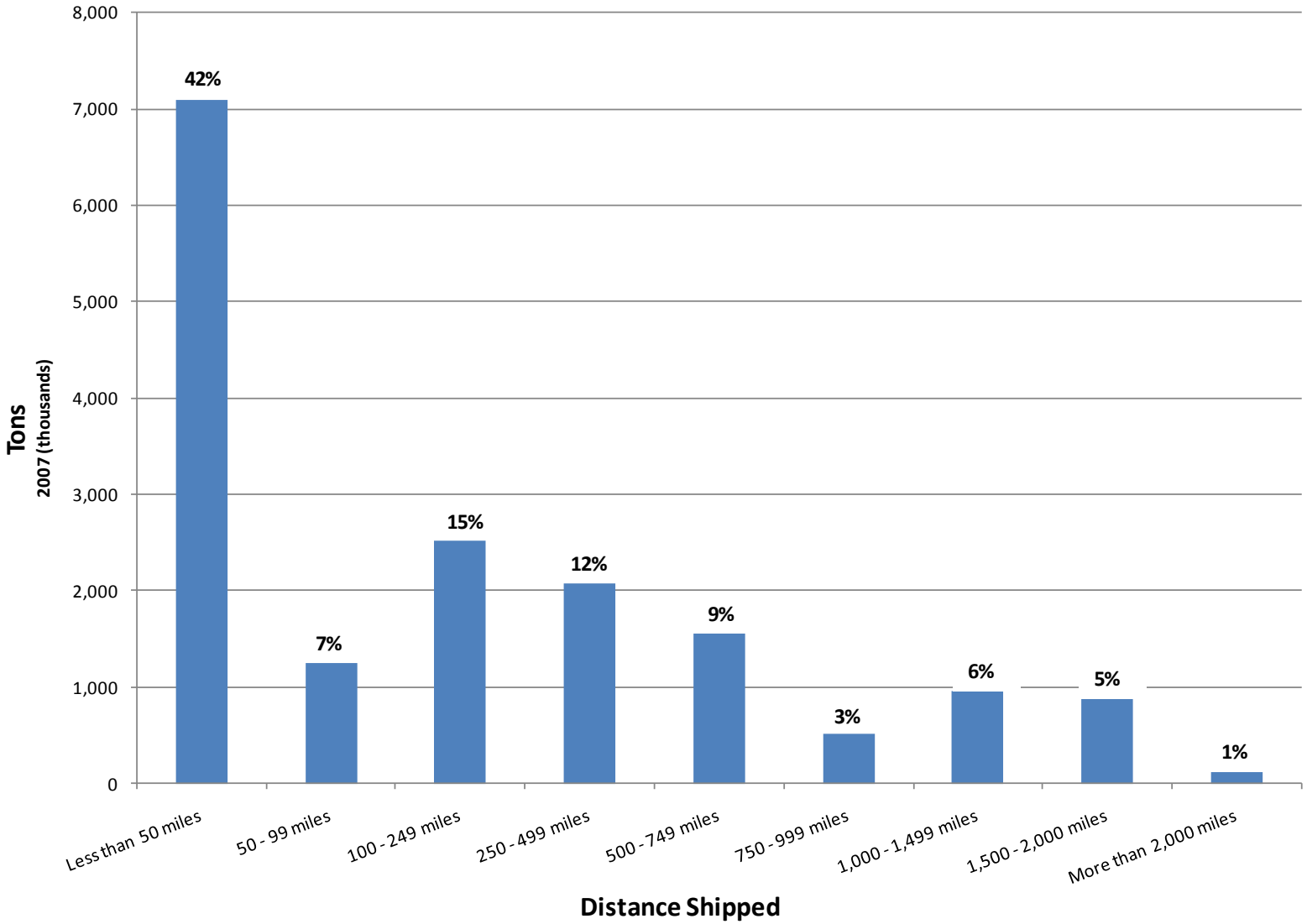
Distance

- By ton, 42 percent of manufactured transportation equipment is shipped less than 50 miles from the Detroit Combined Statistical Area.
- The plurality of freight moves less than 50 miles.
- However, per ton-mile, 27 percent of manufactured transportation equipment is shipped between 1,500 and 2,000 miles.

Weight

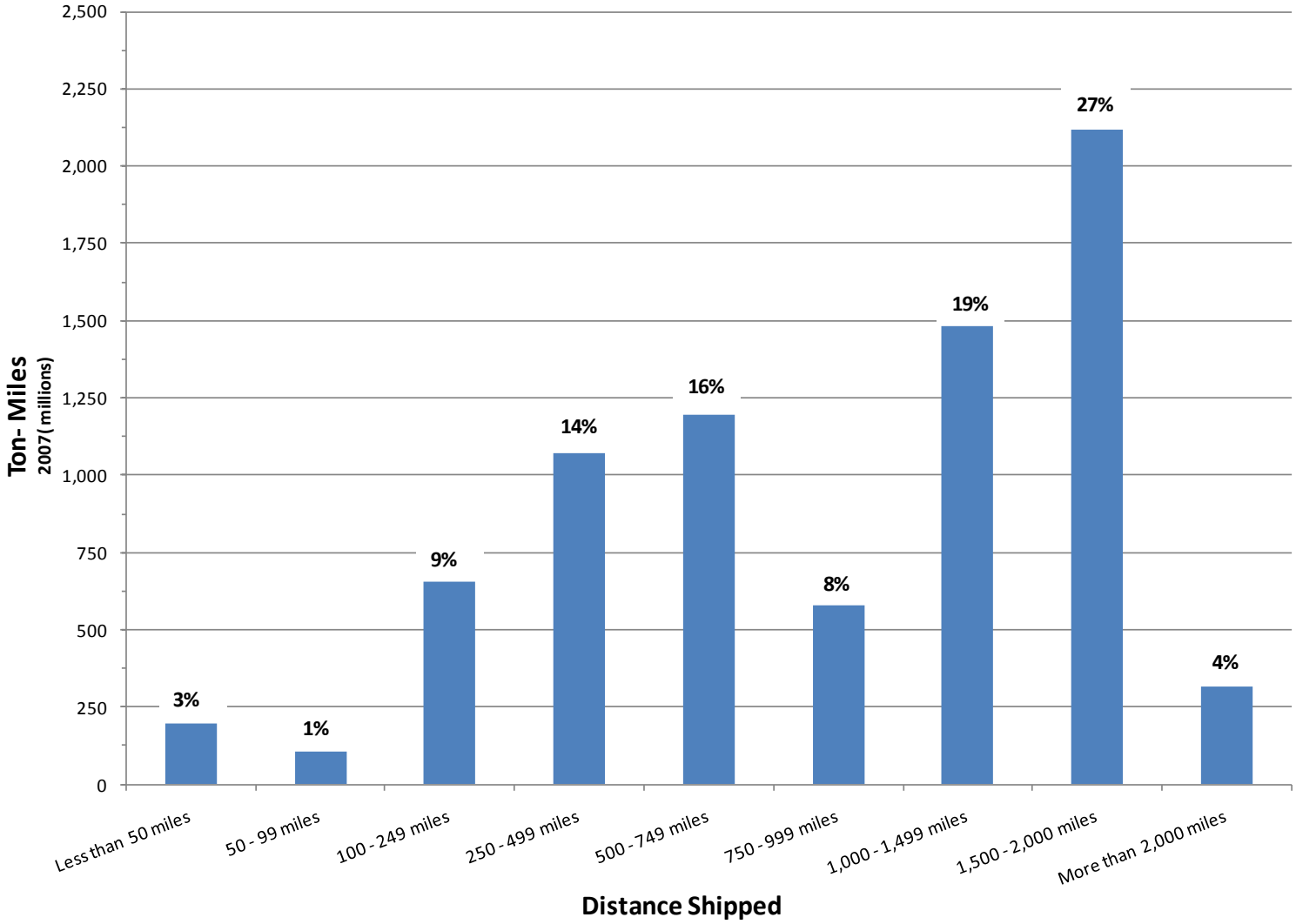
- Fifty-eight (58) percent of total shipment weight is for shipments weighing between 10,000 and 49,999 pounds.

Distance Shipped by Tons for the Transportation Equipment Manufacturing Industry
Origin in Detroit Combined Statistical Area (2007)



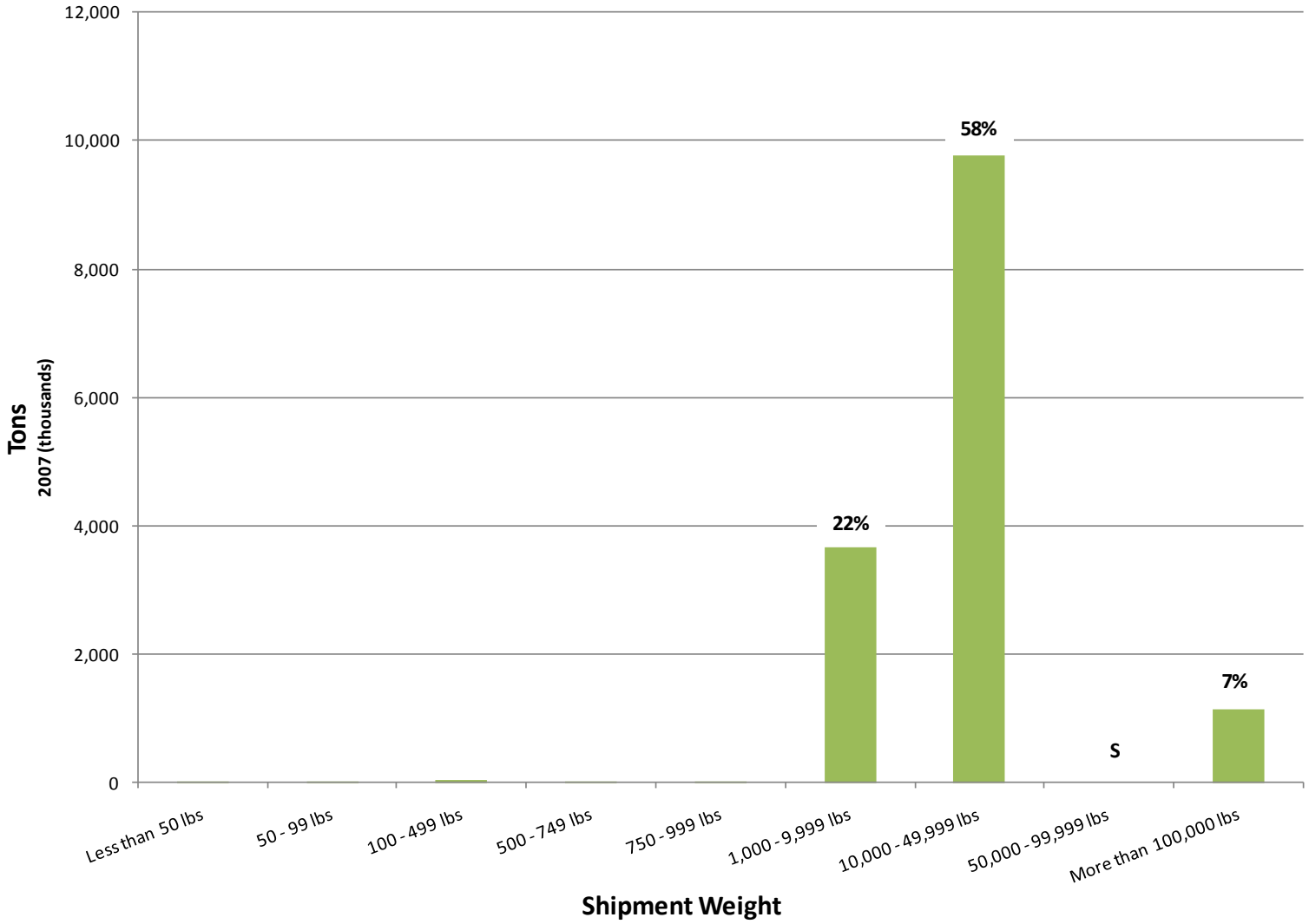
Source: US Census Bureau and BTS, Commodity Flow Survey

Distance Shipped by Ton-Miles for the Transportation Equipment Manufacturing Industry
Origin in Detroit Combined Statistical Area (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

Shipment Weight by Tons for the Transportation Equipment Manufacturing Industry Origin in Detroit Combined Statistical Area (2007)



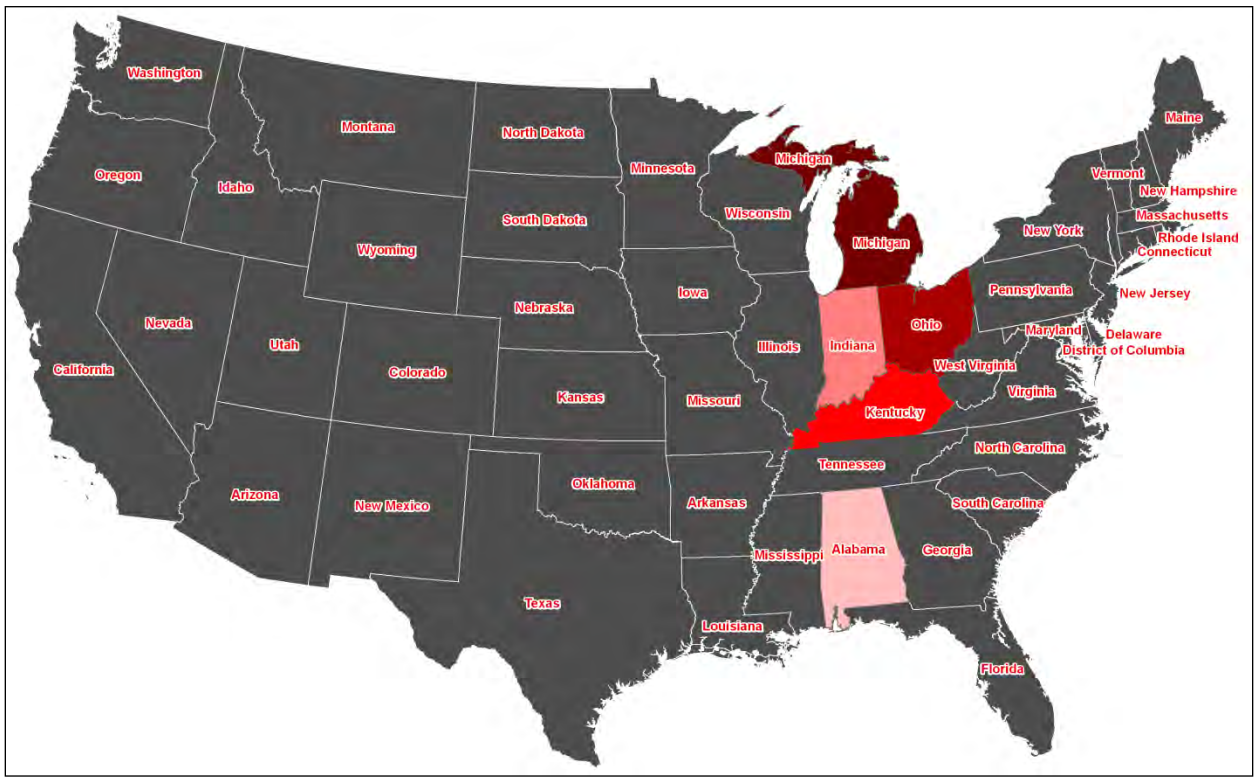
S = high sampling variability or poor response quality

Source: US Census Bureau and BTS, Commodity Flow Survey

INDUSTRY OUTLOOK

- The Motor Vehicle Manufacturing subsector includes over 350 establishments in the United States, but the Big Three account for the majority of revenues. In addition to the Big Three, there are assembly plants for foreign manufactures and boutiques that manufacture chassis. As shown in the exhibit below, the top five states for Motor Vehicle Manufacturing as a percent of US employment are: Michigan (28 percent), Ohio (16 percent), Kentucky (13 percent), Indiana (13 percent), and Alabama (12 percent).

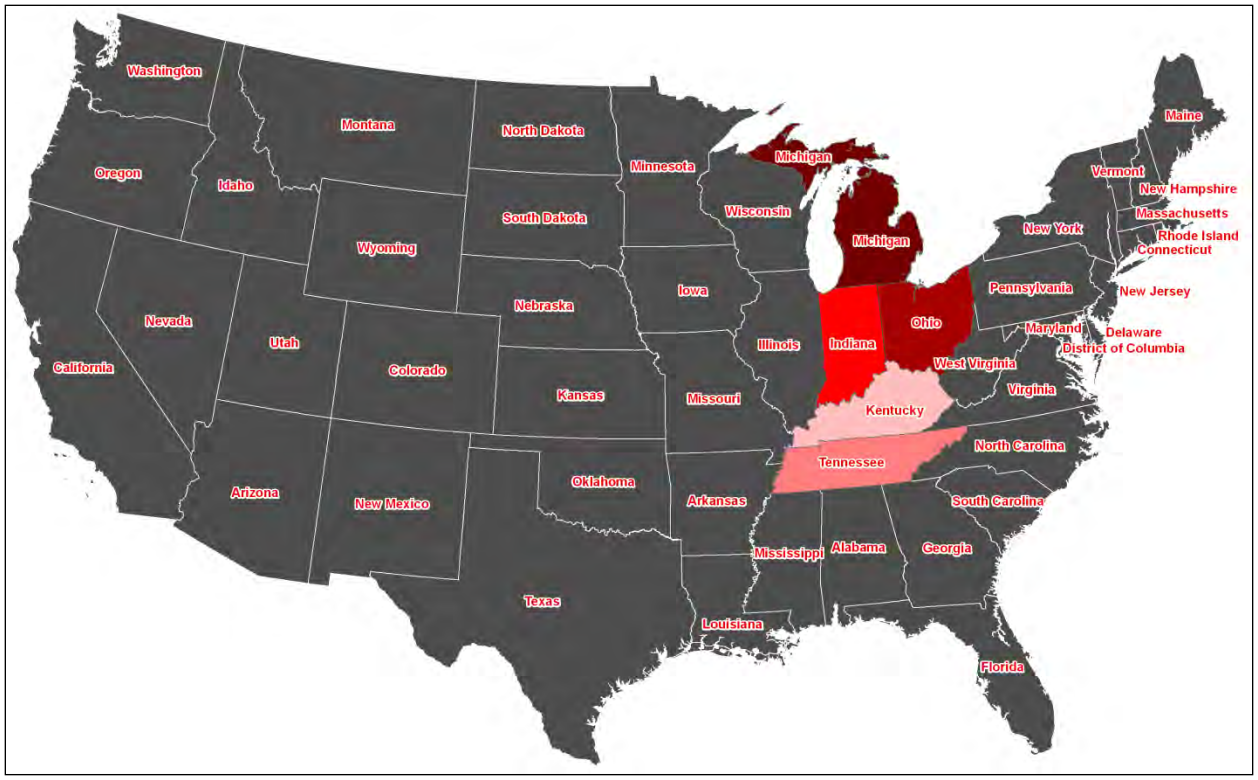
Top Five Motor Vehicle Manufacturing States by Employment (2007)



Source: US Census Bureau, County Business Patterns

- The demand for automobiles is driven by factors that affect consumer purchasing power – employment and interest rates. The health of individual companies can depend on manufacturing efficiency, product quality, and marketing. Fuel efficiency concerns have driven a shift in demand from trucks to automobiles for consumers.
- The demand for heavy trucks is driven by production in the Agriculture, Manufacturing, Construction, and Retail sectors. As a result, the subsector can experience rapid changes in demand as economic conditions shift. Stricter emissions compliance issues are driving technology change in heavy trucks and buses.
- The Motor Vehicle Parts Manufacturing subsector includes over 5,000 establishments nationally. Some of the largest companies are headquartered in Southeast Michigan, including ArvinMeritor, Inc. and Delphi Automotive, LLP in Troy, the Lear Corporation in Southfield, the and Visteon Corporation in Van Buren Township. As shown in the exhibit below, the top five states for Motor Vehicle Parts Manufacturing as a percent of US employment are: Michigan (19 percent), Ohio (14 percent), Indiana (11 percent), Tennessee (7 percent), and Kentucky (6 percent).

Top Five Motor Vehicle Parts Manufacturing States by Employment (2007)



Source: US Census Bureau, County Business Patterns

- Since motor vehicle parts are an intermediate input for Motor Vehicle Manufacturing, the demand for parts is driven strongly by the strength of new vehicle sales. The consolidation of Motor Vehicle Manufactures and the demand for more complicated component assemblies has resulted in fewer and larger parts manufacturers. Parts manufactures are also consolidating in order to compete globally.
- The integration of automotive technologies with electronics and communication technologies is expected to continue as computers and wireless communication are further incorporated into vehicles.
- The draft SEMCOG forecast of employment suggests that region's concentration in the Transportation Equipment Manufacturing subsector will decline slightly over the next 30 years.
- The Bureau of Labor Statistics projects that national employment in the subsector will drop by 11.5 percent between 2008 and 2018. The largest declines will be among production workers, particularly assemblers, fabricators, and plastic and metal workers.
- Respondents to the SEMCOG survey listed the following improvements to freight infrastructure as vital to Transportation Equipment Manufacturing: increased rail availability, better roads, and grade separators to accommodate double stack.

2. Machinery Manufacturing

DESCRIPTION

Industries in the Machinery Manufacturing subsector create end products that apply mechanical force to perform work, such as the application of gears and levers. Some important processes for the manufacture of machinery are forging, stamping, bending, forming, and machining to shape individual pieces of metal. Processes, such as welding and assembling are used to join separate parts together. Although these processes are similar to those used in metal fabricating establishments, machinery manufacturing is different because it typically employs multiple metal forming processes to produce in manufacturing the various parts of a machine. Moreover, complex assembly operations are an inherent part of the production process.

The industries included in the Machinery Manufacturing subsector are listed by NAICS code:

3331 Agriculture, Construction, and Mining Machinery Manufacturing
3332 Industrial Machinery Manufacturing
3333 Commercial and Service Industry Machinery Manufacturing
3334 Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing
3335 Metalworking Machinery Manufacturing
3336 Engine, Turbine, and Power Transmission Equipment Manufacturing
3339 Other General Purpose Machinery Manufacturing

IMPORTANCE TO REGION

- According to data reported in the 2009 County Business Patterns, the Machinery Manufacturing subsector has a relatively high location quotient of 1.6. This suggests that that the SEMCOG region is more specialized in this subsector than the nation.
- In the SEMCOG region, the Machinery Manufacturing subsector comprised 14 percent of all manufacturing employment in 2009, or 2 percent of all employment (County Business Patterns).
- The draft SEMCOG forecast of employment suggests that region's concentration in the subsector will grow, resulting in a location quotient of 1.8 in 2040.
- The Machinery Manufacturing sector has a very high economic multiplier. Nearly every industry in the sector has a multiplier between 2.21 and 2.41. This means that producing $1.00 of output in the sector will generate $2.21 to $2.41 of activity in the economy. These multipliers compare very favorably with an average industry multiplier of only about 2.0.
- Even the Metalworking Machinery industry, which has the lowest multiplier in the sector, has an average multiplier of 2.02.
- According to Dunn and Bradstreet, three of the larger Detroit companies in this subsector are Detroit Diesel Corporation (about 3,500 employees), Chrysler (about 1,500 employees at the Mt. Elliot Tool and Die Plant) and Inland Industrial Services Group, LLC (about 200 employees).

ECONOMIC TRENDS

- Since 1999, the SEMCOG region has lost 24,990 jobs in the Machinery Manufacturing industrial subsector. This loss (46 percent) is roughly the same as that in Michigan (40 percent) and nearly twice that of the nation (26 percent) over the same period.
- Of the 15,500 Machinery manufacturing jobs lost in Michigan from 1999 to 2004, 55 percent were in the SEMCOG region. This share increased to 61 percent from 2004 to 2009.
- As a result of these losses, the SEMCOG region's share of the state's employment in the Machinery Manufacturing subsector has dropped from 53 percent in 1999 to 48 percent in 2009.
- Michigan accounted for about 7 percent and 6 percent of the country's Machinery Manufacturing employment in 1999 and 2009, respectively. However, this small decline hides the larger trend that Michigan has accounted for a disproportionate share of the nation's losses (8 percent from 1999 to 2004 accelerating to 29 percent from 2004 to 2009).
- From 1999 to 2009, the average wage increased at a slower rate in the SEMCOG region (6 percent), Extended Economic Region excluding Canada (12 percent), and Michigan (6 percent) compared to the United States (22 percent). However, the average wage in Michigan of $56,937 is still 20 percent higher than the US average.
- The United States has a higher number of employees per establishment than Michigan or the SEMCOG region. From 1999 to 2009, the number of employees per establishment fell by 11 percent in the United States, which is lower than the 23 percent reported by the SEMCOG region and Michigan, and 25 percent reported by the Extended Economic Region.

SEMCOG Region's Machinery Manufacturing Subsector

	1999	2004	2009
SEMCOG Region			
Employment	54,076	37,560	29,086
# of Establishments	1,519	1,268	1,056
Average Wage	$55,307	$59,481	$58,512
Employees per Establishment	36	30	28
SEMCOG Extended Economic Region (excluding Canada)			
Employment	65,551	45,771	34,510
# of Establishments	1,895	1,590	1,330
Average Wage	$50,910	$56,957	$56,937
Employees per Establishment	35	29	26
Canadian Extended Ecconomic Region (Chatham-Kent, Essex, Lambton)			
# of Establishments	n/a	347*	291*
Michigan			
Employment	102,400	76,709	61,220
# of Establishments	2,739	2,411	2,123
Average Wage	$49,589	$53,975	$52,772
Employees per Establishment	37	32	29
United States			
Employment	1,398,226	1,087,944	1,033,961
# of Establishments	30,177	27,037	24,926
Average Wage	$39,961	$46,380	$48,826
Employees per Establishment	46	40	41

* 2005 and 2010 data are reported for Canadian counties
Sources: US Census Bureau, County Business Patterns
Statistics Canada, Canadian Business Patterns

LABOR FORCE SKILLS

- More than 55 percent of the labor force in the Machinery Manufacturing subsector is in production occupations. Many of these workers are metal and plastic workers (28 percent) or assemblers/fabricators (17 percent). Other highly represented occupations include machinists (7 percent) and machine tool cutter setters/operators (6 percent).
- Employment in the Machinery Manufacturing subsector accounts for 10 to 20 percent of total employment in each of these occupations. Nearly 29 percent of tool and die makers are employed in the Machinery Manufacturing sector.
- Management and professional occupations represent 9 percent and 11 percent of the labor force in the sector, respectively. The majority of the professional staff is in architecture or engineering occupations.

- The Bureau of Labor Statistics forecasts that employment in the subsector will decline almost 8 percent by 2018. This drop will be felt mostly among machine tool setters and operators, who will experience about a 19 percent decrease in employment opportunities.
- Two of the respondents to the SEMCOG survey cited skilled labor as an impediment to growth in this subsector.

National Employment in the Machinery Manufacturing Subsector by Occupation
Actual 2008 and Projected 2018

Occupation		2008		Percent Change
		Percent of Industry	Percent of Occupation	
00-0000	Total, All Occupations	100.00	0.79	-7.62
11-1300	**Management, Business, and Financial Occupations**	9.31	0.70	-6.74
15-2900	**Professional and Related Occupations**	10.98	0.42	-5.07
17-0000	Architecture and Engineering Occupations	8.46	3.80	-4.73
29-0000	Other Professional and Related Occupations	2.52	N/A	N/A
43-0000	**Office and Administrative Support Occupations**	10.90	0.54	-10.51
51-0000	**Production Occupations**	55.09	6.48	-7.36
51-2000	Assemblers and Fabricators	17.17	10.43	-7.39
51-4000	Metal Workers and Plastic Workers	27.86	15.30	-7.52
51-4010	Computer control programmers and operators	2.98	22.36	7.28
51-4030	Machine tool cutting setters, operators, and tenders, metal and plastic	5.62	15.00	-18.97
51-4041	Machinists	6.84	19.25	-5.28
51-4070	Molders and molding machine setters, operators, and tenders, metal and plastic	1.05	7.81	-6.28
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	1.14	15.77	-18.75
51-4111	Tool and die makers	2.05	28.84	-2.03
51-4120	Welding, soldering, and brazing workers	6.66	16.94	-6.65
	Other metalworkers and plastic workers	1.31	N/A	N/A
51-9000	Other Production Occupations	10.06	N/A	N/A
	Other Occupations	13.7	N/A	N/A

Source: Bureau of Labor Statistics, Occupational Employment Statistics

OTHER SITE SELECTION CRITERIA

- One of the respondents to the SEMCOG survey located to the SEMCOG region for strategic reasons – easy access to two major highways and close proximity to the Detroit Airport.

SUPPLY CHAIN CHARACTERISTICS

Purchasing Patterns

- The Machinery Manufacturing sector is capital intensive. According to the most recent Transportation Satellite Accounts, the purchase of intermediate inputs (other than transportation) account for 57 to 65 percent of industry costs for most industries in the sector. This compares to an average of about 42 percent across all industries.
- The use of labor is below average. Employee compensation ranges from 18.6 to 26.9 percent of production costs for most industries in the sector. This compares to an average of 30.6 percent of production costs for all industries.

- The big exception to this pattern in the Metal Working Machinery Industry, which has a relatively low use of other intermediate inputs at 49.4 percent, but a high percentage of employee compensation at 39.5 percent.
- Other value-added is below average, ranging from 9.5 percent to 13.9 percent. This compares to an average of 24 percent for all industries.

National Purchasing Patterns in Machinery Manufacturing (1997)

Input to Industry Production	3331 Agriculture, construction, and mining machinery	3332 Industrial machinery	3333 Commercial and service industry machinery	3334 HVAC and commercial refrigeration equipment	3335 Metal-working machinery	3336 Turbine and power transmission equipment	3339 Other general purpose machinery
Use of Transportion							
Truck For-Hire	1.7%	0.6%	0.8%	0.8%	0.8%	1.4%	0.9%
In-House	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Rail For-Hire	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
In-House	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Air For-Hire	0.4%	0.4%	0.4%	0.4%	0.3%	0.5%	0.4%
In-House	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Transit and Ground Transport	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other (incl. water and pipeline)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total Transportation Use	2.7%	1.6%	1.7%	1.8%	1.6%	2.4%	1.8%
Other Intermediate Inputs	65.4%	60.6%	65.1%	65.0%	49.4%	60.0%	57.4%
Employee Compensation	18.6%	25.2%	23.1%	22.1%	39.5%	19.9%	26.9%
Other Value Added	13.4%	12.6%	10.2%	11.1%	9.5%	17.7%	13.9%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Bureau of Transportation Statistics (BTS), Transportation Satellite Accounts

Transportation Usage

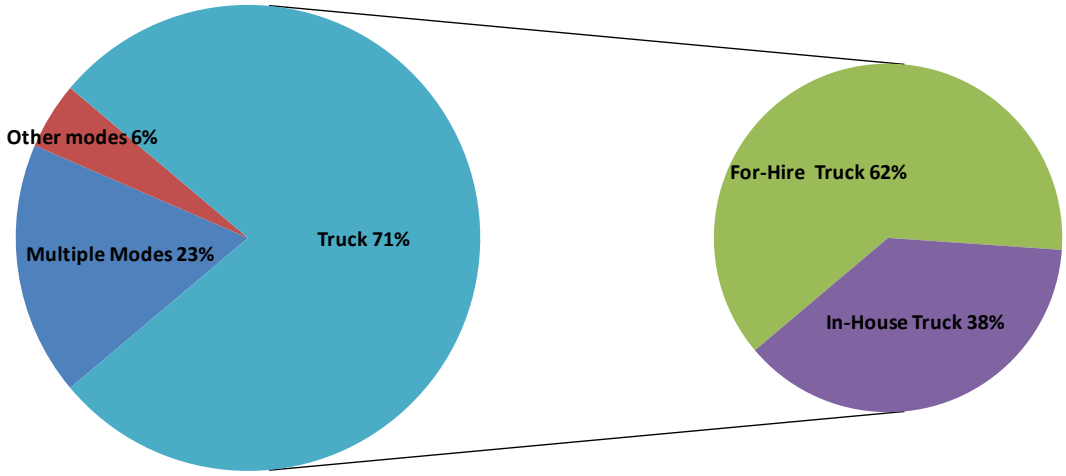
- The Machinery Manufacturing sector is less reliant on transportation than other sectors. Transportation accounts for 1.6 to 2.7 percent of the production costs in the sector compared to an average of about 3.8 percent across all industrial sectors.
- As a percent of production costs, the highest use of transportation occurs in machinery industries that build heavy products, such as agricultural machinery, power transmission equipment, or turbines.
- The sector tends to use truck transportation more than other modes. Trucks account for 1.0 to 2.1 percent of production costs. About two-thirds of these costs are associated with hiring outside trucking services.
- The sector uses air transportation consistent with other industrial sectors (about 0.4 percent of production costs).
- Rail is used slightly less by the Machinery Manufacturing sector than most sectors (0.1 percent of production costs compared to a 0.2 percent average).
- Both rail and air transportation services are purchased rather than conducted in-house.

Characteristics of Shipments

Mode

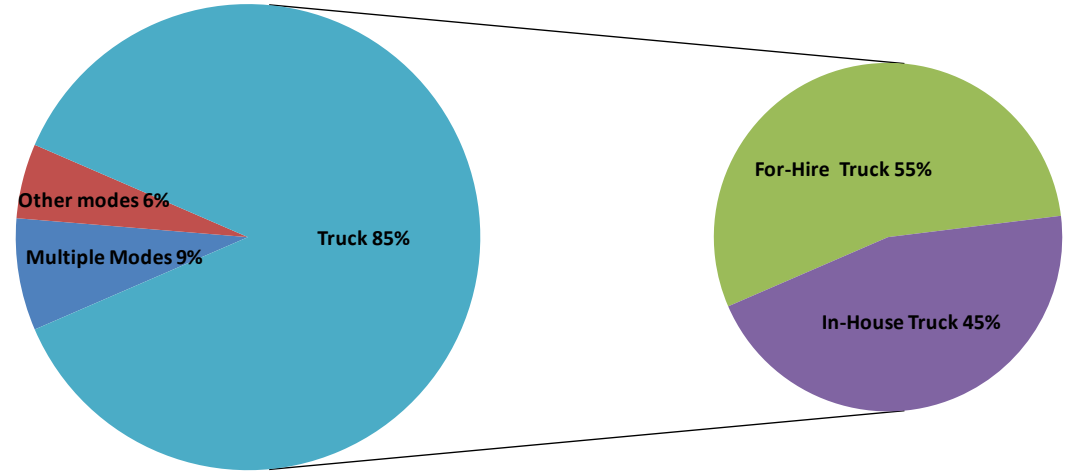
- By value and tonnage, the majority of manufactured machinery goods shipped from the Detroit Combined Statistical Area, which includes Flint and Ann Arbor, is transported by truck (71 and 85 percent, respectively). Of those transported by trucks, more than half is carried by outside trucking companies, while the remaining is shipped using in-house fleets.
- Shipments that utilize multiple modes reported a higher average miles per shipment (625 miles) compared to trucks (287 miles).
- Shipments that are transported by outside trucking companies move over longer distances (555 average miles) than shipments moved by in-house trucking (65 average miles).
- SEMCOG survey respondents that work in Machinery Manufacturing do not have rail access. However, they indicated that better rail would not benefit their businesses.
- Two out of the four respondents in this subsector have access to truck docks. However, only one of the respondents believes better highway access would benefit the business.

Mode of Shipment by Value for the Machinery Manufacturing Subsector
Detroit Combined Statistical Area of Origin (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

Mode of Shipment by Tons for the Machinery Manufacturing Subsector
Detroit Combined Statistical Area of Origin (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

Average Miles per Shipment by Mode
Origin in Detroit Combined Statistical Area (2007)

Mode	Average miles per shipment
Multiple Modes	625
Other modes	147
Truck	287
For-Hire	555
In-House	65

Source: US Census Bureau and BTS, Commodity Flow Survey

Make of Commodities

- Machinery is the most heavily shipped commodity, comprising 52 percent of total value (or 31 percent of total tons) shipped. Miscellaneous manufacture products and articles of base metal account for another 21 percent of the commodities shipped.
- Other commodities shipped by the sector include: chemical products; cutlery and hand tools; other fabricated metal products; computer and peripheral equipment; electronic instruments; motor vehicle bodies, trailers, and parts; aerospace products and parts; and scrap, used and secondhand goods.

Machinery Manufacturing Shipment Characteristics by Commodity
Origin in Detroit Combined Statistical Area (2007)

SCTG	Commodity Description	Value		Tons		Ton-miles		Average miles per shipment
		2007 (million $)	Percent of total	2007 (thousands)	Percent of total	2007 (millions)	Percent of total	
	All Commodities	8,989	100%	970	100%	452	100%	507
33	Articles of base metal	718	8%	56	6%	21	5%	620
34	Machinery	4,642	52%	305	31%	283	63%	425
40	Miscellaneous manufactured products	1,171	13%	59	6%	S	S	578
	Other	3,629	40%	609	63%	148*	33%	

S = high sampling varaibility or poor response quality

*Includes SCTG 40

Source: US Census Bureau and BTS, Commodity Flow Survey

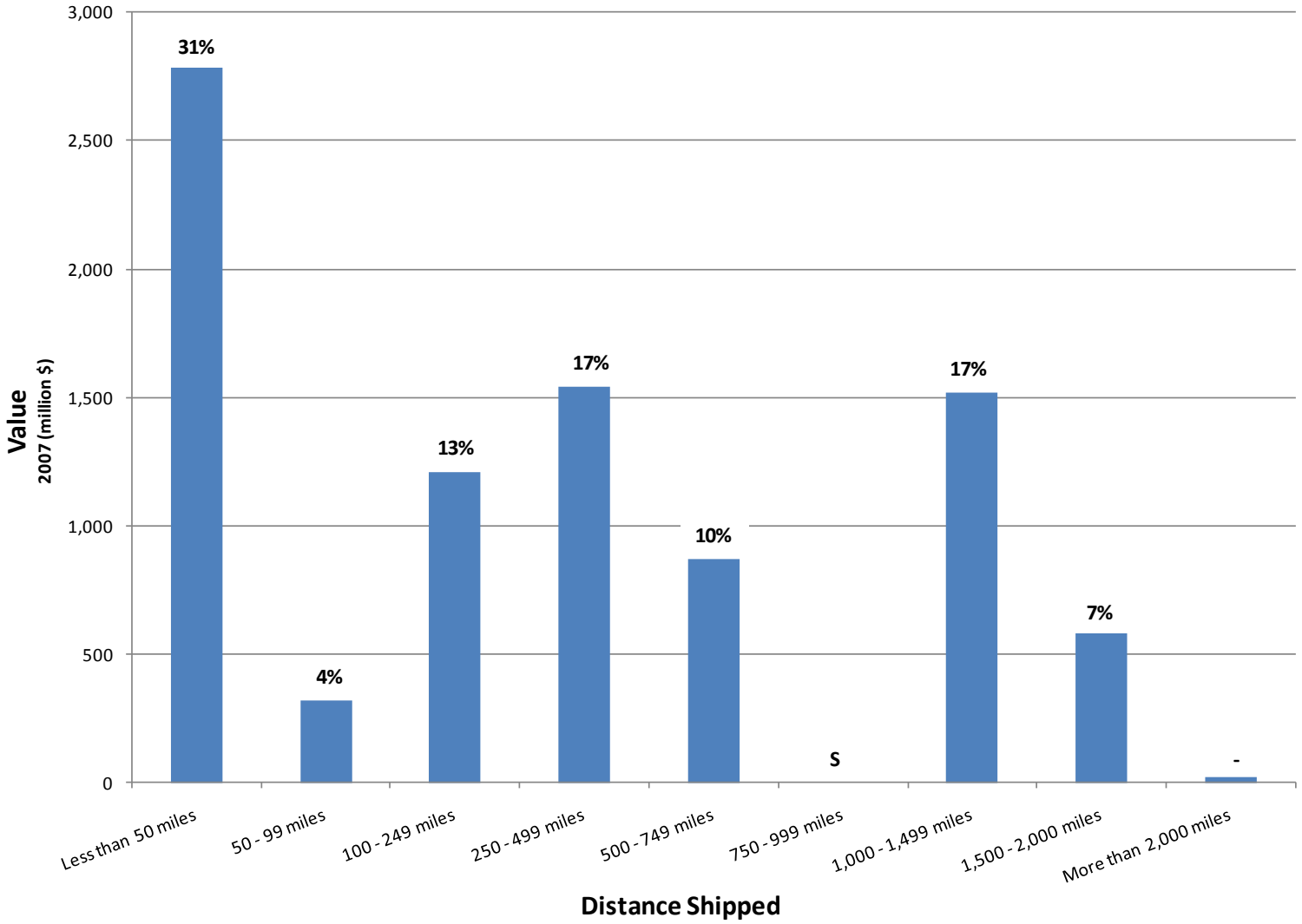
Distance

- By value, 31 percent of manufactured machinery goods are shipped fewer than 50 miles from the Detroit Combined Statistical Area.
- Per ton-mile, 36 percent of manufactured machinery goods are shipped between 1,000 -1,499 miles.

Weight

- Sixty-six (66) percent of total shipped weight of the Machinery Manufacturing subsector is for shipments weighing between 10,000 and 49,999 pounds.

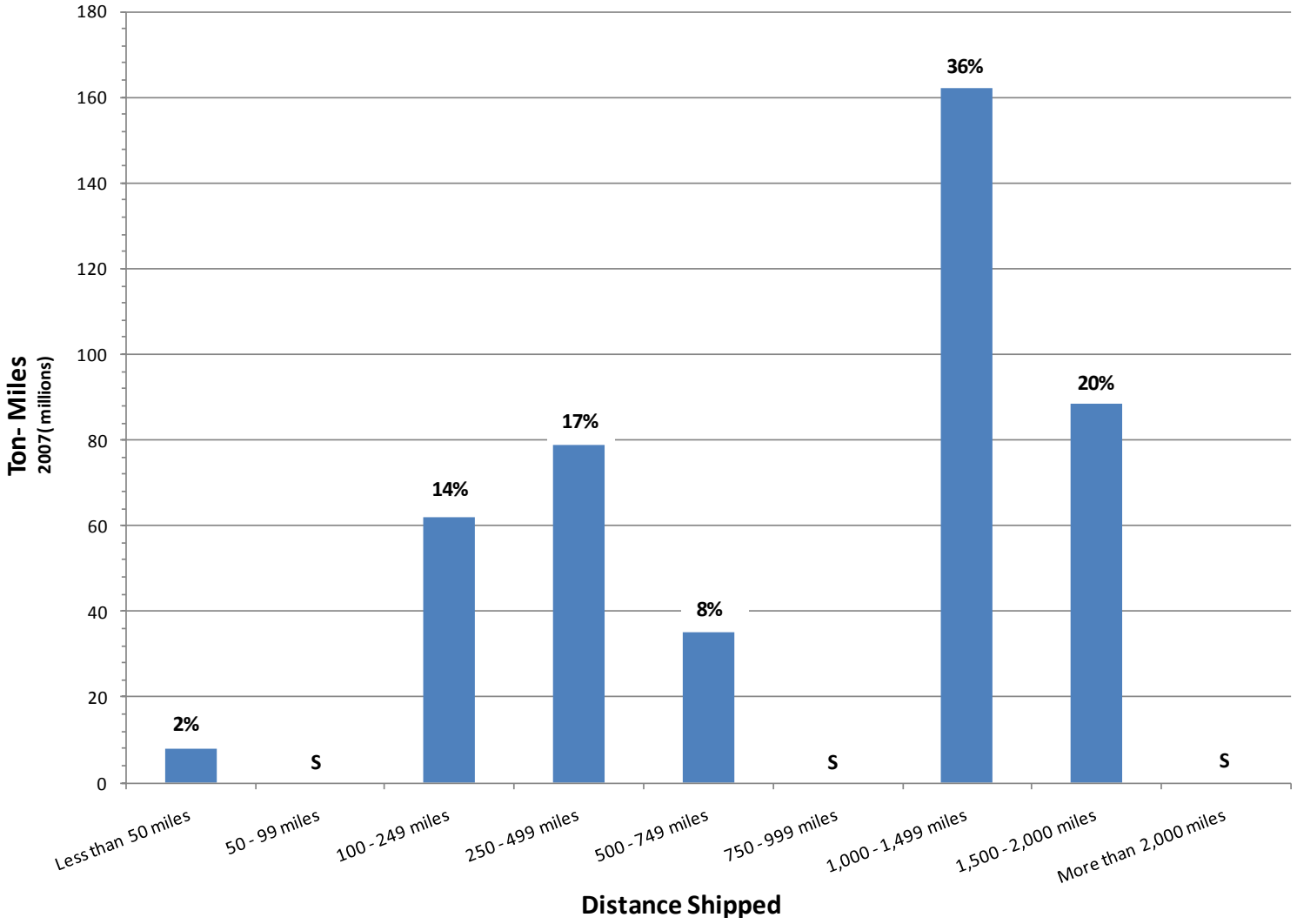
Distance Shipped by Value for the Machinery Manufacturing Subsector
Origin in Detroit Combined Statistical Area (2007)



S = high sampling variability or poor response quality

Source: US Census Bureau and BTS, Commodity Flow Survey

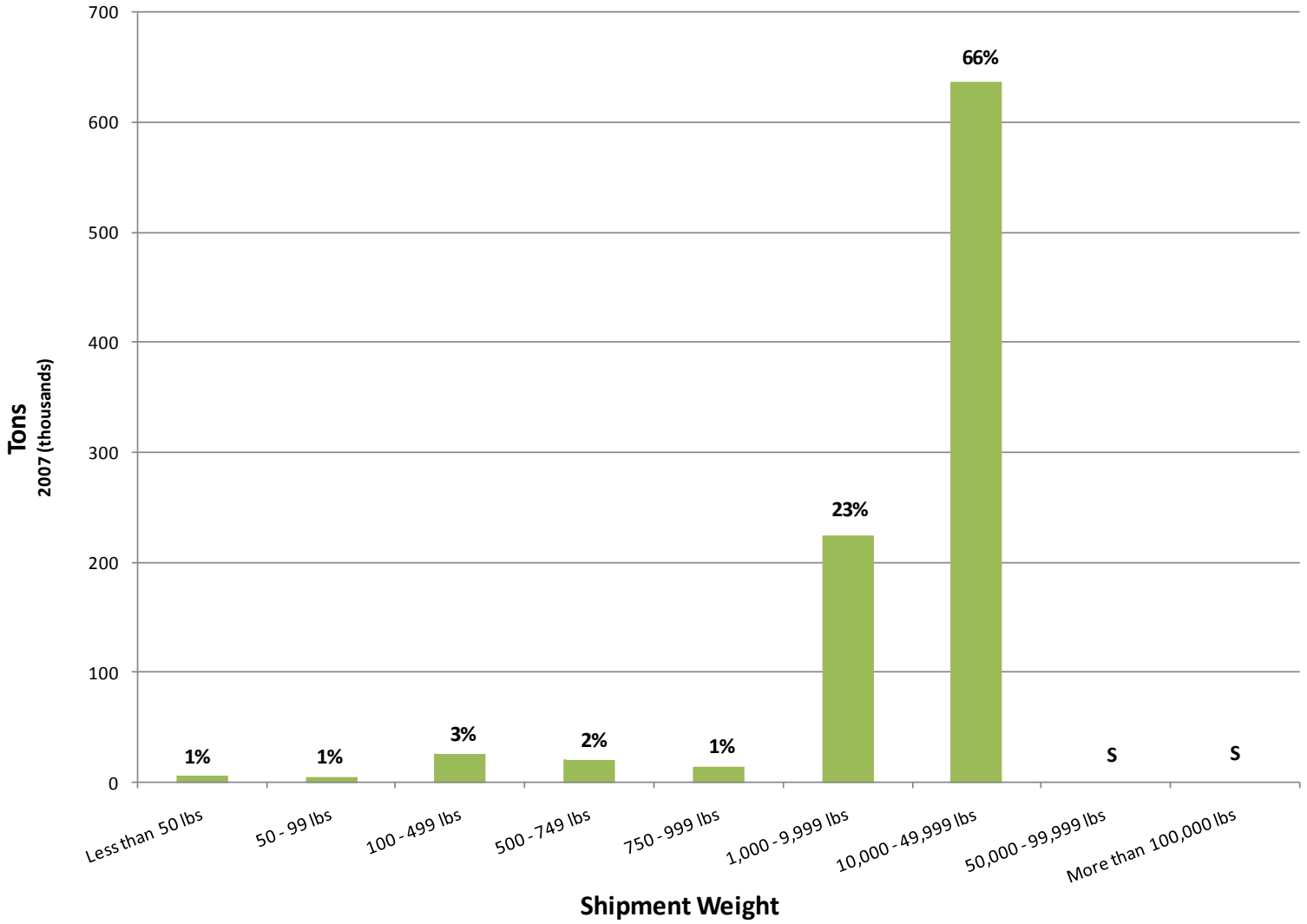
Distance Shipped by Ton-Miles for the Machinery Manufacturing Subsector Origin in Detroit Combined Statistical Area (2007)



S = high sampling variability or poor response quality

Source: US Census Bureau and BTS, Commodity Flow Survey

Shipment Weight by Tons for the Machinery Manufacturing Subsector Origin in Detroit Combined Statistical Area (2007)



S = high sampling variability or poor response quality

Source: US Census Bureau and BTS, Commodity Flow Survey

INDUSTRY OUTLOOK

- The Machinery Manufacturing subsector is comprised of several concentrated industries, such as Industrial Machinery Manufacturing, Metal Working Machinery Manufacturing, as well as Engine, Turbine, and Power Transmission Equipment Manufacturing.
- Like many other manufacturing subsectors, the products of Machinery Manufacturing are used as intermediate inputs by other industries. As a result, the health of the subsector depends on other industries, such as agriculture, construction, motor vehicle manufacturing, and power generation.
- The demand for machinery can rise and drop rapidly with the business cycles. Recent increases in fuel prices have created a demand for more fuel-efficient machinery.
- The draft SEMCOG forecast of employment suggests that region's concentration in the Machinery Manufacturing subsector will grow over the next 30 years.
- Employment in the subsector is concentrated in production occupations. The Bureau of Labor Statistics forecasts that national employment in metal and plastic worker occupations will decline by 8 percent between 2008 and 2018. The largest decline in employment opportunities will be among machine tool cutting setters and operators.
- Respondents to the SEMCOG survey listed the following improvements to freight infrastructure as vital to the industry: improved border crossing and highway improvements.

3. Plastics and Rubber Products Manufacturing

DESCRIPTION

Industries in the Plastics and Rubber Products Manufacturing subsector make goods by processing plastics and raw rubber. The US Census combines plastics and rubber in the same subsector because plastics are increasingly being used as a substitute for rubber. However, the subsector is generally restricted to the production of products made of just one material, either solely plastics or rubber.

The two industries that are included under the Plastics and Rubber Products Manufacturing subsector are listed by NAICS code:
3261 Plastics Product Manufacturing
3262 Rubber Product Manufacturing

IMPORTANCE TO REGION

- The Plastics and Rubber Products Manufacturing subsector has a relatively high location quotient of 1.4 according to County Business Patterns. This suggests that the SEMCOG region is more specialized in this subsector than the nation.
- In the SEMCOG region, this subsector comprised 6 percent of all manufacturing jobs in 2009, or less than one percent of all jobs.
- Employers in the subsector tend to be small. For example, according to Dunn and Bradstreet, there are 39 companies engaged in Plastics and Rubber Products Manufacturing in the City of Detroit. Of these, only three (Vitec, LLC with about 290 employees, Recycled Polymeric Materials, Inc. with about 60 employees, and Ideal Shield, LLC with about 30 employees) employ 30 people or more.
- The draft SEMCOG forecast of employment suggests that region's concentration in the subsector will diminish slightly to a location quotient of 1.1 by 2040 as SEMCOG's economy diversifies. However, the SEMCOG region will still have a slightly higher concentration in the Plastics and Rubber Products Manufacturing subsector than the national average.
- The production of plastics and rubber products has a fairly high economic multiplier of 2.39. This means that producing $1.00 of output in the sector will generate $2.39 of activity in the economy. An average industry has a multiplier of only about 2.0.

ECONOMIC TRENDS

- In 2009, the SEMCOG region had 35 percent of the state's employment in the Plastics and Rubber Manufacturing industrial subsector. This is down from a 40 percent share of the state's employment in 1999.
- The SEMCOG region has lost a disproportionate share of plastics and rubber manufacturing jobs, particularly during the first five years of the last decade. Of the 12,500 plastics and rubber manufacturing jobs lost in Michigan from 1999 to 2004, 62 percent were in the SEMCOG region. From 2004 to 2009, the losses in the SEMCOG region were proportionate to state losses, but only because the state experienced a significant job loss of over 20,200 jobs in the subsector.
- Michigan is losing its share of this industry nationally. Michigan had 7 percent of the country's plastics and rubber manufacturing employment in 1999, 6 percent in 2004, and 5 percent in 2009. From 1999 to 2009, Michigan accounted for 9 percent of all the Plastics and Rubber Manufacturing jobs lost in the country.
- From 2004 to 2009, employment in the Extended Economic Region (excluding Canada) experienced a 45-percent decline, which is greater than the decline experienced by the SEMCOG region (35 percent), Michigan (35 percent), and the country (34 percent).
- Average wages have been increasing in this subsector. From 1999 to 2009, the Extended Economic Region reported a wage increase of 33 percent (or $10,464), compared to the country at 25 percent, the SEMCOG Region at 23 percent, and Michigan at 14 percent.
- As of 2009, the Extended Economic Region had a higher average wage ($42,313) than the US ($39,925), while it roughly equaled the national average in 1999. This suggests that much of the job loss over the last decade included lower-paid workers.
- From 1999 to 2009, the average number of employees per establishment declined as larger manufacturers closed. The Extended Economic Region experienced the greatest decline (29) compared to: Michigan (20), SEMCOG (16), or the rest of the country (11).

SEMCOG Region's Plastics and Rubber Manufacturing Subsector

	1999	2004	2009
SEMCOG Region			
Employment	27,802	20,069	13,011
# of Establishments	417	326	257
Average Wage	$31,459	$35,943	$38,541
Employees per Establishment	67	62	51
SEMCOG Extended Economic Region (excluding Canada)			
Employment	45,807	33,750	18,502
# of Establishments	610	499	398
Average Wage	$31,849	$36,449	$42,313
Employees per Establishment	75	68	46
Canadian Extended Ecconomic Region (Chatham-Kent, Essex, Lambton)			
# of Establishments	n/a	115*	84*
Michigan			
Employment	69,941	57,372	37,156
# of Establishments	922	796	664
Average Wage	$31,821	$35,393	$36,268
Employees per Establishment	76	72	56
United States			
Employment	1,046,935	908,100	693,481
# of Establishments	16,646	14,886	13,351
Average Wage	$31,855	$36,515	$39,925
Employees per Establishment	63	61	52

* 2005 and 2010 data are reported for Canadian counties
Sources: US Census Bureau, County Business Patterns
Statistics Canada, Canadian Business Patterns

LABOR FORCE SKILLS

- Nationally, over 60 percent of the employment in the Plastics and Rubber Manufacturing subsector is in production-related occupations. The largest portion (24 percent) is concentrated in metal and plastic workers.
- About 11 percent of workers nationally are in transportation and material-moving occupations.
- The Bureau of Labor Statistics forecasts that employment in Plastics and Rubber Products Manufacturing will decline almost 8 percent by 2018. The largest decrease (14 percent) will occur in transportation and material moving occupations. The next largest decrease (close to 11 percent) will be in management occupations.

National Employment in the Plastics and Rubber Manufacturing Subsector by Occupation
Actual 2008 and Projected 2018

Occupation		2008		Percent Change
		Percent of Industry	Percent of Occupation	
00-0000	Total - All Occupations	100.00	0.49	-7.67
11-1300	**Management, Business, and Financial Occupations**	6.00	0.28	-7.88
51-0000	**Production Occupations**	61.48	4.48	-6.64
51-1000	Supervisors, Production Workers	4.51	4.86	-7.08
51-2000	Assemblers and fabricators	8.89	3.34	-5.93
51-4000	Metal workers and plastic workers	23.74	8.08	-7.78
51-9000	Other production occupations	24.34	N/A	N/A
53-0000	**Transportation and Material Moving Occupations**	11.35	0.85	-13.89
	Other Occupations	21.2	N/A	N/A

Source: Bureau of Labor Statistics, Occupational Employment Statistics

OTHER SITE SELECTION CRITERIA

- Respondents to the SEMCOG survey indicated that they have located in the SEMCOG region for strategic reasons. Issues cited include close proximity to clients and population centers as well as pursuing business opportunities.

SUPPLY CHAIN CHARACTERISTICS

Purchasing Patterns

- The Plastics and Rubber Products Manufacturing sector is capital intensive. According to the most recent Transportation Satellite Accounts, the purchase of intermediate inputs (other than transportation) account for more than 57 percent of industry costs. This compares to an average of about 42 percent across all industries.
- The use of labor is below average. While employee compensation accounts for about 31 percent of production costs for the average industry, it accounts for about 23 percent in the Plastics and Rubber Products Manufacturing sector.
- Other value-added is below average at 14 percent (compared to 24 percent for all industries).

National Purchasing Patterns in Plastics and Rubber Products Manufacturing (1997)

	3260
Input to Industry Production	**Plastics and Rubber Products**
Use of Transportion	
Truck For-Hire	2.8%
In-House	0.6%
Rail For-Hire	0.5%
In-House	0.0%
Air For-Hire	0.3%
In-House	0.5%
Transit and Ground Transport	0.0%
Other (incl. water and pipeline)	0.1%
Total Transportation Use	4.9%
Other Intermediate Inputs	57.5%
Employee Compensation	23.4%
Other Value Added	14.2%
TOTAL	100.0%

Source: Bureau of Transportation Statistics (BTS), Transportation Satellite Accounts

Transportation Usage

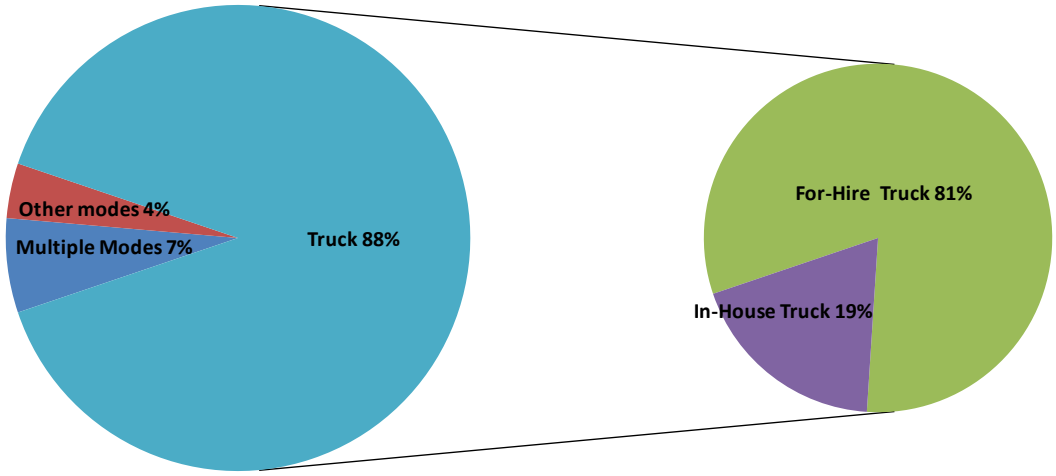
- Transportation accounts for about 4.8 percent of the production costs in the Plastics and Rubber Products subsector compared to an average of about 3.8 percent across all industrial sectors.
- The subsector relies on truck transportation. Trucks account for 3.4 percent of production costs. More than 80 percent of these costs are due to the hiring of outside trucking services.
- The use of in-house fleets is less prevalent in the Plastics and Rubber Products sector. Only about 0.6 percent of production costs (or about 20 percent of the truck production costs) are due to the use of in-house trucking.
- Rail and air transportation are also used to ship plastics and rubber products. About 0.5 percent of costs are for rail transport. Air transportation accounts for 0.8 percent of production costs, with over half of the air transport being conducted in-house.

Characteristics of Shipments

- By value, the majority of manufactured plastics and rubber products shipped from the Detroit Combined Statistical Area, which includes Flint and Ann Arbor, are transported by truck (88 percent). Of those transported by trucks, more than 80 percent is carried by outside trucking companies, while the remaining is done in-house.
- Similar statistics by weight are not available from the Commodity Flow Survey due to confidentiality restrictions.
- Shipments that utilize multiple modes reported a higher average miles per shipment (896 miles) compared to trucks (505 miles).
- Shipments that are transported by outside trucking companies move further distances (626 average miles) than shipments moved by in-house trucks (107 average miles).

- Two of the respondents to the SEMCOG survey that operate in this subsector indicated that they do not utilize rail service and would not benefit from improved rail service.

Mode of Shipment by Value for the Plastics and Rubber Products Manufacturing Subsector
Detroit Combined Statistical Area of Origin (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

Average Miles per Shipment by Mode
Origin in Detroit Combined Statistical Area (2007)

Mode	Average miles per shipment
Multiple Modes	896
Truck	505
For-Hire	626
In-House	107

Source: US Census Bureau and BTS, Commodity Flow Survey

Make of Commodities

- By value, about 60 percent of the commodities shipped by the Plastics and Rubber Products Manufacturing sector are plastics or rubber, but motorized vehicle parts make up another 29 percent.
- The remaining commodities shipped by the sector include: converted paper products; resins, rubber, and artificial fibers; metalworking machinery; miscellaneous manufactured products.

Plastics and Rubber Products Manufacturing Shipment Characteristics by Commodity Origin in Detroit Combined Statistical Area (2007)

SCTG	Commodity Description	Value		Tons		Ton-miles		Average miles per shipment
		2007 (million $)	Percent of total	2007 (thousands)	Percent of total	2007 (millions)	Percent of total	
	All Commodities	3,769	100%	S	S	S	S	702
24	Plastics and rubber	2,268	60%	S	S	S	S	769
36	Motorized and other vehicles (including parts)	1090	29%	443	21%	189	15%	455
40	Miscellaneous manufactured products	210	6%	S	S	4	0%	S
	Other	201	5%	S	79%	S	85%	

S = high sampling varaibility or poor response quality

Source: US Census Bureau and BTS, Commodity Flow Survey

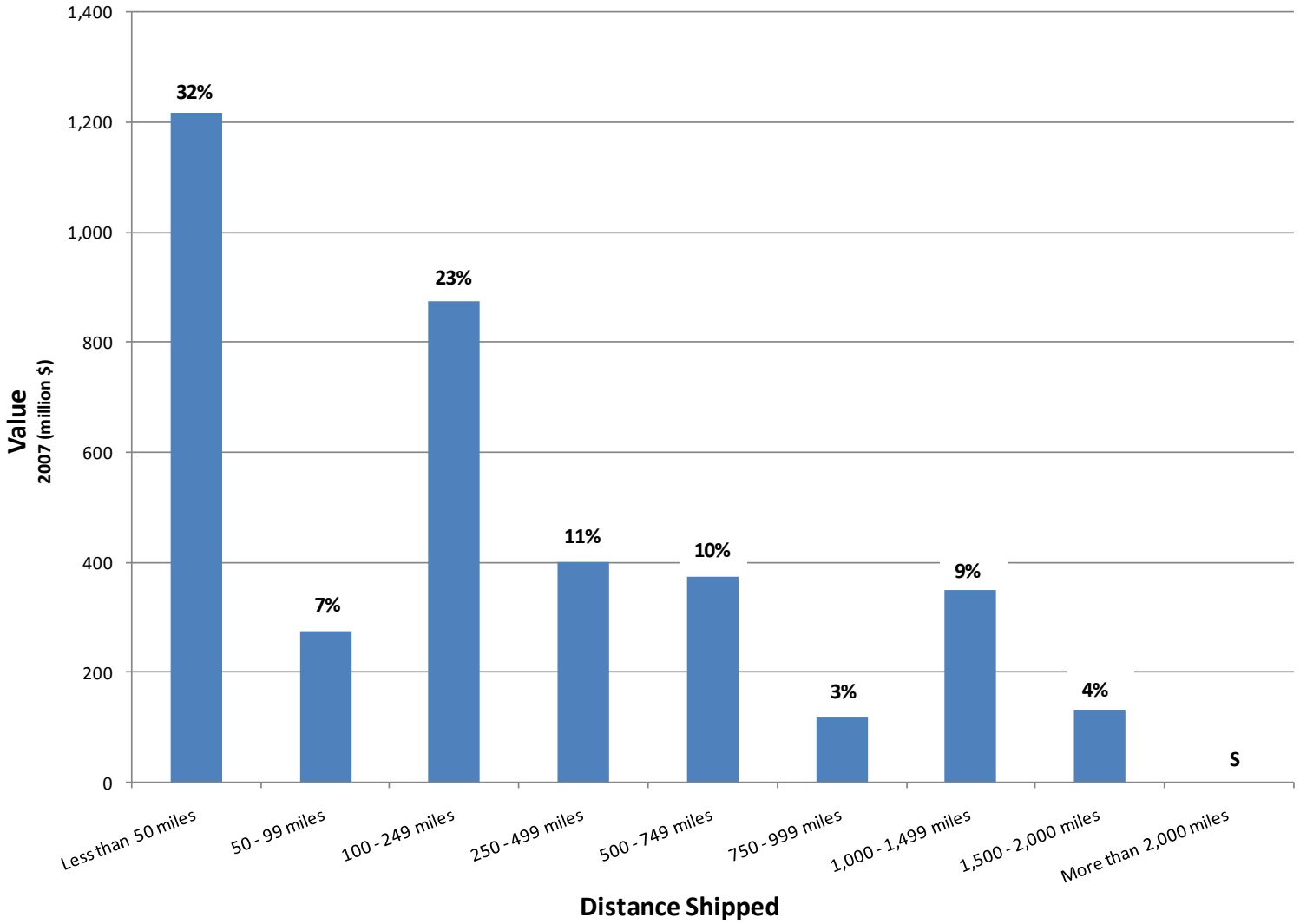
Distance

- By value, 32 percent of plastics and rubber products are shipped less than 50 miles from the Detroit Combined Statistical Area.
- Over 60 percent of plastics and rubber products are shipped less than 249 miles.
- A logistics provider that carries plastics and rubber products indicated in the SEMCOG survey that travel averages 2,000 miles daily or 560,000 miles annually.

Weight

- By value, 45 percent of total shipped weight is for shipments weighing between 1,000 and 9,999 pounds. An additional 35 percent of total shipment weight is based on shipments that are between 10,000 and 49,999 pounds.

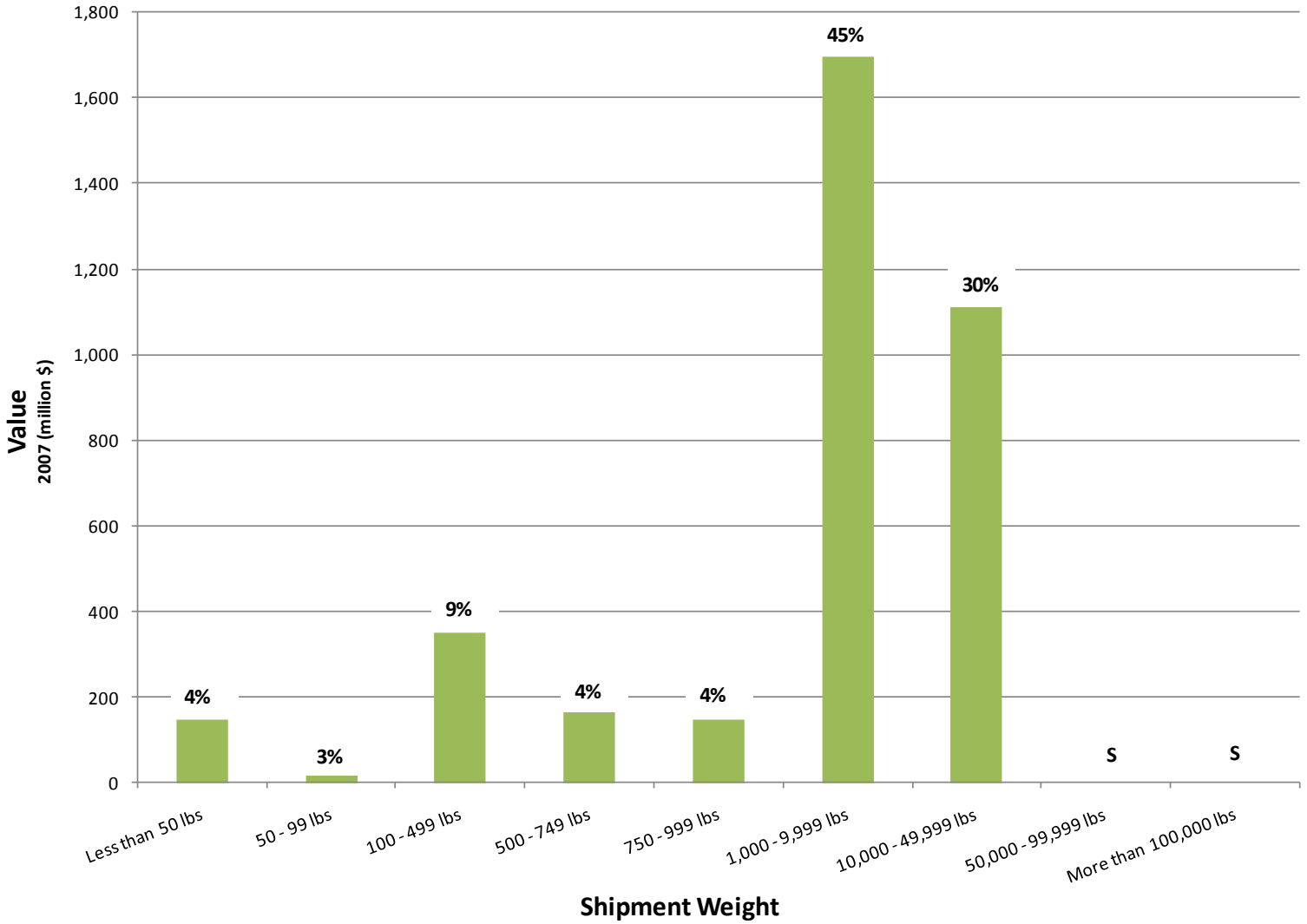
Distance Shipped by Value for the Plastics and Rubber Products Manufacturing Subsector Origin in Detroit Combined Statistical Area (2007)



S = high sampling variability or poor response quality

Source: US Census Bureau and BTS, Commodity Flow Survey

Shipment Weight by Value for the Plastics and Rubber Products Manufacturing Subsector Origin in Detroit Combined Statistical Area (2007)



S = high sampling variability or poor response quality

Source: US Census Bureau and BTS, Commodity Flow Survey

INDUSTRY OUTLOOK

- Since the products of the Plastics and Rubber Products Manufacturing subsector tend to have very specialized applications, many firms focus on niche products. While large companies have economies of scale in purchasing intermediate commodities, small companies compete through specialization, resulting in a fragmented subsector.
- The products of the subsector are used as intermediate inputs to other industries. As a result, production levels and the health of the subsector are tied closely to the national economy and the industries the subsector supplies.
- In recent years, motor vehicle and parts manufacturers as well as aerospace product and parts manufactures have replaced aluminum and other metal components with low-weight plastics. This demand will continue as long as the industry innovates with high-performance materials that can withstand high temperatures.
- The draft SEMCOG forecast of employment suggests that region's concentration in the subsector will diminish slightly as SEMCOG's economy diversifies over the next 30 years.
- However, one of the respondents to the SEMCOG survey projects 50-percent growth in the Plastics and Rubber Products Manufacturing subsector in the next five to 20 years.

4. Fabricated Metal Manufacturing

DESCRIPTION

Industries in the Fabricated Metal Product Manufacturing subsector transform metal into various intermediate or end products. They may also treat metals and metal-formed products fabricated elsewhere. Important fabricated metal processes are forging, stamping, bending, forming, machining, welding and assembling. Establishments in this subsector may use one of these processes or a combination of these processes. Since

The industries that comprise the Fabricated Metal Manufacturing sector are listed below by NAICS code:

3321 Forging and Stamping
3322 Cutlery and Handtool Manufacturing
3323 Architectural and Structural Metals Manufacturing
3324 Boiler, Tank, and Shipping Container Manufacturing
3325 Hardware Manufacturing
3326 Spring and Wire Product Manufacturing
3327 Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing
3328 Coating, Engraving, Heat Treating, and Allied Activities
3329 Other Fabricated Metal Product Manufacturing

IMPORTANCE TO REGION

- According to data reported in the 2009 County Business Patterns, the Fabricated Metal Manufacturing subsector has a relatively high location quotient of 1.2 in the SEMCOG region. This suggests that the SEMCOG region is slightly more specialized in this subsector than the nation.
- In 2009, the Fabricated Metal Manufacturing subsector comprised 14 percent of all manufacturing jobs, or 2 percent of all jobs, in the SE MCOG region.
- The draft SEMCOG forecast of future employment suggests that the region's concentration in this subsector will remain steady with a location quotient of about 1.2 in 2040.
- Almost every industry in the Fabricated Metal Product Manufacturing sector has a multiplier above 2.0 (the average across all industries). This means that producing one dollar of output in the subsector will generate over two dollars of activity in the economy.
- The production of boilers, tanks, and shipping containers has the highest multiplier at 2.6. While expenditures cannot be guaranteed to be contained in the SEMCOG region, this is a high multiplier.
- Most other industries in the subsector have multipliers between 2.0 and 2.3.
- According to Dunn and Bradstreet, three of the larger Detroit companies in this subsector are American Axle & Manufacturing, Inc (about 325 employees), Metal and Welding Industries, Inc. (about 300 employees), and W Industries, Inc (about 275 employees).

ECONOMIC TRENDS

- From 1999 to 2004, the SEMCOG region accounted for roughly 50 percent of the Michigan's employment in the Fabricated Metal Manufacturing industrial subsector.
- Since 2004, the region has lost a disproportionate share of the state's employment. Of the 22,107 Fabricated Metal Manufacturing jobs lost in Michigan between 2004 and 2009, 66 percent were in the SEMCOG region. An even greater number of jobs were lost in the Extended Economic Region (excluding Canada).
- As a result of these loses, the SEMCOG region's share of Fabricated Metal Manufacturing employment declined to 44 percent in 2009. The Extended Economic Region's share declined to 65 percent.
- While employment in Fabricated Metal Manufacturing has been declining nationally (20 percent from 1999 to 2009), the loss in the SEMCOG region has caused employment to decline almost twice as fast as the nation. While Michigan comprised 6 percent of the country's Fabricated Metal Manufacturing employment in 1999, this share declined to 5 percent in 2009. From 2004 to 2009, Michigan accounted for 20 percent of all the Fabricated Metal Manufacturing jobs lost in the country.
- From 1999 to 2009, the average wage has increased in the subsector, but the increases have been higher nationally than in Michigan or the SEMCOG region. The United States reported an average wage increase of 24 percent, compared to the Michigan at 9 percent and the SEMCOG Region at 4 percent. Note that wages in the Extended Economic Region, which includes areas outside Michigan, has grown at a faster rate (16 percent).
- Despite the slower increase, average wages in the SEMCOG region are comparable to the US national average. This is due to the region having much higher wages than the national average in 1999.

SEMCOG Region's Fabricated Metal Manufacturing Subsector

	1999	2004	2009
SEMCOG Region			
Employment	50,958	42,903	28,290
# of Establishments	1,999	1,741	1,515
Average Wage	$40,681	$43,317	$42,315
Employees per Establishment	25	25	19
SEMCOG Extended Economic Region (excluding Canada)			
Employment	72,769	59,854	41,215
# of Establishments	2,681	2,302	1,969
Average Wage	$36,905	$42,670	$42,735
Employees per Establishment	27	26	21
Canadian Extended Ecconomic Region (Chatham-Kent, Essex, Lambton)			
# of Establishments	n/a	366*	298*
Michigan			
Employment	104,119	85,826	63,719
# of Establishments	3,725	3,359	3,075
Average Wage	$37,071	$40,145	$40,557
Employees per Establishment	28	26	21
United States			
Employment	1,788,484	1,514,595	1,401,482
# of Establishments	62,242	59,373	57,762
Average Wage	$34,445	$38,677	$42,558
Employees per Establishment	29	26	24

* 2005 and 2010 data are reported for Canadian counties
Sources: US Census Bureau, County Business Patterns
Statistics Canada, Canadian Business Patterns

LABOR FORCE SKILLS

- Close to 62 percent of the employment in Fabricated Metal Product Manufacturing is concentrated in production-related occupations with metal and plastic skills. In addition, nearly 27 percent of all metal and plastic workers are employed in Fabricated Metal Product Manufacturing.
- From 2008 to 2018, the Bureau of Labor Statistics projects a total decline of 8.5 percent in the work force in this subsector. The largest decline, in percentage terms, will be among top executives (a decrease of about 17 percent).
- Employment among metal and plastic workers is expected to decline by close to 11 percent by 2018.

National Employment in the Fabricated Metal Manufacturing Subsector by Occupation
Actual 2008 and Projected 2018

Occupation		2008		Percent Change
		Percent of Industry	Percent of Occupation	
	Total, All Occupations	100.00	1.01	-8.45
11-1300	**Management, Business, and Financial Occupations**	7.56	0.73	-7.40
11-0000	Management occupations	4.87	0.84	-11.90
11-1000	Top executives	2.29	1.59	-17.12
11-9000	Other management occupations	2.58	N/A	N/A
13-0000	Business and financial operations occupations	2.69	0.60	0.76
15-2900	**Professional and Related Occupations**	4.50	0.22	-5.71
43-0000	**Office and Administrative Support Occupations**	10.33	0.65	-10.61
51-0000	**Production Occupations**	61.91	9.38	-8.57
51-1000	Supervisors, production workers	4.33	9.72	-7.26
51-2000	Assemblers and fabricators	10.02	7.85	-2.75
51-4000	Metal workers and plastic workers	37.71	26.70	-10.80
51-9000	Other production occupations	9.8	N/A	N/A
	Other Occupations	15.7	N/A	N/A

Source: Bureau of Labor Statistics, Occupational Employment Statistics

OTHER SITE SELECTION CRITERIA

- One of the respondents to the SEMCOG survey indicated the decision to locate in the SEMOG region was dictated by proximity to customers and service centers.

SUPPLY CHAIN CHARACTERISTICS

Purchasing Patterns

- The Fabricated Metal Product Manufacturing sector is capital intensive. According to the most recent Transportation Satellite Accounts, the purchase of intermediate inputs (other than transportation) account for 44 to 66 percent of industry costs. This compares to an average of about 42 percent across all industries. Manufacturing boilers, tanks, and shipping containers is the most capital intensive, with intermediate purchases of 66 percent.
- The use of labor is slightly below average for this subsector. While employee compensation accounts for about 31 percent of production costs for the average industry, it accounts for between 20 and 34 percent for fabricated metal products. In percentage terms, employee compensation is below average because the sector is so capital intensive. Employee compensation for most industries in the sector makes up about 26 to 28 percent of total costs.
- Other value-added is below average at 11 to 23 percent (compared to 24 percent for all industries). The production of cutlery and handtools produces the most other value-added at 23 percent.

National Purchasing Patterns in Fabricated Metal Product Manufacturing (1997)

Input to Industry Production	3321 Forgings and stampings	3322 Cutlery and handtools	3323 Architectural and structural metal products	3324 Boilers, tanks, and shipping containers	332A Ordnance and accessories	332B Other fabricated metal products
Use of Transportion						
Truck For-Hire	1.5%	1.4%	1.4%	1.4%	2.3%	0.8%
In-House	0.8%	0.8%	0.8%	0.8%	0.7%	0.8%
Rail For-Hire	0.3%	0.2%	0.2%	0.2%	0.1%	0.1%
In-House	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Air For-Hire	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
In-House	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Transit and Ground Transport	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other (incl. water and pipeline)	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%
Total Transportation Use	2.9%	2.9%	2.8%	2.8%	3.4%	2.3%
Other Intermediate Inputs	54.6%	46.9%	53.1%	65.6%	43.8%	48.6%
Employee Compensation	27.9%	27.6%	26.7%	20.2%	33.5%	31.4%
Other Value Added	14.6%	22.5%	17.3%	11.3%	19.3%	17.6%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Bureau of Transportation Statistics (BTS), Transportation Satellite Accounts

Transportation Usage

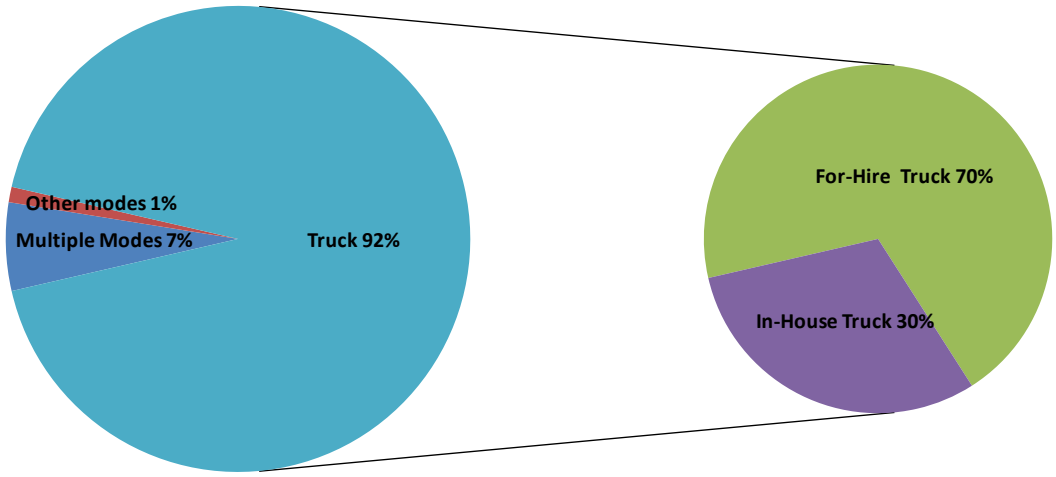
- The Fabricated Metal Product Manufacturing sector is less dependent on transportation services than other manufacturing sectors. Transportation accounts for 2.8 to 2.9 percent of the production costs in most industries in the sector compared to an average of about 3.8 percent across all industrial sectors. Ordnance and Accessories is the most dependent on transportation (3.4 percent of costs), while Other Fabricated Metal Products is the least dependent (2.3 percent of costs).
- The industries in this sector tend to rely on truck transportation. Trucks account for about 2.2 to 2.3 percent of production costs. About two-thirds of these costs are due to hiring outside trucking services, while about one-third of truck costs are absorbed in-house. The Ordnance and Accessories and Other Fabricated Metal Products industries are outliers in terms of truck usage.
- Rail and air transportation are also used to ship fabricated metal manufacturing. However, only about 0.2 percent of costs are for rail transport and 0.3 percent of costs are for air transport.
- One of the respondents to the SEMCOG survey cited reliable transportation, particularly strong rail service and truck carriers, as a factor that determines the competitiveness of businesses. Another respondent cited transportation cost as an impediment to growth.

Characteristics of Shipments

Mode

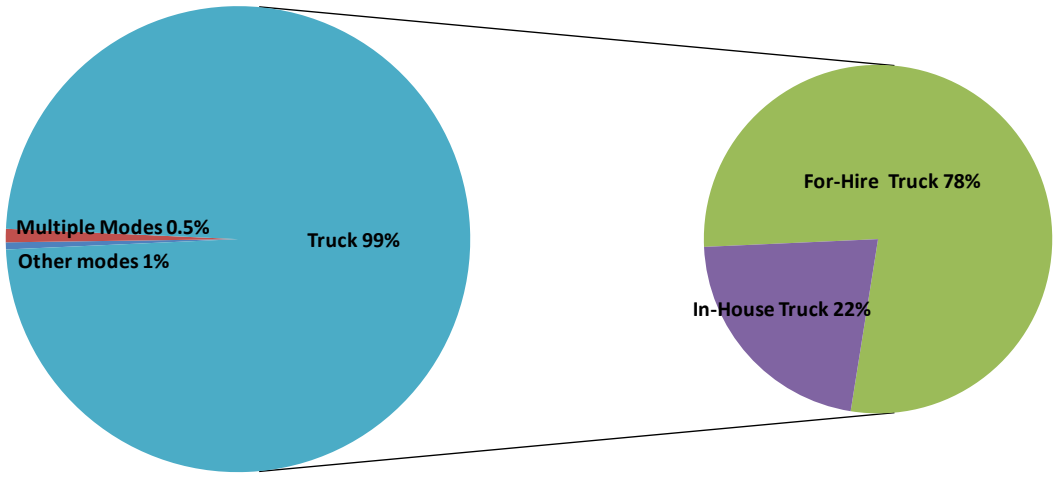
- By value and tonnage, the vast majority of manufactured fabricated metals shipped from the Detroit Combined Statistical Area, which includes Flint and Ann Arbor, are transported by truck (92 and 99 percent, respectively). Of those transported by trucks, over 70 percent is carried by outside trucking companies while the other half is carried by in-house fleets.
- Shipments that are transported by multiple modes move longer distances (607 average miles) compared to shipments transported by truck only (193 miles).
- All of the respondents to the SEMCOG survey that work in the Fabricated Metal Manufacturing subsector have access to truck docks. However, only half have access to rail. Three of four respondents believe that better rail would benefit their businesses, whereas only one of four respondents believes that better highway access would improve their businesses.

Mode of Shipment by Value for the Fabricated Metal Manufacturing Subsector
Detroit Combined Statistical Area of Origin (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

Mode of Shipment by Tons for the Fabricated Metal Manufacturing Subsector
Detroit Combined Statistical Area of Origin (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

Average Miles per Shipment by Mode
Origin in Detroit Combined Statistical Area (2007)

Mode	Average miles per shipment
Multiple Modes	607
Other modes	32
Truck	193

Source: US Census Bureau and BTS, Commodity Flow Survey

Make of Commodities

- By value, motorized and other vehicles (including parts) are the most heavily-shipped commodity, comprising 26 percent of total value. Another 42 percent are basic metal forms or articles of base metal. Machinery comprises 19 percent of the commodities shipped.
- By tons and ton-miles, base metal in primary or semi-finished forms is the most heavily-shipped commodity comprising 63 percent and 43 percent, respectively.
- The remaining commodities shipped by the sector include: plastics and rubber products; primary ferrous metal products; metalworking machinery; other general purpose machinery; and scrap, used and secondhand goods.

Fabricated Metal Manufacturing Shipment Characteristics by Commodity
Origin in Detroit Combined Statistical Area (2007)

SCTG	Commodity Description	Value		Tons		Ton-miles		Average miles per shipment
		2007 (million $)	Percent of total	2007 (thousands)	Percent of total	2007 (millions)	Percent of total	
	All Commodities	8,230	100%	5,615	100%	1,189	100%	281
32	Base metal in prim. or semifin. forms & in finished basic shapes	1,827	22%	3,565	63%	508	43%	217
33	Articles of base metal	1,606	20%	542	10%	194	16%	317
34	Machinery	1,573	19%	419	7%	150	13%	208
36	Motorized and other vehicles (including parts)	2,132	26%	651	12%	183	15%	170
43	Mixed freight	104	1%	11	0%	11	1%	720
40	Miscellaneous manufactured products	632	8%	S	S	32	3%	337
	Other	356	4%	427*	8%	111	9%	

S = high sampling varaibility or poor response quality

*Includes SCTG 40

Source: US Census Bureau and BTS, Commodity Flow Survey

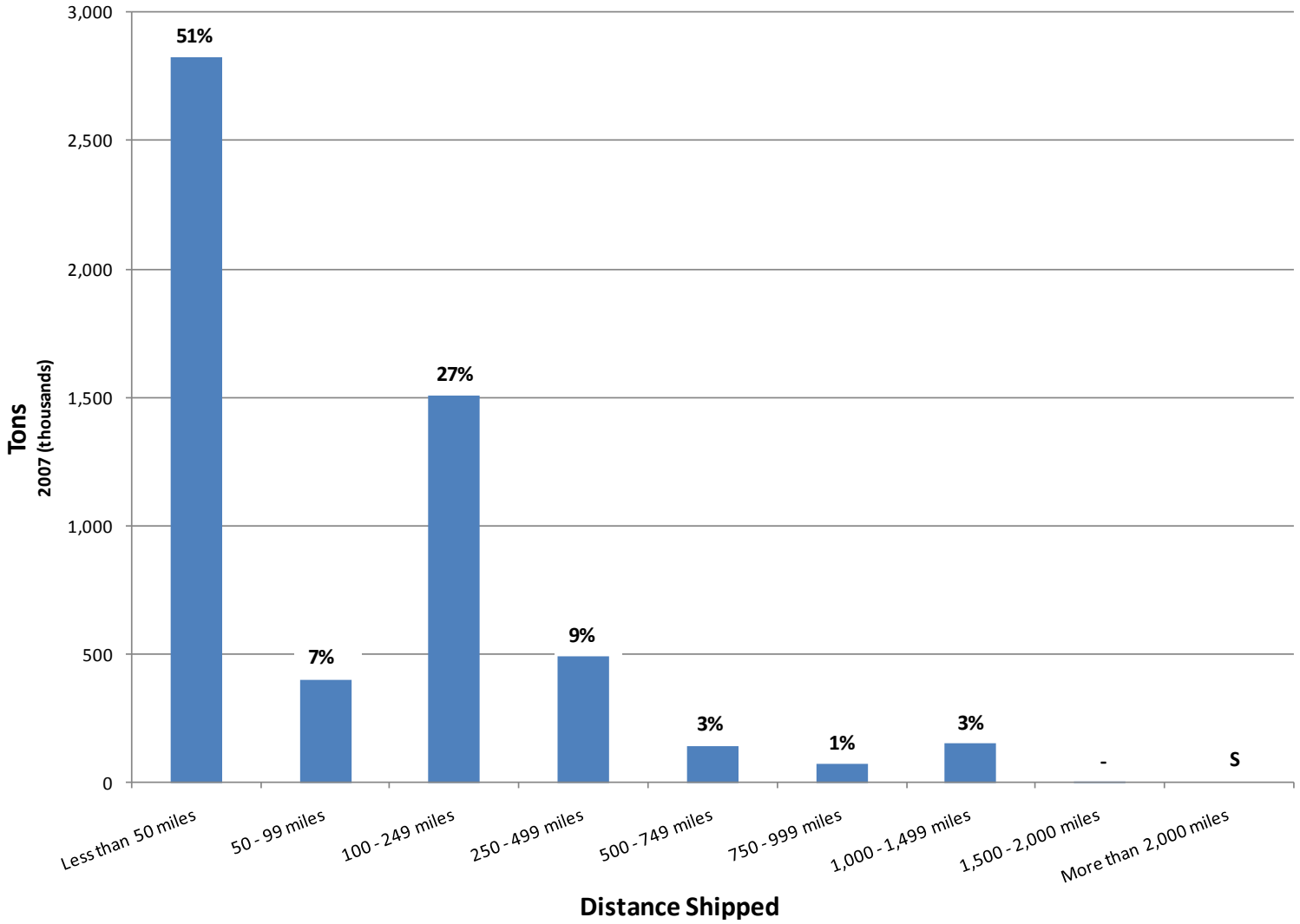
Distance

- By ton, 51 percent of manufactured fabricated metal is shipped less than 50 miles from the Detroit Combined Statistical Area.
- By ton, 31 percent of manufactured fabricated metal is shipped between 100 and 249 miles.

Weight

- Fifty-five (55) percent of the total shipped weight of fabricated metal products is for shipments weighing between 10,000 and 49,999 pounds.

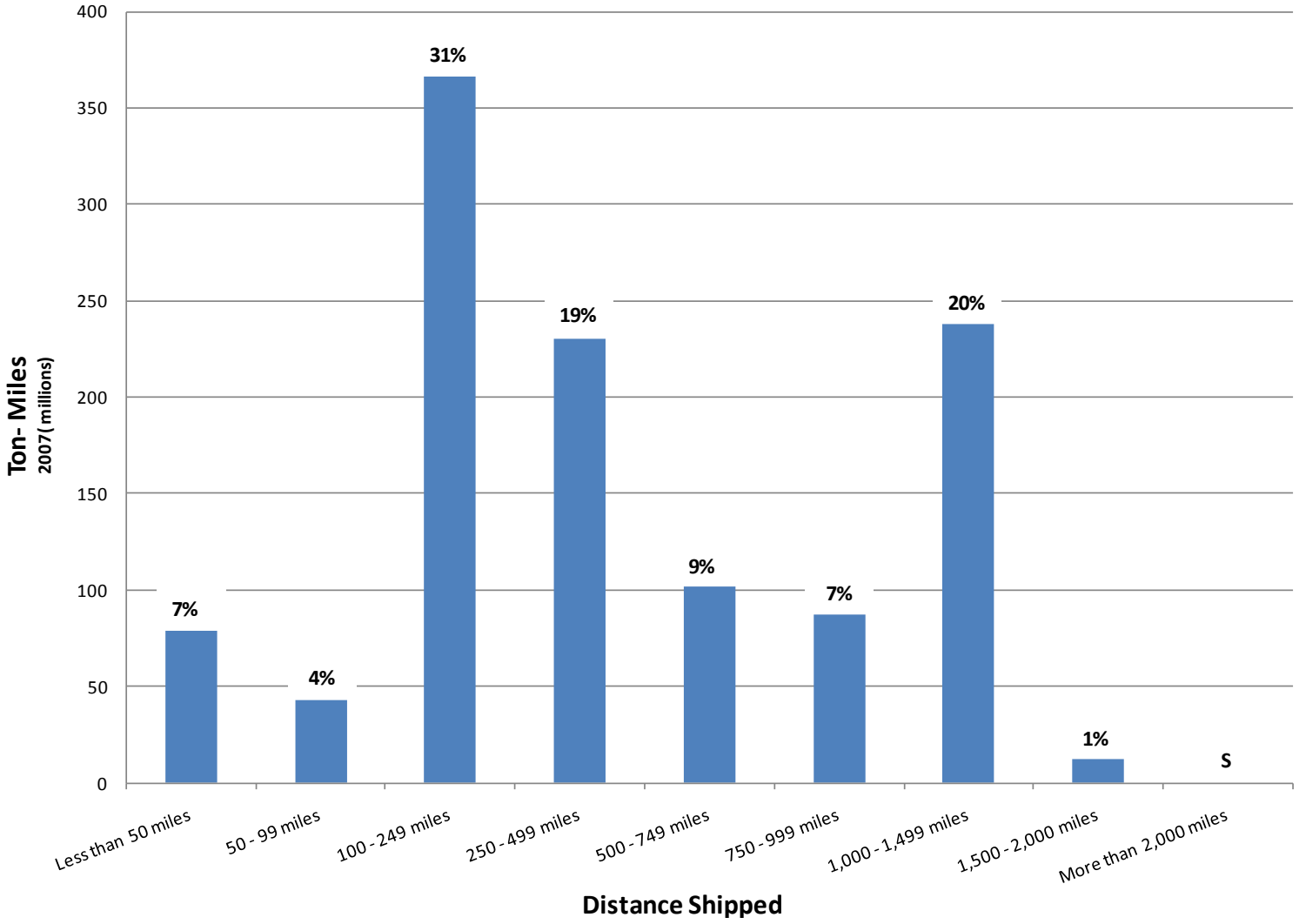
Distance Shipped by Ton for the Fabricated Metal Manufacturing Subsector
Origin in Detroit Combined Statistical Area (2007)



S = high sampling variability or poor response quality

Source: US Census Bureau and BTS, Commodity Flow Survey

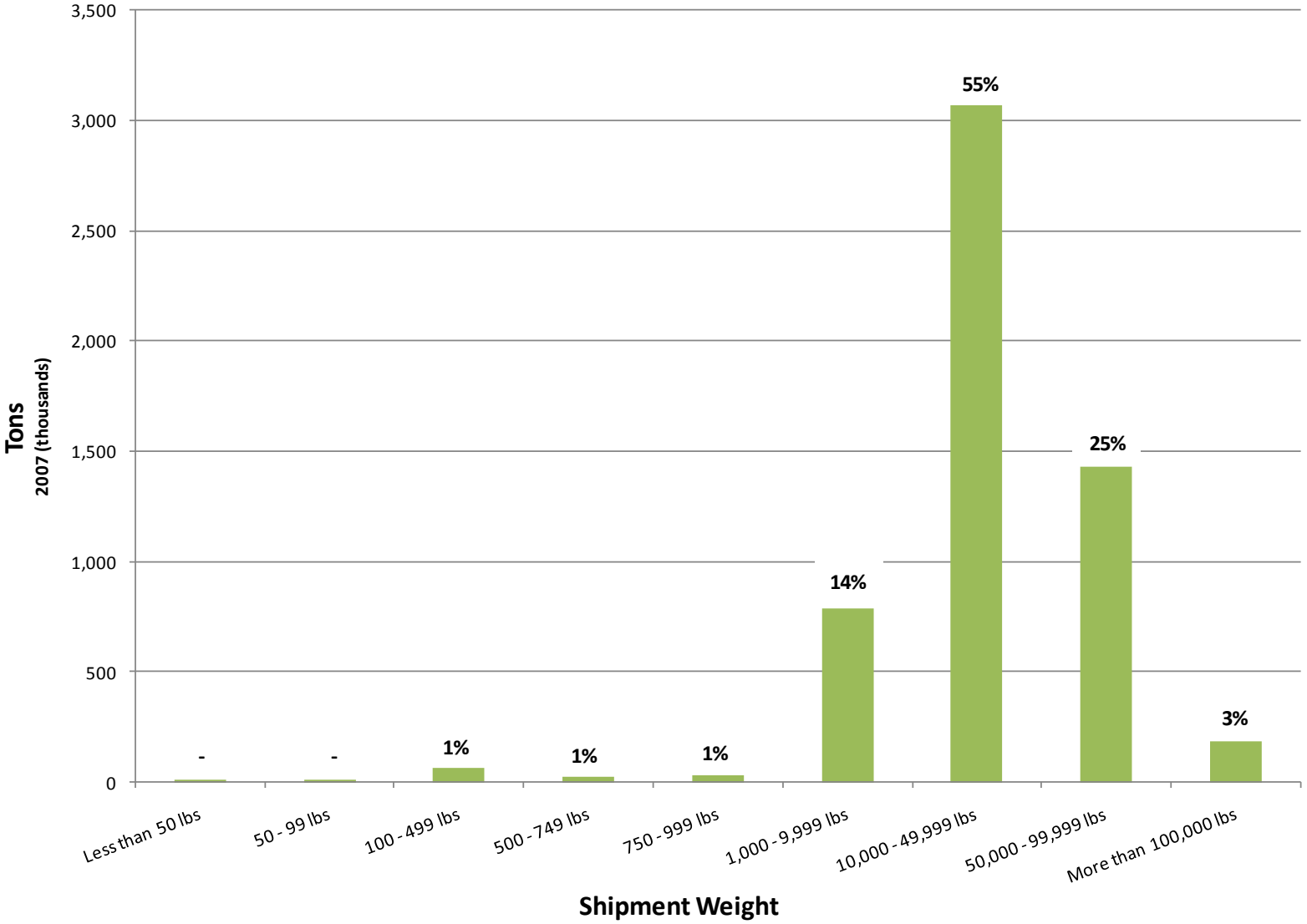
Distance Shipped by Ton-Miles for the Fabricated Metal Manufacturing Subsector
Origin in Detroit Combined Statistical Area (2007)



S = high sampling variability or poor response quality

Source: US Census Bureau and BTS, Commodity Flow Survey

Shipment Weight by Tons for the Fabricated Metal Manufacturing Subsector Origin in Detroit Combined Statistical Area (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

INDUSTRY OUTLOOK

- The Fabricated Metal Manufacturing subsector is fairly fragmented overall with specialized manufacturing processes geared towards the manufacturing of specific parts. However, industry concentration is high in the manufacturing of some products, such as springs.
- The products of the subsector are used as intermediate inputs to other industries. As a result, production levels and the health of the subsector are tied closely to the national economy and the industries the subsector supplies. The health of individual firms depends on technical expertise and efficient manufacturing practices.
- The introduction of new metal alloys has allowed fabricated metal manufacturers to innovate with the introduction of new and upgraded products.
- The Bureau of Labor statistics forecasts that national employment in relevant occupations will contract by 8 percent between 2008 and 2018. Employment among metal and plastic workers is expected to decline by close to 11 percent.
- The draft SEMCOG forecast of employment suggests that region's concentration in the subsector will remain steady over the next 30 years.
- Two of four respondents to the SEMCOG survey believe that their businesses will grow over 25 percent in five to 20 years.
- Survey respondents cited the following improvements to freight infrastructure as critical to the industry: wider lanes and more lanes to relieve congestion at Oakwood and the I-94 exit to Schafer as well as a new bridge to Canada.

5. Wholesale Trade

DESCRIPTION

The Wholesale Trade sector is engaged in wholesaling merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. The merchandise described in this sector includes the outputs of agriculture, mining, manufacturing, and certain information industries, such as publishing.

The wholesaling process is an intermediate step in the distribution of merchandise. Wholesalers are organized to sell or arrange the purchase or sale of: (a) goods for resale (i.e., goods sold to other wholesalers or retailers); (b) capital or durable non-consumer goods; and, (c) raw and intermediate materials and supplies used in production.

The subsectors included as part of this analysis involve merchant wholesalers of durable and nondurable goods. It does not capture business-to-business electronic markets, agents, and brokers that arrange sales and purchases for others generally for a commission or fee. The subsectors and industries which are covered in this analysis are listed by NAICS code:

423 - Merchant Wholesalers, Durable Goods
- 4231 Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers
- 4232 Furniture and Home Furnishing Merchant Wholesalers
- 4233 Lumber and Other Construction Materials Merchant Wholesalers
- 4234 Professional and Commercial Equipment and Supplies Merchant Wholesalers
- 4235 Metal and Mineral (except Petroleum) Merchant Wholesalers
- 4236 Electrical and Electronic Goods Merchant Wholesalers
- 4237 Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers
- 4238 Machinery, Equipment, and Supplies Merchant Wholesalers
- 4239 Miscellaneous Durable Goods Merchant Wholesalers

424 - Merchant Wholesalers, Nondurable Goods
- 4241 Paper and Paper Product Merchant Wholesalers
- 4242 Drugs and Druggists Sundries Merchant Wholesalers
- 4243 Apparel, Piece Goods, and Notions Merchant Wholesalers
- 4244 Grocery and Related Product Merchant Wholesalers
- 4245 Farm Product Raw Material Merchant Wholesalers
- 4246 Chemical and Allied Products Merchant Wholesalers
- 4247 Petroleum and Petroleum Products Merchant Wholesalers
- 4248 Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers
- 4249 Miscellaneous Nondurable Goods Merchant Wholesalers

IMPORTANCE TO THE REGION

- According to County Business Patterns, the Wholesale Trade sector comprised 5 percent of all jobs in the SEMCOG region in 2009.
- The Wholesale Trade sector has a location quotient of 1.0, which means that the sector is equally represented in the SEMCOG region as in the nation as a whole.
- The draft SEMCOG forecast of employment suggests that the region's concentration in Wholesale Trade will grow slightly to a location quotient of 1.1 in 2040.
- Wholesale Trade has a very low economic multiplier of 1.62. This means that producing $1.00 of output in the sector will generate $1.62 of activity in the economy. Few other industries (e.g., warehousing, real estate, and professional services) generate such little additional economic activity. An average industry has a multiplier of about 2.0.

ECONOMIC TRENDS

- The SEMCOG region consists of about 57 percent of the state's employment in Wholesale Trade in 1999 and 55 percent in both 2004 and 2009. During the same years, Michigan made up three percent of the country's employment in this sector.
- From 1999 to 2009, the SEMCOG region lost 20 percent of its jobs in Wholesale Trade, which is similar to the job losses in the Extended Economic Region (excluding Canada) and Michigan, but significantly higher than the 3 percent job loss reported in the United States.
- Average wages in Wholesale Trade increased from 1999 to 2009. The United States reported a wage increase of 37 percent, compared to 15 percent in the SEMCOG region, 17 percent in the Extended Economic Region, and 22 percent in Michigan.
- Establishments engaged in Wholesale Trade are relatively small with only about 14 employees per establishment.

SEMCOG Region's Wholesale Trade Sector

	1999	2004	2009
SEMCOG Region			
Employment	107,910	95,678	86,860
# of Establishments	7,665	6,814	6,369
Average Wage	$50,745	$56,812	$58,426
Employees per Establishment	14	14	14
SEMCOG Extended Economic Region (excluding Canada)			
Employment	140,477	126,188	112,849
# of Establishments	10,002	8,880	8,232
Average Wage	$47,883	$53,548	$55,918
Employees per Establishment	14	14	14
Canadian Extended Ecconomic Region (Chatham-Kent, Essex, Lambton)			
# of Establishments	n/a	1,448*	1,352*
Michigan			
Employment	189,534	172,962	158,543
# of Establishments	13,689	12,260	11,617
Average Wage	$45,143	$51,574	$55,242
Employees per Establishment	14	14	14
United States			
Employment	5,972,022	5,907,051	5,827,769
# of Establishments	450,030	429,489	419,758
Average Wage	$41,861	$49,191	$57,339
Employees per Establishment	13	14	14

* 2005 and 2010 data are reported for Canadian counties
Sources: US Census Bureau, County Business Patterns
Statistics Canada, Canadian Business Patterns

LABOR FORCE SKILLS

- Over 25 percent of the employment in Wholesale Trade is in sales and related occupations and another 21 percent of the employment is in office and administrative support occupations.
- Approximately 21 percent of workers are in transportation and material-moving occupations. Wholesale Trade provides a large portion of the employment opportunities (17 percent) available to workers in these occupations.
- The Bureau of Labor Statistics projects that employment in Wholesale Trade will increase by 4 percent by 2018.
- One of the SEMCOG survey respondents in the sector cited the size of the skilled labor pool as an impediment to business growth.

National Employment in the Wholesale Trade Sector by Occupation
Actual 2008 and Projected 2018

Occupation		2008		Percent change
		Percent of Industry	Percent of Occupation	
00-0000	Total, All Occupations	100.00	3.95	4.29
11-1300	**Management, Business, and Financial Occupations**	9.55	3.62	3.65
41-0000	**Sales and Related Occupations**	26.82	10.06	8.20
43-0000	**Office and Administrative Support Occupations**	23.65	5.85	2.46
53-0000	**Transportation and Material Moving Occupations**	20.51	12.46	1.87
53-1000	Supervisors, transportation and material moving workers	1.16	17.03	0.00
53-3000	Motor vehicle operators	8.76	12.53	8.05
53-6000	Other transportation workers	0.12	N/A	N/A
53-7000	Material moving occupations	10.47	13.63	-3.01
	Other - All Occupations	19.47	N/A	N/A

Source: Bureau of Labor Statistics, Occupational Employment Statistics

OTHER SITE SELECTION CRITERIA

- According to the SEMCOG survey, respondents that work in Wholesale Trade have located in the region for location – access to the Detroit Airport, the US-Canadian border, distribution areas, and the St. Lawrence Seaway.

SUPPLY CHAIN CHARACTERISTICS

Purchasing Patterns

- Wholesale Trade is less capital intensive than other industries, because establishments in the sector act as intermediaries. According to the most recent Transportation Satellite Accounts, the purchase of intermediate inputs (other than transportation) account for 28 percent of production compared to an average of about 42 percent in other industries.
- The use of labor is slightly above average for this sector. Employee compensation accounts for about 37 percent of production costs compared to 31 for the average industry.
- Much of the production costs in Wholesale Trade are reflected in value added (29 percent compared to 24 percent for other industries).

National Purchasing Patterns in Wholesale Trade (1997)

	4200
Input to Industry Production	**Wholesale trade**
Use of Transportion	
Truck For-Hire	0.1%
In-House	5.9%
Rail For-Hire	0.0%
In-House	0.0%
Air For-Hire	0.4%
In-House	0.1%
Transit and Ground Transport	0.1%
Other (incl. water and pipeline)	0.0%
Total Transportation Use	6.6%
Other Intermediate Inputs	28.3%
Employee Compensation	36.5%
Other Value Added	28.5%
TOTAL	100.0%

Source: Bureau of Transportation Statistics (BTS), Transportation Satellite Accounts

Transportation Usage

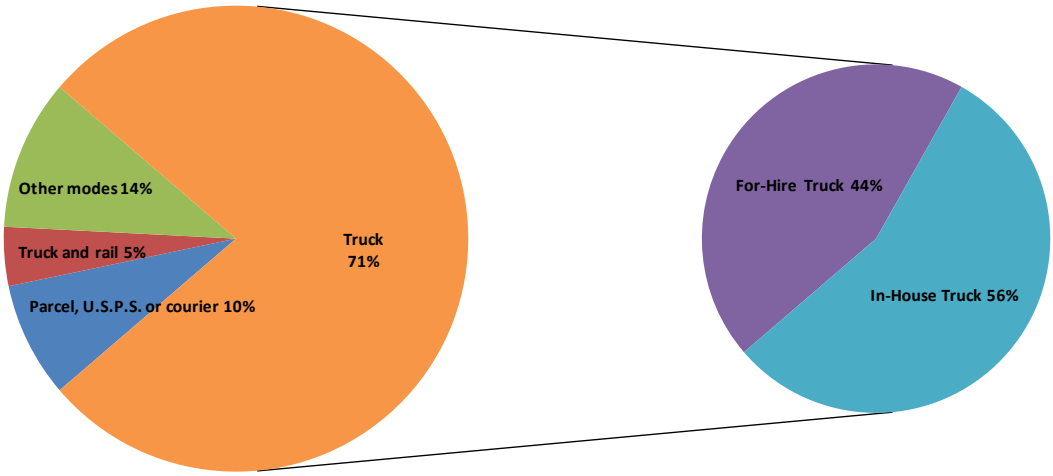
- Since Wholesale Trade involves the intermediate distribution of merchandise, the industrial sector is dependent on transportation services. Transportation accounts for about 6.6 percent of Wholesale Trade production costs compared to an average of about 3.8 percent across all industrial sectors.
- Wholesale trade relies extensively on truck transportation (6.0 percent of production costs) and the freight is carried almost exclusively by in–house fleets.
- Rail transportation is rarely used, but Wholesale Trade does use air transportation on par with industries in general (0.5 percent of production costs compared to 0.4 percent of production costs). Other forms of ground transportation are also used and account for 0.1 percent of production costs.

Characteristics of Shipments

Mode

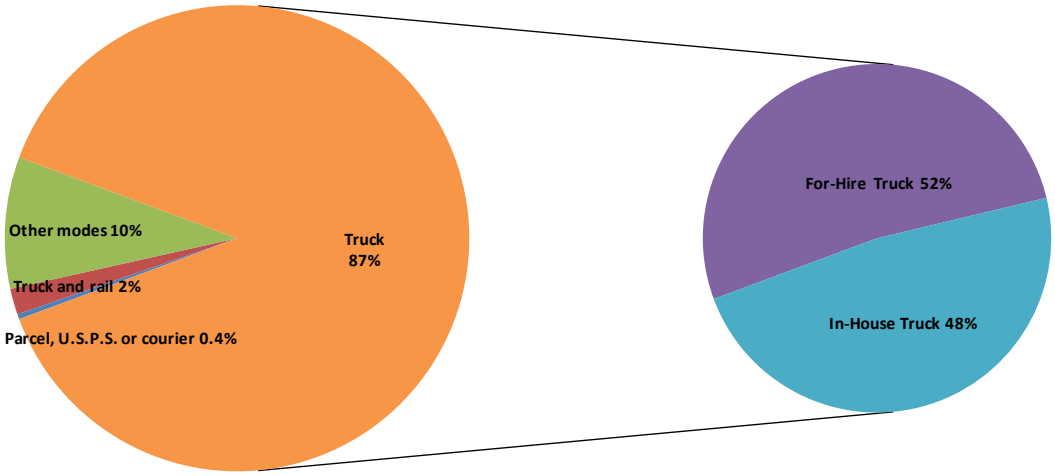
- By value and tonnage, the majority of wholesale goods shipped from the Detroit Combined Statistical Area, which includes Flint and Ann Arbor, are transported by truck (71 and 87 percent, respectively). Of those transported by trucks, about half is carried by outside trucking companies while the other half is carried by in-house fleets.
- Shipments that are transported by parcel services, USPS, or courier travel longer distances (583 average miles) compared to shipments transported by truck only (129 miles).
- Shipments that are transported by outside trucking companies move longer distances (485 average miles) than shipments moved by in-house fleets (51 average miles).
- The majority of respondents to the SEMCOG survey have access to truck docks, but only a third of respondents have access to rail. The majority of respondents do not believe that better rail services would benefit their businesses, while half believe that better highway access would benefit their businesses.

Mode of Shipment by Value for the Wholesale Trade Sector
Detroit Combined Statistical Area of Origin (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

Mode of Shipment by Tons for the Wholesale Trade Sector
Detroit Combined Statistical Area of Origin (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

Average Miles per Shipment by Mode
Origin in Detroit Combined Statistical Area (2007)

Mode	Average miles per shipment
Parcel, U.S.P.S. or courier	583
Truck and rail	1,957
Other modes	42
Truck	129
For-Hire	485
In-House	51

Source: US Census Bureau and BTS, Commodity Flow Survey

Make of Commodities

- By value, motorized and other vehicles (including parts) is the most heavily shipped commodity, comprising 34 percent of total value.
- By tons and ton-miles, base metal in primary or semi-finished forms are the most heavily shipped commodity comprising 17 percent and 13 percent, respectively.

Wholesale Trade Shipment Characteristics by Commodity
Origin in Detroit Combined Statistical Area (2007)

SCTG	Commodity Description	Value		Tons		Ton-miles		Average miles per shipment
		2007 (million $)	Percent of total	2007 (thousands)	Percent of total	2007 (millions)	Percent of total	
	All Commodities	92,692	100%	45,848	100%	9,791	100%	290
17	Gasoline and aviation turbine fuel	3,636	4%	5,419	12%	S	S	39
18	Fuel oils	1,729	2%	3,143	7%	S	S	47
19	Coal and petroleum products, nec	1,030	1%	1,258	3%	241	2%	144
24	Plastics and rubber	3,409	4%	1,136	2%	217	2%	239
26	Wood products	450	0%	291	1%	62	1%	184
32	Base metal in prim. or semifin. forms & in finished basic shapes	6,299	7%	7,831	17%	1,606	16%	S
36	Motorized and other vehicles (including parts)	31,340	34%	S	S	S	S	399
38	Precision instruments and apparatus	981	1%	15	0%	7	0%	300
40	Miscellaneous manufactured products	853	1%	124	0%	88	1%	775
41	Waste and scrap	1,145	1%	2,690	6%	376	4%	S
43	Mixed freight	4,470	5%	1,868	4%	169	2%	331
	Other	37,350	40%	22,073*	48%	7,025**	72%	

S = high sampling varaibility or poor response quality

*Includes SCTG 36

*Includes SCTG 17, 18, 36

Source: US Census Bureau and BTS, Commodity Flow Survey

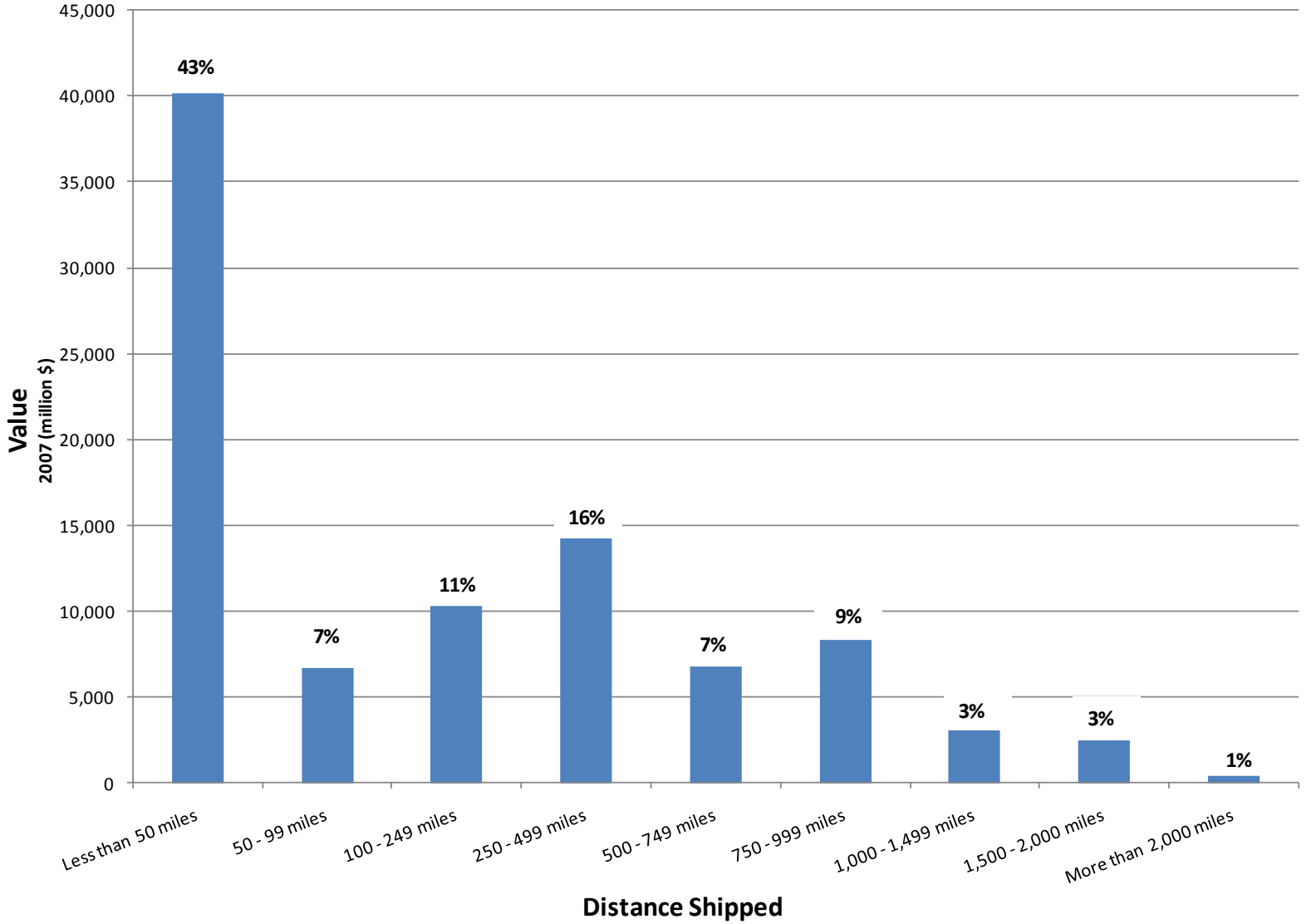
Distance

- By value, 43 percent of wholesale trade goods are shipped less than 50 miles from the Detroit Combined Statistical Area. Most of the freight moves less than 50 miles, which suggests the usage of local roads
- Per ton-mile, 40 percent of wholesale trade goods are shipped between 250 and 749 miles.

Weight

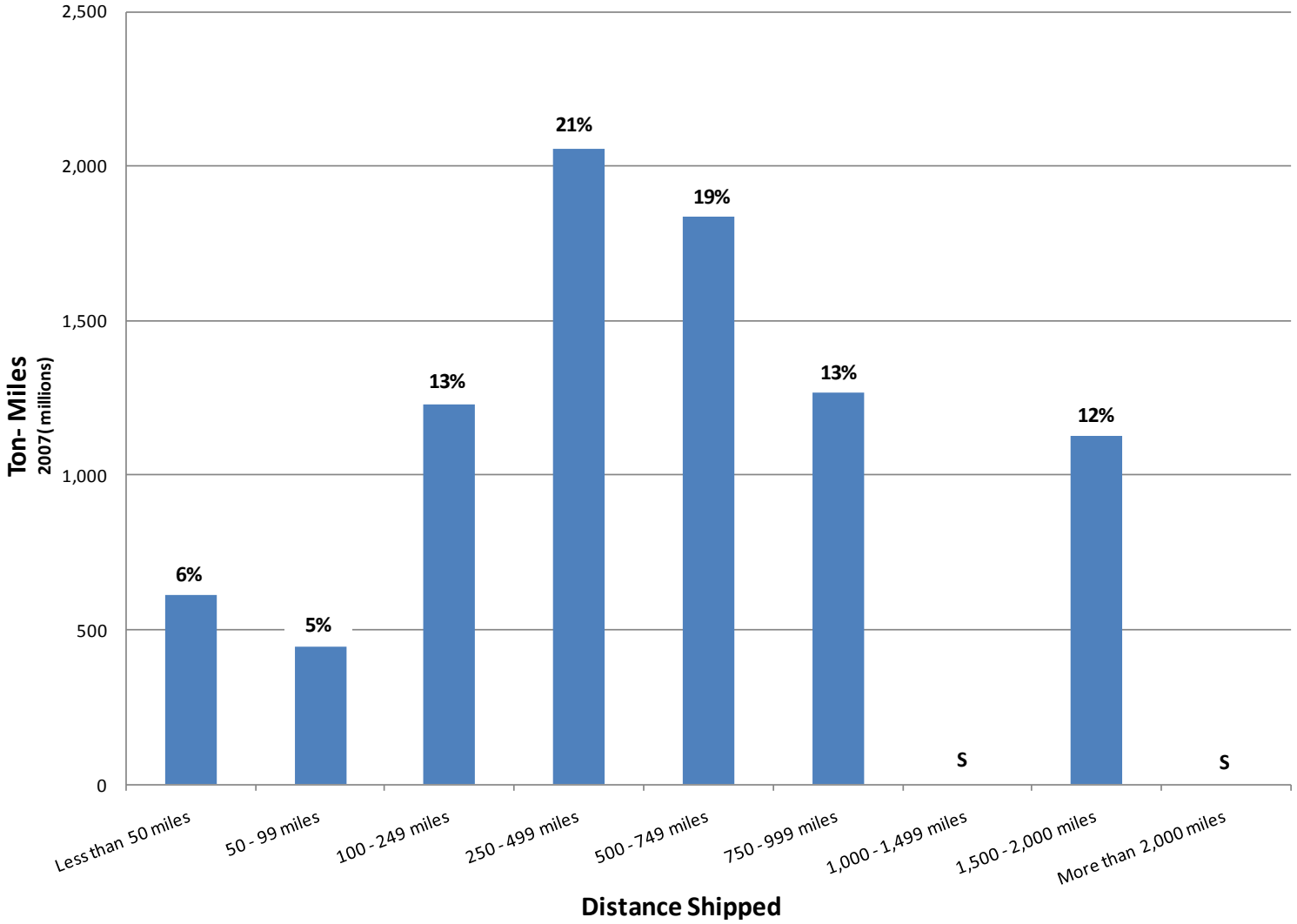
- By value, 64 percent of total shipment weight is for shipments weighing between 10,000 and 99,999 pounds.

Distance Shipped by Value for the Wholesale Trade Sector
Origin in Detroit Combined Statistical Area (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

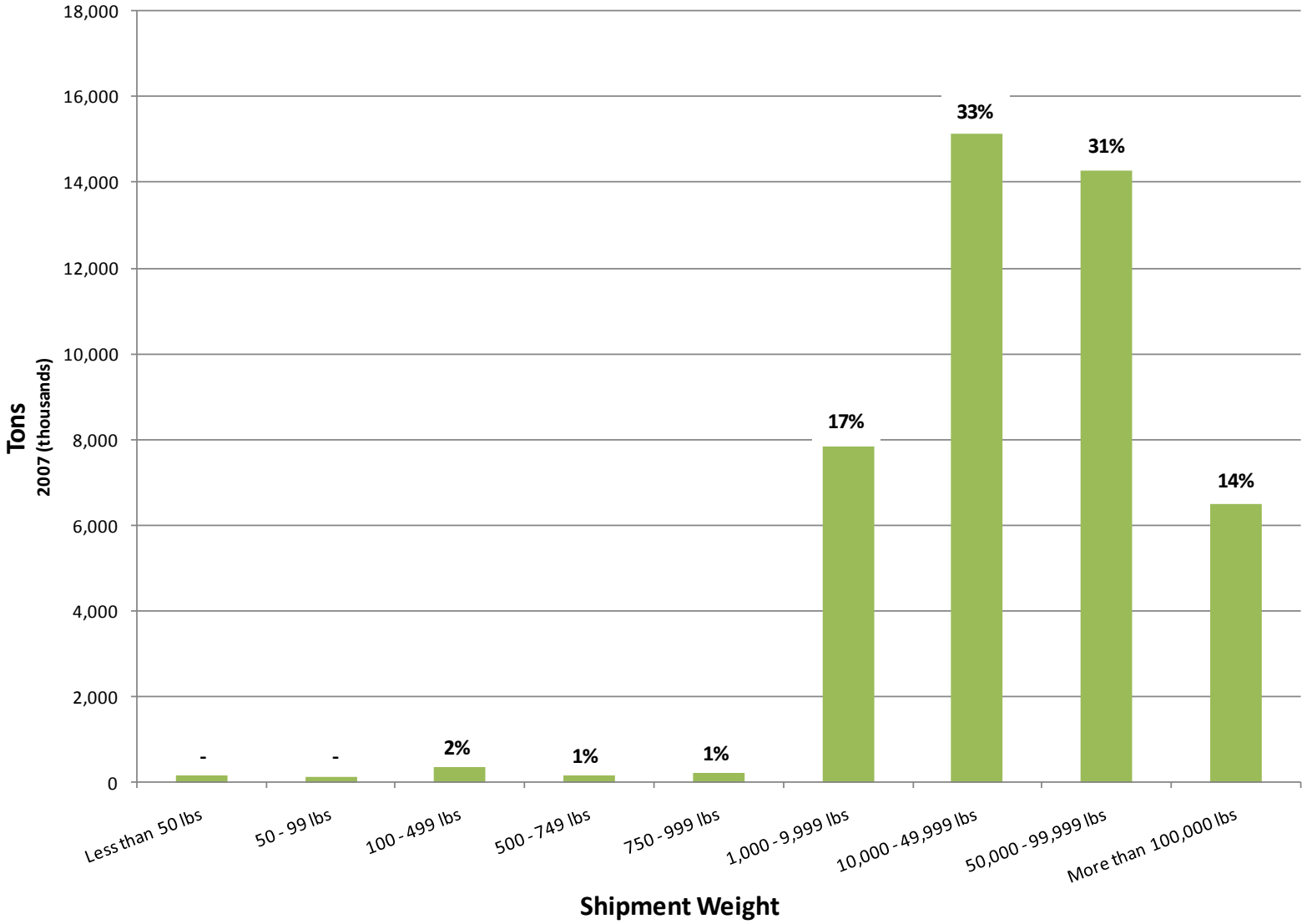
Distance Shipped by Ton-Miles for the Wholesale Trade Sector
Origin in Detroit Combined Statistical Area (2007)



S = high sampling variability or poor response quality

Source: US Census Bureau and BTS, Commodity Flow Survey

Shipment Weight by Value for the Wholesale Trade Sector
Origin in Detroit Combined Statistical Area (2007)



Source: US Census Bureau and BTS, Commodity Flow Survey

INDUSTRY OUTLOOK

- The Wholesale Trade sector is highly fragmented with over 400,000 establishments nationwide. Wholesale distributors specialize by product, such as pharmaceuticals, farm products, and electronic goods.
- The demand for Wholesale Trade is closely linked to economic activity. The profitability of individual companies can depend on their efficiency in managing inventory and fulfilling orders. The cost of production for Wholesale Trade is influenced by fuel costs and inventory carrying costs. Just-in-time delivery and improved logistics have helped to reduce carrying costs.
- Carrying costs are also influenced by interest rates, which have been low in recent years by historical standards. Since machinery distributors hold inventory for longer periods, they are more sensitive to carrying costs. Transportation improvements that increase travel time reliability can reduce carrying costs.
- The sector provides a large portion of the employment opportunities available to workers are in transportation and material-moving occupations. The Bureau of Labor Statistics projects that national employment in the sector will increase by 4 percent from 2008 to 2018, while opportunities in the transportation and material-moving occupations grow more slowly.
- The draft SEMCOG forecast of employment suggests that the region's concentration in the Wholesale Trade sector will grow slightly over the next 30 years.
- The majority of SEMCOG survey respondents anticipated positive growth in their business over the next five to 20 years.

6. Health Care and Social Services

DESCRIPTION

The Health Care and Social Assistance sector includes both health care and social assistance because the boundaries between these two activities are sometimes difficult to distinguish. The industries in this sector are arranged on a continuum starting with those establishments providing medical care exclusively, continuing with those providing health care and social assistance, and finishing with those providing only social assistance. The services provided by establishments in this sector are delivered by trained health professionals or social workers. Many of the industries in the sector are defined based on the educational degree held by the practitioners included in the industry.

The subsectors included in this sector are listed by NAICS code:

621 Ambulatory Health Care Services
622 Hospitals
623 Nursing and Residential Care Facilities
624 Social Assistance

IMPORTANCE TO THE REGION

- Employment in the Health Care and Social Services sector grew 12 percent in the SEMCOG region from 1999 to 2009. By 2009, the Health Care and Social Services sector comprised 15 percent of all jobs in the SEMCOG region.
- According to County Business Patterns, the Health Care and Social Services sector has a location quotient of 1.1. This suggests that the sector is slightly more concentrated in the SEMCOG region than the nation as a whole.
- The draft SEMCOG forecast of employment suggests that the region's concentration in the sector will remain about the same with a location quotient of 1.2 in 2040.
- The Health Care and Social Assistance sector has very low economic multipliers ranging from 1.55 for Ambulatory Health Care Services to 1.83 for Hospital Care. These multipliers mean that producing $1.00 of output in the sector will generate between $1.55 and $1.83 of activity in the economy. An average industry has a multiplier of about 2.0.
- The Detroit Regional Chamber lists some of the larger hospitals and medical centers in Detroit. Detroit Medical Center with about 10,500 employees is the largest healthcare employer. Established by Henry Ford in 1915, the Henry Ford Health System is a large healthcare system with over 8,500 employees in the Detroit area. St. John Providence Health System operates eight hospitals and over 125 medical facilities in Michigan and employs over 3,800 people.

ECONOMIC TRENDS

- The SEMCOG region comprises about 50 percent of the state's Health Care and Social Services sector employment. However, Michigan makes up only 3 percent of the sector's employment nationally.
- From 1999 to 2009, the SEMCOG region experienced a 12 percent increase in Health Care and Social Services employment, which is about the same as the Extended Economic Region (excluding Canada), but lower than what Michigan (15 percent) or the nation (23 percent) reported.
- From 1999 to 2009, average wages in the Health Care sector increased about 40 percent nationally. Similar wage increases occurred in Michigan and the SEMCOG region.
- The number of employees per establishment in the Health Care and Social Services sector is fairly low at 22. This reflects the large number of sites for ambulatory health care services (e.g., doctor's offices).

SEMCOG Region's Health Care Sector

	1999	2004	2009
SEMCOG Region			
Employment	254,541	270,112	284,964
# of Establishments	11,622	12,497	13,410
Average Wage	$31,919	$37,084	$44,238
Employees per Establishment	22	22	21
SEMCOG Extended Economic Region (excluding Canada)			
Employment	363,004	385,510	405,692
# of Establishments	16,252	17,454	18,444
Average Wage	$31,327	$36,340	$43,087
Employees per Establishment	22	22	22
Canadian Extended Ecconomic Region (Chatham-Kent, Essex, Lambton)			
# of Establishments	n/a	1,534*	1,937*
Michigan			
Employment	492,761	537,404	568,492
# of Establishments	23,270	25,087	26,128
Average Wage	$30,126	$35,025	$41,418
Employees per Establishment	21	21	22
United States			
Employment	13,865,014	15,814,812	17,531,142
# of Establishments	649,846	731,917	799,271
Average Wage	$29,515	$35,400	$41,956
Employees per Establishment	21	22	22

* 2005 and 2010 data are reported for Canadian counties
Sources: US Census Bureau, County Business Patterns
Statistics Canada, Canadian Business Patterns

LABOR FORCE SKILLS

- The health care industries rely on a very specialized technical staff. Over 60 percent of employees in the field are health care practitioners or in health care support occupations. The majority of these workers are employed as registered nurses (15 percent), health care technicians (14 percent), and in health care support (22 percent). Only a small percentage (4 percent) includes physicians or surgeons.
- As can be expected, health care services accounts for most of the employment opportunities for this specialized staff. The sector employs 74 percent of all health care practitioners nationally and 80 percent of the health care support staff. Registered nursing occupations have the highest concentration within this industry of over 15 percent.

- These workers are supported by other office, administrative, and professional support occupations. The employment in these occupations as a percentage of total employment is roughly commensurate with health care as a percent of total employment (roughly 10 percent).
- The Bureau of Labor Statistics forecasts robust growth in employment of over 22 percent in this economic sector between 2008 and 2018. The employment opportunities are expected to be shared across all occupations.

National Employment in the Health Care Sector by Occupation
Actual 2008 and Projected 2018

Occupation		2008		Percent Change
		Percent of Industry	Percent of Occupation	
	Total, All Occupations	100.00	9.50	22.48
11-1300	**Management, Business, and Financial Occupations**	4.29	3.90	16.78
15-2900	**Professional and Related Occupations**	43.83	20.24	22.53
29-0000	Healthcare practitioners and technical occupations	38.46	73.61	22.82
29-1000	Health diagnosing and treating practitioners	24.14	74.73	24.47
29-1060	Physicians and surgeons	3.57	77.49	25.99
29-1111	Registered nurses	15.29	83.72	23.37
29-1199	Health diagnosing and treating practitioners, all other	5.28	N/A	N/A
29-2000	Health technologists and technicians	13.98	73.71	20.02
29-9000	Other healthcare practitioners and technical occupations	0.34	35.10	20.36
	Other Professional and Related Occupations	5.37	N/A	N/A
31-3900	**Service Occupations**	31.99	15.51	25.29
31-0000	Healthcare support occupations	22.15	79.74	29.82
33-0000	Other	9.84	N/A	N/A
43-0000	**Office and Administrative Support Occupations**	17.72	10.54	19.74
	Other Occupations	2.17	N/A	N/A

Source: Bureau of Labor Statistics, Occupational Employment Statistics

OTHER SITE SELECTION CRITERIA

- Hospitals, residential care facilities, and clinics in the Health Care and Social Services sector frequently locate near target populations. Larger facilities aggregate where labor forces with specialized skills are available.
- The Health Care and Social Services sector relies on specialized distributors, such as Owens and Minor with a distribution center in Romulus, for obtaining medical supplies. Manufacturers ship to regional distribution centers and distributors often ship to hospitals on a regular basis. Distributors will typically use in-house trucks for deliveries to a large hospital and package services for deliveries to small hospitals and clinics.
- Health care distributors take into account the proximity to the customer, quality of roads, and the impact of weather, when selecting locations for distribution centers.

SUPPLY CHAIN CHARACTERISTICS

Purchasing Patterns

- The Health Care sector is not very capital intensive. According to the most recent Transportation Satellite Accounts, the purchase of intermediate inputs (other than transportation) account for only 30 to 43 percent of industry costs. This compares to an average of about 42 percent across all industries. The higher use of intermediate inputs occurs in hospital care, which reflects the higher use of medical supplies and equipment in hospitals than in other health care settings.
- The use of labor is well above average. While employee compensation accounts for about 31 percent of production costs for the average industry, it accounts for 48 to 54 percent for the health care industries. The high proportion for employee compensation reflects the high wages in the industrial sector.
- Other value-added is low at 2 to 20 percent (compared to 24 percent for all industries). The highest value added occurs in ambulatory health care services.

National Purchasing Patterns in Health Care and Social Assistance (1997)

Input to Industry Production	6210 Ambulatory health care services	6220 Hospital care	6230 Nursing and residential care
Use of Transportion			
Truck For-Hire	0.1%	0.3%	0.3%
In-House	1.0%	1.1%	1.4%
Rail For-Hire	0.0%	0.0%	0.0%
In-House	0.0%	0.0%	0.0%
Air For-Hire	0.4%	0.4%	0.3%
In-House	0.1%	0.0%	0.0%
Transit and Ground Transport	0.1%	0.2%	0.4%
Other (incl. water and pipeline)	0.0%	0.0%	0.0%
Total Transportation Use	1.8%	2.1%	2.4%
Other Intermediate Inputs	30.0%	43.1%	35.4%
Employee Compensation	48.4%	53.3%	54.1%
Other Value Added	19.9%	1.5%	8.1%
TOTAL	100.0%	100.0%	100.0%

Source: Bureau of Transportation Statistics (BTS), Transportation Satellite Accounts

Transportation Usage

- The Health Care and Social Assistance sector is much less dependent on transportation services than other sectors. Transportation accounts for 1.8 to 2.4 percent of the production costs in health care compared to an average of about 3.8 percent across all industrial sectors. Ambulatory health care services (e.g., doctors offices) is the least dependent on transportation (1.8 percent of costs), while nursing and residential care is the most dependent (2.4 percent of costs).
- The industries in this sector generally rely on truck transportation, which accounts for about 1.0 to 1.4 percent of production costs. Most of the truck transportation is conducted in house.
- Transit and air transportation are also used. Air transportation accounts for 0.3 to 0.4 in all health care industries, reflecting the time-sensitive nature of some shipments. Transit is used primarily in nursing and residential care, but also in hospital care. The use of transit reflects the need to transport staff in urban settings.
- Rail transportation is rarely used in the health care industry.

INDUSTRY OUTLOOK

- Demand in the Health Care and Social Services sector is driven by demographics – aging populations need more health care services – and advances in medical care.
- The sector is very labor-intensive. Employee compensation accounts for about 50 percent of production costs nationally, which is well above the all-industry average.
- The sector has economies of scale. Larger organizations have advantages in negotiating insurance contracts, buying supplies, accessing research, and offering a range of services. Recent health care reform is changing the Health Care and Social Services sector.
- Although the sector relies on specialized distributors, there is a growing trend for large health care providers to own their own warehouses. This has opened an opportunity for providers of medical supply management.
- The draft SEMCOG forecast of employment suggests that the region's employment in the Health Care and Social Services sector will grow about 45 percent over the next 30 years. The region's concentration in the sector will remain roughly constant despite this employment growth.
- The Bureau of Labor Statistics forecasts robust growth in national employment of over 22 percent between 2008 and 2018. The employment opportunities are expected to be shared across all occupations.

7. Accommodation and Food Services

DESCRIPTION

The Accommodation and Food Services sector comprises establishments providing customers with lodging and/or preparing meals, snacks, and beverages for immediate consumption. The sector includes both accommodation and food services establishments because the two activities are often combined at the same establishment.

The subsectors included in this sector are listed by NAICS code:
721 Accommodation
722 Food Services and Drinking Places

IMPORTANCE TO REGION

- Employment in the Accommodation and Food Services grew three percent in the SEMCOG region from 1999 to 2009. This is one of several industrial sectors that experienced gains in employment during this period.
- In 2009, the Accommodation and Food Services sector comprised 9 percent of all jobs in the SEMCOG region.
- The Accommodation and Food Services sector has a location quotient of 0.9 (CBP, SEMCOG Forecast). This suggests that the SEMCOG region is slightly less specialized in this sector than the nation. The draft SEMCOG forecast of employment suggests that the region's concentration in the sector will remain about the same with a location quotient of 0.9 in 2040.
- The Accommodation and Food Services industries have very different economic multipliers. Accommodations (i.e., motels and hotels) have economic multipliers of only about 1.61. This means that producing $1.00 of output in Accommodations will generate about $1.61 of activity in the economy. Note that this multiplier effect may spill outside the SEMCOG region. The average industry has a multiplier of 2.0.
- The Food Services industry has a much higher multiplier of 2.18.

ECONOMIC TRENDS

- The SEMCOG region comprised 48 percent of the state's Accommodation and Food Service sector employment in 1999, 2004, and 2009. During the same years, Michigan made up three percent of the country's employment in this sector.
- From 1999 to 2004, the SEMCOG region gained 3 percent of jobs in this sector, which is similar to the gains made in the Extended Economic Region (excluding Canada) and Michigan, but not as high as the 12-percent employment gain reported by the nation.
- From 2004 to 2009, the SEMCOG region lost slightly less than one percent of its jobs in this sector (about 940 jobs), while the nation posted a 7 percent gain in employment.
- Average wage in this sector increased from 1999 to 2009. The United States reported a wage increase of 29 percent, compared to 27 percent in the SEMCOG region, 26 percent in the Extended Region, and 17 percent in Michigan.
- The number of employees per establishment is relatively low at around 18.

SEMCOG Region's Accommodation and Food Services Sector

	1999	2004	2009
SEMCOG Region			
Employment	155,442	160,754	159,817
# of Establishments	8,315	8,790	8,992
Average Wage	$10,932	$12,020	$13,870
Employees per Establishment	19	18	18
SEMCOG Extended Economic Region (excluding Canada)			
Employment	222,326	230,073	225,694
# of Establishments	12,082	12,616	12,777
Average Wage	$10,487	$11,452	$13,239
Employees per Establishment	18	18	18
Canadian Extended Ecconomic Region (Chatham-Kent, Essex, Lambton)			
# of Establishments	n/a	1,861*	1,572*
Michigan			
Employment	322,205	335,036	327,911
# of Establishments	18,541	19,222	19,395
Average Wage	$11,287	$11,267	$13,218
Employees per Establishment	17	17	17
United States			
Employment	9,638,007	10,749,811	11,443,293
# of Establishments	539,576	591,022	635,239
Average Wage	$12,132	$13,691	$15,684
Employees per Establishment	18	18	18

* 2005 and 2010 data are reported for Canadian counties
Sources: US Census Bureau, County Business Patterns
Statistics Canada, Canadian Business Patterns

LABOR FORCE SKILLS

- Nearly all workers in this field (87 percent) are in service occupations. Close to 80 percent of employment within the Accommodation and Food Services sector are concentrated in food preparation and serving related occupations. Likewise, the sector accounts for most of the employment opportunities (79 percent) available to these occupations.
- The Bureau of Labor Statistics expects modest growth (7 percent) from 2008 to 2018 in employment within the Accommodation and Food Services sector.

National Employment in the Accommodation and Food Services Sector by Occupation
Actual 2008 and Projected 2018

Occupation		2008		Percent Change
		Percent of Industry	Percent of Occupation	
	Total, All Occupations	100.00	7.61	7.30
31-3900	**Service Occupations**	86.93	33.77	7.93
35-0000	Food preparation and serving related occupations	79.78	79.34	8.28
37-0000	Building and grounds cleaning and maintenance occupations	5.26	10.56	2.50
	Other Service Occupations	1.9	N/A	N/A
	Other Occupations	13.07	N/A	N/A

Source: Bureau of Labor Statistics, Occupational Employment Statistics

SUPPLY CHAIN CHARACTERISTICS

Purchasing Patterns

- According to the most recent Transportation Satellite Accounts, accommodations are not very capital intensive (30 percent of production costs), while food services are slightly more capital intensive (47 percent of costs). These figures compares to an average of about 42 percent across all industries.
- The use of labor is average in both industries. While employee compensation accounts for about 31 percent of production costs for the average industry, it accounts for 32 to 33 percent of production in the Accommodation and Food Services sector.
- Other value added is higher in Accommodations (34 percent) than in Food Services (15 percent). These figures compare to 24 percent for all industries.

National Purchasing Patterns in Accommodation and Food Services (1997)

Input to Industry Production	7210 Accommodations	7220 Food and beverage services to customer order
Use of Transportion		
Truck For-Hire	0.2%	0.8%
In-House	2.3%	4.4%
Rail For-Hire	0.0%	0.1%
In-House	0.0%	0.0%
Air For-Hire	0.3%	0.3%
In-House	0.8%	0.0%
Transit and Ground Transport	0.5%	0.0%
Other (incl. water and pipeline)	0.0%	0.0%
Total Transportation Use	4.1%	5.7%
Other Intermediate Inputs	29.7%	47.1%
Employee Compensation	32.6%	31.9%
Other Value Added	33.7%	15.3%
TOTAL	100.0%	100.0%

Source: Bureau of Transportation Statistics (BTS), Transportation Satellite Accounts

Transportation Usage

- The Accommodation and Food Services sector is more dependent on transportation services than many other industrial sectors (although not as transportation-intensive as the Construction sector). Transportation accounts for 4.1 percent of production costs for Accommodations and 5.7 percent of production costs for Food Services. The higher use of transportation in food services reflects the perishable nature of food supplies.
- The two industries in the Accommodation and Food Services sector use transportation in very different manners.
- Food Services use truck transportation almost exclusively (5.2 percent compared to the 5.7 percent of production costs devoted to transportation). Most of the truck transportation occurs in house with nearly 85 percent of the trucking costs being in house rather than for hire.
- Food Services also use air (0.3 percent of costs) and rail (0.1) percent of costs. This is roughly equal to the average usage across all industries.
- Accommodations, such as hotels and motels, rely on a mixture of transportation. Trucking accounts for 2.5 percent of production costs, with over 90 percent occurring in house.
- Aviation is also used extensively in accommodations (1.1 percent of costs). Most of the aviation costs occur in house, reflecting the frequent bundling of accommodations and air transportation in travel packages.
- Transit and ground transportation is also used fairly extensively, which reflects the provision of shuttle services by many hotels and motels.

Make and Use of Commodities

- Accommodation and Food Services generally produces only lodging and dinner services; however some hotels and motels do get involved in real estate.

INDUSTRY OUTLOOK

- The Accommodation and Food Services sector is highly diverse with separate factors driving the Accommodation and Food Services industries.
- Commodity prices for food supplies can significantly impact the Food Services industry. Changing lifestyles and tastes can also affect industry health.
- Since food safety can affect consumer demand, developing warehouse management systems that support traceability and recall is becoming a major issue. The Produce Traceability Initiative (PTI) is s an industry-led effort to track produce from the grower to the shelf. PTI is set to go into effect in 2012 and will affect the supply chains of growers, wholesalers, and retailers.
- Business and tourist travel drive demand in the Accommodation industry. Since the demand for travel is largely affected by fuel prices, these prices also determine demand in the Accommodations industry. The industry is highly sensitive to changes in personal income (for personal travel) and corporate profits (for business travel).
- The Accommodation industry is subject to economies of scale in marketing, particularly through hotel loyalty programs. Consolidation is occurring in the industry.
- The SEMCOG region is slightly less specialized in the Accommodation and Food Services sector than the nation as a whole. The draft SEMCOG forecast of employment suggests that the region's concentration in the sector will remain about the same over the next 30 years.
- Close to 80 percent of employment within the Accommodation and Food Services sector is concentrated in food preparation and serving related occupations.