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The Mirage of Reshoring: Apple's iPhone Production and the Economic Limits of Protectionist Strategy

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Abstract

Reshoring—commonly referred to as "back-shoring"—describes the relocation of manufacturing operations from overseas sites to a firm's domestic base. The Trump administration sought to accelerate this trend by implementing extensive tariff regimes and policy measures aimed at encouraging U.S. companies to reinvest domestically and reestablish production facilities on American soil. American Public opinion surveys indicate broad bipartisan support for reshoring, reflecting a belief that domestic production safeguards employment and national economic interests. However, protectionist policies are frequently criticized for their limited economic rationale. Such measures often invite retaliatory trade practices, raise production and consumer costs, and erode long-term competitiveness by disrupting efficient global supply chains.

This study examines the economic implications of reshoring policies through an in-depth case analysis of Apple Inc., a firm emblematic of complex, high-technology supply networks. The paper evaluates how reshoring initiatives affect production efficiency, cost structures, innovation capacity, and job creation. Findings demonstrate how free trade and globally integrated supply chains benefit both business and consumers, and explains the impracticality of repatriating jobs in the modern economy. Reversing globalization by relocating advanced manufacturing operations is unlikely to achieve meaningful employment gains and may compromise the industry's competitive positioning within the global economy. Thus, President Trump's protectionist "Make America Great Again" (MAGA) agenda fail to deliver its stated economic goals. This analysis underscores that, for technologically intensive sectors, global supply chain integration remains indispensable for sustaining innovation and economic resilience.

Keywords: *global supply chains, Apple Inc., protectionism, competitive strategy, reshoring*

1. INTRODUCTION

Manufacturing reshoring has attracted significant attention from academics, industry practitioners, and policymakers since the 1980s. Reshoring (backshoring) denotes relocating production back to the home country, while nearshoring refers to regional relocation. Canonical reviews stress that confusion between location (home vs. foreign) and governance (insourcing vs. outsourcing/contracting) has slowed theory development and cross-study comparability (Barbieri et al., 2018). This clarity problem is consequential in electronics, where electronics manufacturers' governance, for example, Original Design Manufacturers (ODM) and Electronics Manufacturing Service (EMS),

and multi-country assembly blur simple distinction between onshore and offshore. Empirical tracking suggests reshoring is real but limited in frequency and scale relative to offshoring or "stay" decisions. Early panel work for Europe/Germany documented low backshoring rates (Kinkel, 2014). The advantages of cost-based relocation activities to low-wage countries seem to diminish more and more, while market related expansion investments in emerging markets are gaining significance.

A recent systematic literature review (Li et al., 2025) is based on 100 peer-reviewed journal papers discussing reshoring decision-making contents published from 2009 to 2022. This review extracted 80 decision factors which were categorized into resource-seeking, market-seeking, efficiency-seeking, and strategic asset-seeking motives. Among these, efficiency-seeking factors—such as access to markets, logistics optimization, and proximity to customers—have been identified as particularly critical in shaping reshoring decisions. Another comprehensive bibliometric review (Siddiqui et al., 2024) aims to clarify the concept of reshoring within the context of Supply Chain Management (SCM) and related fields such as operations and logistics. This research investigated 148 articles published between 1980 and 2020. It highlights the conceptual ambiguity surrounding reshoring within the broader context of SCM, operations, and logistics research. This ambiguity, they argue, has impeded the development of robust theoretical frameworks. Furthermore, the scope of reshoring remains contested: while traditionally defined as relocating production from overseas to a firm's home country, some studies adopt a broader view that includes nearshoring—i.e., shifting production from global (multi-continent) operations to regional (single-continent) manufacturing hubs.

Both literature reviews pointed out that, while theoretical progress has been made, the field of reshoring research remains at an early stage. Much of the literature is conceptual, with relatively few empirical investigations or detailed case studies. Consequently, there is a need for more holistic approaches that integrate practical and managerial perspectives through alternative methodologies, such as in-depth case analyses. In response to this gap, this paper employs a case study of Apple Inc.—a leading high-technology firm with one of the world's most complex and globally integrated supply chains—to examine the economic viability of reshoring advanced manufacturing to the United States.

2. CHANGING U.S. TRADE POLICY

The global political and economic environment has undergone profound transformation in recent years. The COVID-19 pandemic triggered unprecedented disruptions in global supply chains, rekindling discussions on the need for shorter, more localized, and diversified production networks. Likewise, the Russia-Ukraine has intensified geopolitical divisions, underscoring the fragility of interdependent global systems. In response, many countries have increasingly adopted protectionist policies that prioritize national interests, thereby deepening global fragmentation. The most prominent example of this trend is the United States, where protectionism—manifested through high tariffs and incentives for domestic production—has become a central feature of trade policy. Public opinion in the U.S. broadly supports these measures, viewing them as mechanisms for safeguarding employment and promoting national economic security (Clark, et al., 2025).

Trade policy has consequently become one of the most contentious issues in recent political discourse. During the 2016 U.S. presidential campaign, Donald J. Trump, the Republican candidate, centered his economic platform on the slogan "Make America Great Again" (MAGA). He pledged to reinvigorate U.S. manufacturing and employment by reversing decades of trade liberalization. His policy proposal included dismantling existing trade agreements, renegotiating North American Free Trade Agreement (NAFTA), and imposing steep tariffs—35% on Mexican imports and 45% on Chinese imports (Noland, Hufbauer, Robinson, & Moran, 2016, p.5). Following his election, U.S. trade policy shifted decisively toward protectionism. Although politically popular, such policies have been described as "politically expedient but economically shortsighted," as they fail to account for the complexities and dynamics of global markets (Perry 2017b). Protectionist measures often

provoke retaliatory tariffs from trading partners, while American consumers and businesses ultimately bear the costs in the form of higher prices, reduced efficiency in the market, and slower economic growth.

Reshoring has reemerged as a core element of U.S. policy, particularly since 2018, when tariff-led industrial policy sought to "rebuild" domestic manufacturing capacity. These policy shifts have compelled businesses worldwide to reconsider and restructure their supply chain to mitigate the impact of the U.S. tariffs. However, empirical evidence indicates that nearly the entire burden of these tariffs was almost completely passed on to U.S. domestic prices. In other words, the burden of tariffs fell on U.S. consumers and importers, reducing real income and yielding deadweight losses. Retaliatory tariffs depressed U.S. exports without clear net manufacturing gains in domestic manufacturing employment or output (Amiti, Redding & Weinstein 2019, Fajgelbaum et al. 2021). Collectively, these findings suggest that protectionist instruments are blunt tools for reshoring complex high-technology supply chains.

High-technology industries such as consumer electronics, face structural constraints that make reshoring impractical. These include dense supplier ecosystems, steep learning-curve effects, extreme time-to-market pressures, and substantial scale economies that can not be easily replicate within the U.S. The next section examines Apple Inc. as a case study to illustrate why reshoring does not achieve the economic outcomes envisioned by President Trump's policies.

3. APPLE INC. AND ITS GLOBAL SUPPLY CHAIN

3.1. Apple's global supply chain and its evolution

Apple Inc. has revolutionized the smartphone industry since CEO Steve Jobs unveiled the iPhone in 2007. The company redefined the mobile phone with new technologies—creating a device with a clear wide screen, touch screen controls, and connectivity to the internet (Berr, 2017). Despite initial skepticism from media and investors, Apple sold over 2.5 billion iPhones between 2007 and 2022. By 2016, Apple had become the world's largest information technology company in terms of revenue, with US$216 billion in sales-exceeding the entire 2017–2018 California state budget (Carroll & Respaut, 2017). As of 2023, Apple remains the largest publicly traded company globally, with a market capitalization of US$2.96 trillion and annual gross sales exceeding US$380 billion (MarketScreener, 2025).

Apple's success is largely attributable to its highly efficient and sophisticated global supply chain. Apple designs iPhone's hardware, software, and marketing strategies in the U.S., while manufacturing and assembly are outsourced to specialized firms worldwide. Apple contracts manufacturers for individual components, such as displays, cameras, and batteries, to ensure high-quality production. Notably, even South Korea's Samsung Electronics, a competitor, supplies critical components such as NAND/flash memory used for data storage (Gould & Villas-Boas, 2016). Figure 1. illustrates the global distribution of main suppliers for iPhone 13 which was first released in September 2021. Regarding the evolution of iPhone's supply chain, four key trends can be identified.

First, while long-established suppliers such as Sony continue to provide advanced camara components, Chinese firms have rapidly gained technological capability. Companies like BOE (Beijing Oriental Electronics Group Co. Ltd.), a producer of OLED panels, and ATL (Amperex Technology Ltd.), a lithium-ion batteries manufacturer, have become integral to the iPhone production network. Second, in terms of the system-on-chip (SoC), Apple began developing its own cellular modems around 2018 to reduce its reliance on Qualcomm (USA) and gain strategic control over a key technological component. Although, recent iPhone models continue to use Qualcomm's chips in heigh-end devices, Apple aims to replace them with its in-house modem technology. Internalizing SoC modem development enables Apple to better integrate hardware and software architecture, optimize device performance and enhance differentiation from competitors. This strategic movement represents a long-term investment in control, cost efficiency, integration and innovation. Third, Apple has gradually diversified production beyond China

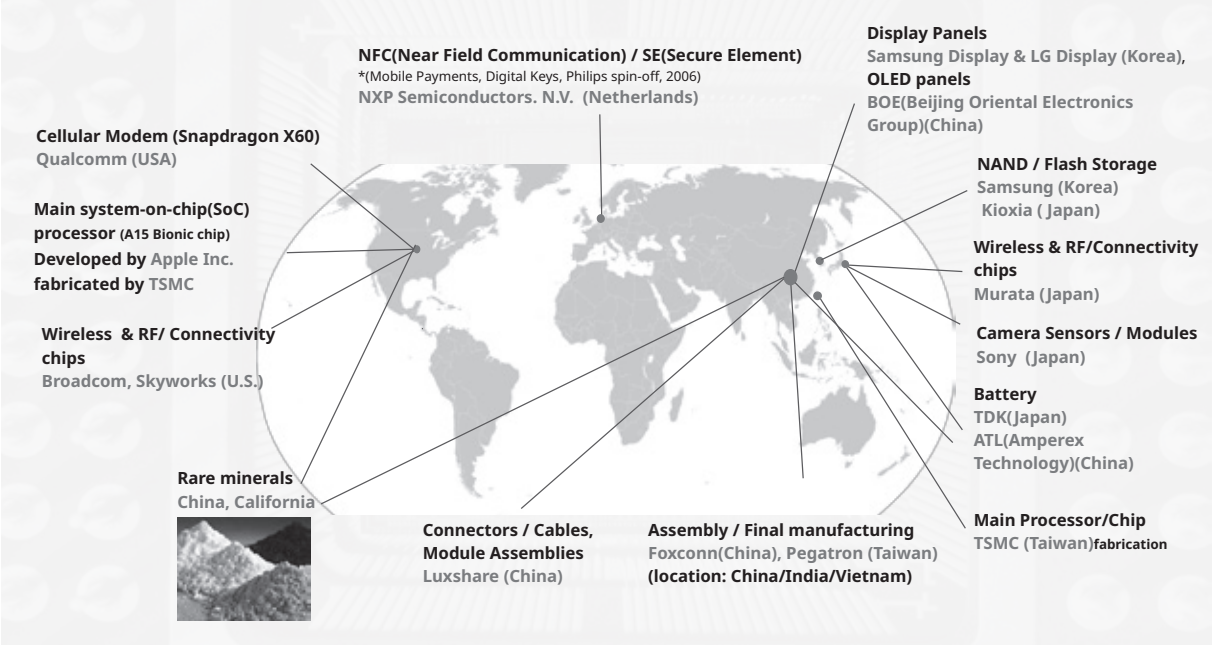


Figure 1: Global distribution of iPhone 13 suppliers

Source: Created by the author based on *Apple FY2023 supplier list*
https://s203.q4cdn.com/367071867/files/doc_downloads/2024/04/Apple-Supplier-List.pdf

to countries such as India and Vietnam, particularly in response to U.S. trade policies introduced during the Trump administration, including the "reciprocal tariff" framework affecting more than 180 countries in 2025 (Kharpal, 2025). Nevertheless, China continues to assemble approximately 80% of iPhones, remaining Apple's primary production base to its massive industrial scale and sophisticated logistics infrastructure. Fourth, Apple's iPhone production depends critically on access to rare earth minerals, which are indispensable for essential components such as speakers, camera stabilizes, and wireless charging systems. China domines over 70% of global rare earth mining and nearly 90% of refining and magnet production, granting it substantial control over this strategic segment of the supply chain (Washington Post, 2025). Amid escalating U.S.-China trade tensions, Beijing has increasingly leveraged these rare earth elements as strategic assets, retaliating against U.S. policies by imposing export restriction and tightening licensing requirements.

By 2022, Apple's supply chain encompassed over 700 manufacturers across 50+ countries, with 615 suppliers located in China (Apple Inc., 2024). The iPhone 13 Pro Max consists more than 2,000 components sourced from multiple countries, emphasizing the complexity and interdependence of global trade networks. For iPhone 14 series (released in 2022), Samsung and TSMC (Taiwan Semiconductor Manufacturing Company) were the only suppliers capable of mass-producing Apple's high-technology chips. These thousands of parts were then shipped to assembly plants primarily in China for final assembly. Apple's global supply chain allows it to focus on its core competencies—design, branding, and marketing-while leveraging the technological expertise of specialized manufacturers worldwide.

3.2. Apple's supply chain management and high profit margins

Apple exercises precise supply management to keep down costs while maintaining product quality. According to a detailed cost analysis by Tecinsights.com, in 2017 the total bill of materials (BOM) and manufacturing (assembly and test) for an 8-gigabytes model iPhone 8, and iPhone X were US$285

Table 1: Cost comparisons for the iPhone X and 8 (2017)

Category	iPhone X	iPhone 8	Percentage share of total cost (%) iPhone X	Percentage share of total cost (%) iPhone 8
Applications Processor	$52.00	$52.00	14.5	18.2
Baseband Processor	$14.50	$14.50	4.1	5.1
Battery	$4.00	$4.00	1.1	1.4
Camera / Image	$40.00	$20.00	11.2	7.0
Connectivity	$11.50	$11.50	3.2	4.0
Display / Touchscreen	$65.50	$36.00	18.3	12.6
Memory: Non-Volatile**	$20.50	$20.50	5.7	7.2
Memory: Volatile	$25.50	$16.50	7.1	5.8
Mixed Signal	$0.50	$0.00	0.1	0.0
Non-Electronics	$36.00	$21.50	10.1	7.5
Other	$16.00	$15.50	4.5	5.4
Power Management / Audio	$14.00	$12.00	3.9	4.2
RF Component	$21.00	$25.00	5.9	8.8
Sensor	$2.00	$4.00	0.6	1.4
Substrates	$14.50	$9.00	4.1	3.2
Supporting Materials	$3.50	$7.00	1.0	2.5
Final Assembly & Test	$16.50	$16.00	4.6	5.6
Total	$357.50	$285.00	100.0	100.0
Retail price in the U.S.	$999.00	$699.00		
Gross profit (%)	35.8	40.8		

Source: Created by the author based on (Techinsights.com 2017) *in US$

and US$357, respectively (Table 1).

As the average retail price of iPhone 8 and iPhone X were around US$699 and US$999, component costs represented roughly 40% and 36% of the retail price, yielding an estimated gross profit margin of up to 50%. This demonstrates that manufacturing and assembly account for only a minor share of Apple's complex value chain. The share of profits captured by subcontractors—especially Chinese assemblers—is comparatively very small. For technology companies, labor costs are minimal relative to component costs: the final assembly and testing of iPhone cost US$16, of which the assembly alone was around US$6 per unit, or around 2% of the total materials and manufacturing cost.

Consequently, the profit margin for Chinese manufacturers is estimated at 1.8% to 2%. In contrast, South Korean suppliers as LG and Samsung, which produce higher-value components like displays and memory chips, achieve gross margins at 5% to 7%. According to the Nikkei Asia article (2022), components for the iPhone 14 were primarily sourced from U.S. suppliers accounting for 32.4% of the total parts cost, followed by South Korea (24.8%) and Japan (10.9%). This composition underscores Apple's dependence on technologically advanced partners, rather than low-cost producers.

In fiscal year 2023, Apple achieved a record gross profit margin of 44%, and net profit margin of 25%. These high figures can be explained by the Smiling Curve framework, which illustrates how value is distributed along a product's value chain (Figure 2). The curve shows that the upstream activities—R&D (research & development), branding, and design in the left side of the curve, and the downstream—distribution, marketing, and after sales service in the right side of the curve, capture the highest-value. In contrast, midstream activities such as component manufacturing and assembly generate minimal value. Apple's innovation and

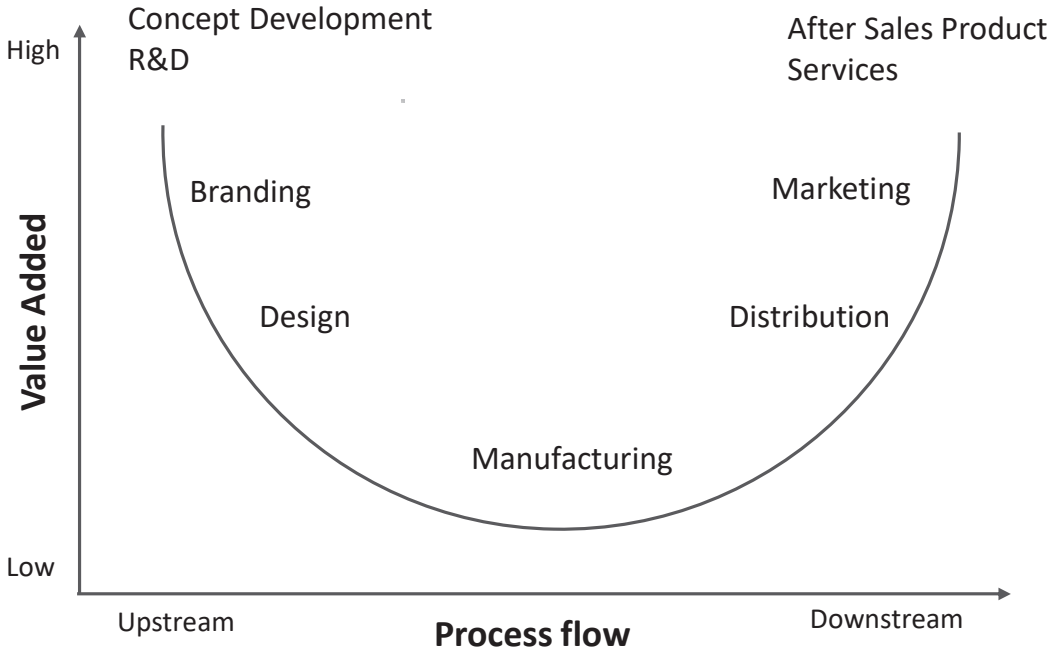


Figure 2: Distribution of the added value in the commodity chain

Source: Created by the author based on "Smile Curve" concept (Shih, S. 1996)

management ability are critical, and these functions remain within the U.S. headquarters because it would be difficult and expensive to replicate these competences elsewhere. By specializing in design, software development, and premium branding, Apple captures the largest share of value and earns high margins. Meanwhile, its low-value manufacturing is outsourced to China and other countries. Chinese sub-contractors handled high-volume but low-margin assembly work, earnings a fraction of what component and technology suppliers do. This strategy enables Apple to offer competitively priced premium products worldwide while maintaining exceptional profitability through global specialization.

Beyond cost considerations, Apple's dependence on Chinese manufacturers extends to factors like workforce scalability, supply chain flexibility, and rapid production capacity. These criteria cannot be matched by counterparts located in the U.S.; thus, reshoring manufacturing is not a viable option for Apple products. Foxconn, a subsidiary of the Taiwanese manufacturer Hon Hai Group, is the world's largest electronics contract manufacturer. In mainland China, Foxconn employs over one million workers in 2022 (Foxconn 鴻海科技集団, 2025). It started to operate the world's largest iPhone assembly factory in Zhengzhou, China in August 2010 (Barboza, 2016a). After specialized manufacturers produce components of the iPhone, all parts are shipped to contract manufacturers mostly in China, who then finish final assembly, testing and packaging (F.A.T.P.) (Barboza, 2016b). Before the COVID-19 outbreak, *New York Times* (2017) report revealed that Foxconn's Zhengzhou facility produced about half of the world's iPhones with a maximum potential production capacity of 350 iPhones per minute, equivalent to roughly 500,000 units per day. The factory covered 2.2 square miles, more than 1.5 times the size of Central Park in New York, and employed up to 350,000 workers. There were 94 production lines on the site, and the finishing process took about 400 steps to assemble the iPhone, including polishing, soldering, drilling and fitting screws (Barboza, 2016b).

Locating this massive assembly hub in China was a logical and strategic decision. The Zhengzhou plant is in close proximity—both geographically

and communicatively—to over 600 of Apple's Chinese contractors. Thus, the rate of production at the Foxconn factory can be adjusted quickly to market demand without the time loss which usually results from a shortage of one or more components. China also provides an abundant supply of both low-level and mid-level skilled workers to accommodate fluctuating demand easily. In summer 2025, a record number of 12.2 million college graduates will enter China's job market, underscoring the country's deep reservoir of skilled labor (Xinhua, 2025). In contrast, the U.S. labor market lacks the capacity to scale up production. Apple's executives estimated that the time needed to hire approximately 8,700 engineers to supervise 200,000 assembly workers for iPhone production would take as long as nine months in the U.S., compared to only 15 days in China (Duhigg & Bradsher, 2012) (Compare Camp, 2014).

After assembling all of the components, testing and packaging are done at the Foxconn Zhengzhou facility, finished iPhones are transported to the Chinese customs facility located just outside of the factory. For overseas markets, products are shipped primarily by air freight from the airport located just three miles away from the factory (Barboza, 2016b). Boeing 747s can easily carry 150,000 iPhones per flight. Shipments by air are destined for Apple's online orders, and the U.S. distribution hubs. Logistically, it takes about two days to transport products 590-mile (950 kilometers) from Zhengzhou to Shanghai by road, and roughly three days for 6,300-mile (10,139 kilometers) journey to reach Apple retail stores in San Francisco (Barboza, 2016b). Ultimately, the U.S. manufacturing base cannot replicate China's production scale or flexibility. China's highly developed industrial clusters, dense supply ecosystem, and synchronized logistics network provide Apple with an unparalleled operational advantage that would be prohibitively costly and perhaps impossible to duplicate domestically.

3.3. The challenges of reshoring iPhone production to the U.S.

Despite the clear impracticality of replicating China's manufacturing ecosystem, President Trump consistently advocated for reshoring iPhone productions to the U.S. soil. Proponents argue that such a move would boost domestic manufacturing and reduce reliance on foreign supply chains. However, this transition presents significant economic and logistical barriers that could severely undermine Apple's global competitiveness.

A primary concern is the dramatic increase in production costs. Estimates suggest that manufacturing an iPhone domestically could more than double its retail price, increasing from approximately US$1,000 to US$2,400 for the iPhone 14 Pro (Bryan, 2023). This surge reflects higher labor costs, strict regulatory compliance, and the massive capital investment required to establish advanced production infrastructure. Consequently, production volumes would plummet from over 200 million units annually to just a few million, severely limiting Apple's capacity to meet global demand. Moreover, critical components—such as displays, camera modules, and semiconductor chips—are sourced from highly specialized suppliers across the world. Even if final assembly were relocated to the U.S., these essential components would still require importation, negating much of the supposed benefit of reshoring (Gereffi & Lee, 2016).

Beyond cost implications, reshoring would generate serious strategic disadvantages. Reduced production scale would weaken Apple's bargaining power with suppliers, increasing procurement and logistics costs. Furthermore, diverting managerial and financial resources toward domestic manufacturing would also constrain investments in Apple's core competencies—research and development (R&D), software engineering, branding, and service expansion. Apple has pioneered a "designed in the U.S. and manufactured globally" supply chain model that maximizes efficiency and profitability. Apple's 2024 financial report shows that the company invests US$31 billion (8% of net sales) in R&D, reflecting its commitment to continuous innovation. Such investment underscores the importance of a globally integrated supply chain in sustaining long-term innovation, competitiveness, and economic growth.

Apple's current manufacturing strategy leverages highly developed industrial clusters in China that have been optimized for decades in terms of specialized labor, logistical efficiency, and interfirm coordination. Replicating this ecosystem in

the U.S. would demand enormous time and capital investment, presenting a formidable challenge. Offshore manufacturing provides Apple with key operational advantages, including access to a vast and adaptive labor force, just-in-time component availability, and unmatched expertise in production. Chinese factories enable Apple to rapidly scale production volume instantaneously to respond to market fluctuations—a level of agility that remains unattainable within U.S. borders. Moreover, Apple's global supply chain management fosters disciplined and efficient inventory control, enhancing its competitive edge in the international marketplace. Apple's globally distributed, multi-tiered, high-precision, mass-market iPhone manufacturing system represents an essential case study in the limits of reshoring. For complex consumer electronics, reshoring initiative are unlikely to generate substantial employment gains, but would instead risk higher cost, slower innovation, and diminished resilience compared with globally integrated—but diversified—production networks.

4. CONCLUSION

Since the late 1980s, the digital revolution has transformed the business landscape in ways previously unimaginable. Companies such as Alphabet, Amazon, Meta, Uber, and Instagram have refined industries through technological innovation. The evolution of multinational business operations, particularly in high-technology manufacturing, highlights the often-unseen interdependencies of global economic networks. Apple's supply chain epitomizes this interconnected system: an invisible yet indispensable architecture that enables of cutting-edge products at competitive prices while sustaining exceptional profitability.

Historically, companies like IBM, Hewlett-Packard, and Apple designed and manufactured their products domestically. However, as globalization has progressed and technological complexity has increased, firms now rely on global networks to source and assemble components beyond national boundaries. Firms such as Apple, which operate in high-demand technology markets, have little alternative but to engage in global outsourcing to ensure adequate production capacity. The intricate complexities and economic benefits of this globally integrated manufacturing system are frequently misunderstood and largely absent from political discourse. Realistically, no single country is the source of all innovation, thus they must collaborate with specialized partners to bring advanced products to market at scale. The global supply chain framework allows Apple to procure high-quality components at competitive prices. If forced to manufacture exclusively within the U.S., Apple would lose a critical competitive advantage, diminishing its contributions to both the domestic and global economies.

Protectionist policies threaten to destabilize this intricate ecosystem. To remain competitive in the global market, the U.S. must embrace freer trade policies that acknowledge the realities of globalization, foster international cooperation, and support a dynamic, innovation-driven economy. President Trump's hardline stance against globalization has exposed significant risks for U.S. firms deeply integrated into global supply chain cooperation and partnerships (White House, 2017). Nationally bounded trade policies are increasingly obsolete, failing to accommodate the complex interconnections of the 21st century economy. While tariffs and import restrictions may provide temporary relief for a limited number of American producers and jobs, they are ultimately unsustainable and counterproductive. Simplistic anti-trade rhetoric may gain political traction, but it overlooks the broader economic benefits of globalization. Politicians, labor unions, and uncompetitive industries frequently downplay these advantages, leveraging public discontent over offshoring and outsourcing for political gain. However, efforts to reshore low-value-added functions ignore fundamental economic principles. Protectionist measures, driven by populist narratives, erode long-term competitiveness, weakening "Made in America" brand in international markets, and undermining national economic resilience. Sustainable growth depends instead on leveraging the efficiencies of global supply chains where low-value-added tasks, such as assembly, are performed where labor costs are lower, allowing firms to allocate resources to high-value activities like product development, research, and supply chain management.

Isolationist trade policies would ultimately harm U.S. businesses and consumer alike, leading to job losses and declining living standards. The impact is disproportionately severe for low-income group, who face rising prices for essential goods. Nevertheless, protectionist policies persist in public discourse because job losses in certain industries are highly visible, and foreign competition is often scapegoated. This narrative overlooks the true causes of business failures and dismisses the significant gains from international trade and specialization.

This case of Apple demonstrates that in high-technology industries, competitive advantage derives from integration—not isolation. Policy-makers and corporate leaders must recognize that sustainable strategies emerge from embracing interdependence, innovation, and the global flow of knowledge, talent and capital.

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