

THE FUTURE OF Global Manufacturing

Overview

Global manufacturing has transitioned from labor-intensive processes to sophisticated, technology-driven operations.

Today, manufacturers face challenges like shifting supply chains, evolving consumer demands, and technological advancements. This report examines global manufacturing trends, the competitive landscape in Greater Phoenix and emerging opportunities for the region.

In 2023, Arizona's manufactured exports were valued at \$24.6 billion, contributing a majority of the state's total goods exports of \$28.8 billion.



6.25%
Nonfarm
Employment ¹



8%
Regional GDP ²



84%
Share of AZ
Exported Goods ³

Historical Context in the U.S.

The historical development of U.S. manufacturing reflects major shifts in industrial practices and economic power. In 1870, the U.S. accounted for 23% of global manufacturing output, only trailing the UK, but by 1913, it became the largest industrial economy in the world, reaching nearly 32% of global output. During this time, Greater Phoenix was largely focused on agriculture and natural resources, primarily within the 5Cs: copper, cattle, climate, cotton and citrus. The rise of the Industrial Revolution fueled this growth as advancements in machinery and techniques enabled mass production at unprecedented scales.

In Greater Phoenix, manufacturing gained momentum in the mid-20th century, with the aerospace and defense industries attracting companies like Hughes Aircraft and Motorola. This industrial base expanded throughout the post-World War II era, and the region became a key hub for defense-related manufacturing driven by firms like Honeywell and General Dynamics. Manufacturing at that time constituted a major part of the U.S. economy, with nearly 30% of the workforce employed in this sector.

1. 5-year average. AZ Office of Economic Opportunity Labor Statistics, October 2024, not seasonally adjusted

2. 5-year average. Lightcast 2024 Q4 Dataset, November 2024

3. 10-year average. U.S. Census Bureau, Exports of Goods for Arizona and Exports of Goods: Manufactured Commodities for Arizona, September 2024

Between 1979 and 2009, approximately eight million U.S. manufacturing jobs were lost due to globalization and offshoring, as production shifted largely to Asia. China drew electronics, textiles and machinery manufacturing due to its low labor costs and favorable policies. Mexico became a major manufacturing center for automotive and electronics under NAFTA, while Taiwan, South Korea and Japan focused on electronics and automotive industries. Vietnam, Malaysia, Thailand and India specialized in textiles and light manufacturing. Arizona's manufacturing sector experienced declines similar to the U.S., notably in textiles, metal fabrication and automotive parts due to competition from lower-cost producers abroad. However, the state countered these losses with growth in advanced manufacturing sectors like semiconductors and aerospace, establishing a more resilient industrial foundation.



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The Evolution of Global Manufacturing

The 21st century has ushered in a new era of technological innovation in manufacturing, often referred to as Industry 4.0. Advanced automation, artificial intelligence, and data analytics are now central to production processes, allowing for significant productivity gains and quality improvements. By 2022, over 30% of U.S. manufacturers had integrated advanced technologies, revolutionizing production efficiencies and cost management.

Greater Phoenix has emerged as a leader in the high-tech manufacturing landscape with companies like Axon, specializing in advanced public safety equipment, propelling the region into cutting-edge sectors. OnePointOne's advanced vertical farming technology reflects the market's capacity to embrace innovative agricultural solutions. FABRIC, a forward-thinking textile and apparel incubator, underscores its commitment to sustainable manufacturing practices, particularly in eco-conscious apparel. Global consumer product players like Red Bull, Nestle, Proctor & Gamble and Niagara Bottling contribute to the region's prominence by utilizing efficient, large-scale, sustainable production methods. Together, these and other organizations showcase Greater Phoenix's evolution into a versatile manufacturing hub, poised to lead and compete globally.



U.S. Policy Changes

In response to global supply chain disruptions, reshoring gained momentum, bringing 350,000 jobs back to the U.S. by 2022.⁴ In Phoenix, TSMC's \$65 billion investment in semiconductor fabrication plants aligns with U.S. efforts to secure domestic manufacturing for critical sectors.

Several presidents have enacted policies to bring global manufacturing back to the U.S., creating significant advantages for the national economy by strengthening domestic manufacturing, supporting technological advancement and fostering job creation. The American Recovery and Reinvestment Act and Advanced Manufacturing Partnership jumpstarted investment in high-tech manufacturing sectors, laying the groundwork for further innovation and driving competitiveness. Programs like the National Network for Manufacturing Innovation facilitated public-private partnerships that spurred advancements in key areas such as additive manufacturing, positioning the U.S. as a leader in cutting-edge technologies. The Tax Cuts and Jobs Act of 2017 and tariffs on Chinese goods incentivized businesses to maintain or bring back operations to the U.S., addressing trade imbalances and supporting domestic industries. Additionally, the United States-Mexico-Canada Agreement strengthened North American supply chains, particularly in automotive and electronics, reducing reliance on distant suppliers. Recent measures like the Bipartisan Infrastructure Law, CHIPS and Science Act, and Inflation Reduction Act further support domestic manufacturing by funding infrastructure upgrades, semiconductor production, and green energy projects, while Buy American Executive Orders reinforce demand for U.S.-made products in government procurement. Collectively, these policies strengthen economic resilience, bolster national security, and generate sustainable, high-quality employment, ensuring the U.S. maintains its competitiveness in the global economy. In Arizona, since the enactment of the CHIPS and Science Act in August 2022, notable developments include job creation in the semiconductor sector, partnerships between educational institutions and industry leaders to develop specialized programs aimed at increasing the talent pool, and the expansion of a robust supply chain ecosystem supporting advanced manufacturing.

4. The Reshoring Initiative, 2022 Report

Education and Workforce Development in Greater Phoenix

According to the National Association of Manufacturers, the skills gap in manufacturing is projected to leave 2.1 million jobs unfilled by 2030 and cost the U.S. economy \$1 trillion. To sustain growth in advanced manufacturing, Greater Phoenix is investing in workforce development through various initiatives including high school STEM, career technical education (CTE) programs, bachelor, graduate and doctoral degrees in manufacturing engineering, robotics and autonomous systems, systems engineering, industrial engineering, materials science and engineering, and a range of apprenticeship programs designed to propel the industry forward.

Apprenticeships in the market include programs in precision manufacturing, automated industrial technology, and electronics technology within the Arizona Advanced Manufacturing Institute at Mesa Community College, which collaborates with companies like Boeing and Intel to provide job placement opportunities after training. Intel's Advanced Manufacturing Technician Apprenticeship helps participants learn how to operate and maintain the highly technical equipment used in semiconductor production. Intel works closely with Chandler-Gilbert Community College and Mesa Community College to provide training pathways that align with industry needs. Western Maricopa Education Center partners with local manufacturers to offer apprenticeship-style training in CNC machining, robotics, and other advanced manufacturing skills. Boeing offers apprenticeships in precision assembly, automated production, and maintenance of aerospace components where participants receive on-the-job training and opportunities to gain industry-recognized certifications, positioning them as competitive career candidates in aerospace manufacturing.

Economics of Manufacturing in Greater Phoenix

Nonfarm manufacturing employment in Greater Phoenix has climbed steadily over the last decade. Overall manufacturing employment grew from 116,900 in 2013 to 149,400 in 2023, a 28% growth rate that significantly outpaces the 8% national growth during that time.

Between 2013 and 2023, the region saw significant job growth in transportation equipment, metal fabrication and chemical manufacturing, with the highest employment increases in apparel manufacturing (240%), electrical equipment, appliance and component manufacturing (136%), and chemical manufacturing (104%). Additionally, average earnings in the manufacturing sector rose markedly, particularly in apparel (108%), fabricated metal products (59%), wood products (66%) and petroleum and coal products manufacturing (63%).

Although employment concentrations in Greater Phoenix generally remain below national averages, subsectors such as electrical equipment, apparel, chemical, and paper manufacturing have shown significant growth. For example, the category of miscellaneous manufacturing increased its location quotient (LQ) from 0.69 in 2013 to 1.02 in 2023.⁵ Apparel manufacturing rose from an LQ of 0.07 to 0.32, electrical equipment, appliance and component manufacturing grew from 0.28 to 0.52, while chemical and paper manufacturing increased from 0.39 to 0.61 and 0.31 to 0.48, respectively.

5. Location Quotient (LQ) measures the concentration of industry in a geography compared to the United States. An LQ less than 1 indicates the industry is less concentrated than the U.S.; an LQ above 1 indicates greater concentration. For example an LQ of 1.5 would mean the industry is 50% more concentrated than the U.S.

Greater Phoenix Manufacturing Economic Data

	2013	2023	% Change	U.S. % Change
Employment	116,922	149,462	28%	8%
Payrolled Business Locations	3,207	3,794	18%	17%
Location Quotient	0.74	0.77	4%	N/A
Average Earnings Per Job	\$84,091	\$111,597	33%	33%

Source: Lightcast 2024 Q4 Dataset, November 2024

Global Manufacturing Future Outlook

Greater Phoenix and Arizona are poised to play increasingly significant roles in the global manufacturing sector, driven by strategic growth in high-tech and advanced manufacturing industries. Arizona’s strength in semiconductors, aerospace and electric vehicle production aligns well with broader national trends toward reshoring and supply chain resilience.

The U.S. Department of Energy estimates energy efficiency improvements in manufacturing could reduce energy consumption by 25% by 2030, leading to a reduction of 10% in carbon emissions. Greater Phoenix is capitalizing on this with companies such as JA Solar, NE Solar and Meyer Burger leveraging cutting-edge technologies to manufacture solar panels while promoting sustainable manufacturing practices.

Despite recent rises in operational costs and competition from neighboring states like Texas and Nevada, collaborations with Mexico’s manufacturing hubs in Baja California and Sonora further strengthen Greater Phoenix’s supply chain flexibility and cross-border integration, particularly in the automotive and electronics sectors.

Strategies Driving Future Success

Establish Programs that Encourage Smart Manufacturing

Upgrading to digital networks that support smart manufacturing initiatives will facilitate real-time data exchange and process optimization for most companies. To induce development in Arizona the state could expand programs and offer benefits to companies that focus on these technologies, as well as rapid prototyping and customized production such as 3D printing, enabling faster product development and reducing material waste.

Further Pathways Through Post-Secondary Education Collaboration

The region stands to benefit from further industry-led educational institution collaborations, such as Arizona State University, University of Arizona, Northern Arizona University and local community colleges aligning curricula, creating joint degree programs and establishing transfer pathways in high-demand manufacturing fields. These partnerships can ensure a long-term, consistent pipeline of skilled talent to meet the state's workforce needs.

Continue Advancing Port and Regional Infrastructure Investments

Greater Phoenix should capitalize on its strategic location near West Coast ports and the U.S.-Mexico border by continuing to invest in road, rail and air transport infrastructure. These investments should focus on expanding highways, upgrading rail connections and enhancing cargo handling capacities at Phoenix Sky Harbor International Airport to ensure efficient and streamlined movement of goods across the region.

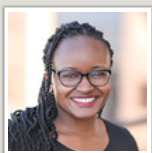
Modernize Arizona's Economic Development Tools

Over the last two decades, Arizona has developed a set of tools to grow the manufacturing industry in the state such as the Qualified Facilities tax credit, reimbursement of public infrastructure for large-scale manufacturing projects and a tax environment conducive to business. However, competition for manufacturing growth and reshoring continues to intensify in the South, Southeast and Upper Midwest. The state needs to develop additional policies such as on-the-job-training resources for incumbent manufacturers, new community development tools for public infrastructure to ensure it stays ahead of future industry growth needs in water, wastewater and roads, and continue to modernize our current policies to keep up with the changing needs of businesses.

Reduce Import Reliance in Key Production Subsectors

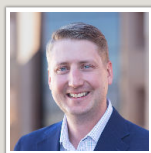
From 2013 to 2023, the number of payrolled businesses in primary metal manufacturing, leather and allied product manufacturing, and textile mills in Greater Phoenix declined by 9%, 33%, and 25%, respectively. To reverse this trend, effective policies and a robust business ecosystem are essential to fostering company growth and preventing further contraction. Stakeholders should collaborate to strengthen the region's production capabilities within these subsectors, aiming to meet local demand and reduce reliance on imports.

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