First Research

INDUSTRY PROFILE

Manufacturing Sector

1.11.2016

NAICS CODES: 31, 32, 33

SIC CODES: 20 , 21 , 22 , 23 , 24 , 25 , 26 , 27 , 28 , 29 , 30 , 31 , 32 , 33 , 34 , 35 , 36 , 37 , 38 , 39

Industry Overview

Companies in this industry manufacture a wide variety of goods; major product groups include food and beverages, chemicals, machinery, transportation equipment, and computers and electronics. Major companies include Boeing, Caterpillar, DuPont, Ford, GE, GM, Hewlett-Packard, IBM, Procter & Gamble, Pfizer, and Tyson Foods (all based in the US); Nestlé (Switzerland), Sanofi (France), Siemens (Germany), and Toyota Motor (Japan).

The global manufacturing sector generates about $11.6 trillion in annual revenue, according to the UN. Top manufacturing countries include China, the US, Japan, Germany, South Korea, Italy, and France. Leading exporting countries include China, the US, Germany, Japan, and France.

The US manufacturing sector consists of about 300,000 establishments (single-location companies and units of multi-location companies) with combined annual sales of about $6 trillion. Leading growth drivers include rapid industrialization in the developing world, along with the use of technology to improve products and supply chains.

Competitive Landscape

Demand ultimately depends on **consumer spending**. The profitability of individual companies depends on **efficient production** and **distribution**. Large companies often have large **economies of scale** in purchasing, production, and marketing. Small companies can compete effectively by producing specialized products. The US manufacturing sector is fragmented: the largest 50 companies account for less than half of overall sales.

Computer systems and controls have steadily increased the **labor productivity** of US manufacturers in the last 10 years. Even so, US labor costs remain high, and many manufacturers have moved production operations to lower-cost countries like China.

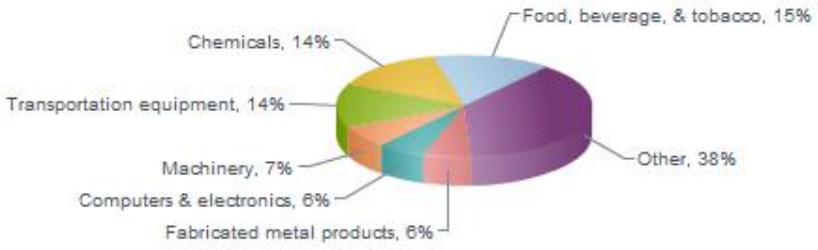
Many US exports are goods with **high technology content**: motor vehicles and parts, semiconductors, computers, drugs, and agricultural and construction equipment. Leading export markets include Canada, Mexico, and China. A large portion of exports are components shipped to **Canadian** and **Mexican** factories for eventual re-entry to the US as finished products.

Imports of manufactured goods to the US come primarily from China, Mexico, Canada, Japan, and Germany.

Products, Operations & Technology

Food, beverages, and tobacco products account for about 15% of US manufacturing revenues; chemicals, for 14%; transportation equipment (automobiles, planes, and railroad equipment), 14%; machinery, 7%; computers and electronics, 6%; and fabricated metal products, 6%. Other major segments include primary metals, plastic and rubber products, and paper.

Revenue by Product - US Census Bureau



Production operations transform **input materials**, including unfinished products and components, into finished products, using **energy**, **machinery**, and **labor**. Inputs may be raw materials (iron ore, petroleum feedstock); crops (cotton, rubber, foods); or semi-processed components (steel bars, plastic pellets, electronics, car subassemblies). To ensure availability of input materials, **supply contracts** are common. Energy, used mainly to power equipment or produce heat, is a major cost for many manufacturers. The steady rise in the cost of energy has encouraged companies to design energy-efficient production processes.

Several basic manufacturing methods are used, including **continuous process** and **batch operations**. Continuous process operations, like assembly lines, have proven to be the most efficient way to make many products, with economies increasing as greater volume is produced. These economies of scale encourage companies to grow. Batch operations are more common when customized products are made. The **efficiency of production** varies from company to company, and in many cases both the process and the final products are protected by **patents**.

The greatest production efficiencies are often achieved by companies that specialize in a particular product. Few US manufacturers today produce everything from raw materials to finished goods. A result of **specialization** is that most manufacturers make products for other manufacturers. Specialization often allows a manufacturer to have expertise in manufacturing similar products or products with similar uses.

Technology

The US manufacturing industry has become highly automated in all aspects. US manufacturers spend about $6 billion annually for computer equipment. Manufacturing was a lead industry in the application of **enterprise resource planning (ERP)** technology and in its evolution to an enterprise services architecture (ESA). Applying these technologies has streamlined business processes and reduced the number of labor hours required per unit of production.

Most manufacturers have automated **backoffice processes** such as accounting, order entry, inventory management, and HR. These processes are integrated, operating on common databases. Many companies have implemented ERP systems that include suites of applications adapted to the manufacturing industry. Adopting **industry standard packages** lowers the cost of automation and gives the company flexibility in leveraging third-party applications.

To minimize investment in materials inventory, most manufacturing companies practice some form of **just-in-time** (or lean) manufacturing. This requires the company to carefully coordinate deliveries from suppliers to minimize raw materials inventory and to coordinate deliveries to customers to minimize finished goods inventory. **Supply chain management systems** allow manufacturers, suppliers, and customers to share information on orders, schedules, and inventories to reduce inventory costs and maintain timely order fulfillment.

To remain competitive in a global economy, US manufacturers have automated production operations using machinery, robotics, and computer control systems. Much of the equipment used in manufacturing includes **programmable logic controllers** (PLCs) containing microprocessors that can be programmed. These controllers can be networked to pass status and control information from machine to machine. In some larger operations, controllers are linked to servers that control processes among multiple machines. Factory systems are usually tied together using TCP/IP networking. Some factories are evolving to use wireless technology, driven in part by increasing use of radio frequency identification (RFID) tags.

Factory floor hardware, including portable computers, is generally **ruggedized** so that it can perform in adverse environments. The ruggedization can include shock mounting, heat sinks, fans, and hermetically sealed units.

Sales & Marketing

Most manufacturers sell to other **manufacturers** or to **wholesalers**. Developing and maintaining **long-term relationships** with repeat customers is a major goal of marketing and sales. Sales may be handled by an in-house sales force or independent **manufacturers representatives**.

Industry trade shows and advertising in trade publications are important sources of new customers. Single or multi-year **sales contracts** are often used for large orders, and may commit the buyer to take a certain amount of product. Many products are made according to buyer specifications. For highly technical products, the sales process is often handled by engineers.

Although **pricing** is important, **product quality** and **on-time delivery** are often more important. Price pressures are high for US-based manufacturers that compete with lower-cost foreign producers. US manufacturers are increasingly focusing on specialty products that have a high technology and a low labor content.

Finance & Regulation

Manufacturers often have **large inventories**, both of raw materials and finished goods, because production is most efficient when it's uninterrupted. To ensure the availability and costs of basic raw materials and energy, some manufacturers use futures contracts. Some manufacturers may carry significant inventories of finished goods, semi-finished goods, and raw materials. On average, inventories represent about 10% of sales, and inventories turn about five times per year. In some manufacturing industries, typically for durable goods, companies provide financing to customers by carrying large receivables. For the US sector overall, accounts receivable average about 60 days' sales. The US manufacturing sector has an average **working capital turnover** ratio of about 20%.

Capital investments in plant and equipment are large and must periodically be renewed. For all manufacturers, annual capital expenditures average about 3% of sales. The sector is **capital-intensive:** average annual revenue per employee in the US is about $480,000.

Working Capital Turnover by Company Size

The working capital turnover ratio, also known as working capital to sales, is a measure of how efficiently a company uses its capital to generate sales. Companies should be compared to others in their industry.

Financial industry data provided by MicroBilt Corporation collected from 32 different data sources and represents financial performance of over 4.5 million privately held businesses and detailed industry financial benchmarks of companies in over 900 industries (SIC and NAICS). More data available by subscription or single report purchase at www.microbilt.com/firstresearch.

Regulation

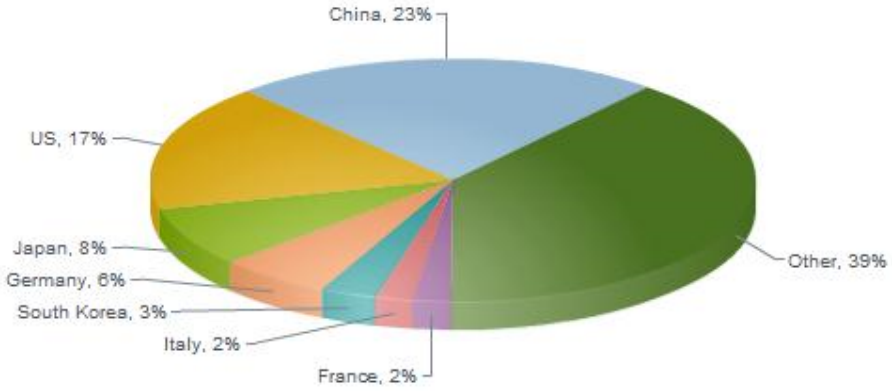
Most manufacturing operations produce **wastestreams** that must be disposed of, and may produce hazardous byproducts that can **pollute** the air, water, or ground. Many older manufacturing plants sit on contaminated land and some manufacturers are still liable for past pollution problems, including so-called Superfund sites. Regulation by the EPA is strict and fines can be large. Other US **regulators** of special importance to manufacturers are OSHA, for workplace safety, and the Labor Department, for employee-related issues. Many manufacturers are also affected by import and export regulations.

International Insights

The global manufacturing sector generates about $11.6 trillion in annual revenue, according to the UN. Among countries, top global producers of manufactured goods include China, the US, Japan, Germany, South Korea, Italy, and France. Leading exporting countries include China (13% of all global exports, including exports from Hong Kong), the US (10%), Germany (7%), Japan (3%), and France (3%).

Products vary greatly by country, but **key product groups** include food, chemicals, transportation equipment, (automobiles, aircraft, and railroad equipment), machinery, pharmaceuticals, computers and electronics, and textiles and apparel. Major manufacturing companies outside the US include Toyota Motor (Japan), Siemens (Germany), Nestlé (Switzerland), and Sanofi (France).

Global Manufacturing Revenue - United Nations, 2013



Global manufacturing output is largely dominated by North America and Western Europe, but China's massive population, low labor costs, and government policies (including subsidies for certain industries), have helped it advance rapidly. China's **manufacturing output** has grown more than 6,000 percent since 1970. Government subsidies have, in part, helped China grow global market share in production of certain commodity products such as steel and paper. China's deep pool of **low-cost labor** has enabled its rise as a top producer of apparel and toys. However, a **growing middle class**, rising wages, and growing trade tensions with the US and the EU have caused some major Western companies to look for cheap labor in places such as Vietnam, Thailand, Cambodia, and Indonesia.

Competitive pressures from low-cost labor regions have led US manufacturers to invest in **increased automation** to make their operations more efficient. While US manufacturing employment peaked in 1979, productivity as measured by output-per-worker has increased 240 percent since 1986. Increasing productivity through **manufacturing technology** has kept the US, Canada, and Western Europe ahead of low-cost producers in areas of highly complex manufactured goods such as automobiles, **industrial machinery**, medical and scientific equipment, and aerospace and defense products.

China and India are making significant inroads in these and other highly complex manufacturing industries. For example, India and China each have robust **domestic auto industries** that have attracted investment from Western manufacturers. As globalization continues, wages and the ranks of the middle-class will rise, and options for low-cost labor will diminish. In such an environment, manufacturers will have to compete through **niche manufacturing** of specialized products and components, and technical expertise combined with control of intellectual property.

To better compete on technologically advanced, value-added manufactured goods, China's government is investing in the country's manufacturing sector to drive innovation and efficiency. The program aims for China's manufacturing sector to reach technological parity with those of developed countries in North America and Western Europe by 2035, and to be the world's technological leader before 2050. Areas of focus for innovation include aerospace, IT, robotics, new materials, and biotech.

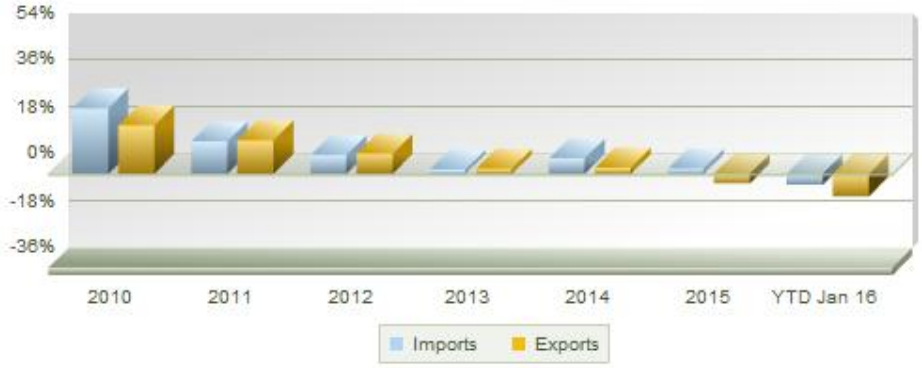
By 2025, India and China together will account for 25 to 40 percent of global demand for goods and services, according to analysis by the University of Maryland's Smith School of Business. China surpassed the US as the world's top manufacturer in 2010, according to the UN. The US is currently ranked second behind China as the most lucrative **world economy** for near-term foreign direct investment. **Emerging nations** such as China, India, Russia, and Brazil will drive increased demand for consumer goods such as clothing, cars, food, electronics, and pharmaceuticals, which will greatly impact future corporate decisions on manufacturing and

distribution center site selection.

Change in Dollar Value of US Trade - US International Trade Commission

Imports of manufactured goods to the US come primarily from China, Mexico, Canada, Japan, and Germany. Major export markets for US manufactured goods include Canada, Mexico, China, Japan, and UK.

33 MANUFACTURING



Regional Highlights

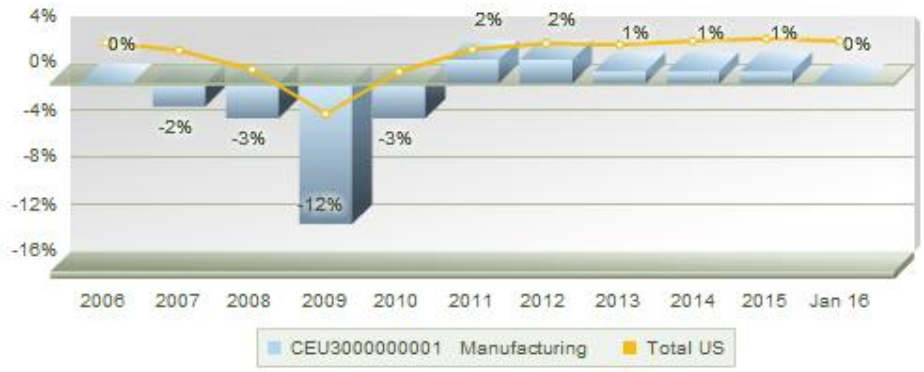
In the US, the largest concentrations of manufacturing output are in Texas, California, Ohio, Illinois, Louisiana, Indiana, and Michigan. Many specific industries are concentrated in just a few states, because of easy access to raw materials or energy sources, or proximity to customers.

Human Resources

As manufacturing has become more automated, the role of many workers has changed from direct operations to **machinery control**. Average hourly wages for the US manufacturing sector are about the same as the national average. The design of new products and the supervision of production facilities require that manufacturers maintain a high level of **engineering expertise**.

Many manufacturing operations create **safety issues** for workers. The overall injury and illness rate for workers in manufacturing is about 15% higher than that for all US workers.

Industry Employment Growth
Bureau of Labor Statistics



Average Hourly Earnings & Annual Wage Increase
Bureau of Labor Statistics

Industry Growth Rating

Demand: Depends on consumer spending
Require efficient production and distribution
Risk: Economic downturns and import competition

Quarterly Industry Update

1.11.2016

Challenge: US Manufacturing Activity Drops - US manufacturing activity declined in November 2015 to its lowest level since November 2012, according to the Institute for Supply Management (ISM). A strong dollar has made US products more expensive for overseas customers, and weak economic growth in China and Europe has slowed demand for US goods. Low oil prices have hurt demand for drilling, mining, and industrial equipment. Of the 18 manufacturing industries reporting to the ISM, five reported growth in November 2015, including printing and related support activities; nonmetallic mineral products; food, beverage, and tobacco products; and transportation equipment. Ten industries experienced contractions in activity, including apparel, leather, and allied products; plastics and rubber products; machinery; primary metals; and petroleum and coal products.

Industry Impact - If weak demand persists, manufacturers in affected industries may alter staffing, production, purchasing, or inventory strategies to help preserve margins. Economists suggest that factors contributing to reduced manufacturing activity -- a strong dollar, weak global demand, and low oil prices -- are likely to continue to drag on the sector in 2016, according to *The Wall Street Journal*.

9.28.2015

Opportunity: US Manufacturing Sector Growth to Continue in 2016 - US manufacturing production is forecast to increase 2.1% in 2015 compared to the prior year, according to the MAPI Foundation. Manufacturing production is expected to further accelerate in 2016, with a rise of 3.4% amid strong employment and income growth, which should spur consumer spending. Credit availability and low interest rates should help stimulate demand for expensive purchases like automobiles and housing. Non high-tech manufactured goods production -- which account for 95% of the manufacturing sector -- is forecast to rise 2.3% in 2015 and 3.3% in 2016. Production of high-tech goods is expected to increase 1.5% in 2012 and 6.1% in 2016. While overall manufacturing production is forecast to be strong, demand for oil- and gas-related products, such as oil and gas field machinery, is expected to remain weak.

Industry Impact - Manufacturers may make adjustments to production, purchasing, staffing, and/or marketing strategies if upticks in demand continue to the end of 2015 and into 2016.

6.29.2015

Challenge: Manufacturing Production Slows - US industrial production of manufactured goods unexpectedly fell 0.2% in May 2015 compared to the month before. Industrial production has not seen monthly growth since November 2014, according to the US Federal Reserve. The six months since then of stagnating US industrial output has sparked concern among some economists that US manufacturing may be in a technical recession.

Economists polled by MarketWatch had expected to see May industrial production growth of 0.2%. Manufacturing activity has slowed as the strong dollar has made US exports less competitive in overseas markets. In addition, the decline in oil prices since mid-2014 has reduced investment in new equipment by energy producers. Overall global economic weakness also has contributed to reduced demand for US manufactured goods.

Industry Impact - Manufacturers may be more cautious with inventory, production, staffing, and capital expenditure strategies if US industrial production growth remains flat in the coming months.

3.30.2015

Trend: Manufacturing Growth Continues But at Slower Pace - US manufacturing activity increased for the 26th consecutive month in February 2015, according to the Institute for Supply Management (ISM). However, manufacturers generally reported slower growth in production, employment, and new orders. Of the 12 industries reporting growth in February, the ones experiencing the strongest demand included paper products; printing and related support activities; furniture; primary metals; nonmetallic mineral products; and food, beverage, and tobacco products. Three industries reported lower activity in February: textile mills; apparel, leather, and allied products; and computer and electronic products. While manufacturers are enjoying lower prices for many types of commodities including aluminum, steel, petroleum products, and plastic resins, some reported being negatively affected by the West Coast dock slowdown that impeded imports and exports and drove up costs. The labor dispute between dock workers and shipping companies was resolved in late February and is not expected to have an ongoing negative impact on the US economy.

Industry Impact - While US manufacturing activity is still growing, companies reported slower growth in February 2015. Some manufacturers may take a conservative approach to capital expenditures and staffing until orders show signs of stronger growth.

Industry Indicators

Total US manufacturers' shipments, which indicate manufacturing sector activity, fell 4.0% year-to-date in January 2016 compared to the same period in 2015.

The spot price of crude oil, which indicates energy prices paid by manufacturers, fell 21% in the week ending March 11, 2016, compared to the same week in 2015.

Industry Forecast

Revenue (in current dollars) for the US manufacturing sector is forecast to grow at an annual compounded rate of 4% between 2016 and 2020, based on changes in physical volume and unit prices. Data Published: February 2016

First Research forecasts are based on INFORUM forecasts that are licensed from the Interindustry Economic Research Fund, Inc. (IERF) in College Park, MD. INFORUM's "interindustry-macro" approach to modeling the economy captures the links between industries and the aggregate economy. Forecast FAQs

Companies

Company	Country	Sales
Samsung Electronics Co., Ltd.	South Korea	$187,606.21M
INGERSOLL-RAND PUBLIC LIMITED COMPANY	Ireland	$13,300.70M
PERNOD RICARD	France	$9,494.25M
Saint-Gobain Corporation	United States	$7,579.43M
Freudenberg & Co. KG	Germany	$7,271.49M
Marmon Holdings, Inc.	United States	$6,925.00M
Newell Rubbermaid Inc.	United States	$5,915.70M
Wärtsilä Oyj Abp	Finland	$5,490.91M
Philips Electronics North America Corporation	United States	$5,118.74M
HINDUSTAN UNILEVER LIMITED	India	$5,039.09M
THAI BEVERAGE PUBLIC COMPANY LIMITED	Thailand	$4,766.42M
LION PTY LTD	Australia	$4,408.49M
LG International Corp.	South Korea	$3,435.86M
UNILEVER UK LIMITED	England	$3,300.64M
D. Swarovski KG	Austria	$3,248.70M
Flsmidth & Co. A/S	Denmark	$2,881.44M
Scientific Games Corporation	United States	$2,758.80M
Hunter Douglas N.V.	The Netherlands	$2,695.00M
Les Industries Dorel Inc	Canada	$2,677.55M
ARDAGH GLASS INC.	United States	$2,440.43M
NOVOMATIC AG	Austria	$2,403.77M
TAIWAN TOBACCO & LIQUOR CORPORATION	Taiwan	$2,377.18M
KINGSPAN GROUP PUBLIC LIMITED COMPANY	Ireland	$2,298.75M
Tupperware Brands Corporation	United States	$2,283.80M
International Game Technology PLC	United Kingdom	$2,058.10M
Elster Group GmbH	Germany	$1,868.98M
PLY GEM HOLDINGS, INC.	United States	$1,839.73M
Atlas Holdings, LLC	United States	$1,719.72M
Qorvo, Inc.	United States	$1,710.97M
CENTRAL GARDEN & PET COMPANY	United States	$1,650.74M

Industry Drivers

Changes in the economic environment that may positively or negatively affect industry growth.

Data provided by First Research analysts and reviewed annually

Energy Prices Change in crude oil and related energy prices

Interest Rates Change in prime and related interest rates

Technology Innovation Advances in science and technology, including information technology

Commodity Prices Changes in prices for commodities, such as crops, metals, and other raw materials

Critical Issues

Highly Dependent on Consumer Spending - Production in the manufacturing sector depends on consumer spending and retail sales, and can change rapidly during an economic slowdown. For example, industrial production rose by about 2 percent per year on average between 2002 and 2007, but fell 10 percent between 2007 and 2010. In some subsectors, such as automobiles and primary metals, production dropped 25 percent or more during the late 2000s recession.

Competition from Low-Cost Imports - US imports of manufactured goods have increased, because products with large labor content are much cheaper to produce in countries like China and Mexico. To remain competitive, many US manufacturers have moved production facilities abroad or have shifted to products with higher technology content. In dollar terms, the US imports more than twice the amount of manufactured goods from China as from Canada. In recent years Mexico has overtaken Canada to become the second-largest source of US imports.

Business Challenges

Large R&D Spending, Capital Expenditures Required - Manufacturing companies must make large investments in production equipment and computer systems to improve efficiency, and in R&D to develop new products. R&D expenses for US manufacturing companies are typically about 4 to 5 percent of revenue, but can be as high as 10 to 15 percent. Capital expenditures can typically range from 3 to 6 percent of revenue.

Volatile Energy, Raw Material Costs - Scarcity of resources and long supply routes contribute to frequent changes in prices for energy and for many raw materials used by manufacturers. Steel prices, for example, can change by more than 30 percent from year to year. Crude oil and natural gas prices can also move more than 30 percent annually.

Extensive Government Regulation - To protect workers and prevent pollution, states and the federal government regulate many activities of manufacturing companies. Such regulations can add to the cost of production. Government regulations also affect imports and exports of many raw materials and manufactured products.

Dependence on Few Large Customers - Because of consolidation in many parts of the US economy, and because of their own specialization, many manufacturers depend heavily on a small number of big customers for a large part of their revenue. In many cases, because no alternative market exists, manufacturers are essentially production arms of their customers. In some instances, the US government is a company's major customer.

Business Trends

More Automation, Less Labor - Productivity has steadily increased in manufacturing because of the increasing use of machines and, especially, computers. Generally, the US industries that have prospered in the past decade have been those where the most automation has been possible and where technology content is high.

Manufacturing output per hour between 2004 and 2013 increased more than 20 percent.

Outsourcing and Leasing - To increase operational efficiency by concentrating resources on primary production and marketing functions, many companies have outsourced services they previously did themselves, such as parts manufacture, maintenance, computer and payroll services, and benefits management. As product life cycles get shorter, building proprietary assembly lines becomes less practical. Contract manufacturers have made it possible for some companies to operate without owning any brick-and-mortar factories. Many manufacturers have also increased the efficiency of their assets by leasing, rather than owning, equipment and facilities.

More Service Required - The greater technological content of many machines and products requires more complicated support such as training, maintenance, operations, and services. Some companies, like IBM, sell more services related to their product than they do the product itself. Large-scale use of computers has created demand for IT services in many industries.

Manufacturing Globalization - The development of international logistics networks that can efficiently deliver raw materials and finished products to many parts of the world has increased the reach of US manufacturers and international competitors. US manufacturers in labor-intensive industries such as apparel now have most of their production facilities abroad. Factories are frequently located in countries for tax, labor costs, or political reasons, rather than proximity to raw materials or markets, as was once the case.

More Alliances, Strategic Investments - The large resources required for many business enterprises, especially in the international sphere, encourage manufacturers to ally with other companies. In some cases, partners produce different components for a product; in others, one partner makes the product while the other provides distribution. Relationships between manufacturers and their suppliers also often take the form of alliances, with strong integration of information systems and regular production consultations. Many large companies now hold "strategic stakes" in smaller companies that are developing new products or markets, enabling them to essentially farm out their R&D efforts.

Reshoring US Manufacturing - Rising wages in the developing world and the complications of far-flung supply chains are causing some US manufacturers to bring back jobs that had been outsourced to other countries. "Reshoring" hit a milestone in 2013 when the US brought back as many jobs as it exported, according to the Reshoring Initiative. In a 2014 survey of manufacturers by the Boston Consulting Group, more than two-thirds expected reshoring to increase manufacturing employment within five years. Half of manufacturers said they planned to boost their US manufacturing workforces by 5% or more. More than 70% cited access to skilled labor as a reason for bringing manufacturing back to the US.

Industry Opportunities

Technological Innovation - US manufacturers use technology to lower costs, improve products, and optimize supply chain performance. The US manufacturing sector is evolving toward providing goods that either have a high technology component or are produced with technologically advanced equipment. Biotech and fiber optics provide recent examples of rapid movement from research labs to production facilities.

Improved Logistics - To minimize inventories and speed distribution, many manufacturers invest in distribution technology and better logistics communication. Advancements include satellite communication links with delivery trucks, cargo containers with communication capabilities, specialized cargo ships that can be unloaded in hours, and radio frequency identification (RFID) tags that allow individual products to be tracked. Improved communication between suppliers and manufacturers eases production scheduling and product flow.

Business-to-Business Internet Communication - Many manufacturers can order parts and products through Internet sites, speeding delivery and cutting out a layer of distributors. Internet auction sites let suppliers bid to fill supply contracts. The success of Internet-based procurement is closely tied to the continuing growth and refinement of logistics networks, so suppliers can keep delivery costs low.

Improved Energy Use - Because many production techniques were designed in an era of lower energy costs, manufacturers can often redesign processes to reduce energy use. Some manufacturers use large amounts of energy in production. Due to the high cost of converting to energy-efficient systems, manufacturers are reluctant to approve such projects unless energy costs are projected to remain high.

Green Manufacturing Practices - In addition to investing in energy efficiency, manufacturers are also redesigning plants and processes to reduce emissions and the company's carbon footprint. These green investments can provide an attractive return and allow the company to market a positive environmental message to customers and investors. In recent years the EPA has created national emission standards for hazardous air pollutants.

Executive Insight

Chief Executive Officer - CEO

Competing with Low-Cost Imports
Imports of manufactured goods to the US have increased steadily, because products with a large labor content are much cheaper to produce in lower-cost countries like China and Mexico. US companies have automated production as much as possible to lower the labor content and have implemented lean manufacturing to reduce waste and costly inventories. US manufacturers keep complex manufacturing at home while offshoring some mass manufacturing and taking advantage of established brand names and distribution pipelines.

Moving Manufacturing Offshore
Any product with high labor content is susceptible to being manufactured more economically in a low-wage country. This is particularly true of small items that don't have high shipping costs, such as handtools, electronic products, textiles, etc. Many companies have adopted a strategy of either setting up manufacturing plants overseas or contracting with an overseas supplier to produce merchandise with their name.

Chief Financial Officer - CFO

Substituting Capital for Labor
Manufacturing domestically allows better management oversight and responsiveness to customers' evolving needs. To make domestic manufacture cost-competitive with low-cost imports, companies must minimize labor content by automating production. Manufacturing automation requires expensive networked intelligence systems and robotics. Factory automation is generally financed through long-term bank loans or capital placements.

Outsourcing Noncore Functions
Outsourcing noncore functions allows management to increase operational efficiency by concentrating resources on primary production and marketing functions. Many companies are outsourcing services they previously did themselves, like parts manufacture, maintenance, computer and payroll services, and benefits management. As product life cycles have contracted, building proprietary assembly lines has become less practical. In the telecom industry, contract manufacturers have made it possible for companies to increase efficiency by leasing, rather than owning, equipment and employees.

Chief Information Officer - CIO

Supporting Lean Manufacturing
Lean manufacturing is a continuous process whereby all processes and operations are examined to eliminate (or minimize) waste: wasted feedstock; wasted motion; wasted product (below quality standards); wasted time (inventories, moving in-process materials, etc). Processes are defined, analyzed, and redesigned to be more efficient. Once implemented, processes are continually re-evaluated and refined to make them still more efficient. Information systems must be designed to be flexible to support process changes, provide the real time data required for lean manufacturing, and integrate with both suppliers and customers.

Applying Technology Inventively
Investors and other equity holders demand better margins, more product innovation, and quicker time-to-market for new products. Manufacturers use technology to lower costs, improve products, and optimize supply chain performance. The US manufacturing sector is evolving toward producing goods with either a high-tech component or that are fabricated with technologically advanced equipment.

Human Resources - HR

Overseeing Personnel Needs During Outsourcing
Outsourcing has become a fact for most manufacturing companies. Factories can be sold to other manufacturing companies or companies can outsource noncore operations, such as accounting, payroll, benefits programs, IT, etc. Staff is generally part of the outsourcing process, either moving to the outsourcer or being laid off by the manufacturer. HR must evaluate the benefit status of each employee and assure that they're accommodated.

Implementing Safety Training Programs
Many manufacturing jobs are semi-skilled and require expertise in operating specialized machinery. Safety has improved, but the rate of injury and illness for the manufacturing sector in the US is about 15% higher than the national average. To minimize company liability, HR must implement training programs for the safe and efficient operation and maintenance of all equipment, ensure that staff members attend training, and oversee training compliance.

VP Sales/Marketing - Sales

Developing Sales Channels

Sales and distribution channels are critical to manufacturing companies. Once customer and distributor relationships have been established, companies can relocate or outsource manufacturing facilities without disrupting the customer relationships. Developing and maintaining long-term relationships with repeat customers is a crucial part of marketing, which may be handled by an in-house sales force, independent manufacturer representatives, or distributor sales staff, and augmented by marketing at industry trade shows and through advertising. Manufacturers may participate in cooperative advertising with industrial customers. For example, tire and auto manufacturers may advertise jointly on a national level.

Marketing Globally
Manufacturing has become global with plants established as needed, where needed. DuPont, for example, operates more than 300 facilities in Africa, Asia, Europe, the Middle East, and the Americas across seven distinct product segments. As plants are located to accommodate local markets, marketing is taking advantage to increase regional sales.

Financial Information

COMPANY BENCHMARK TRENDS

Quick Ratio by Company Size

The quick ratio, also known as the acid test ratio, measures a company's ability to meet short-term obligations with liquid assets. The higher the ratio, the better; a number below 1 signals financial distress. Use the quick ratio to determine if companies in an industry are typically able to pay off their current liabilities.

Financial industry data provided by MicroBilt Corporation collected from 32 different data sources and represents financial performance of over 4.5 million privately held businesses and detailed industry financial benchmarks of companies in over 900 industries (SIC and NAICS). More data available by subscription or single report purchase at www.microbilt.com/firstresearch.

Current Liabilities to Net Worth by Company Size

The ratio of current liabilities to net worth, also called current liabilities to equity, indicates the amount due creditors within a year as a percentage of stockholders' equity in a company. A high ratio (above 80 percent) can indicate trouble.

Financial industry data provided by MicroBilt Corporation collected from 32 different data sources and represents financial performance of over 4.5 million privately held businesses and detailed industry financial benchmarks of companies in over 900 industries (SIC and NAICS). More data available by subscription or single report purchase at www.microbilt.com/firstresearch.

COMPANY BENCHMARK INFORMATION

NAICS: 31, 32, 33

Data Period: 2014	Last Update January 2016
Table Data Format	Mean

Company Size	All	Large	Medium	Small
Size by Revenue		Over $50M	$5M - $50M	Under $5M
Company Count	278987	3890	26706	248391

Income Statement				
Net Sales	100%	100%	100%	100%
Gross Margin	29.1%	28.4%	30.0%	32.5%
Officer Compensation	2.3%	2.0%	2.9%	3.7%
Advertising & Sales	0.7%	0.7%	0.6%	0.7%
Other Operating Expenses	23.9%	23.4%	24.5%	26.0%
Operating Expenses	26.9%	26.1%	28.0%	30.4%
Operating Income	2.2%	2.3%	2.1%	2.1%
Net Income	1.0%	1.1%	0.8%	0.8%

Balance Sheet				
Cash	8.0%	7.4%	9.5%	9.7%
Accounts Receivable	21.9%	21.5%	22.9%	23.0%
Inventory	18.4%	17.5%	21.0%	20.4%
Total Current Assets	54.6%	52.6%	59.9%	59.5%
Property, Plant & Equipment	27.3%	27.8%	25.6%	25.9%

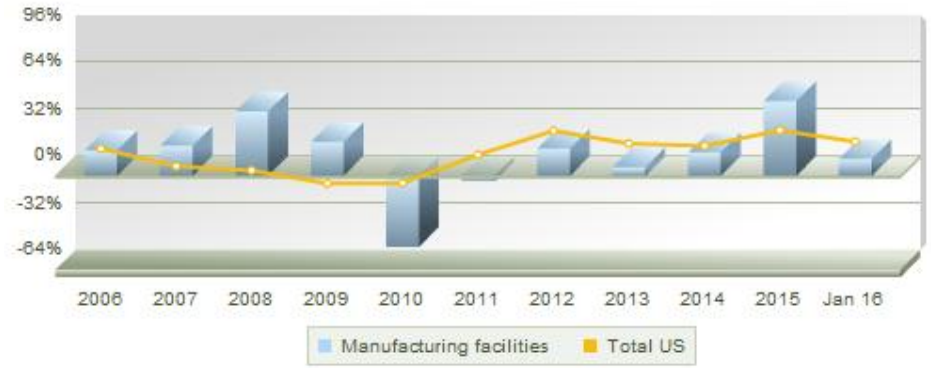
Other Non-Current Assets	18.2%	19.6%	14.6%	14.6%
Total Assets	100.0%	100.0%	100.0%	100.0%
Accounts Payable	12.2%	12.4%	11.9%	11.7%
Total Current Liabilities	26.6%	26.2%	27.6%	27.5%
Total Long Term Liabilities	24.8%	24.3%	25.3%	27.7%
Net Worth	48.6%	49.4%	47.2%	44.8%

Financial Ratios				
Quick Ratio	1.23	1.21	1.27	1.29
Current Ratio	2.05	2.01	2.17	2.17
Current Liabilities to Net Worth	54.7%	53.1%	58.5%	61.3%
Current Liabilities to Inventory	x1.44	x1.50	x1.31	x1.35
Total Debt to Net Worth	x1.06	x1.02	x1.12	x1.23
Fixed Assets to Net Worth	x0.56	x0.56	x0.54	x0.58
Days Accounts Receivable	49	49	49	49
Inventory Turnover	x6.34	x6.63	x5.66	x5.72
Total Assets to Sales	60.6%	61.5%	58.4%	57.6%
Working Capital to Sales	16.9%	16.2%	18.8%	18.5%
Accounts Payable to Sales	7.4%	7.6%	7.0%	6.8%
Pre-Tax Return on Sales	1.6%	1.7%	1.4%	1.4%
Pre-Tax Return on Assets	2.7%	2.8%	2.3%	2.3%
Pre-Tax Return on Net Worth	5.5%	5.6%	4.9%	5.2%
Interest Coverage	x2.59	x2.79	x2.19	x2.15
EBITDA to Sales	5.4%	5.6%	5.1%	5.2%
Capital Expenditures to Sales	3.1%	3.2%	2.7%	2.8%

Financial industry data provided by MicroBilt Corporation collected from 32 different data sources and represents financial performance of over 4.5 million privately held businesses and detailed industry financial benchmarks of companies in over 900 industries (SIC and NAICS). More data available by subscription or single report purchase at www.microbilt.com/firstresearch.

ECONOMIC STATISTICS AND INFORMATION

Annual Construction Put into Place - Census Bureau



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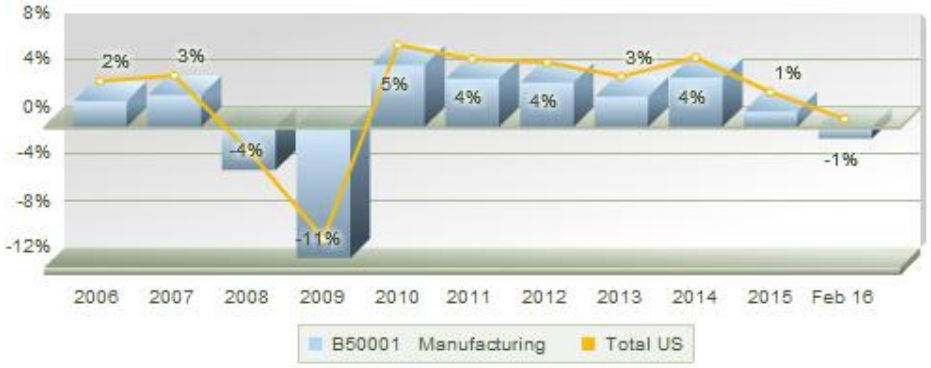

VALUATION MULTIPLES

No valuation multiples available for this industry.