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The manufacturing renaissance: Reshoring, innovation, and industrial strategy for US competitiveness

Joan Jané

Holly Anne Hill

IESE
Business School
University of Navarra

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Authors

Joan Jané
Professor of the Practice of Management of Operations, Information and Technology

Holly Anne Hill
Research assistant

Design: IESE Business School: www.iese.edu

Executive summary

The United States is experiencing a historic resurgence in domestic manufacturing driven by a convergence of technological innovation, geopolitical tensions, environmental sustainability, and policy incentives. This "manufacturing renaissance" marks a strategic shift in national priorities—transforming supply chains, advancing workforce development, and reshaping industrial competitiveness.

Key drivers of reshoring

- **Supply chain resilience**: COVID-19 and global instability revealed deep vulnerabilities in supply chains, pushing companies to simplify operations, reduce lead times, and improve quality control.

- **National security & strategic independence**: Rising geopolitical tensions, especially between the US and both China and Russia, have accelerated the push for domestic manufacturing in sectors such as semiconductors, defense, and pharmaceuticals.

- **Tariffs & trade policy**: Although not a direct reshoring tool, tariffs have increased the cost of offshoring and created pressure for increased local production.

- **Rising global labor costs**: Wage growth in historically low-cost regions is closing the gap with similar costs in the United States, diminishing offshoring's economic advantage

- **Technological advancements & industry 4.0**: Automation, AI, additive manufacturing, and the Internet of Things (IoT) are reducing reliance on low-cost labor and enabling flexible, responsive production.

Workforce challenge

The most critical workforce constraint in the US is a shortage of skilled labor. An estimated 1.9 million manufacturing jobs may go unfilled by 2033. Targeted workforce development, especially in the Midwest, Southeast, and West Coast, will be essential for success.

Industry insights

- **Short-Term reshoring**: Pharmaceuticals, aerospace, and defense

- **Mid-Term reshoring**: Electronics, automotive, and food and beverage

- **Long-Term reshoring**: Textiles, fast-moving consumer goods (FMCG), and labor-intensive sectors

Recommendations

1. Invest in Industry 4.0 technologies and agile manufacturing
2. Build regional workforce pipelines through public–private partnerships
3. Create resilient supply chains through localization and digitalization
4. Align strategy with policy incentives (the Creating Helpful Incentives to Produce Semiconductors [CHIPS] and Science Act, Inflation Reduction [IRA] Act, and Buy American Act)
5. Foster regional innovation ecosystems for sustainable growth

Conclusion

Reshoring is no longer just an economic strategy—it is a national imperative. With the correct alignment of innovation, workforce development, and policy, the United States can reclaim its leadership in global manufacturing and secure its economic future.

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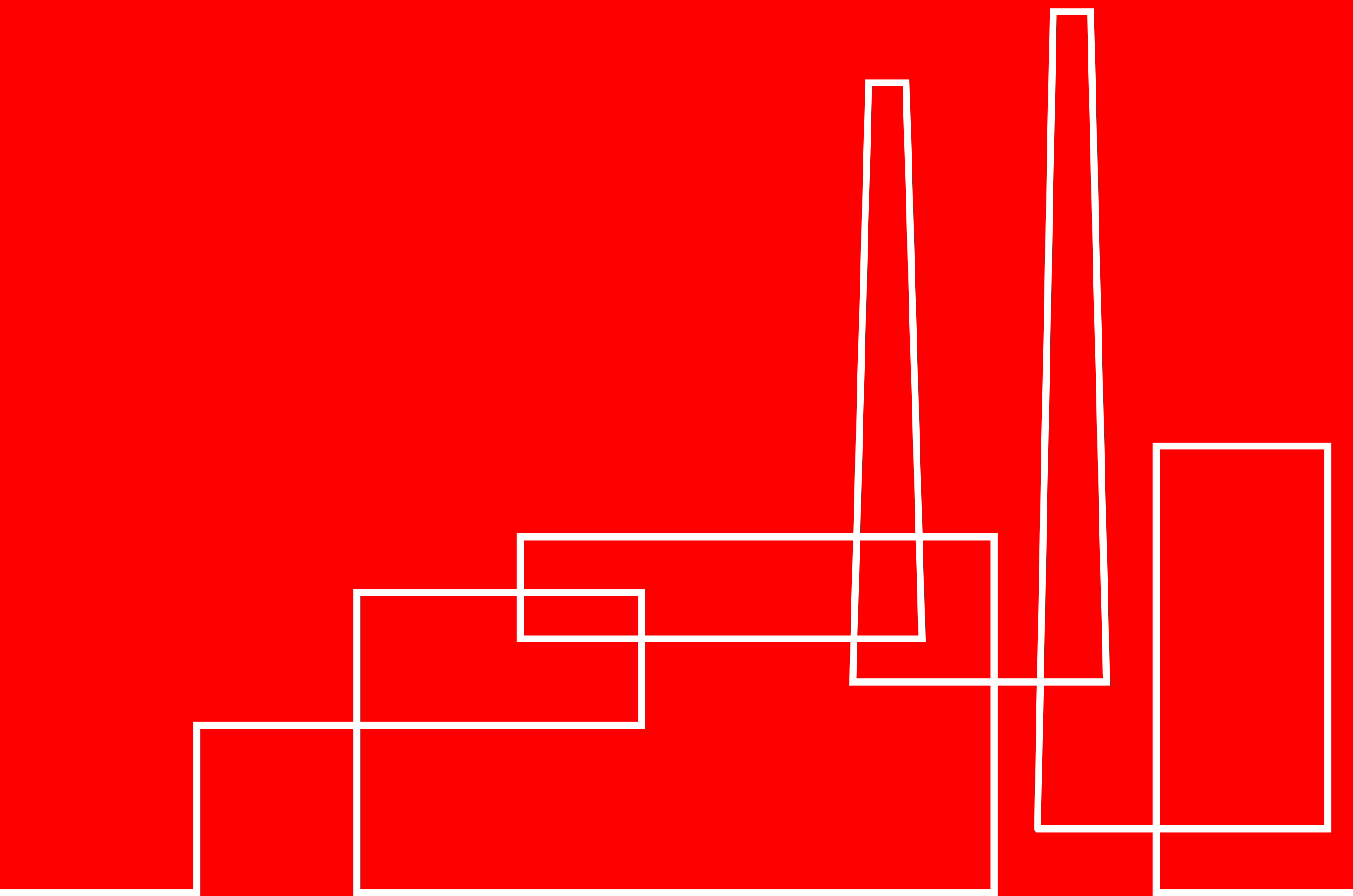


1. Key terms: The manufacturing renaissance

This glossary defines essential terms used throughout the report, particularly those that reflect core concepts of modern manufacturing transformation.

Industry 4.0

Also known as the Fourth Industrial Revolution, Industry 4.0 refers to the current trend of automation and data exchange in manufacturing. It combines cyber-physical systems, the Internet of Things (IoT), cloud computing, and cognitive computing to create smart factories where machines, systems, and products interact in real time.

Goals include the following:

- Optimizing production
- Enhancing flexibility
- Improving efficiency and decision-making across the value chain

Internet of Things (IoT)

The IoT refers to a network of physical devices embedded with sensors, software, and connectivity functionality, allowing them to collect and exchange data over the Internet. These connected devices—ranging from household items to industrial tools—enable the following:

- Automation
- Real-time monitoring
- Data-driven decision-making
- Enhanced operational efficiency
- In manufacturing, the IoT is key to developing responsive, intelligent production systems.

Big data

Big data refers to datasets that are extremely large, diverse, and quickly changing—in other words, too complex to be handled with traditional data-processing tools. Big data can be defined by three Vs:

- **Volume**. Massive amounts of data
- **Velocity**. Rapid generation and processing of data
- **Variety**. Diverse data formats (structured, unstructured, semi-structured)

Big data enables predictive analytics, real-time monitoring, and optimization in manufacturing environments.

Smart manufacturing

Smart manufacturing is the application of advanced digital technologies—such as sensors, cyber-physical systems, automation, and real-time analytics—to enhance manufacturing operations. It seeks to accomplish the following:

- Increase efficiency and flexibility
- Reduce production costs and errors
- Improve product quality
- Enable rapid responsiveness to market shifts

Smart manufacturing is a foundational pillar of Industry 4.0, which is focused on making factories more adaptive, data driven, and efficient.

Agile manufacturing

Agile manufacturing is a strategic approach that enables companies to swiftly adapt to rapidly changing market conditions, evolving consumer demands, and technological advancements. It emphasizes flexibility, responsiveness, and the integration of advanced technologies to efficiently produce high-quality, customized products.

Key components include the following:

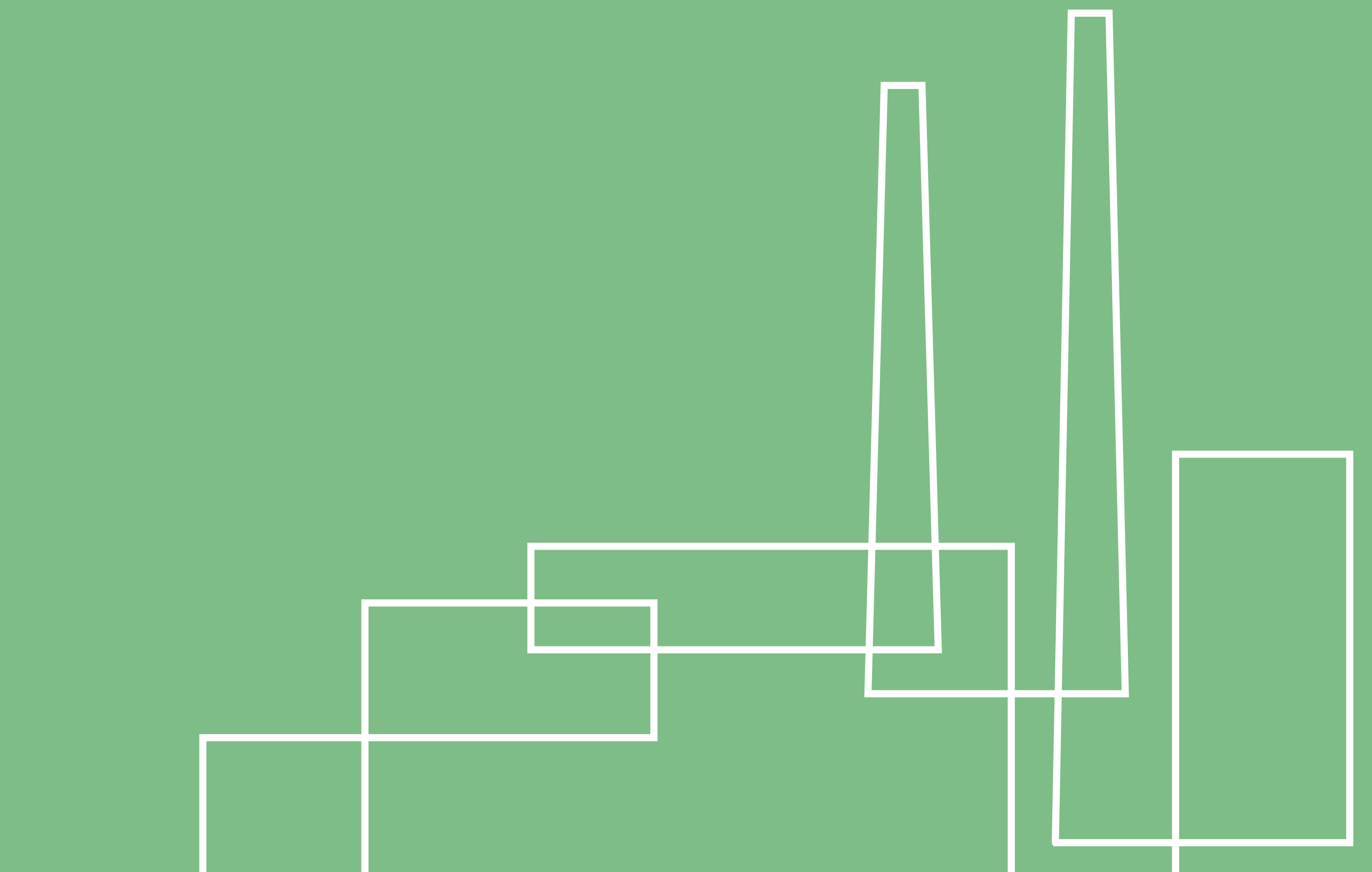
- Process management for rapid adjustments
- Organizational agility for faster decision-making
- Advanced technology integration, such as human–machine interaction, additive and subtractive manufacturing, cyber-physical systems, IoT, big data, and artificial intelligence

Agile manufacturing encourages the use of manufacturing as a service (MaaS) and pay-per-use business models to align production capabilities with dynamic market demand.

- Drivers of agile manufacturing include the following:
- Intensified global competition
- Fragmentation of mass markets
- Social and environmental pressures
- Demand for ethical labor practices and higher-quality production

Agile manufacturing represents a shift from traditional mass production to a more flexible, technology-driven model that equips manufacturers to meet modern market challenges and opportunities.

2. Introduction



2. Introduction

The United States is currently experiencing a resurgence in domestic manufacturing, driven by shifts in the global economic landscape and rapid technological advancements. This manufacturing renaissance signals a new era of opportunity, along with a new set of challenges for industries within the US.

While this resurgence has accelerated under the new Trump administration, it also reflects a broader trend that has occurred under multiple administrations. In 2001, policy attention toward domestic manufacturing in the US intensified notably during a period that has been described as the "China shock." At that time, China's accession to the World Trade Organization was followed by an increased US dependence on a surge in Chinese exports, which contributed to substantial job losses across many American manufacturing sectors.

In 2014, the Obama administration responded with the launch of the "Manufacturing USA" initiative. This initiative aimed to reinvigorate domestic US industries through a public–private partnership model, bringing together federal agencies, universities, national labs, large manufacturers, small and medium-sized enterprises (SMEs), and state and local governments. Coordinated by the National Institute of Standards and Technology (NIST) (2023) in partnership with the Department of Defense, Department of Energy, and the National Science Foundation, the initiative enhanced US competitiveness in advanced composites, photonics, robotics, digital manufacturing, smart sensors, and additive manufacturing. It also fostered workforce development through over 200 R&D projects and the participation of more than 1,000 companies and organizations. Between 2010 and 2016, over 800,000 manufacturing jobs were added.

Building on this foundation, in 2017, the Trump Administration implemented Executive Order 13797 to bolster support for American workers and manufacturers. Citing national security concerns, it imposed a 25% tariff on steel and a 10% tariff on aluminum imports. These actions were followed by tariff increases—up to 145%—on certain imports from China, with the intent of encouraging domestic production. These trade measures were supported by the Export Control Reform Act of 2018, which granted the president authority to restrict exports for national security and foreign policy reasons.

Additionally, Executive Order 13788, titled "Buy American, Hire American," which was signed in 2017, promoted the use of US-made goods and labor in federal projects. Collectively, these efforts advanced trade protectionism, infrastructure investment, workforce development, and regulatory reform aimed at securing American industrial capabilities.

The Biden administration further strengthened these efforts with a comprehensive industrial strategy. Key legislative actions at this time included the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act, which incentivized domestic semiconductor research and manufacturing; the 2022 Inflation Reduction Act (IRA), which promoted clean energy, electric vehicles (EVs), and sustainable industry; and the Infrastructure Investment and Jobs Act, which allocated $1.2 trillion for infrastructure development—including transportation, broadband, and energy systems. Building on prior momentum, Biden's 2021 "Made in America" executive order reinforced procurement rules to prioritize US-made goods and services.

Collectively, the efforts of these three administrations have contributed to the creation of over 775,000 domestic manufacturing jobs and nearly $800 billion in private-sector investment. They have also stimulated regional development and accelerated progress in clean and sustainable manufacturing.

To understand the dynamics of this resurgence, one must examine the key drivers of reshoring, which will be explored in depth in the following sections:

1. Supply Chain Resilience
2. National Security, Strategic Independence, and Industrial Policy Incentives
3. The Role of Tariffs and Trade Policy
4. Rising Global Labor Costs
5. Technological Advancements and Industry 4.0

Although the tariffs proposed so far under the second Trump administration have not been primarily designed as a reshoring policy, they function as a trade weapon to address perceived imbalances and penalize unfair practices—particularly with regard to China. However, these tariffs exert an indirect, sector-specific influence on reshoring by making foreign imports more expensive and less attractive.

Primary purposes of Trump's tariffs:

- Trade leverage and negotiation tool
- Punitive action against foreign competitors (especially China)
- Political signaling: "America First"
- Reducing dependence on strategic rivals
- Protecting key US industries from foreign competition

Reshoring is an expected consequence but not the intent. Tariffs raise the cost of importing, which can encourage companies to

- Reshore production to avoid tariff exposure
- Reduce dependence on China through diversification that includes relocating to other countries or back to the United States
- Accelerate investment in automation to offset higher domestic labor costs

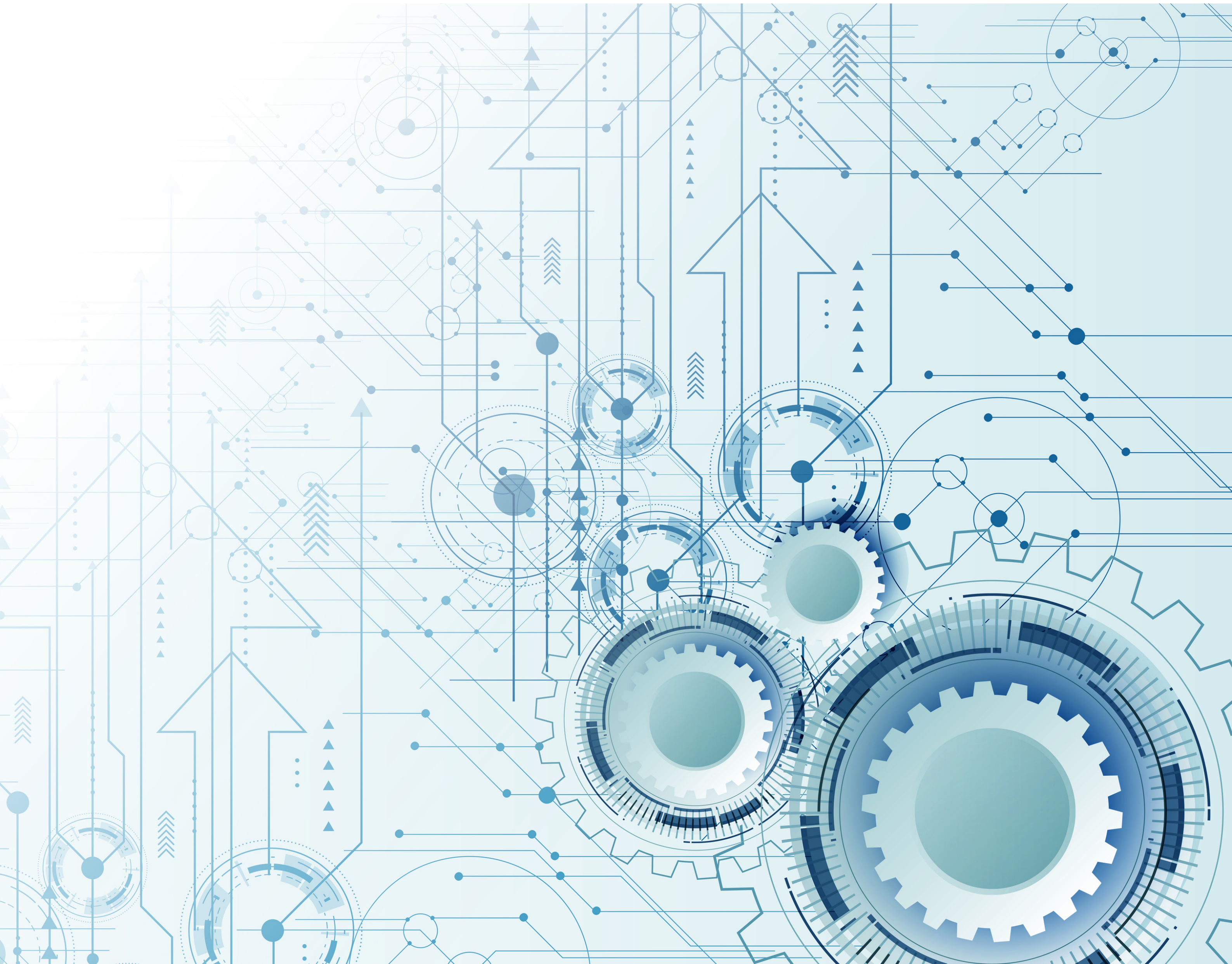
However, reshoring is not driven by tariffs alone. It is the result of a complex interplay among the previously listed drivers—economic, strategic, technological, and political. The following sections include analyses of each of these drivers in detail.

To fully appreciate the present reshoring momentum, one must first examine the broader historical context of US manufacturing. While the United States has long been a global leader in manufacturing innovation, globalization has altered the competitive landscape. Starting in the 1970s and accelerating through the 1980s, countries such as China, India, and others in Southeast Asia have gained manufacturing dominance by leveraging lower labor and raw material costs. High-quality production at contained costs became their core competitive strength.

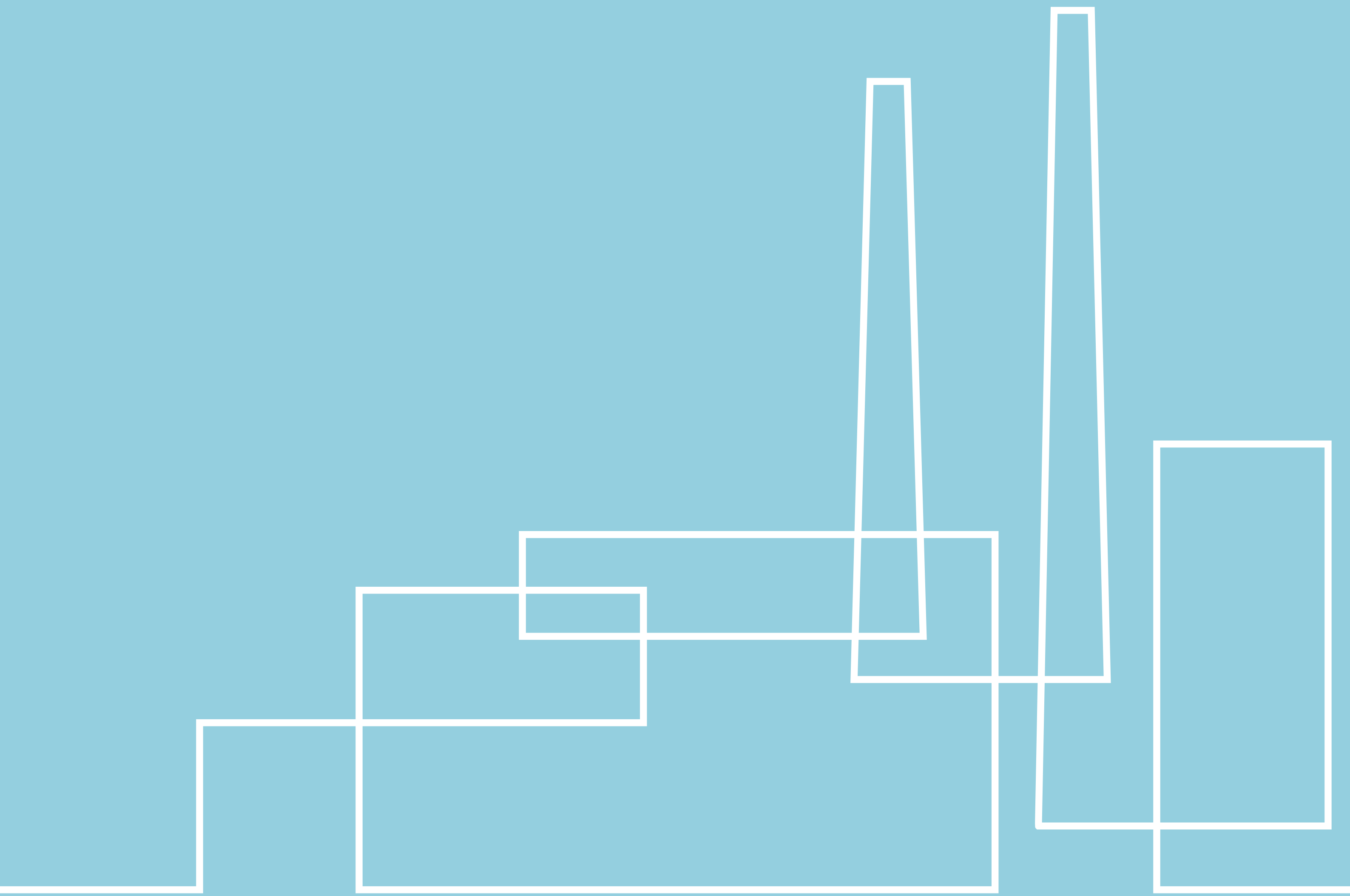
As a result, China, Canada, and Mexico emerged as the top trading partners of the United States, although not without geopolitical tension. Today's reshoring momentum is fueled by rising tariffs, growing support for the "Made in America" movement, advances in technology, and the urgent need to simplify complex global supply chains.

This urgency was increased in 2020 by the COVID-19 pandemic, which exposed vulnerabilities in global supply chains. Disruptions in labor, materials, and regulation have led businesses and governments to reassess global sourcing strategies. Simplifying the supply chain has become a strategic imperative—reducing both risk and cost while supporting domestic production to meet evolving economic and geopolitical goals.

Alongside these disruptions, rising labor and shipping costs have further motivated reshoring efforts (McLaughlin and Peterson, 2023).



3. Manufacturing renaissance drivers



3. Manufacturing renaissance drivers

3.1. Supply chain resilience

Supply chain resilience represents the ability of a production and distribution network to anticipate, absorb, recover from, and adapt to disruptions. As supply chains have been increasingly experiencing many disruptions, supply chain resilience has become more important than ever. The greatest supply chain disruptors include pandemics, geopolitical shocks, raw materials shortages, and cyberattacks. The COVID-19 pandemic exposed the fragility of the global supply chain network with concerns regarding just–in–time models. This fragility was demonstrated by widespread delays, product shortages, inflation, production shutdowns, and backlogs, resulting in an overall loss of business confidence. During and after COVID-19, there were factory shutdowns, ports were paralyzed, global demand increased greatly, and labor shortages occurred globally. Just-in-time models, which had previously been implemented to minimize inventory, were exposed as having insufficient buffers. As a result, this disruption led to critical shortages of chips, masks, packaging, food ingredients, electronics, and auto parts, among others. Thus, there has been a demand for an alternative plan for raw materials and finished goods.

Geopolitical shocks due to various disruptors additionally emphasized the importance of supply chain resilience. For example, the Ukraine War resulted in geopolitical fracturing, and fluctuating shortages in energy, fertilizer, and metal supply chains. US–China tensions have resulted in tariffs, risk assessments, and concerns of cyberattacks, affecting critical tech sectors, such as computer chips, batteries, and telecom materials. Since 2023, the Red Sea Crisis, involving attacks on commercial ships in Yemen, has disrupted supply chains considerably. Nearly 15% of global seaborne trade and 30% of all container traffic pass through the corridor in this area. The Red Sea route is a vital shipping lane that connects Asia to Europe and the East Coast of North America. Due to the disruption, thousands of ships have been rerouted, resulting in nearly tripled shipping rates, lead time delays of 10-15 days, nearly $1 trillion worth of goods impacted, and congested African ports (Reuters, 2024).

These various supply chain disruptors have motivated companies to rethink the strategic vision of their supply chains, resulting in the movement of supply chain simplification and resilience. Supply chain simplification promotes a shift from efficiency to reliability, prioritizing predictability higher than short-term cost minimization. This predictability can be achieved by moving production closer to end markets in order to reduce lead times, avoid geopolitical chokepoints, and gain better control over the quality of production. Simplification of the supply chain includes relying far less on at-risk suppliers and increasing reliance on regional integration. Reshoring encourages integrating advanced technologies to adjust inventory levels dynamically. IoT sensors, predictive analytics, and AI-driven risk alerts can all be used to manage supply chain simplification and the minimization of risk. Shortening supply lines inevitably improves agility and reduces transport risk. In a globalized world, the use of multi-modal logistics is recommended rather than relying on one source of transportation. Furthermore, supply chain resilience includes working closely with suppliers and building strong partnership relationships that can function with transparency regarding forecasts, quality standards, and contingency plans. Simplified supply chains are not only more resilient but are also more aligned with environmental, social, and governance (ESG) compliance requirements, presenting greater ease of traceability and risk mitigation.

In conclusion, resilient supply chains must deliver continuity, agility, and control. Supply chain fragility inevitably results in an increase in costs and delayed shipments due to increased risks. In response, firms are simplifying operations, reshoring critical capabilities, and leveraging advanced digital tools to effectively manage and build resilient supply chains.

3.2. National security, strategic independence, and industrial policy incentives

Geopolitical instability is a growing driver of reshoring in the United States. Factors such as the Russia–Ukraine war and mounting tensions between the United States and China have exposed vulnerabilities in global supply chains. Companies operating in or dependent on these regions have faced delays, material shortages, and operational shutdowns. These disruptions have amplified the risks associated with an overreliance on foreign suppliers, particularly for critical goods and technologies.

The US–China relationship, in particular, has been a flashpoint. Tariffs imposed on a wide range of Chinese goods have driven up costs and introduced uncertainty into long-established outsourcing models. National security concerns surrounding China have also triggered broader scrutiny, especially regarding dependence on foreign-made technologies, such as semiconductors.

In response to these risks, the US government has launched a series of legislative and industrial initiatives to promote strategic independence. Chief among these is the CHIPS and Science Act, which was implemented to bolster the domestic production of essential technologies. By incentivizing US-based semiconductor research and manufacturing, this legislation aims to secure critical supply chains and reduce their exposure to geopolitical volatility.

Moreover, the unpredictability of international regulatory environments—including sanctions, tariffs, and changing trade agreements—makes domestic production a more stable and secure alternative. In this context, reshoring is not just an economic decision but a national security imperative.

In support of domestic production, the Infrastructure Investment and Jobs Act (IIJA) of 2021 allocated $1.2 trillion over several years to modernize core infrastructure. This included funding for roads, bridges, public transit, railways, airports, ports, water systems, broadband expansion, and energy grids. A more advanced and resilient infrastructure network provides the necessary foundation for manufacturers to operate efficiently and securely within the borders of the US (J.P. Morgan Private Bank, 2025).

In tandem, the Inflation Reduction Act (IRA) of 2022 reinforced these efforts by advancing clean energy initiatives and domestic industrial capacity. The IRA offers substantial tax credits and grants to support clean energy production, advanced manufacturing, and the electric vehicle (EV) supply chain. Notably, the Advanced Manufacturing Production Tax Credit encourages the US-based production of solar panels, wind turbines, batteries, and critical mineral components. These incentives are tied to workforce upskilling requirements, promoting the development of a highly skilled labor pool aligned with sustainable industrial growth (US Department of the Treasury, 2022).

In summary, reshoring driven by national security and strategic independence reflects a broader recognition of the risks inherent in global interdependence. By reducing reliance on foreign actors, investing in domestic infrastructure, and incentivizing advanced manufacturing, the United States is fortifying its industrial base for a more resilient and geopolitically secure future.

3.3. The role of tariffs and trade policy

The resurgence of domestic manufacturing in the United States cannot be attributed to a single policy or economic shift. Instead, it is the result of a complex interplay of economic, geopolitical, and technological forces—including the strategic use of tariffs.

Protecting US manufacturing and jobs

One of the primary objectives of tariffs is to protect American industries and jobs. By making imported goods more expensive, tariffs encourage companies and consumers to favor domestically made products. This shift can revitalize local production and support the reshoring of supply chains—particularly in sectors such as steel and aluminum, which are essential inputs in the automative and semiconductor industries, among others.

Reducing trade deficits

Tariffs also aim to reduce the US trade deficit, which the Trump Administration has viewed as a sign of economic imbalance and unfair trade practices—especially with regard to China. By discouraging imports and encouraging exports, tariffs are intended to reassert US competitiveness on the global stage. As the United States' largest trade rival, China has been the primary focus of these measures. In the 2018 USTR Section 301 Report, US policymakers expressed concern over China's forced technology transfers, state subsidies, and intellectual property theft (Office of the United States Trade Representative, 2018). These concerns and China's recent "Made in China 2025" initiative have led to increased US tariff actions intended to counter China's industrial dominance.

Strengthening national security

Certain tariffs are justified on national security grounds. For example, Section 232 of the Department of Commerce's steel report identified the decline in domestic steel production as a national security risk, particularly in the areas of defense and infrastructure (U.S. Department of Commerce, 2018). In this view, maintaining a robust domestic manufacturing base is essential to strategic autonomy during periods of geopolitical instability.

Negotiating better trade deals

Tariffs can also be used as bargaining chips in international trade negotiations. The Trump administration has employed tariffs to secure more favorable terms with international trading partners such as Canada, Mexico, and the European Union. One major outcome was the United States–Mexico–Canada Agreement (USMCA), which included enhanced rules-of-origin requirements and stronger intellectual property protections (Office of the United States Trade Representative, 2020).

Rebuilding political support in industrial regions

Politically, tariffs resonate with voters in regions affected by deindustrialization and globalization—particularly in the US Rust Belt. They serve as a symbolic and practical demonstration of support for American workers, bolstering the political narrative of an "America First" industrial revival. Areas heavily exposed to import competition from China have shown considerable support for protectionist policies.

The tariff tipping point: When local production becomes competitive

A critical concept in assessing the real-world impact of tariffs is the tariff tipping point—the tariff rate at which the present value of localizing production outweighs the cost of continuing to import goods and pay duties. Once this threshold is crossed, localizing production becomes the financially superior option.

The tariff tipping point is industry- and context-specific, shaped by multiple factors:

- **Cost structure:** In labor-intensive industries, such as furniture or textiles, the tipping point may be very high due to significantly lower labor costs abroad. For example, smartphone assembly, where labor represents a major cost share, would require tariffs in the range of 30% to 35% to make reshoring to the U.S. viable.

- **Capital intensity:** Industries with higher capital intensity and lower labor input can justify localization at lower tariff rates. In battery cell manufacturing, where automation plays a greater role, tariffs of just 10% to 15% may already justify reshoring due to asset-heavy economics.

- **Pass-through ability**: Industries with strong product differentiation, like medical equipment or industrial machinery, can often pass tariff costs to consumers through higher pricing. In contrast, commoditized goods, like furniture or apparel, see rapid margin erosion even at modest tariff levels, as they lack pricing power.

- **Geographic substitution**: Tariffs often encourage a shift not directly to the U.S. but to low-cost countries outside the targeted region. For example, when factories in Mexico faced a 25% tariff, many reported that exporting became economically unviable, prompting reconsideration of production footprints entirely.

Liberation day tariff and its implications

On April 2, 2025, President Trump announced the "Liberation Day" tariff, scheduled to take effect on July 9, 2025. This sweeping measure targeted 80% of imported goods from key trade partners, with the following rates:

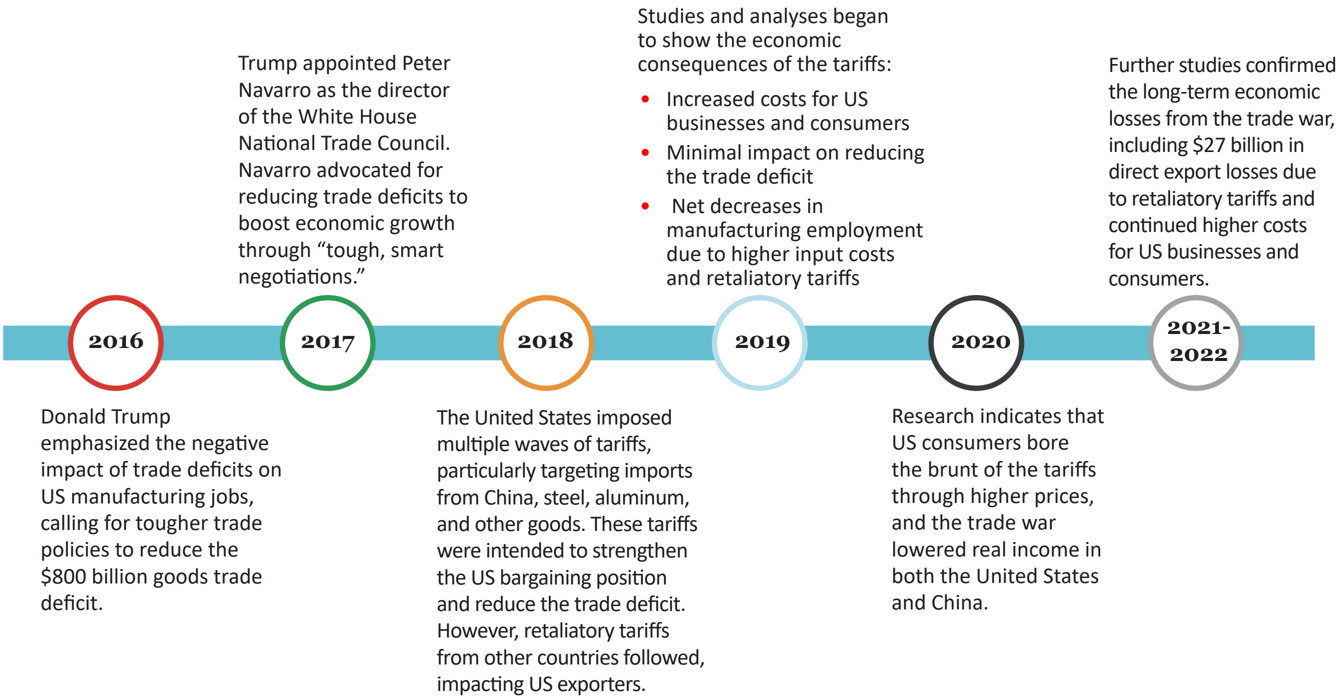
- **145% on Chinese imports**
- **27% on Indian imports**
- **32% on Indonesian imports**
- **46% on Vietnamese imports**

The sectors affected include pharmaceuticals, copper, lumber, semiconductors, chemicals, and energy. The automotive industry will face a 25% tariff on imported vehicles and parts, although Canada and Mexico will remain exempt under USMCA (Automotive Logistics, 2025). If enacted, these tariffs could add $79.7 billion in taxes within the first year (American Action Forum, 2025).

Trump-Era tariff strategy in practice

The Trump Administration's tariff strategy began with a focus on China's trade practices, resulting in tariffs of $60 billion worth of Chinese imports in March 2018. By September 2019, a 15% tariff was imposed on $112 billion in imports, contributing $11 billion in tax revenue. After the US–China Phase One trade deal was signed in 2020, and during the Biden administration's review period, tariff rates fluctuated but continued to focus on goods such as semiconductors, steel, aluminum, and critical raw materials. As of April 2025, Section 301 tariffs on China accounted for $77 billion of the total $79 billion in US tariffs. In response, China imposed retaliatory tariffs on over $106 billion in US goods, generating $11.6 billion in counter-tariffs (York and Durante, 2025).

Figure 1. Timeline on the Trump administration's tariffs



Source: https://taxfoundation.org/research/all/federal/trump-tariffs-trade-war/

Macroeconomic Impacts and Fiscal Policy Implications

Beyond trade dynamics, tariffs may contribute to federal debt reduction. A University of Pennsylvania study (Penn Wharton Budget Model, 2025) suggests that replacing borrowing with tariff revenues could reduce the federal debt by 7.3% by 2030. Additionally, reduced imports—especially in sectors such as steel, aluminum, auto parts, and electronics—create incentives for domestic sourcing and production. Though components may be more expensive to manufacture in the United States, this shift could stimulate GDP growth in local communities. According to Schiller International University (2025), tariffs can selectively reduce trade deficits by curbing imports in key industries and supporting domestic output.

Conclusion

While tariffs are not a direct reshoring policy tool, they function as a critical lever within a broader industrial strategy. By altering the cost-benefit calculus, especially near or beyond the tariff tipping point, they influence sourcing decisions across multiple sectors. To be effective, however, tariffs must be paired with investment in digital manufacturing, workforce development, and regional infrastructure to ensure the long-term sustainability of reshoring momentum.

3.4. Rising global labor costs

Due to factors such as globalization, wage inflation, and skill shortages, global labor costs have been on the rise. According to S&P Global PMI data, there has been a post-2020 surge in manufacturing prices, inclusive of manufacturing service prices. Global labor prices increased considerably from 2021, with a peak in 2022. In early 2022, this peak in global labor prices reached nearly nine times the long-term average (S&P Global Market Intelligence, 2023).

Globalization has exposed labor markets to international wage comparisons, which not only lessens wage inequality but also raises pressure for employers to follow the optics of ESG. Additionally, skill shortages drive global demand and result in even higher wage increases for skilled workers.

According to the International Labor Organization, as of 2024, real wage growth was driven by labor shortages and stronger bargaining in various countries. In the Asia-Pacific region, China has been a strong performer with wages increasing by 1.6%, with a 2024 projection of a 2.9% increase. In Central and Western Asia, there was a wage increase at a rate of 25.1% in 2023, and 17.9% as of 2024. In advanced G20 economies, wage growth presented mixed outcomes due to inflation and limited productivity growth. Around 50% of countries raised minimum wages from 2016 to 2023 while slowly decreasing global wage inequality (International Labor Organization, 2024). In addition, Deloitte has found that India's blue-collar wages in the manufacturing sector are rising at a consistent 5%–6% annual rate. This reflects growing industrial activity, the formalizing of labor practices, and intentional pay equity efforts (Deloitte and The Manufacturing Institute, 2024).

At the same time, Bloomberg's analysis of US manufacturing versus national wage growth suggests that manufacturing wage growth has outpaced the national average since 2022. As of January 2024, manufacturing wage growth was 5.5%, compared to 5.2% nationally. This aligns with the fact that divergence highlights stronger labor market pressure in post-pandemic manufacturing. From mid-2021, wages accelerated sharply, peaking around mid-to-late 2022, with manufacturing peaking near 6.8%. The manufacturing wage growth may reflect that there is pressure to retain experienced workers, lower labor substitutability, and compete more strongly for talent (Bloomberg Finance L.P., 2024).

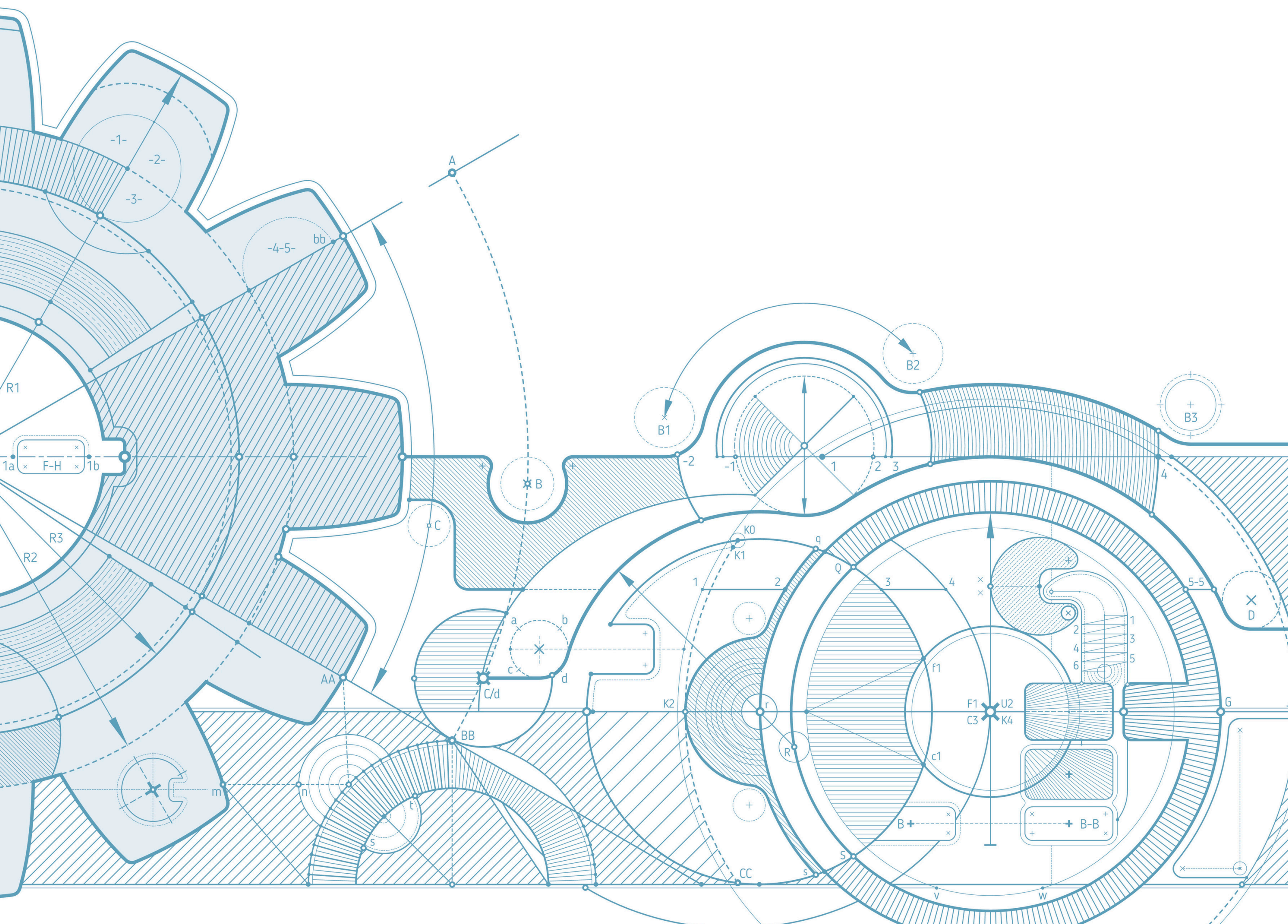
These rising global labor costs, as well as declining levels of inequality, present a structural shift shaped by various global dynamics. The evidence across a number of sources, including S&P Global, ILO, Deloitte, and Bloomberg, suggests that labor is becoming more expensive globally. The movement from traditionally low-cost manufacturing regions to reliable, more technologically advanced production drives companies to rethink their global production strategies. Notably, lower-cost countries have increasing wages, domestic production remains more competitive, and the gap between traditionally cost-effective countries and domestic costs narrows. The rise of global labor costs, as well as transportation, tariffs, lead times, quality control, and intellectual property risks, poses the total cost of ownership of offshoring to be increasing less attractive. In conclusion, this furthers an economic case influencing the reshoring movement, which aligns well with long-term cost stability.

3.5. Technological advancements and industry 4.0

Technological advancement has become a pivotal force in the resurgence of domestic manufacturing. The history of technological progress in the US industry is deeply intertwined with the country's rise as a global economic leader. From what is now being called the First Industrial Revolution, when the United States embraced the introduction of interchangeable parts and mechanized textile mills, to the further developments of mass production and the assembly line, innovation has consistently driven American manufacturing. The 20th century brought further breakthroughs with the integration of electricity, automated machinery, and computer-aided design, supporting the growth of new and expanding industries, such as automotive, aerospace, and electronics. These developments laid the foundation for today's high-tech innovation environment.

In the 21st century, the digital revolution and the adoption of Industry 4.0 technologies—including smart systems, robotics, artificial intelligence (AI), the Internet of Things (IoT), and big data—are transforming production processes. These innovations enhance productivity, improve flexibility, and enable real-time responsiveness to market demands. As US production becomes more automated and digitally integrated, the nation has maintained its position as a global leader in digital manufacturing. Previously, the lack of advanced technology hindered competitiveness; today, innovation enables the United States to remove traditional barriers, lower production costs, and reconfigure global supply chains.

Smart manufacturing is particularly critical to high value-added sectors, such as automotive, aerospace, precision instruments, and pharmaceuticals. These industries increasingly rely on advanced automation and digital tools to remain competitive in a global market characterized by high labor costs and constant innovation. In this context, strong partnerships between manufacturers and academic institutions play a key role in accelerating R&D and integrating advanced technologies.



Agile manufacturing: adapting to market dynamics

The emergence of agile manufacturing represents a significant shift in how US companies approach production. Agile manufacturing emphasizes flexibility, speed, and responsiveness, supported by advanced technology and real-time data. With employment trends moving away from cheap, mass labor and toward highly skilled, tech-enabled roles, agile manufacturing is becoming critical to the US industrial resurgence.

Companies that once relied on third-party offshore suppliers can now use agile methods within US-based facilities to meet surges in local demand. This model allows businesses to automate and optimize production processes while minimizing labor-intensive operations. By reducing reliance on low-cost foreign labor, agile manufacturing revitalizes domestic production and boosts profitability. It also supports the development of a highly skilled, cross-trained workforce—strengthening education and training systems and offsetting the traditional advantages of outsourcing.

As these systems evolve, innovative business models, such as manufacturing as a service (MaaS), have gained traction. MaaS enables small and medium-sized enterprises (SMEs) to access expensive manufacturing tools—such as additive manufacturing and laser cutting—through pay-per-use models. These technologies allow companies to reduce costs, cut waste, and produce customized products in smaller batches, thus enhancing flexibility and scalability. Digital twin technology and AI-driven automation further improve efficiency by enabling intelligent, connected production environments (Ivanov and Dolgui, 2020).

The fundamentals of Industry 4.0 integration in manufacturing include a broad spectrum of technologies—ranging from real-time data analytics and machine learning to smart sensors and decentralized production systems with additive manufacturing—as outlined in **Table 1** (Industry 4.0 Technologies).

Table 1. Industry 4.0 technologies

Embedded sensors	Sensors are integrated into product components and manufacturing equipment to collect real-time data, enabling better monitoring and control of processes.
Cyber-physical systems	These systems connect physical manufacturing processes with digital systems, allowing for real-time data exchange and automation.
Big Data	Data collected from sensors and other sources is analyzed using advanced analytics and machine learning to optimize processes, improve quality, and predict maintenance needs.
Cloud computing	Cloud platforms enable data storage, sharing, and processing across multiple locations, facilitating collaboration and real-time decision-making.
Advanced robotics	Robots equipped with sensors and machine learning capabilities can perform complex tasks, adapt to changes, and work collaboratively with humans.
Additive manufacturing	This technology allows for rapid prototyping and on-demand production, reducing lead times and enabling customization.
Human machine interactions	Technologies like touch interfaces, augmented reality (AR), and virtual reality (VR) improve interaction between humans and machines, enhancing productivity and safety.
Low-Power Wide-Area Networks (LPWANs)	These networks enable efficient data transfer over long distances, even in areas with limited connectivity, supporting IoT devices in manufacturing.
Digital twins	Virtual replicas of physical systems are used to simulate, monitor, and optimize manufacturing processes in real-time.

Source: Javier Zamora. *Blueprint for an Integrated IT Architecture*, IESE.

Enabling conditions for technology-led reshoring

In addition to workforce alignment, several complementary factors support the successful application of advanced technology in US manufacturing:

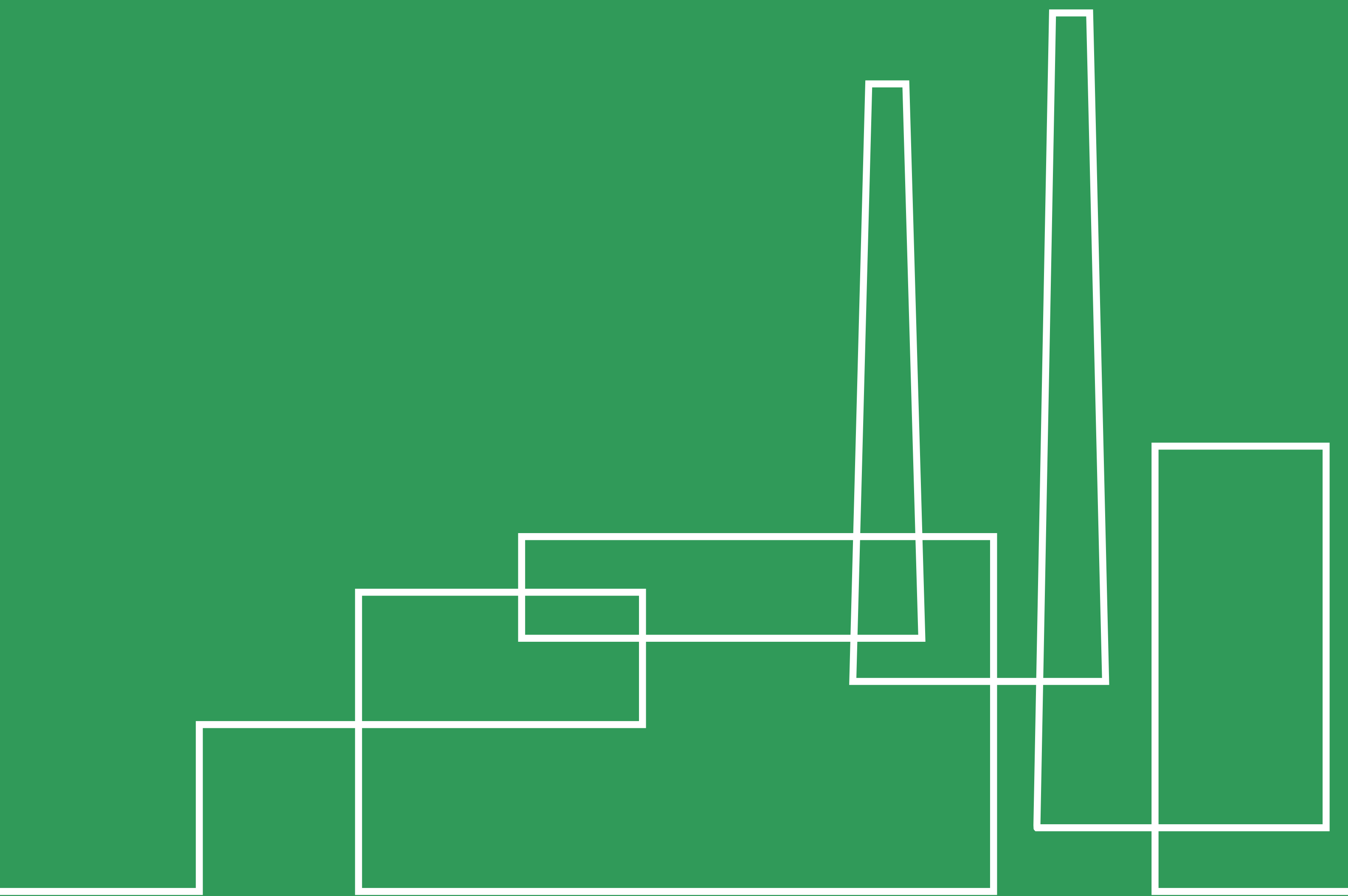
- **Domestic demand**. Local consumption trends favor fast, flexible production near end users.
- **Supply chain localization**. Sourcing materials and components locally reduces tariff exposure and lowers supply chain risk.
- **Government support.** Subsidies, tax incentives, and research grants facilitate technology adoption and modernization in key sectors.

These factors enable firms to align industrial growth with regional workforce availability and market needs. Industries operating in regions with strong labor pools can better leverage these advantages, provided that public and private investment continues to support educational and infrastructure development.

Despite these advances, the successful adoption of technological innovation is constrained by workforce challenges, which are explored more fully in a later section. However, it is important to note that digital transformation requires a shift from mass, low-skilled labor to a more agile, highly skilled, and cross-trained workforce. Upskilling and educational reform are essential to unlocking the full benefits of Industry 4.0.

In conclusion, technological innovation is not just a response to global competition—it is a proactive strategy for industrial revitalization. When reinforced with supportive policies, workforce development, and agile production models, technology serves as a powerful driver for reshoring and global competitiveness in American manufacturing.

4. Challenges and constraints: Workforce availability and readiness



4. Challenges and constraints: Workforce availability and readiness

While technological advancement is a critical driver of the current manufacturing renaissance, its success depends heavily on the availability and adaptability of the workforce. A shift toward high-value, technology-intensive manufacturing requires a labor force with advanced skills, digital fluency, and cross-functional capabilities. However, the US manufacturing sector faces a range of structural and demographic challenges that threaten its ability to meet this demand.

Skilled labor shortages

One of the most pressing challenges is the projected shortage of skilled labor. According to Deloitte and The Manufacturing Institute (2021), as many as 2.1 million manufacturing jobs could go unfilled by 2030 due to a skills gap, potentially resulting in a $1 trillion economic loss. The United States may need up to 3.8 million new workers by 2033, with nearly half of these positions at risk if current trends continue.

Aging workforce

Demographics also play a significant role. Approximately 25% of the current manufacturing workforce is over the age of 55, according to the US Census Bureau (2020). A “silver tsunami”—a wave of baby boomer retirements—is expected to significantly deplete the pool of experienced manufacturing workers.

Generational perception and talent attraction

Manufacturing struggles to attract younger generations, who often perceive the industry as physically demanding, low paying, and lacking career growth. Sectors such as healthcare and technology draw far more interest from millennials and Gen Z workers. The decline in union influence and outdated perceptions of industrial work contribute to this image problem.

Educational and training gaps

There is a notable mismatch between the skills required by modern manufacturing and the education and training provided in many regions. Access to technical education and vocational training is inconsistent across states, and many regions lack the infrastructure to support upskilling at scale. Policy fragmentation at the state level also leads to uneven support for workforce development pipelines.

Regional disparities

Workforce availability varies significantly across the country. The Industrial Midwest and South maintain a stronger concentration of manufacturing talent due to their historical ties to this type of work. However, many traditional manufacturing areas are also experiencing a brain drain as workers migrate toward urban centers or sectors offering higher wages and flexibility. Rural and post-industrial areas face the additional burden of limited educational access, further straining the talent pipeline.

Labor market mismatches and fragmentation

While manufacturing jobs may be concentrated in states such as Texas, Tennessee, and Alabama due to lower labor costs and pro-business policies, capital investment tends to favor high-cost-of-living states. This results in a mismatch between available labor and investment capital. Additionally, regional policies related to tax incentives and subsidies vary widely, contributing to fragmentation in workforce planning.

Capital requirements and infrastructure gaps

Some industries within manufacturing—particularly those requiring complex machinery or advanced infrastructure—face significant capital barriers. SMEs, in particular, may struggle to access the funds needed to modernize operations or invest in workforce development. Business models, such as MaaS, offer potential solutions by democratizing access to capital-intensive technologies.

Current labor market conditions

As of early 2025, manufacturing employment remained relatively flat, with approximately 66,000 fewer manufacturing jobs than a year ago. The Alliance for American Manufacturing (2024) anticipated a hiring uptick in response to recent industrial policy-fueled manufacturing construction. As of April 2025, the US Department of Labor reported a net decline of 1,000 manufacturing jobs. Sectors such as fabricated metals, food processing, and machinery saw gains, while motor vehicles, electronics, semiconductors, plastics, and textile-related sectors experienced losses (Industry Select, 2024).

Additionally, the overall unemployment rate in the US manufacturing sector stood at 3.6% in April 2025, up from 3.1% in March and 2.9% in February (UW-Stevens Point College of Professional Studies, 2025). Comparatively, labor cost pressures are evident. As of 2016, Mexican labor costs were only 10% of US costs, further highlighting the competitive challenge faced by domestic employers.

According to the US Chamber of Commerce (2025)

- 45% of manufacturing job openings are currently unfilled
- 33% of the workforce is over 55
- 25% of workers are considering switching jobs within a year
- 75% of manufacturing managers cite labor shortages as their top challenge

International comparisons

Europe faces similar labor constraints. As of December 2024, the EU employed about 30 million workers in manufacturing, with top contributors including Italy, Poland, and France. However, from 2011 to 2022, manufacturing's share of EU employment declined from 18.3% to 17.7%. Notably, automotive manufacturing grew in various countries, such Czechia, Poland, and Slovakia, yet 13% of EU employers in the vehicle sector identified labor shortages as a production constraint.

In contrast, Asia—particularly the Asia-Pacific region—has maintained a strong manufacturing workforce. In 2023, the region employed approximately 500 million individuals in manufacturing, accounting for a substantial share of global industrial labor (International Labour Organization, 2024).

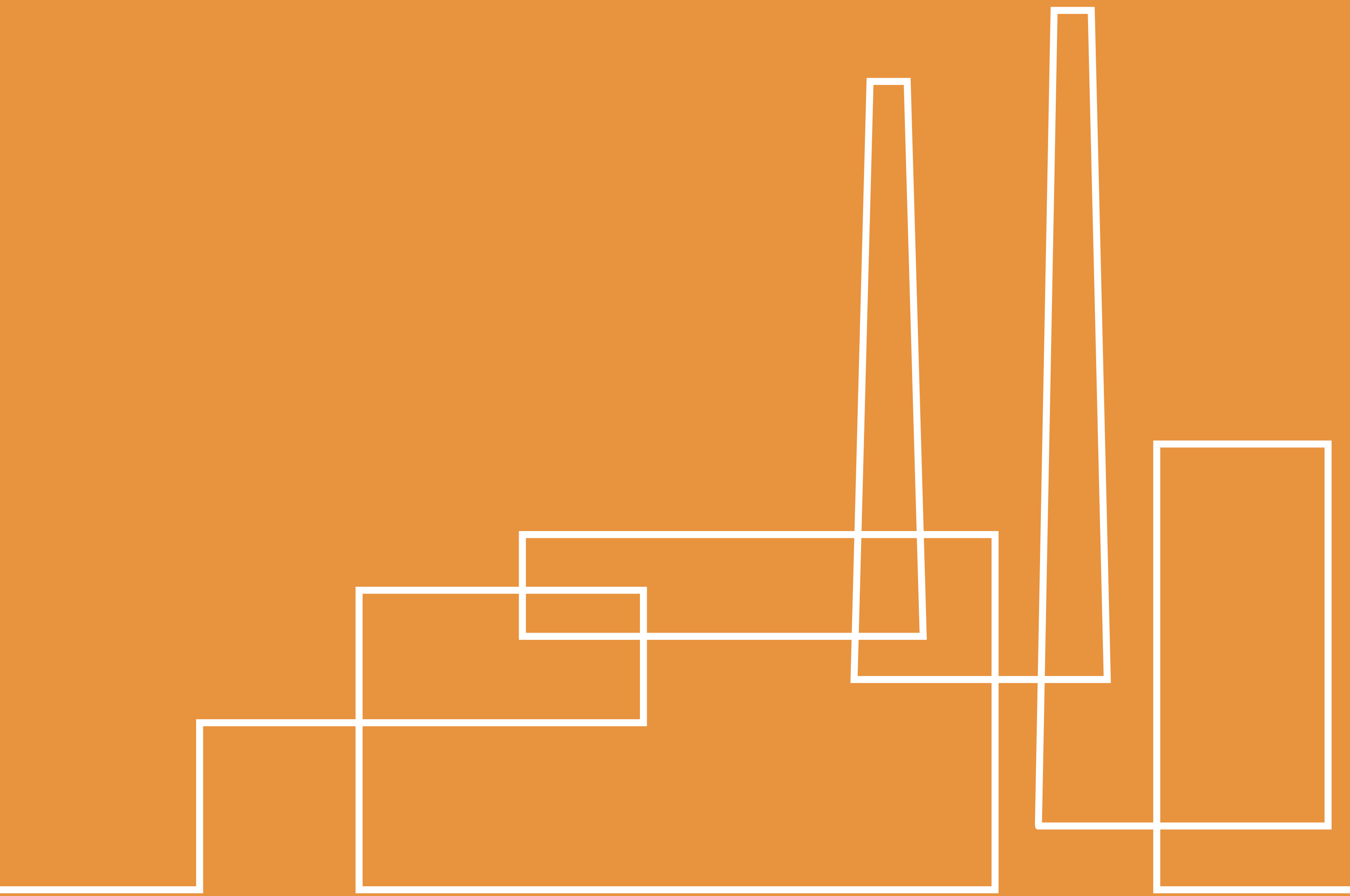
In conclusion, addressing workforce challenges is critical to realizing the full potential of the US manufacturing renaissance. Without targeted strategies to attract, train, and retain skilled talent—supported by a cohesive policy, educational reform, and investment—the effectiveness of reshoring and technological adoption will be significantly constrained.

Please refer to **Table 2** to view an analysis of the US manufacturing workforce.

Table 2. US manufacturing workforce: Current status vs. future needs

Metric	Value	Source
Current manufacturing employment	~13 million workers	National Association of Manufacturers (2025)
Projected additional jobs needed	3.8 million (2024–2033)	Deloitte & The Manufacturing Institute (2024)
Potential unfilled positions	1.9 million (by 2033)	Deloitte & The Manufacturing Institute (2024)
Current job openings (as of jan 2024)	622,000 positions	US Chamber of Commerce (2025)
Average manufacturing compensation		National Association of Manufacturers (2025)

5. Manufacturing resurgent analysis by industry



5. Manufacturing resurgent analysis by industry

Tables 3A and **3B** present industry specifics and specific data on imports and domestic production.

Table 3A. Industry-specific import vs. domestic production ratios

Industry sector	Domestic content (%)	Imported content (%)	Notes
Food, beverages & tobacco	81%	19%	High domestic sourcing
Motor vehicles & parts	60%	40%	Significant import of parts
Chemicals	66%	34%	Diverse global supply chains
Electronics	11%	89%	Heavy reliance on imports
Apparel & textiles	15%	85%	Predominantly imported
Machinery	33%	67%	Substantial import dependence
Furniture	45%	55%	Moderate import reliance
Plastics & rubber products	70%	30%	Strong domestic production

Sources: Federal Reserve Board (n.d.) and US International Trade Commission (2023)

Table 3B. US manufacturing demand by industry sector, 2023

Industry Sector	Total Demand ($B)	Domestic Content (%)	Domestic Value ($B)	Imported Content (%)	Imported Value ($B)
Food, beverages, & tobacco	783.7	78%	611.3	22%	172.4
Motor vehicles & parts	677.5	60%	406.5	40%	271.0
Chemicals	500.0	66%	330.0	34%	170.0
Electronics	450.0	29%	130.5	71%	319.5
Apparel & textiles	300.0	15%	45.0	85%	255.0
Machinery	350.0	33%	115.5	67%	234.5
Furniture	200.0	45%	90.0	55%	110.0
Plastics & rubber products	250.0	70%	175.0	30%	75.0

Note: The total demand figures are illustrative estimates based on available data and should be interpreted accordingly.
Source: US Department of Commerce. (2025, January)

5.1. Sector spotlight: Electronics

The electronics industry has been a foundational force in the modern economy, with the United States playing a pioneering role since the early 20th century. Initially, Silicon Valley emerged as a hub for innovation in semiconductors and computing. Over time, other countries, notably Japan and later Taiwan, have taken the lead in semiconductor production. In recent years, however, the United States has renewed its commitment to regaining global leadership in this sector by investing heavily in reshoring semiconductor manufacturing and expanding infrastructure beyond Silicon Valley.

Reshoring opportunities and tariff impacts

Industry leaders in electronics can optimize reshoring by leveraging automation, AI, and robotics to increase domestic production and global competitiveness. Tariff policy under the Trump Administration has had substantial effects on the electronics sector, with tariffs imposed on consumer electronics, components, smartphones, laptops, monitors, and gaming consoles. Integrated circuits and printed circuit board (PCB) equipment are also affected.

While this industry has considerable potential to reshore, constraints remain. Within the electronics industry, Apple is faced with the opportunity and challenge of choosing whether or not to reshore iPhone production. The Trump administration has suggested a tariff of 25% on iPhones sold in the United States that are not manufactured domestically. The impact of reshoring iPhone production would not be financially viable as Apple would need to reassess labor expenses, supply chain design, component sourcing, investment infrastructure, and workforce availability. The domestic infrastructure investment required to replace plants in China, India, and Vietnam would be extremely costly. At the same time, Apple announced plans to invest over $500 billion in the United States over the next four years, focusing on areas that include AI, silicon engineering, and advanced manufacturing, though not specifically on large-scale iPhone assembly. According to Dan Ives, Global Technology Research Lead at Wedbush Securities, bringing iPhone manufacturing back to the United States would raise prices significantly while requiring over three years and $30 billion to return 10% of the manufacturing back to the US shores. Not only would reshoring iPhone production expose Apple to financial and logistical risks, but the long-term benefits of having American-made iPhones would not outweigh these negative aspects. According to the Global Trade Research Initiative (GTRI), the total production cost would still be much lower in India with a 25% tariff than if the iPhone was manufactured in the United States. This significant differential is partially due to the low cost of labor in India and China, with only 3% of the total iPhone retail price covering the assembly price. The report states that assembly workers in India receive USD 230 a month, while US assembly workers receive a monthly wage, which is nearly 13 times greater. The GTRI shares that the current value chain involves contributions from over 12 countries, positioning reshoring iPhone production as a very complex task. Furthermore, the profit could fall from USD 450 to USD 60 if Apple reshored iPhone production. Despite strong drivers, such as Trump's proposed 25% tariff on iPhone production, it is not financially viable for Apple to reshore manufacturing (*The Economic Times*, 2024).

Aside from the specific case of iPhone production, the electronics industry has one of the highest reshoring potentials due to enabling technologies, geopolitical dynamics, and the growing demand for secure, resilient supply chains. According to the Reshoring Initiative (2023), electronics consistently ranks among the top reshoring sectors by job announcements, with growing investment in semiconductor fabrication, printed circuit board (PCB) assembly, and consumer electronics integration in the United States.

Table 4. Industry classification and reshoring potential

Industry	Reshoring potential	Key technologies	Challenges	Opportunities
Electronics	High	Automation, AI, Robotics	Supply chain complexity, capital investment	Proximity to consumers, rapid prototyping
Automotive	Moderate	IoT, Robotics, AI	Infrastructure needs, skilled labor shortage	Integration with EV initiatives
Textiles	Moderate	Automation, 3D Printing	Cost competitiveness, workforce training	Customization, sustainable production
Pharmaceuticals	High	Biotech, Automation	Regulatory hurdles, specialized facilities	Domestic production of essential medicines
Aerospace & Defense	High	Advanced Manufacturing, AI	High precision requirements, R&D investment	National security, technological leadership
Fast Moving Consumer Goods	Moderate	Advanced Manufacturing, AI	Labor Requirements	Ethical and Environmental Concern
Food and Beverage Aerospace & Defense	High	Advanced Manufacturing, AI	Labor Requirements	Health and sustainability movements

Key technologies enabling reshoring

- **Automation and robotics.** High levels of automation reduce dependency on low-cost labor, making US manufacturing more cost competitive. The use of robotic soldering, automated inspection systems, and "lights-out" manufacturing enables advanced production environments (OECD, 2022).
- **Artificial Intelligence (AI).** AI enhances production through predictive maintenance, supply chain optimization, and quality control—which is especially vital in the highly complex electronics sector (Plex Systems, 2023).

Advanced semiconductor fabrication

Fueled by the CHIPS and Science Act, United States investments are dramatically reshaping the semiconductor landscape. Strategic investment from major corporations and federal funding is accelerating domestic semiconductor production, as illustrated in the following examples:

- **Taiwan Semiconductor Manufacturing Company (TSMC).** TSMC is investing $165 billion in Arizona, including three new fabrication plants, two advanced packaging facilities, and a major R&D center. This expansion is projected to create over 40,000 construction jobs and tens of thousands of high-skilled positions. TSMC's CEO, Dr. C.C. Wei, credited President Trump's early support for kickstarting this effort (TSMC, 2025).
- **Intel Corporation.** Intel is expanding existing fabrication facilities in Arizona and developing a new $100 billion campus in New Albany, Ohio. In 2024, Intel received $7.865 billion in CHIPS Act funding. The White House called the award a pivotal step in reshoring and job creation (Holt, 2024).
- **GlobalWafers.** In May 2025, GlobalWafers announced the development of a fully integrated 300 mm silicon wafer facility—the company's only advanced wafer manufacturing site. The facility, part of the CHIPS for America program, is set to receive $406 million in federal grants (Reuters, 2025).

Other companies, including GlobalFoundries and Micron Technologies, are also expanding operations in various states, including Arizona, Texas, New York, Ohio, Idaho, and Vermont. According to Technology in Global Affairs, semiconductor manufacturing facilities were previously concentrated in Texas, Arizona, California, Oregon, and New York (Technology Global, 2024). These developments position the United States as a renewed hub for advanced semiconductor manufacturing.

Challenges facing the electronics industry

Supply chain complexity Electronics manufacturing relies on globally distributed supply chains for rare earths, passive components, and specialized tooling. Over 70% of global semiconductor assembly and testing currently occurs in East Asia (Boston Consulting Group & Semiconductor Industry Association, 2021)

Capital investment requirements. Establishing a modern fabrication facility can cost over $10 billion, posing high barriers to entry and long ROI timelines (OECD, 2022).

Workforce limitations. The United States faces a shortage of skilled electronics technicians and engineers. Without expanded workforce development initiatives, scaling domestic capacity will remain a challenge (NSF, 2023a).

Conclusion

The US electronics industry is undergoing a transformative phase, driven by government support, corporate investment, and a shifting global landscape. While opportunities for reshoring are strong, success depends on addressing capital, labor, and supply chain constraints. With the right strategic focus, the electronics sector can become a cornerstone of America's manufacturing resurgence and technological leadership.

Table 5. Electronics industry summary

What is made	Semiconductors, computers, and telecommunications equipment
Major players	Intel, AMD, Apple, and Cisco
Regions	Silicon Valley, Texas, and PNW
Notes	Chip manufacturing is getting large investments due to national security and supply chain issues.
Greatest global competitors	Huawei, Lenovo, Samsung, and LG

5.2. Sector spotlight: Automotive

The automotive industry has played a central role in US manufacturing since the 1890s, with Henry Ford revolutionizing production with the assembly line. By 1929, the Big Three—General Motors, Ford, and Chrysler—dominated the market. Following World War II, Japan emerged as a major automotive competitor, establishing plants in the United States by the 1980s. Today, the United States leads in electric vehicle (EV) innovation, with Tesla competing globally against firms from China and Germany.

Reshoring momentum and investment trends

The reshoring potential of the automotive sector is high, especially as the industry transitions to EVs. Reshoring is driven by climate policy, technological innovation, and national security concerns. Between 2020 and 2024, companies announced over $100 billion in EV and battery investments in the United States, with the majority aimed at domestic manufacturing (Center for Automotive Research, 2024).

Key enablers include smart manufacturing, automation, and AI-powered supply chain solutions (BCG, 2022, 2023; McKinsey & Company, 2023a). Growth in lithium-ion and solid-state battery cell technologies is supported by the Inflation Reduction Act and CHIPS Act (US Department of Energy, 2023).
EV hubs in Michigan, Georgia, and Tennessee strengthen domestic innovation ecosystems. Automotive reshoring brings high volumes of blue-collar and engineering employment, garnering political and consumer support (McLaughlin and Peterson, 2023).

Battery supply chain and technological innovation

A primary challenge in EV reshoring is battery supply chain dependence. Critical minerals, such as lithium, cobalt, and nickel, are mostly sourced outside the United States. As of 2023, over 75% of battery-grade lithium processing has occurred in China (IEA, 2023). Addressing this dependency requires domestic mining, processing, and new technological solutions.

Sodium-ion batteries are emerging as a viable alternative to lithium-ion batteries. Sodium is abundant, cost-effective, and free from the environmental and ethical concerns associated with cobalt and lithium. Originally researched in the 1970s, sodium ion as an alternative gained traction in the 2020s due to rising lithium prices.(Argonne National Labaratory, 2023). By 2030, sodium-ion technology is expected to support grid-scale energy storage, low-cost EVs, and data centers:

- **Faradion.** One of the first firms to push for commercialization.
- **Natron Energy**. Based in Santa Clara, CA, Natron Energy developed sodium-ion batteries using Prussian blue electrodes. The firm opened the first mass-scale sodium-ion battery plant in Michigan and plans to establish a gigafactory in North Carolina, adding over 1,000 jobs (Natron Energy, 2024).
- **Acculon Energy.** This firm began a series production of sodium-ion battery modules and packs in 2024, targeting commercial and industrial markets.

Domestic production and capacity expansion

EV production is geographically concentrated in the Southeast, Midwest, and Southwest:

- Georgia, North Carolina, and Tennessee have attracted $77 billion in EV manufacturing investments, creating 74,000 jobs.
- Michigan leads the Midwest with $25 billion in EV-related investments.
- Arizona is emerging as a Southwest leader, with $8 billion in manufacturing projects (Atlas Public Policy, 2024).

By the end of 2023, the United States had 300 GWh of annual battery manufacturing capacity, projected to reach 421.5 GWh in 2024 (Kavanagh, 2025). North America's capacity is expected to exceed 1,200 GWh annually—enough to power 12 to 15 million EVs per year (US DOE, 2024).

Leading EV manufacturers and projects include the following:

- Tesla Fremont Factory (CA) and Gigafactory (TX)
- Hyundai Motor Group Plant (GA)
- Blue Oval City (TN)
- Rivian Factory (IL)

Since 2018, over $154 billion has been committed to US EV and battery manufacturing. Of this, $121 billion came from the private sector, and $33 billion from federal, state, and local governments. These projects span EV assembly, battery production, component recycling, and supply chain development—creating over 170,000 direct manufacturing jobs. The United States is on track to exceed 1,000 GWh of battery cell manufacturing capacity by the early 2030s, enough to supply nearly all domestic demand and support exports (Atlas Public Policy, 2024).

Advanced battery production innovations

The evolution of EV battery manufacturing plays a crucial role in reshoring. Historically, electrodes in batteries have required high energy input and toxic materials.

AM Batteries, a US startup, is transforming this with lithium-ion dry-electrode technology. By applying electrode material in powder form, AM Batteries can achieve the following:

- Eliminate toxic chemicals
- Reduce energy use by 75%
- Lower production costs by 30%
- Shrink factory footprint by 80%

These advances reduce labor costs and environmental impacts, aligning with stricter EPA regulations and improving the economic feasibility of domestic EV production (Bowman, 2025).

Conclusion

The US automotive industry is undergoing a renaissance, driven by electrification, technological innovation, and supportive policy. With billions invested in EV and battery production, the sector is poised for growth. However, its long-term success will depend on addressing mineral sourcing, workforce readiness, permitting delays, and supply chain resilience. Through strategic investment and innovation, the automotive sector can anchor the next phase of America's manufacturing resurgence.

Table 6. Automotive industry summary

What is made	Cars, trucks, and auto parts
Major players	General Motors, Ford, and Tesla
Regions	Midwest
Notes	EVs and autonomous vehicles are key drivers
Greatest global competitors	Volkswagen, BMW, Mercedes-Benz, and Toyota

5.3. Sector spotlight: Textiles

The US textile and apparel industry has experienced significant offshoring since the 1990s. Countries such as China, Bangladesh, Vietnam, and India have become key manufacturing hubs for US brands due to lower labor costs and more established production infrastructure (Gereffi, 2005). As reshoring efforts gain traction across sectors, the textile industry must now re-evaluate its position in light of labor costs, supply chain complexity, sustainability demands, and shifting trade dynamics.

Labor and infrastructure constraints

Reshoring textile production faces steep challenges in offsetting global wage differentials. Apparel manufacturing remains one of the most labor-intensive sectors, and the US wage premium makes it difficult to compete in low-value garment categories (Gereffi and Frederick, 2010). Additionally, gaps in domestic production infrastructure—especially for dyeing, finishing, and cut-and-sew operations—pose barriers to scaling.

Sustainability and ethical sourcing trends

Nonetheless, new consumer preferences for sustainability and ethical sourcing present major opportunities. Companies seeking tighter control over environmental impacts and labor conditions may benefit from localized production. Geopolitical tensions with China and rising global wages are further accelerating interest in domestic sourcing (Bailey and De Propris, 2014).

Patagonia offers a leading example of reshoring aligned with sustainability. Since 1996, Patagonia has committed to using only organic cotton to minimize environmental harm, avoid toxic chemicals, and ensure ethical labor practices. Its "4-Fold" approach screens suppliers for sourcing, quality, social, and environmental standards. While Patagonia outsources some production to ethical international suppliers, it also manufactures domestically in California, Texas, and North Carolina (Patagonia, n.d.). Founder Yvon Chouinard emphasized the company's philosophy: "Build the best product, cause no unnecessary harm, use business to inspire and implement solutions to the environmental crisis" (Pongtratic, 2007).

Similarly, Keen, a footwear company, has reshored part of its production to a new factory in Kentucky, even prior to the 2025 tariff increases. The facility, located outside Louisville, nearly doubles Keen's domestic output. Automation plays a key role, complemented by hiring skilled labor. Keen cited supply chain disruptions, rising overseas costs, and the appeal of Kentucky's central logistics location as motivating factors (Hufford, 2024).

Strategic factors supporting reshoring

Reshoring becomes more viable when quality, responsiveness, and intellectual property protection outweigh cost concerns—a pattern seen in defense and healthcare textiles (Ellram, Tate, and Petersen, 2013). Consumer expectations of sustainability also open doors for domestic innovation. Opportunities, such as biodegradable fibers, circular economy models, and localized dyeing and printing, could position the United States as a leader in sustainable fashion tech.

Advanced manufacturing in textiles

New technologies are also enabling a shift toward automated and customized production:

- **3D knitting & seamless garment technology.** Reduces labor inputs and supports on-demand manufacturing (Tapia et al., 2021).
- **Digital textile printing.** Increases production flexibility while minimizing environmental impact (Shishoo, 2007).
- **Robotic sewing and ai-driven supply chains.** Improve efficiency and traceability, which are crucial for quality control and customer responsiveness.

Tariffs and trade policy adjustments

Trade policy plays a supporting role in reshoring momentum. Safeguard measures, such as tariffs on imported washing machines and solar panels, have spurred domestic production by companies such as Whirlpool (Ohio) and First Solar (South Carolina). Appliance manufacturers have also expanded in Tennessee.

Similarly, the 2018 steel and aluminum tariffs helped revive key industrial assets—such as the US Steel plant in Granite City, Illinois, which boasts 2.8 million net tons of raw steelmaking capacity (United States Steel Corporation, n.d.). These policy tools indirectly benefit the textile sector by reinforcing upstream supply chains and strengthening regional industrial ecosystems.

Conclusion

While reshoring in the textile industry faces structural challenges, it is increasingly feasible in niche, high-value segments focused on sustainability, quality, and speed. Companies such as Patagonia and Keen demonstrate that domestic production can succeed when supported by automation, ethical sourcing, advanced technologies, and supportive trade policy. With the right alignment of innovation, infrastructure, and consumer values, textiles can play a renewed role in America's manufacturing renaissance.

Table 7. Textiles industry summary

What is made	Clothing, fabrics, and footwear
Major players	Southeast (especially North and South Carolina)
Regions	Southeast
Notes	Smaller than it once was but tech-driven (e.g., smart fabrics and automation).
Greatest global competitors	Bangladesh and Vietnam

5.4. Sector spotlight: Pharmaceuticals

The United States has long been a global leader in the pharmaceutical industry and is known for its strength in drug discovery, biopharmaceutical innovation, and robust R&D ecosystems. Iconic companies such as Pfizer and Johnson & Johnson are at the forefront of this sector. However, over time, offshoring has increased, particularly in the production of generic drugs and active pharmaceutical ingredients (APIs). India has become a major supplier, with the United States relying on India for approximately 40% of its generic drug demand. Additionally, over 80% of APIs used in US pharmaceuticals are produced abroad, especially in China and India (GAO, 2020).

Within the pharmaceutical industry, the United States has strong ecosystems, posing a considerable advantage for pharmaceutical manufacturers who can build partnerships and continuously expand within the ecosystem. New Jersey maintains the leading pharmaceutical ecosystem in the United States, hosting major companies such as Johnson & Johnson, Merck & Co., Bayer Healthcare Pharmaceuticals, Novartis, and Teva. Initiatives such as the Pharmaceutical Rebate Act support the sector by obligating companies to pay a portion of drug costs to government-run health programs if the price of a drug increases faster than inflation, if there is a cheaper alternative available, or if the drug is covered by state-funded insurance (New Jersey State Library, 2022). This initiative is part of a broader public health movement of budget sustainability and aligns with price-capping efforts. Rebate laws ensure the government is a guaranteed buyer through state-funded programs and create a dynamic of long-term industry stability. The rebate initiative enables pharmaceutical companies to benefit from proximity to government health organizations, healthcare data infrastructure, and legal knowledge, which successfully contribute to a network effect. In addition to the Pharmaceutical Rebate Act, New Jersey provides research and development tax credits that cover 10% of the excess of New Jersey qualified research expenses over a base amount, as well as 10% of basic research payments for a tax period. These incentives encourage innovation, research, and continuous development of pharmaceuticals. Furthermore, the state has introduced legislation proposing $500 million in tax credits to support advanced manufacturing sectors, including pharmaceuticals (Fazelpoor, 2024). Not only does New Jersey offer these tax credits that encourage innovation and implementation of advanced manufacturing, but statewide initiatives also offer skills partnership training grants, which offer up to 50% cost reimbursement to employers for training current and new employees to meet the skill requirements for high-wage jobs (Medpak, 2023).

In addition to New Jersey's well-established pharmaceutical industry, alternative innovation clusters in the country can be found in Boston (MA), the San Francisco Bay Area (CA), Philadelphia (PA), and Research Triangle Park (NC). These hubs thrive due to their strong R&D capabilities, a culture of innovation, and deep partnerships with leading academic institutions. These clusters have not only attracted domestic pharmaceutical firms but have also drawn significant foreign investment, particularly from European pharmaceutical companies.

For example, Roche (2025) announced a $50 billion investment in US manufacturing, Novartis (2025) committed $23 billion to expand its manufacturing and R&D footprint, Sanofi (2025) pledged $20 billion over five years, and AstraZeneca (2024) announced a $3.5 billion investment in US-based manufacturing and research. These investments have largely occurred within the last two years, driven by a range of strategic and policy-related factors.

Notably, regulatory streamlining programs, such as SelectUSA (2025), assist foreign pharmaceutical investors by providing regulatory navigation, coordinating federal and state support, and facilitating investment through national summits. In addition, public-private partnerships, such as the Manufacturing USA Institutes, foster sectoral growth by advancing biomanufacturing innovation and workforce development (Congressional Research Service, 2021).

On the federal level, these clusters and investments are encouraged by the CHIPS and Science Act, which offers investment tax credits of up to 25% for domestic manufacturing facilities, with a focus on pharmaceutical and biomanufacturing. In addition, the Biomedical Advanced Research and Development Authority provides funding, contracts, and partnerships for companies developing countermeasures for pandemics, bioterror threats, and public health emergencies. The Orphan Drug Tax Credit provides a 25% tax decrease for clinical testing expenses of drugs targeting rare diseases, while the National Institutes of Health offers billions in grants for early-stage drug and technology development. From these tax incentives and funding sources, research and development has clearly become a key priority fueling the presence of pharmaceutical ecosystems and domestic investments in industry. Together, they help solidify the United States as a global leader in biomanufacturing and pharmaceutical advancement.

The current dynamic with tariffs and their potential impact on the reshoring of the pharmaceutical industry is further explained by previous US policy regarding pharmaceutical tariffs. Historically, pharmaceutical products have been excluded from US tariffs to ensure affordability and accessibility of essential medicines. This outlook aimed to protect consumers from increased drug prices, supply chain disruptions, and access to generic drugs. As of April 2025, President Trump has continuously indicated his intent to impose substantial tariffs on pharmaceuticals. The aim is to gain control of supply chains and reinstitute pharmaceutical manufacturing in the United States (Arnold and Porter, 2025). Megan Van Etten, the public affairs VP from the Pharmaceutical Research and Manufacturers of America (PhRMA), shared that the United States' position of biopharmaceutical leadership should be the focus of government trade measures, while focusing on unfair practices abroad and protecting intellectual property. While company responses vary, the potential for tariffs on pharmaceutical products has raised widespread concern about accessibility due to likely price increases (Fattorini, 2025). These developments have prompted both domestic and foreign pharmaceutical companies to rethink their manufacturing and supply chain operations strategically.

Strategic importance of reshoring pharmaceuticals

The COVID-19 pandemic exposed vulnerabilities in the pharmaceutical supply chain, sparking a bipartisan push to reestablish domestic manufacturing. Rising geopolitical tensions, quality assurance concerns, and national health security considerations have made the reshoring of pharmaceutical manufacturing a strategic imperative (US Department of Health and Human Services, 2021).

Reshoring in this sector is viewed not just as an economic decision, but as a national priority. Executive Order 13944 in 2020, the Defense Production Act (DPA), and the 2021 Biden Administration's supply chain review collectively reinforce the critical importance of restoring domestic pharmaceutical capacity (White House, 2021). Pisano and Shih (2009) argued that reshoring is most viable in sectors where innovation, intellectual property, and safety are closely tied to manufacturing location—conditions that are strongly present in the pharmaceutical industry.

Enablers of reshoring

R&D and innovation:
The pharmaceutical industry is deeply reliant on research and innovation. Proximity between R&D and manufacturing strengthens agility, compliance, and feedback loops.

Quality and compliance:
Domestic manufacturing allows for stricter oversight, reducing the risks of contamination and substandard product quality—issues that have emerged from some foreign suppliers (FDA, 2019).

Public–Private partnerships:
Strategic collaboration between government and industry is central to building US-based pharmaceutical capacity. Phlow Corporation, for instance, is a model for federally supported API and vaccine production.).

Continuous Manufacturing (CM):
Endorsed by the FDA since 2015, CM improves production efficiency and flexibility. It also reduces the manufacturing footprint and cost, making domestic production more viable (Lee et al., 2015).

AI in process and quality control:
Real-time release testing, predictive maintenance, and data-driven decision-making improve regulatory compliance and operational efficiency (Talevi & Bellazzi, 2021).

Workforce development needs

The pharmaceutical industry also faces workforce shortages—particularly in biomanufacturing. Reshoring success will depend heavily on upskilling and workforce development initiatives. A skilled biomanufacturing workforce remains in short supply, and scaling educational pipelines remains a work in progress (NSF, 2023b).

Conclusion

The pharmaceutical sector offers a compelling case for reshoring, grounded in national health security, innovation-driven competitiveness, and the need for quality assurance. Supported by federal policy, public-private partnerships, and technological advancements, such as AI and continuous manufacturing, the United States has a strategic opportunity to re-anchor pharmaceutical production domestically. Overcoming workforce shortages through targeted upskilling will be essential to unlocking the full potential of this transformation.

Table 8. Pharmaceutical Industry summary

What is made	Medications, vaccines, and biotech therapies
Major players	Pfizer, Johnson & Johnson, Moderna, and Amgen
Regions	New Jersey, California, and Massachusetts
Notes	Huge growth due to R&D, aging population, and COVID-19
Greatest global competitors	Roche, Novartis, Bayer, and BioNTech

5.5. Sector spotlight: Aerospace and defense

The aerospace and defense (A&D) industry has long been a cornerstone of American industrial leadership. Its roots trace back to the Wright brothers' first flight in 1903, and it expanded dramatically during the world wars. Over the decades, US-based companies such as Boeing and Lockheed Martin have become global leaders in aviation and defense systems.

Despite the United States' historically large defense budget and leadership in technological innovation, the A&D supply chain has become increasingly globalized. The resulting complexity—and growing geopolitical risks—has made reshoring a top national priority. Notably, the consolidation of suppliers, such as the reduction in fighter jet component vendors, illustrates the need for greater domestic supply chain resilience.

Geopolitical drivers and legislative support

The A&D sector is directly linked to national security and innovation leadership. Rising US tensions with China and Russia, coupled with policy shifts toward protectionism, have elevated reshoring to a strategic imperative.

Key legislative and regulatory frameworks supporting reshoring include the following:

- **Section 889 of the NDAA (FY 2019)**. Prohibits procurement from Chinese firms in defense supply chains.

- **Defense Production Act (DPA)**. Has been invoked multiple times during 2020–2023 to ensure domestic production of critical aerospace components.

- **DoD Industrial Base Assessments**. Identified over 300 supply chain vulnerabilities—including microelectronics, rare earth materials, and missile components (DoD, 2021).

The Department of Defense (2022) has made its position clear: "Reshoring is not a discretionary trend in aerospace and defense—it is a strategic imperative."

Industry action and investment trends

- Boeing has taken steps to simplify and control its supply chain by acquiring Kansas-based AeroSystems, a key supplier of aircraft fuselages. This move aims to streamline operations and enhance quality control (Sindreu, 2024).

- GE Aerospace committed nearly $1 billion toward expanding US domestic capabilities across 16 states. The investment will support engine production, workforce expansion, and supply chain fortification. Key investment highlights include $113 million in Ohio, $70 million in Michigan, $29 million in North Carolina, $5 million in Indiana, and $200 million for military engine manufacturing across Massachusetts and Kentucky. The initiative includes plans to hire approximately 5,000 US-based workers (GE Aerospace, 2025).

Advanced Manufacturing and Innovation Enablers

To support reshoring, the A&D industry is leading the adoption of the following cutting-edge manufacturing technologies:

- **Additive Manufacturing (AM).** Enables rapid prototyping and low-volume, high-precision part production, which is critical for aircraft engines and missile systems (Gao et al., 2021).
- **Advanced composites.** Materials such as carbon fibers, titanium alloys, and ceramic-matrix composites allow for lighter, stronger airframes and reduced logistics dependency.
- **Digital twin technology.** Enhances full lifecycle modeling, enabling faster design-to-production cycles and improved maintenance, repair, and operations (MRO) efficiency.
- **Cyber-resilient manufacturing.** Mitigates the risks of sabotage and intellectual property theft during system integration.

Challenges and strategic responses

- **High Capital Requirements**. Aerospace manufacturing demands a highly regulated, capital-intensive precision infrastructure. The adoption of agile business models, such as pay-per-use systems, can help spread costs and increase accessibility.
- **Innovation Spillover**. Reshoring in A&D has the potential to catalyze broader innovation ecosystems. Technologies developed in this sector—AI, robotics, propulsion systems, and quantum sensing—can drive commercial aviation and civilian tech growth.

Conclusion

Reshoring in the aerospace and defense sector is not optional—it is foundational to US national security and industrial resilience. Legislative support, strategic investment, and technological innovation are aligning to bring critical manufacturing capabilities back to the United States. With strong public and private collaboration, the A&D sector is positioned to strengthen both defense readiness and broader industrial competitiveness in the years ahead.

Table 9. Aerospace and defense industry summary

What is made	Aircraft, spacecraft, and defense systems
Major players	Boeing, Lockheed Martin, Raytheon, and Northrop Grumman
Regions	Washington state, California, Texas, and Florida
Notes	Highly advanced tech, closely tied to government spending.
Greatest global competitors	Airbus and Russia

5.6. Sector spotlight: Fast-Moving Consumer Goods (FMCG)

The fast-moving consumer goods (FMCG) industry has grown rapidly with urbanization, mass marketing, and the rise of consumerism. Brands such as Procter & Gamble and Unilever have become household names and dominated the global market. Globalization has expanded the reach of FMCG production, but sustainability and digital transformation are now reshaping the industry, with greater investment in eco-friendly processes and e-commerce platforms.

In the United States, the FMCG sector experienced rising national and local concentrations between 1992 and 2012, driven by the expansion of multi-market firms (Smith and Ocampo, 2022). Like textiles, FMCG manufacturing has been labor intensive, prompting offshoring to China and Southeast Asia. However, rising overseas labor costs and recent supply chain disruptions are reducing the advantages of offshoring.

Technological advancements are also reducing labor dependency. Notably, 20% of large factories in the United States now report robot utilization rates of around 40% (Financial Times, 2025). This transformation opens up new opportunities for reshoring.

Consumer preferences are shifting toward ethical and sustainable goods. Younger generations increasingly demand transparency in sourcing and production. Reshoring helps companies meet these expectations by enabling stricter labor and environmental standards (Supply Chain Game Changer, 2024).

The "Made in the USA" movement is gaining traction, boosting consumer and investor confidence in domestic goods and encouraging infrastructure investment. Companies such as Johnson & Johnson, Henkel, Procter & Gamble, Colgate, and Kimberly-Clark are reshaping the domestic FMCG manufacturing space. In the United States, regional manufacturing hubs are emerging in the Southeast, Midwest, and Southwest, where favorable climates and labor pools exist.

However, challenges such as high labor costs and a limited supply of highly skilled workers persist. The following use cases illustrate the growing interest in reshoring:

- Newell Brands has relocated Sharpie pen production from China to Tennessee.
- Yeti is shifting half of its drinkware production out of China.
- ELF Beauty, Warby Parker, and Steve Madden are also reshoring parts of their supply chains (Advantech Plastics, 2025).

Table 10. Fast Moving Consumer Goods

What is made	Household products, personal care items, electronics, apparel, and packaged goods
Major players	Procter & Gamble, Unilever, Nestlé (crosses into food), Colgate-Palmolive, and L'Oréal
Regions	Ohio (P&G), New York, London (Unilever HQ), and Paris
Notes	Stable demand across economic cycles; driven by brand loyalty, innovation, and emerging markets; increased focus on sustainability.
Greatest global competitors	Unilever, Rechkitt, Henkel, Kimberly- Clark

5.7. Sector spotlight: Food and beverage

The food and beverage industry surged during the First Industrial Revolution as mass production created demand for preserved, shelf-stable goods. Brands such as Kellogg's and Heinz became early leaders, and post-WWII corporate consolidation saw giants, including General Mills, PepsiCo, and Nestlé, rise. In the late 20th century, globalization drove food processing offshore, especially in packaged goods.

Today, reshoring is gaining traction due to product perishability, regulatory pressures, and evolving consumer expectations. Automation and Industry 4.0 technologies now power sorting, packaging, quality control, predictive maintenance, and demand forecasting. These innovations increase agility and reduce environmental impacts through waste reduction and energy efficiency.

Reshoring is particularly relevant due to perishability and safety concerns. Reducing transit time ensures fresher products and greater supply chain control. With consumer preferences shifting toward natural and minimally processed foods, local production becomes an advantage.

US regulatory frameworks also incentivize reshoring. Key standards include the following:

- **FDA Food Safety Modernization Act (FSMA).** Emphasizes preventive controls across the supply chain.
- **Hazard Analysis and Critical Control Points (HACCP).** Identifies potential food-safety hazards.
- **Current Good Manufacturing Practices (cGMPs).** Mandate clean facilities, environmental controls, and quality assurance (FDA, 2014).

Consumers are now more health conscious. A cross-sectional study found that 71% of US packaged food and beverage products were ultra-processed. Regulatory reforms under the "Make America Healthy Again" movement propose bans on artificial additives and promote raw, organic food production. This shift is supported by policies such as the Supplemental Nutrition Assistance Program (US Department of Health and Human Services, 2025). The move toward natural perishable foods further accelerates reshoring as firms seek tighter control over freshness, quality, and compliance.

Constraints remain

Environmental sustainability, regulatory compliance, and shifting preferences require firms to be agile and innovation-driven. Climate change and resource scarcity increase the need for sustainable practices. The sector is also investing in plant-based foods and expanding research on natural product development (Funmilayo, 2024).

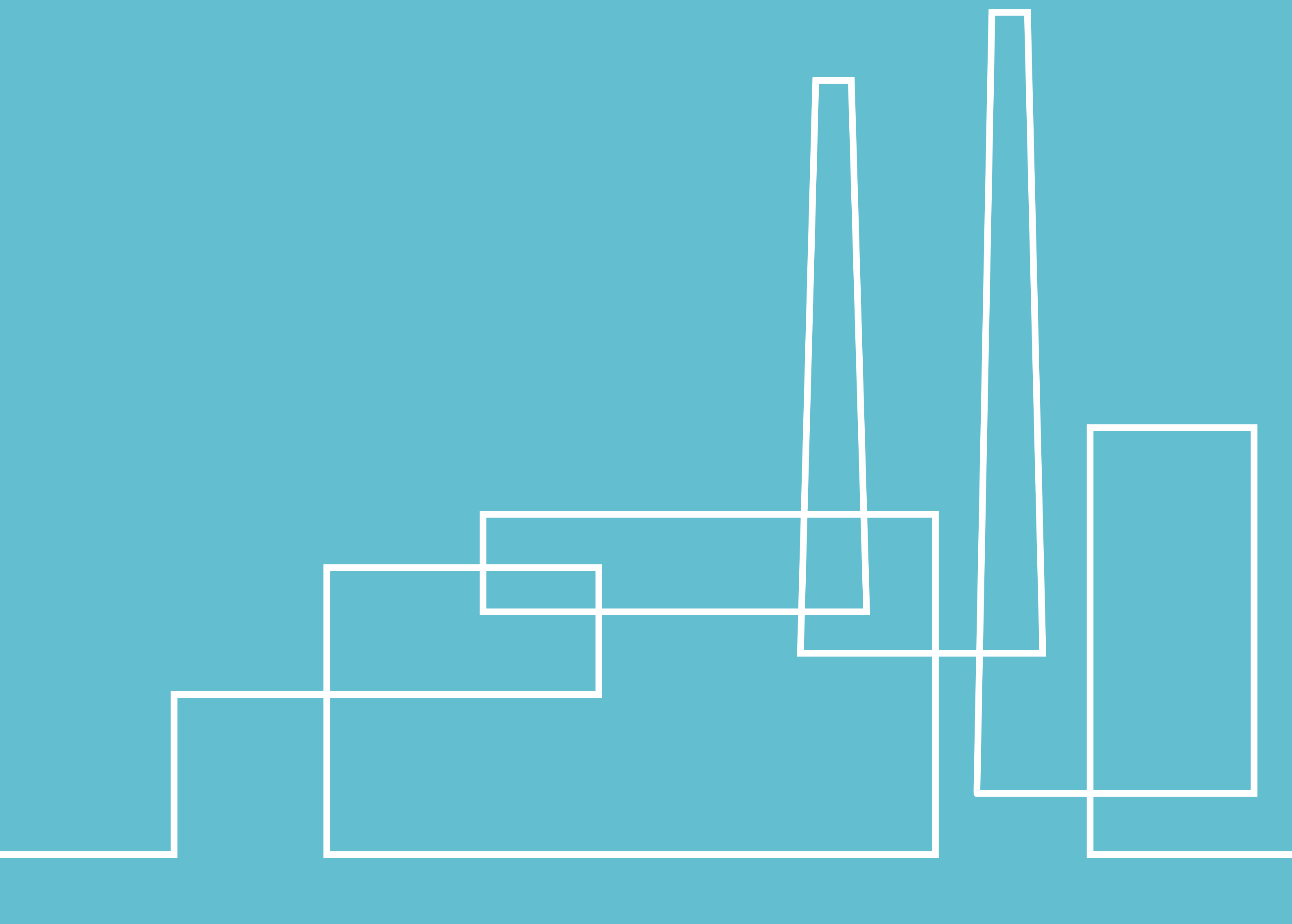
Conclusion

The food and beverage sector is well positioned for reshoring due to proximity requirements, regulatory frameworks, and evolving consumer expectations. Innovation, sustainability, and supply chain control will be essential for companies seeking long-term competitiveness in a rapidly shifting market.

Table 11. Food and beverage

What is made	Packaged foods, snacks, beverages (alcoholic and non-alcoholic), dairy, and meat
Major players	Nestlé, PepsiCo, Coca-Cola, Kraft Heinz, and Mondelez
Regions	Illinois, Georgia, Switzerland (Nestlé HQ), and New York
Notes	Resilient industry, innovation in health-conscious and plant-based products, and supply chain pressures post-COVID
Greatest global competitors	Danone, Unilever (food), Anheuser-Busch InBev, and JBS

6. General review: Reshoring opportunities and workforce readiness



6. General review: Reshoring opportunities and workforce readiness

Common reshoring opportunities across sectors

Across all the manufacturing sectors explored, several common themes emerged as key enablers for reshoring in the United States:

- **Proximity to Consumers**. Shorter delivery times and the ability to quickly respond to demand shifts make domestic production appealing—particularly in fast-paced sectors such as consumer electronics (McLaughlin and Peterson, 2023).
- **Rapid Prototyping and Innovation**. The co-location of R&D and manufacturing accelerates product development. This proximity allows for more efficient prototyping and small-batch testing, which is critical in sectors with short product life cycles (Pisano and Shih, 2012).
- **IP Protection and National Security**. Domestic production helps mitigate the risk of intellectual property theft and reduces dependency on foreign sources for sensitive technologies, especially in defense electronics and telecommunications (US Department of Commerce, 2025).

Workforce availability: A pervasive challenge

One of the most significant barriers to reshoring across all sectors is the lack of skilled labor. According to Deloitte and The Manufacturing Institute (2024),

- The US manufacturing sector will need to fill 3.8 million jobs by 2033.
- 1.9 million of these roles could remain unfilled due to a lack of skilled talent.
- 65% of manufacturers report that attracting and retaining talent is their greatest business challenge.

Educational solutions and case examples

In response to this growing gap, educational institutions play a pivotal role. A prominent example is Ivy Tech Community College in Indiana (Allgood, K., and S. Ellspermann, 2025)

- The college serves more than 200,000 students and offers free courses for high schoolers and career centers.
- It provides certifications through Amazon Web Services (AWS), the National Institute for Metalworking Skills (NIMS), and Smart Automation Certification Alliance (SACA).
- The college launched a smart manufacturing and digital integration program focused on automation, robotics, and data analytics.
- It partners with employers, such as StarPlus Energy, Stellantis, and Samsung SDI, to bridge education and employment.

Programs like this provide the following benefits:

- Real-world work experience and industry-recognized credentials.
- Training in modern technologies, including CNC machining, robotics, additive manufacturing, and CAD/CAM software.
- Mid-career upskilling to adapt legacy system workers to evolving tech environments.
- Seamless pathways from high school to college to industry.

Regional focus areas

Such workforce development initiatives are especially needed in the following areas:

- **Midwest**. Ohio, Indiana, and Michigan
- **Southeast**. Alabama and South Carolina
- **West Coast**. California

These regions represent high reshoring potential but face acute labor pipeline shortages.

Policy and employer recommendations

To maintain skilled employees and remain competitive, companies must invest in training, adopt new technologies, and implement supportive company-wide workforce policies (Marshall, 2024).

Tailored solutions are necessary in specific areas:

- Aerospace and defense require high levels of technical expertise
- Textiles and FMCG benefit from automation-supported reskilling

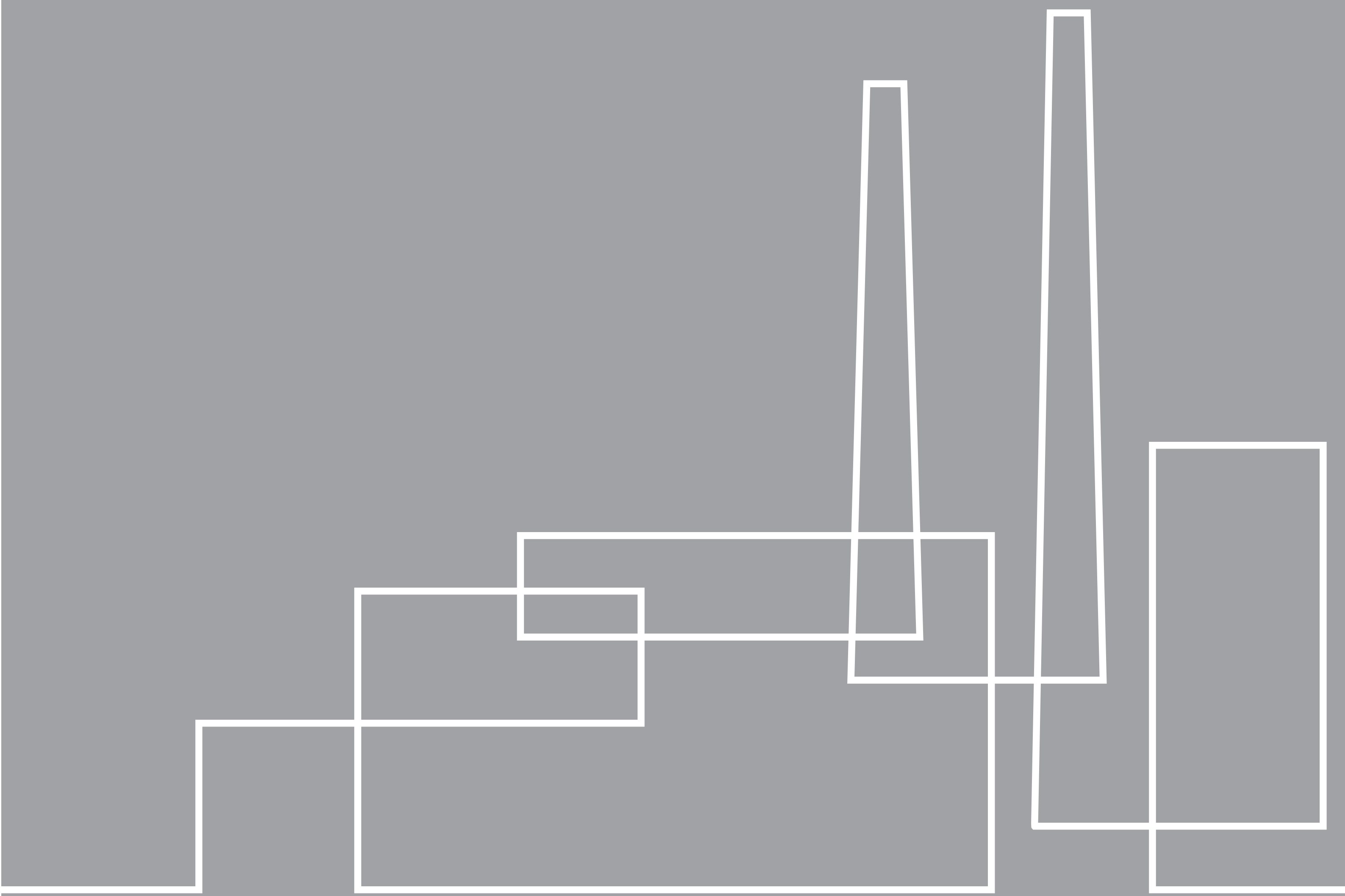
Manufacturers can enhance vocational training and encourage public–private partnerships to achieve the following:

- Increase awareness of manufacturing careers
- Provide incentives for industry-aligned education and workforce development

Conclusion

Reshoring presents a historic opportunity to revitalize American manufacturing. However, its long-term viability depends on resolving a skilled labor shortage. Through educational innovation, public–private collaboration, and regional investment in workforce development, the United States can transform labor challenges into strategic advantages. A skilled, future-ready workforce is essential to achieving the economic, technological, and security goals driving the manufacturing renaissance.

7. Timeline for reshoring by industry



7. Timeline for reshoring by industry

7.1. Short-term reshoring (1–3 years)

Industries expected to reshore rapidly within the next one to three years include pharmaceuticals and aerospace/defense. Key drivers include strategic dependency, legislative action, and national security concerns.

In the pharmaceutical sector, the COVID-19 pandemic revealed US vulnerabilities in active pharmaceutical ingredients (APIs) and personal protective equipment (PPE) supply chains (FDA, 2023; White House, 2021). Legislative tools, such as the Defense Production Act and executive orders, including EO 14017, have incentivized domestic pharmaceutical production. Quality concerns with foreign suppliers have fueled urgency. In 2024, the US military expressed concern about dependence on Chinese pharmaceutical inputs, and the FDA reported that 22% of active pharmaceutical ingredient agreements came from unidentified sources. Drug shortages also worsened, with 323 medications facing critical gaps (Knight, 2024). In response to unsanitary production conditions abroad, such as those discovered in a Mumbai-based eye drop facility, the FDA (2023) issued recalls and consumer warnings.

In the aerospace and defense sector, reshoring is treated as a strategic imperative. Policies such as Section 889 (NDAA FY 2019), DoD industrial base assessments, and multiple invocations of the Defense Production Act have driven momentum. Companies such as Boeing and GE Aerospace are leading the way with substantial investments and supply chain localization efforts.

7.2. Mid-term reshoring (3–5 years)

The electronics, automotive, and food and beverage sectors are expected to reshore within the next three to five years.

Since 2022, the electronics and automotive sectors have benefited from the CHIPS and Science Act, the Inflation Reduction Act, and EV subsidies. Deployment of AI-driven automation, predictive maintenance, and lights-out manufacturing is reaching an industrial scale (Plex Systems, 2023). Key constraints include dependency on Asian suppliers for raw materials and a 3–5 year construction timeline for semiconductor fabrication facilities.

The food and beverage sector is reshoring more quickly than anticipated due to perishability, consumer demand for healthier, less-processed foods, and the need for supply chain agility. Technologies such as predictive maintenance and demand forecasting support this shift.

Environmental sustainability has emerged as a powerful driver across multiple sectors. Companies reshoring for sustainability reasons include the following:

- **Tesla**. Building domestic gigafactories to reduce emissions and control lithium-ion battery production.
- **Nucor**. Investing in electric arc furnaces powered by renewables.
- **Intel**. Constructing fabrication facilities with cleanroom recycling systems and digital twins for energy optimization.
- **First Solar**. Reshoring solar panel manufacturing to comply with Buy American rules and stricter environmental standards.
- **Reformation.** Using green factories and waterless dyeing in apparel production.

These efforts demonstrate that sustainability and reshoring can be mutually reinforcing, enabling compliance with environmental regulations, reducing waste, and appealing to eco-conscious consumers.

7.3. Long-term reshoring (5+ years)

Industries such as textiles and other labor-intensive sectors are expected to follow a longer reshoring trajectory over five or more years. Key constraints include high labor costs and infrastructure gaps. However, ESG goals, carbon reduction strategies, and demand for ethically sourced goods continue to push localization.

Technological enablers—such as AI-powered inspection systems, automated cutting, and sewbots—will gradually improve cost competitiveness and offset labor cost disadvantages (MIT Center for Transportation & Logistics, 2021).

Consumers are increasingly drawn to environmentally and ethically produced products, but the labor cost differential still slows reshoring adoption. Continued innovation and investment in advanced manufacturing will be essential for widespread reshoring in these sectors.

Table 12. Industry classification by timelines of reshoring

Time horizon	Industries	Drivers	Constraints	Key References
Short-Term	Pharmaceuticals, Aerospace & Defense	National security, public health, existing US infrastructure, policy pressure	Regulatory complexity, capital coordination, limited domestic raw material sources	FDA (2023); RAND Corporation (2022); National Defense Industrial Association (2021, 2022); US Department of Defense (2021)
Mid-Term	Electronics, Automotive FMCG	Maturing automation, CHIPS Act, EV transition, semiconductor demand	Supply chain rigidity, skilled labor shortages, high capex for fab construction	McKinsey & Company (2023b); NSF (2023a); Semiconductor Industry Association (2022)
Long-Term	Textiles and Labor-Intensive Manufacturing	Robotics and AI adoption, carbon footprint reduction, shifting global wage dynamics	High cost structure in United States, slow tech diffusion in SMEs, offshoring inertia	MIT Center for Transportation & Logistics (2021); ILO (2023); World Bank (2022)

7.4. Regional reshoring patterns in the United States

Geographic factors continue to shape reshoring trajectories:

- **Midwest & Northeast (Rust Belt)**. Historic hubs such as Detroit, Cleveland, and Pittsburgh are seeing resurgence due to investments in advanced manufacturing, biotech, and clean energy.

- **Southeast**. States, including Georgia, North Carolina, and Tennessee, offer tax incentives and a growing labor force, attracting food processing and FMCG investments (Loyack, 2025).

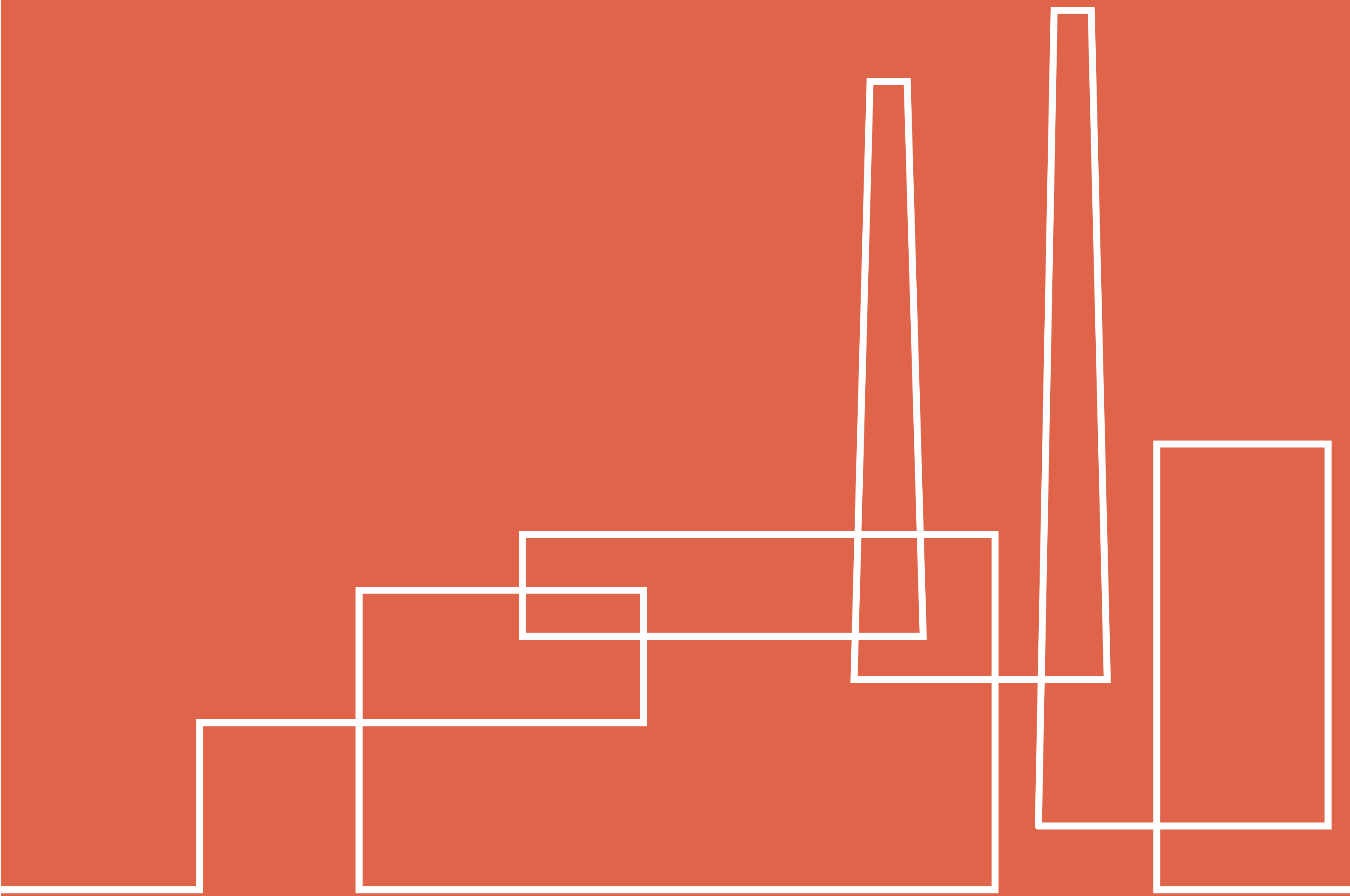
- **West Coast**. California and Washington are fostering innovation in food tech and sustainable manufacturing practices.

- **Southwest**. Offers proximity to Mexico for cross-border supply chain integration, enhancing regional competitiveness.

Conclusion

Reshoring timelines differ considerably across industries due to variations in capital intensity, supply chain dependencies, regulatory factors, and consumer expectations. Nonetheless, all sectors share a common need for strategic coordination, technological investment, and workforce development. With the right alignment of policy, innovation, and public–private collaboration, the United States can solidify its leadership in modern, resilient, and sustainable manufacturing.

8. Recommendations to industry leaders



8. Recommendations to industry leaders

The U.S. manufacturing renaissance is accelerating amid geopolitical realignments, labor shortages, and disruptive technologies. To lead in this new era, industrial decision-makers must think beyond static footprint models and embrace flexible, tech-enabled, and resilient strategies. This section consolidates practical guidance for both long-term transformation and near-term competitive positioning, integrating Industry 4.0 principles with economic analysis, such as tariff tipping points and cost-localization modelling.

8.1. Invest in technology: Leveraging industry 4.0 for competitive advantage

To compete with historically lower-cost manufacturing hubs abroad, U.S. firms must accelerate the adoption of Industry 4.0 technologies—including automation, artificial intelligence (AI), additive manufacturing (3D printing), Internet of Things (IoT), and advanced robotics. These technologies enhance productivity, customization and supply chain responsiveness.

Empirical research has shown that automation improves scalability and precision while reducing labor dependency (Kinkel and Jäger, 2017). For instance, smart factories in the electronics and automotive sectors are cutting operational costs by integrating real-time data across machines and systems (Plex Systems, 2023).

Strategic investments should also include:

- Digital twins for lifecycle system modelling
- Cloud-based production networks for regulatory compliance and traceability
- Cyber-physical systems for decentralized control and diagnostics

See **Tables 13A–13D** for an analysis of Industry 4.0 adoption.

Tables 13A - 13D. Analysis of the Adoption of Industry 4.0.

A. Industry 4.0 market size by region (2023)

Region	Market Size ($ billion)	CAGR (2024–2030)
Asia-Pacific	63.6	21.7%
United States	18.8	11.4%
Europe	36.1	14.2%

Sources: Grand View Research (2023), Straits Research (2024)

B. Industry 4.0 adoption by sector

Sector	Leading Regions	Key Technologies Adopted
Automotive	US, Germany, Japan	AI, IoT, Robotics
Aerospace	US, France	Digital Twins, Predictive Analytics
Electronics	China, South Korea	Automation, Smart Manufacturing
Healthcare	US, UK	AI Diagnostics, IoMT
Logistics	Singapore, Germany	Autonomous Vehicles, IoT

Sources: World Economic Forum (2025), Grand View Research (2023)

C. Robot density in manufacturing (robots per 10,000 employees)

Country	Robot Density
South Korea	1,012
Singapore	932
China	470
Germany	429
United States	309

Source: Reuters

D. Industry 4.0 adoption by sector (global sample)

Industry	Adoption (%)
Automotive	36%
Computer, electronic & electrical	29%
Metals & mining	29%
Process industries	29%
Machinery & equipment	26%
Energy	25%
Other discrete industries	24%
Other hybrid industries	24%

Source: IoT Analytics. (2020).

Additionally, automation reduces the labor cost burden, particularly in high-cost economies like the U.S. This is critical for sectors like bicycle frame manufacturing or battery cells, where automation can nearly eliminate the localization penalty. However, in labor-intensive sectors such as smartphone assembly, automation can only partially mitigate the cost gap.

Policymakers and industry must also consider the scale and concentration of advanced manufacturing. One of the most impactful strategies the U.S. can emulate from China is the development of giant industrial hubs—geographic clusters where knowledge and innovation circulate among workers, entrepreneurs, investors and academics. This collaborative density once existed in Detroit for automobiles and Silicon Valley for tech. Recreating such ecosystems in the U.S. will enable faster deployment of advanced technologies and more efficient upskilling.

China's dominance in automation is also striking. In 2023, China installed 51% of the world's industrial robots, compared to just 7% in the U.S. To stay competitive, American firms must not only accelerate automation adoption but also develop new machine architectures, sensor systems and workflows that integrate AI at the core. AI will reshape factory operations, making real-time decision-making, predictive maintenance and autonomous quality control central to next-generation production.

8.2. Develop the workforce: Building a talent pipeline for the modern factory

Reshoring success depends not only on physical infrastructure and technology, but also on talent. Advanced manufacturing requires a new workforce that spans roles from machinists and technicians to engineers, coders and data specialists. But equally important—and often overlooked—is the need for executives and general managers who understand how to leverage manufacturing and supply chain as a source of competitive advantage.

Over the past two decades, U.S. business schools have deprioritized manufacturing-related education, placing greater emphasis on finance, marketing, and corporate strategy. As a result, many leaders have lost operational fluency, weakening their ability to drive informed decisions about sourcing, automation and global production strategy.

To restore U.S. competitiveness in manufacturing, executive education and MBA programs must reincorporate manufacturing strategy, digital supply chains, and Industry 4.0 into their core curricula. This includes:

- Digital manufacturing and AI applications in production
- Agile operations, manufacturing as a service and Pay-Per-Use models
- Global supply chain design and geopolitical risk management
- Operations analytics, IoT integration and ESG-linked manufacturing metrics

Without this leadership layer, even the most advanced factories may fall short in strategic alignment or investment prioritization. Managers must be trained to see operations not as a cost center, but as a source of value creation and innovation.

Meanwhile, technical workforce development remains a critical pillar. To meet this challenge, the U.S. must expand:

- Public–private partnerships between industry, academia and government
- Apprenticeships and hands-on training programs for technical roles
- K–12 STEM integration and lifelong learning support to build early and sustained interest in advanced manufacturing careers

Programs such as Manufacturing USA—a federally backed network of public-private institutes managed by the Departments of Commerce, Defense and Energy—are helping to advance domestic competitiveness and accelerate innovation. Additionally, the recently expanded National Apprenticeship Act aims to create one million new apprenticeship opportunities, including in nontraditional sectors, with a focus on equity and access.

Upskilling must happen at all levels—from the plant floor to the C-suite—if the U.S. is to lead the next manufacturing renaissance.

8.3. Collaborate with stakeholders: Creating regional innovation ecosystems

Manufacturing competitiveness is strengthened by regional innovation ecosystems that connect government, industry and academia. These collaborations enable:

- Technology diffusion
- Startup incubation and entrepreneurship
- Sector-specific research and commercialization

Notable models include:

- Defense Innovation Unit (DIU): Facilitates DoD adoption of commercial technologies
- Manufacturing Extension Partnership (MEP): Supports SMEs in adopting advanced technologies

The CHIPS and Science Act further supports the creation of regional innovation hubs tied to semiconductor production and R&D.

Beyond existing programs, U.S. policymakers and private stakeholders must promote next-generation breakthroughs, including:

- AI-driven production and human–machine collaboration
- Smart tooling that turns manufacturing into programmable logic
- Orbital manufacturing using microgravity for unique material production
- Nanotechnology for atom-by-atom assembly and hyper-precision

These transformative technologies can position the U.S. as a leader in frontier production methods, if enabled by collaborative innovation hubs and cross-sector investment.

8.4. Assess supply chains and strategic localization readiness

To reduce exposure to geopolitical disruptions and supply shortages, companies must:

- Map supply chains to identify bottlenecks and vulnerabilities
- Adopt multi-sourcing and reshoring strategies
- Implement risk modelling tools for greater visibility and responsiveness
- However, localization must be assessed with care. Executives should calculate the total cost penalty of localization by product, factoring in labor cost differences, logistics savings, loss of scale effects and automation offsets. This includes determining the product-specific "tariff tipping point"—the threshold at which tariffs make local production more viable than importing. For example:
- Smartphone assembly: ~30% cost penalty (reduced to 25% with automation)
- Bicycle frames: 20% penalty, reduced to near zero with automated welding and high logistics savings
- Battery cells: 10–15% tariffs already make localization viable

Scenario-based planning becomes essential here. Tariffs can shift overnight; factories take years to build. Leaders must prepare for multiple geopolitical futures—and align capacity strategies accordingly.

8.5. Align with policy: Leveraging government incentives

Industrial policy is increasingly aligned with reshoring goals. Companies should proactively monitor legislative developments and optimize their strategies around federal and state incentives.

Key policies include:

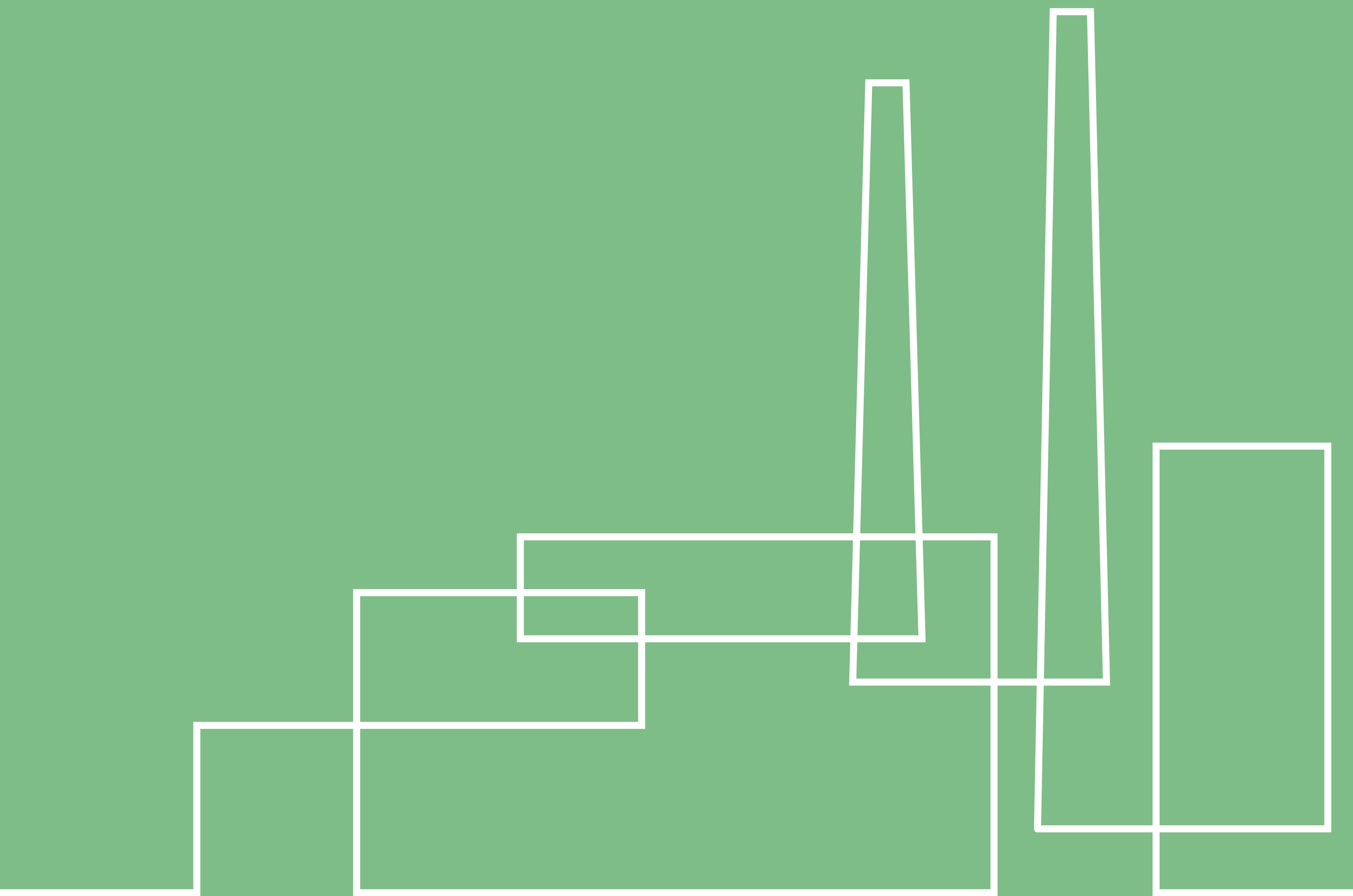
- **CHIPS and Science Act**: $280 billion investment, including $52.7 billion for semiconductor manufacturing and R&D, with $39 billion in subsidies and a 25% tax credit for equipment (PwC, 2025).
- **Inflation Reduction Act (IRA)**: $369 billion over a decade for clean energy, EV incentives and domestic manufacturing. Expected to cut U.S. emissions by 40% below 2005 levels by 2030 (Gile and Chapalgaonkar, 2025).
- **Buy American provisions**: Federal procurement guidelines prioritizing U.S.-made goods.
- **R&D tax credits and CapEx deductions**: Available for investments in innovation and infrastructure.

In tandem, industrial leaders and policymakers should accelerate the creation of large-scale industrial hubs modelled on China's successful clustering strategy. These hubs must be designed to encourage the exchange of ideas and skills across firms, institutions, and disciplines—turning regional strength into national competitiveness.

These policies significantly improve the business case for domestic manufacturing but firms must act strategically to capture their full value.

In conclusion, industry leaders must now operate in a world where global manufacturing strategy is no longer purely about cost, but about balancing flexibility, technology, resilience and risk. Success will belong to those who act early, plan across scenarios and build adaptive, data-driven organizations fit for the next industrial era.

9. Conclusion: A national strategy for resilience, innovation, and industrial renewal



9. Conclusion: A national strategy for resilience, innovation, and industrial renewal

The United States stands at a defining moment in its industrial evolution. The combination of global disruption, technological acceleration, and renewed policy focus has triggered a broad-based reshoring movement that is reshaping the future of American manufacturing. What began as a response to crises—pandemics, geopolitical tensions, and trade instability—has matured into a national strategy for resilience, innovation, and global competitiveness.

A systems-level shift in industrial thinking

This report has demonstrated that reshoring is not a single-issue reaction but rather a systems-level transformation across five interconnected pillars:

1. **Supply chain resilience**. Simplifying complex, vulnerable supply chains is now essential—not optional. Reshoring allows for tighter control, shorter lead times, and higher reliability in critical sectors.

2. **National security and strategic independence**. In sectors such as pharmaceuticals, semiconductors, aerospace, and defense, domestic production is directly tied to national sovereignty and security. Federal mandates and bipartisan policies reinforce this imperative.

3. **Smart trade policy**. Tariffs have become tools of negotiation and protection. While they are not a reshoring policy in themselves, they have altered cost structures and risk calculations for many firms, especially in strategic industries. The concept of tariff tipping points adds nuance to this analysis, helping executives quantify when localization becomes economically favorable—and highlighting the need for scenario-based planning amid trade policy uncertainty.

4. **Global labor cost convergence**. Rising wages and skill shortages in historically low-cost countries are shrinking the cost gap. As labor arbitrage wanes, the United States gains relative competitiveness—particularly when the total cost of ownership is considered. Advanced automation is helping to close the remaining gaps, especially in asset-intensive or logistics-sensitive sectors.

5. **Technological innovation and industry 4.0**. The deployment of AI, robotics, additive manufacturing, digital twins and cyber-physical systems enables localized, scalable and flexible production models across sectors. As America seeks to match and surpass global leaders like China in automation and industrial AI, coordinated investments in digital infrastructure and machine intelligence will be vital.

Sectoral diversity and common themes

This study analyzed eight distinct sectors—from high-tech (electronics, pharmaceuticals, and aerospace) to traditionally labor-intensive (textiles and FMCG). Despite wide variability in timelines and capital intensity, all sectors are responding to the following common market forces:

- Consumers are demanding transparency, sustainability, and quality.
- Companies are investing in automation to reduce reliance on labor and increase customization.
- Public–private partnerships are emerging as a powerful model for both workforce development and regional economic revitalization.

The reshoring momentum is being shaped by long-term policy incentives, such as the CHIPS and Science Act, the Inflation Reduction Act, Buy American provisions, and expanded R&D tax credits. Together, these policies are reshaping the risk/reward calculus for global production.

Workforce readiness: The deciding factor

The most urgent constraint remains the talent pipeline. Without a skilled workforce capable of supporting advanced production environments, reshoring ambitions will fall short. Solving this will require the following:

- Scaled investment in STEM and technical education
- Incentives for industry–academic collaboration
- Agile upskilling programs to reorient legacy workers toward modern systems
- Executive and management education focused on operations, digital manufacturing and supply chain strategy

Importantly, the future of manufacturing leadership will require not just technical talent, but also strategic fluency at the C-suite level. Business schools must step up to prepare executives who understand how to harness agile manufacturing, AI-driven systems and global trade dynamics as sources of long-term advantage.

The examples provided by Ivy Tech Community College, the Manufacturing USA Network, and sector-focused apprenticeship programs can serve as blueprints for building a resilient and inclusive industrial workforce.

A vision for industrial renewal

Reshoring is not a retreat from globalization—it is a recalibration. It is about building industrial capacity in the right places, for the right products, using the right technologies. It is about creating flexible, clean, secure and regionally distributed manufacturing ecosystems that align economic, environmental and security objectives.

A revitalized U.S. manufacturing base will:

- Drive long-term innovation cycles
- Anchor job creation in both high-tech and traditional sectors
- Reduce dependency on vulnerable foreign supply chains
- Position the United States as a global leader in sustainable, inclusive industrial development

To support this transition, America may need to emulate elements of other successful ecosystems—such as China's industrial hubs—by fostering regional clusters where manufacturers, engineers, data scientists and entrepreneurs co-locate and collaborate. These ecosystems are not just factories—they are innovation engines.

Call to action

To achieve this vision, stakeholders must coordinate across federal, state, and local levels—and across public and private sectors. Policymakers, educators, investors, and industry leaders must act with urgency and unity. The time to reindustrialize is not in the future—it is now.

This report concludes with an **Exhibit**, which provide sector-by-sector data and visual summaries to support decision-makers in translating insights into action.

Exhibit

Exhibit

U.S. Imports of goods by end-use category and commodity

In millions of dollars. Details may not equal totals due to seasonal adjustment and rounding. The commodities in this exhibit are ranked on the monthly change within each major commodity grouping. (-) Represents zero or less than one-half of measurement shown.

Item (1)	April 2025	March 2025	Monthly Change	Year-to-Date 2025	Year-to-Date 2024	Year-to-Date Change
Total, Balance of Payments Basis	**277,904**	**346,837**	**-68,933**	**1,282,901**	**1,067,212**	**215,689**
Net Adjustments	1,965	2,245	-280	8,556	10,478	-1,923
Total, Census Basis	**275,939**	**344,592**	**-68,652**	**1,274,345**	**1,056,733**	**217,612**
Foods, feeds, and beverages	**18,485**	**19,331**	**-846**	**77,261**	**69,708**	**7,553**
Fruits, frozen juices	2,313	2,624	-311	10,602	9,614	987
Meat products	1,783	1,978	-195	7,486	6,333	1,153
Cocoa beans	310	476	-166	1,373	417	955
Bakery products	2,009	2,160	-151	8,161	6,965	1,196
Feedstuff and foodgrains	771	899	-128	3,306	3,191	115
Wine, beer, and related products	1,180	1,295	-115	5,311	5,000	311
Alcoholic beverages, excluding wine	857	964	-108	3,994	3,876	118
Nuts	229	267	-38	1,002	927	75
Nonagricultural foods, etc.	112	133	-21	498	447	51
Vegetables	1,501	1,518	-17	6,441	7,087	-647
Tea, spices, etc.	259	273	-14	1,131	959	173
Dairy products and eggs	332	336	-4	1,411	1,219	191
Cane and beet sugar	168	163	5	675	933	-258
Food oils, oilseeds	875	857	18	3,586	3,915	-329
Green coffee	916	837	79	3,150	1,726	1,424
Fish and shellfish	2,459	2,335	124	9,444	8,221	1,223
Other foods	2,412	2,216	196	9,691	8,878	813
Industrial supplies and materials	**51,961**	**75,264**	**-23,304**	**303,818**	**218,632**	**85,187**
Finished metal shapes	4,133	21,039	-16,906	91,265	12,027	79,238
Other precious metals	1,271	2,363	-1,092	7,661	4,242	3,419
Crude oil	11,548	12,450	-902	51,770	56,139	-4,369
Other petroleum products	2,623	3,437	-814	11,863	15,153	-3,290
Nuclear fuel materials	415	1,071	-655	2,863	2,245	618
Bauxite and aluminum	1,350	1,884	-534	6,637	5,485	1,153
Organic chemicals	1,823	2,305	-483	8,626	9,016	-390
Iron and steel mill products	1,448	1,807	-359	7,083	8,310	-1,227
Fuel oil	1,347	1,666	-319	6,462	8,075	-1,613
Industrial supplies, other	3,816	4,074	-258	15,958	15,336	622
Shingles, wallboard	1,263	1,457	-194	5,607	5,424	183
Electric energy	149	320	-171	987	810	177
Iron and steel, advanced	1,047	1,216	-169	4,846	4,924	-78
Other chemicals	1,605	1,771	-166	6,555	6,267	288
Paper and paper products	799	948	-149	3,417	3,132	286
Steelmaking materials	699	842	-143	3,174	3,127	47
Fertilizers, pesticides, and insecticides	1,188	1,321	-132	4,946	5,102	-156
Lumber	621	739	-118	2,686	2,568	118

Exhibit (continued)

In millions of dollars. Details may not equal totals due to seasonal adjustment and rounding. The commodities in this exhibit are ranked on the monthly change within each major commodity grouping. (-) Represents zero or less than one-half of measurement shown.

Item (1)	April 2025	March 2025	Monthly Change	Year-to-Date 2025	Year-to-Date 2024	Year-to-Date Change
Pulpwood and woodpulp	279	397	-118	1,424	1,407	17
Iron and steel products, n.e.c.	827	923	-95	3,845	4,009	-164
Natural gas	1,159	1,250	-91	4,317	2,476	1,841
Nontextile floor tiles	649	730	-80	2,680	2,470	211
Plastic materials	1,690	1,754	-65	7,006	6,984	22
Tobacco, waxes, etc.	1,419	1,481	-62	5,880	5,013	868
Other nonferrous metals	440	501	-61	1,793	1,509	284
Stone, sand, cement, etc.	649	708	-59	2,767	2,685	82
Plywood and veneers	327	379	-51	1,366	1,218	148
Farming materials, livestock	125	171	-45	672	688	-16
Finished textile supplies	500	528	-28	2,085	1,989	96
Synthetic cloth	459	483	-24	1,858	1,822	36
Coal and related fuels	84	107	-23	414	1,336	-921
Zinc	147	169	-22	644	614	30
Glass-plate, sheet, etc.	217	239	-21	893	852	40
Natural rubber	158	176	-18	644	486	158
Liquefied petroleum gases	267	285	-18	1,255	1,110	145
Wool, silk, etc.	53	64	-11	224	234	-10
Hair, waste materials	85	95	-10	378	385	-7
Newsprint	28	38	-10	142	140	2
Cotton cloth, fabrics	75	83	-8	318	316	1
Nickel	233	234	-1	899	776	124
Hides and skins	2	2	(-)	10	9	1
Cotton, natural fibers	9	7	1	26	27	-1
Blank tapes, audio & visual	11	9	2	38	44	-6
Materials, excluding chemicals	146	140	6	590	581	8
Leather and furs	46	37	9	158	161	-4
Tin	92	82	11	364	224	140
Synthetic rubber--primary	276	253	23	986	1,013	-26
Sulfur, nonmetallic minerals	142	117	26	567	580	-13
Inorganic chemicals	1,180	1,091	90	4,372	4,326	45
Nonmonetary gold	940	741	199	8,019	3,517	4,502
Copper	2,103	1,284	820	4,778	2,252	2,526

Exhibit (continued)

In millions of dollars. Details may not equal totals due to seasonal adjustment and rounding. The commodities in this exhibit are ranked on the monthly change within each major commodity grouping. (-) Represents zero or less than one-half of measurement shown.

Item (1)	April 2025	March 2025	Monthly Change	Year-to-Date 2025	Year-to-Date 2024	Year-to-Date Change
Capital goods, except automotive	**90,630**	**93,475**	**-2,845**	**362,424**	**304,582**	**57,842**
Semiconductors	5,944	6,735	-791	25,505	25,372	134
Civilian aircraft engines	2,130	2,604	-474	9,895	9,114	782
Civilian aircraft	939	1,261	-322	5,208	5,562	-355
Photo, service industry machinery	2,371	2,665	-294	10,365	9,128	1,237
Other industrial machinery	7,115	7,322	-207	29,372	27,124	2,248
Civilian aircraft parts	1,310	1,488	-178	5,546	5,665	-120
Measuring, testing, control instruments	2,308	2,484	-176	9,565	9,526	39
Metalworking machine tools	1,228	1,394	-166	5,225	5,242	-17
Materials handling equipment	2,329	2,492	-163	9,855	11,263	-1,407
Wood, glass, plastic	755	918	-163	3,338	3,210	128
Generators, accessories	4,088	4,248	-160	16,091	13,811	2,280
Industrial engines	2,739	2,871	-132	11,218	10,542	676
Laboratory testing instruments	657	743	-86	2,862	2,831	31
Food, tobacco machinery	518	568	-50	2,146	2,132	14
Medical equipment	5,680	5,722	-42	22,694	20,105	2,588
Business machines and equipment	437	479	-41	1,806	1,596	210
Pulp and paper machinery	637	672	-35	2,642	2,608	34
Textile, sewing machines	168	178	-10	689	720	-31
Railway transportation equipment	139	148	-9	542	667	-125
Nonfarm tractors and parts	83	88	-5	334	340	-6
Vessels, except scrap	(-)	(-)	(-)	1	1	-1
Commercial vessels, other	13	11	1	49	66	-17
Spacecraft, excluding military	11	7	4	38	28	10
Computer accessories	13,281	13,275	7	48,914	27,495	21,419
Drilling & oilfield equipment	469	454	15	1,880	1,773	107
Agricultural machinery, equipment	1,216	1,198	18	4,863	5,679	-817
Marine engines, parts	129	105	24	412	352	60
Specialized mining	120	90	30	420	411	9
Computers	13,636	13,547	90	54,022	36,013	18,009
Electric apparatus	9,418	9,301	117	36,447	32,023	4,424
Excavating machinery	1,436	1,310	126	5,369	7,192	-1,824
Telecommunications equipment	9,325	9,095	230	35,114	26,993	8,121
Automotive vehicles, parts, and engines	**33,240**	**41,535**	**-8,295**	**150,646**	**161,168**	**-10,522**
Passenger cars	13,073	19,515	-6,442	66,710	71,881	-5,171
Trucks, buses, and special purpose vehicles	4,471	5,576	-1,105	19,862	22,000	-2,139
Other automotive parts and accessories	11,582	12,177	-595	47,140	49,587	-2,447
Engines and engine parts	2,495	2,660	-165	10,597	11,542	-945
Bodies and chassis for trucks and buses	41	42	-1	156	195	-39
Bodies and chassis for passenger cars	2	3	-1	16	15	1
Automotive tires and tubes	1,576	1,562	14	6,165	5,948	217

Exhibit (continued)

In millions of dollars. Details may not equal totals due to seasonal adjustment and rounding. The commodities in this exhibit are ranked on the monthly change within each major commodity grouping. (-) Represents zero or less than one-half of measurement shown.

Item (1)	April 2025	March 2025	Monthly Change	Year-to-Date 2025	Year-to-Date 2024	Year-to-Date Change
Consumer goods	**69,897**	**102,855**	**-32,958**	**331,976**	**259,190**	**72,786**
Pharmaceutical preparations	24,179	50,156	-25,978	132,460	76,517	55,943
Cell phones and other household goods	8,746	12,242	-3,497	44,250	36,696	7,554
Artwork and other collectibles	972	1,602	-630	4,708	4,418	290
Gem diamonds	882	1,366	-484	4,472	5,223	-751
Other textile apparel and household goods	4,644	4,960	-316	19,423	17,728	1,696
Furniture, household goods, etc.	3,492	3,785	-294	14,455	13,856	599
Cotton apparel and household goods	3,736	4,011	-275	15,066	13,542	1,524
Other consumer nondurables	1,769	2,022	-253	7,639	6,885	754
Stereo equipment, etc	1,072	1,298	-226	4,917	4,046	871
Toys, games, and sporting goods	3,811	4,035	-225	16,060	14,688	1,372
Cookware, cutlery, tools	991	1,214	-223	4,661	4,507	154
Household appliances	3,345	3,491	-146	13,740	12,758	982
Nontextile apparel and household goods	772	893	-121	3,358	3,186	172
Toiletries and cosmetics	1,745	1,860	-115	7,245	6,730	515
Televisions and video equipment	1,226	1,314	-88	5,809	6,146	-337
Books, printed matter	333	412	-79	1,492	1,537	-45
Jewelry	2,086	2,139	-54	8,144	7,462	682
Motorcycles and parts	350	395	-45	1,453	1,711	-258
Gem stones, other	316	349	-33	1,511	1,597	-86
Rugs	293	312	-19	1,169	1,123	47
Wool apparel and household goods	228	240	-12	957	942	16
Glassware, chinaware	238	248	-9	1,005	937	68
Recorded media	56	62	-6	247	292	-45
Musical instruments	172	176	-4	732	719	13
Pleasure boats and motors	400	403	-3	1,516	1,443	72
Photo equipment	446	439	6	1,808	1,722	86
Nursery stock, etc.	306	289	16	1,240	1,205	34
Numismatic coins	219	184	36	868	917	-49
Footwear	1,763	1,721	42	6,684	6,246	438
Camping apparel and gear	1,311	1,234	76	4,888	4,414	474
Other goods	**11,727**	**12,132**	**-405**	**48,220**	**43,454**	**4,767**

(1) Detailed data are presented on a Census basis. The information needed to convert to a BOP basis is not available.

NOTE: For information on data sources, nonsampling errors, definitions, and details concerning what is included in Net Adjustments, see the explanatory notes in this release or at www.census.gov/ft900 or www.bea.gov/data/intl-trade-investment/international-trade-goods-and-services.

Source: US Census Bureau (2019).

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