



# Building a Resilient U.S. Consumer Technology Supply Chain

How a team approach with U.S. treaty allies and trade partners is the best path forward

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KEARNEY

Consumer  
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# Foreword

With the developments of the past few years—including the disruptions from the COVID-19 pandemic and rising geopolitical tensions—supply chain resiliency has been a top priority for every company. Consumer technology manufacturers are no exception. Companies involved in creating the products and components that are critical to our everyday lives face an urgent need to make their supply chains far less vulnerable to events that could interrupt their businesses and impede their ability to serve customers.

This need was the impetus for a major research study commissioned by the Consumer Technology Association and conducted by Kearney that explored how U.S. consumer technology manufacturers could build resiliency by reducing their supply chains' dependence on Mainland China and Taiwan. This effort coincides with recent policy movements by the U.S. government incentivizing companies to bring their supply chains back to the United States, as well as companies' own interest in and steps toward moving some of their operations out of Mainland China and Taiwan. This research sought to provide a fact base that can help both governments and companies de-risk such actions by exploring the following key issues:

- 1) The growing importance of ensuring resilient consumer technology supply chains that service the U.S. market
- 2) Risk exposure to Mainland China and Taiwan for technology products and manufacturing inputs imported by the United States
- 3) Current U.S. consumer technology manufacturing capability and capacity
- 4) Current consumer technology manufacturing capabilities and capacity among key U.S. treaty allies and trading partners
- 5) Recommendations and requirements to increase consumer technology supply chains' resilience

Our research and analyses focused on consumer technology manufacturing within the Computer and Electronic Product Manufacturing subsectors covered by the following North American Industry Classification System (NAICS) industry groups. The following are products in scope:

## NAICS 3341

### Computer and peripheral equipment manufacturing

This industry group comprises businesses primarily engaged in manufacturing and/or assembling electronic computers, such as mainframes, personal computers, workstations, laptops, and computer servers; and computer peripheral equipment, such as storage devices, printers, monitors, and input/output devices and terminals. Computers can be analog, digital, or hybrid

## NAICS 3342

### Communications equipment manufacturing

This industry group comprises businesses primarily engaged in manufacturing wire telephone and data communications equipment, radio and television broadcast and wireless communications equipment, and all other communications equipment.

<b>NAICS 3343</b>	<b>Audio and video equipment manufacturing</b>
<p>This industry group comprises businesses primarily engaged in manufacturing electronic audio and video equipment for home entertainment, motor vehicles, and public address and musical instrument amplification. Examples of products made by these establishments are digital video recorders, televisions, stereo equipment, speaker systems, household-type video cameras, jukeboxes, and amplifiers for musical instruments and public address systems.</p>	
<b>NAICS 3344</b>	<b>Semiconductor and other electronic component manufacturing</b>
<p>This industry group comprises businesses primarily engaged in manufacturing semiconductors and other components for electronic applications. Examples of products made by these establishments are capacitors, resistors, microprocessors, bare and loaded printed circuit boards, electron tubes, electronic connectors, and computer modems.</p>	

Our research scope covers the following geographical areas:

Grouping	USA	Mainland China and Taiwan	Treaty Allies <sup>1</sup>	Trade Partners
<b>Geographical area</b>	United States	Mainland China Taiwan	Canada <sup>2</sup> France Germany United Kingdom Japan Republic of Korea <sup>2</sup> (South Korea)	India Mexico <sup>3</sup> Vietnam

When discussing the current and potential movement of consumer technology manufacturing out of Mainland China, we distinguish between three distinct but related actions:

- **Reshoring:** moving manufacturing back to the United States—typically, but not exclusively, from Asia
- **Nearshoring:** shifting manufacturing closer to the United States, such as to Mexico, Canada, the Caribbean, and Costa Rica—again, typically, but not exclusively, from Asia
- **Friendshoring:** moving manufacturing from, specifically, Mainland China and Taiwan to geographies that are U.S. allies, such as France or Germany

Such distinction is important to our overarching research hypothesis: While a coherent policy that leverages the capabilities of the United States and its allies is required to move technology manufacturing away from Mainland China and Taiwan, reshoring to the United States alone will not be sufficient to meet current and growing demand for consumer technology products. Indeed, our research and analyses confirm some

<sup>1</sup> Treaty allies are defined as selected geographies that are covered by collective defense treaties. For this reason, Mexico, Vietnam, and India are grouped as trade partners.

<sup>2</sup> Treaty allies Canada and South Korea also hold Free Trade Agreements (FTAs) with the United States.

<sup>3</sup> Although Mexico is an important and valuable ally to the United States, Mexico is categorized as a trade partner in this report since the country does not hold a formal defense treaty or Major Non-NATO Ally (MNNA) status with the United States

combination of reshoring, nearshoring, and friendshoring will be needed to deliver the scale and expertise required to replace what Mainland China and Taiwan now provide.

On the following pages, we present the results of our research and analyses, including recommendations for how governments and consumer technology manufacturers should proceed to build greater resiliency in their supply chains. We also explore each of the four industry sectors noted above in more detail to provide more specific guidance to parties associated with those sectors. Finally, we discuss our research methodology and include a glossary of key industry terms used throughout this report.

We hope the contents herein can be a useful guide to company executives and policymakers as they work to set a new course for the consumer technology industry for the coming decade that enables the industry to continue to meet the growing demands of the marketplace and the world at large.

# Executive Summary

Everyone today uses some type of consumer technology device in their daily lives. And thanks to the disruptions of the past few years, we've gotten a taste of what life could be like in a world where the consumer technology supply is uncertain or constrained.

The fact is, we've never been as reliant on the consumer technology supply chain as we are today—and we're likely to be even more so tomorrow given the continued “electronification” of everyday product categories, such as electric vehicles, medical devices, and wearables. Even without these up-and-coming categories, today's \$1.7 trillion market for consumer technology likely will about double within the next decade.

But the COVID-19 pandemic has shown we can't take supply chain reliability for granted, and improving resiliency should be a key goal for private organizations and governments alike. Furthermore, heightened geopolitical tension and conflict have led many governments to re-evaluate the level of overall impact to their economy and continued security.

The most significant threat to consumer technology supply chain resiliency is dependence on a single geographical area—namely, Mainland China and Taiwan. Mainland China and Taiwan lead every other single geographical area in terms of share of the supply chain in all four of the key consumer technology sectors: computers and peripherals, communications, audio and video, and semiconductor and other components, holding close to a 40% global share of exports. In contrast, the United States experiences a trade deficit for most consumer technology products in those sectors, importing over twice as much as it exports. This is primarily because the U.S. focuses on upstream device design while ceding responsibility for manufacturing and other downstream activities such as intermediate processing to other select geographies.

Mainland China and Taiwan's dominance, combined with the U.S.'s heavy reliance on imports, creates significant risks for U.S. companies, levels of government, and even citizens. Such risks take varied forms, but all are significant and represent potential challenges to the United States's ability to maintain effective operations during an unexpected event.

Now, given well-publicized threats and supply chain disruptions, many in both government and industry are asking an important question: Is it time to bring most consumer technology manufacturing to the United States? Or more to the point, is it realistic to assume that it can be done successfully?

According to our research, the answer is “no.” It may be conceptually and politically attractive to think about reshoring most or even all of the consumer technology supply chains to the United States, but it's simply not practically or economically feasible given the scale and complexity of required resources and underlying economic production structures. Not only does the United States lack many of the critical raw materials and associated processing capacity, but reshoring manufacturing of all technology products now taking place in Mainland China and Taiwan for the U.S. market, would require a direct investment of well over \$500 billion. Additionally, a more than 10x increase in workforce for both manufacturing and the indirect supplier ecosystem would be needed to meet the expected production output. The fact is companies—and the United States as a whole—will find it difficult, expensive, and time-consuming to replicate the immense production capacity, large and knowledgeable labor force, industrial infrastructure, and relatively low costs that Mainland China and Taiwan offer in their collective position as “the world's manufacturer.”

## A multi-geography “team approach” is the best route to supply chain resiliency

What’s the alternative? Based on our research, we believe a multi-geography “team approach” is the best route to greater supply chain resiliency. By this, we mean using a combination of the United States and its treaty allies and trade partners to provide a long-term alternative to Mainland China’s and Taiwan’s dominance in the global consumer technology supply chain. Our assessment reveals that capacity and capabilities exist across these geographies to help the United States continue to meet growing demand for consumer technology products (Figure 1). More specifically:

- **Semiconductor and other electronic component manufacturing**

The United States, South Korea, and Japan finished ahead in this industry. The United States scored highly in output and innovation due to expertise across chip design while, in contrast, Japan’s strengths are in labor proficiency and facility capacity alongside complex materials and equipment. South Korea excels in output, productivity, and facilities and has extensive advanced logic and memory fabrication capabilities. Germany and France also perform well, particularly in productivity and in having additional latent capacity in lagging nodes. For these reasons, we recommend expanding manufacturing efforts in a combination of the U.S., South Korea, Japan, Germany, and France for this sector, using a “team approach” to use the strengths of one geography to make up for the perceived weakness of another.

- **Communications equipment manufacturing**

India, Vietnam, and the United Kingdom perform well and have pre-existing latent capacity. The United Kingdom is strong in productivity due to its highly skilled laborers in producing low-volume high-mix specialized communications equipment, while India’s and Vietnam’s significant manufacturing facility volume is a good fit for high-volume, low-mix smartphones. Additional investment should focus on increasing India’s and Vietnam’s manufacturing efforts alongside, to a lesser extent, the United Kingdom.

- **Computer and peripheral equipment manufacturing**

The United States, Germany, Mexico, and Vietnam have the strongest current capabilities in this sector. The U.S.’s and Germany’s high scores across facilities and innovation mean they can produce sophisticated, high-value computing goods. Mexico and Vietnam have strong growth potential and a labor force that can support high-volume and low-mix products within the category. Unlocking latent capacity in the United States and Germany—as well as bolstering Mexico and Vietnam, which excel in low-cost manufacturing—could expand manufacturing in this category.



- **Audio and video equipment manufacturing**

Trade partners Vietnam and Mexico have adequate capability, volume, and expertise and could accommodate expanded manufacturing operations for these products.

Regarding other geographical areas that aren’t noted above: 1) Canada, which was part of our research, innovates in several superclusters that aren’t directly involved in, but are complementary to, technology manufacturing. These are digital technology, protein industries, advanced manufacturing (e.g., robotics, additive manufacturing, nanotechnology, and aerospace), scale artificial intelligence, and the ocean economy. Given its level of economic development, proximity to the United States, and emphasis on design activities within the value chain, Canada could also benefit from actions that make U.S.-bound supply chains more resilient; 2) Several geographical areas that weren’t part of our research scope and which we grouped under Rest of World in our analyses also show promise in select consumer technology product categories—and we have called those economies out as appropriate in this the detailed sections in the appendix of the full report. These include Malaysia, the Netherlands, Philippines, and Poland, among others.

**Figure 1. Investment recommendations across industries by geography**

		Recommend for incremental investment			
Geographical Area Grouping	Geographical Area	NAICS 3341: Computers & Peripherals	NAICS 3342: Communications	NAICS 3343: Audio & Video	NAICS 3344: Semiconductor & Other
USA	USA	✓			✓
Treaty Allies	CAN				
	FRA				✓
	DEU	✓			✓
	GBR		✓		
	JPN				✓
	KOR				✓
Trade Partners	IND		✓		
	MEX	✓		✓	
	VNM	✓	✓	✓	

 Recently announced investment policy    
  Proposed for incremental investment

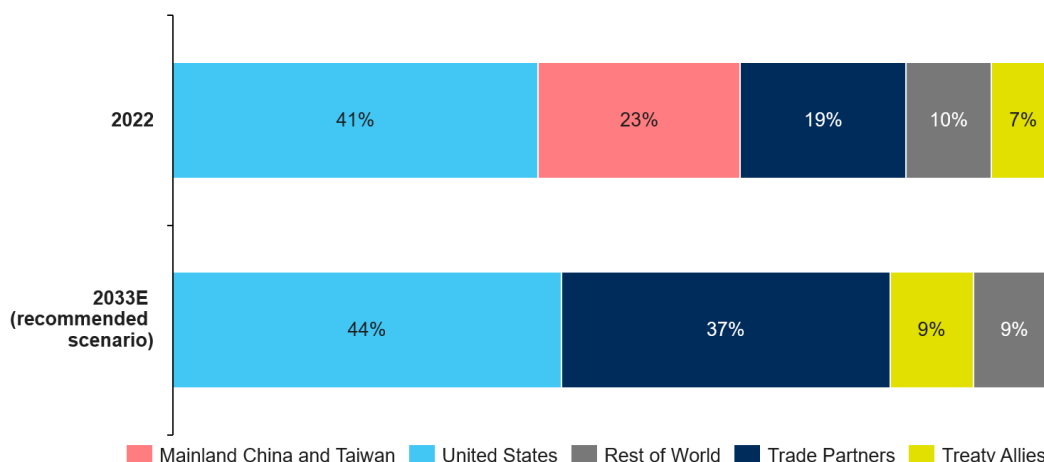
**A multi-geography “team approach” requires significant investments but also creates sizable opportunities and potential benefits for participating economies.**

Our analysis shows there is substantial opportunity to move Mainland China’s and Taiwan’s share of U.S. imports to treaty allies and trade partners. However, pre-existing investments in capacity, capability, and cost make fully decoupling from Mainland China and Taiwan improbable, especially in the upstream portions of the supply chain focused on raw materials, sub-components, and components at tier-N suppliers. Our assessment also illustrates that each geography has its own strengths and weaknesses, and the United States must account for these as it determines an appropriate path forward. Indeed, when pursuing investment and policy to expand manufacturing capabilities, the United States must strike the right balance across all four sectors, leveraging the strengths of individual geographies and considering other important qualitative factors, such as servicing of other primary markets by a geography, security and political considerations, and trade-offs between sectors.

Based on our analyses, we believe there is a scenario whereby the United States can significantly wean its consumption from Mainland China and Taiwan imports by boosting the combined share of the United States itself and its treaty allies and trading partners—from the current 66% to 90% by 2033, with the remainder made up by Rest of World (Figure 2). Significantly greater use of imports from Mexico, Vietnam, and, to a lesser extent, India will largely drive this increase. Mexico’s share of total U.S. consumption will need to increase from 12% to 16%, Vietnam’s from 6% to 16%, and India’s from 0.4% to 5.3%. This scenario also includes selective

increases in the use of the U.S.'s own capacity and capabilities, as well as those of other treaty allies such as South Korea, Japan, Germany, and the United Kingdom.

**Figure 2. Forecasted shift in U.S. consumption for electronics manufacturing<sup>4</sup> by geographical area grouping**



Source: Source: Eurostat, Gartner, OECD, OEC, Oxford Economics, UN Comtrade, U.S. Bureau of Labor Statistics, World Bank, World Trade Organization; Kearney Analysis

This shift will require investments in capabilities at these treaty allies and trade partners to support the U.S.'s growing demand but, as Table 1 below illustrates, it will generate significant economic impacts on them as well. Overall, rebalancing the supply chain away from Mainland China and Taiwan will collectively boost incremental gross value added by an estimated ~\$3.6 trillion cumulatively over the decade while creating north of 18 million direct and indirect new jobs by 2033. These benefits will flow disproportionately to Mexico, Vietnam, and India because these geographies would experience the largest increase in their share of fulfilling U.S. consumption.<sup>5</sup>

**Table 1: Potential U.S. consumption's shares, investment, and impact on the number of jobs created**

	Total	United States	France	Germany	Japan	South Korea	United Kingdom	Mexico	India	Vietnam
Current Share of U.S. Consumption	66.3%	41.4%	0.2%	1.4%	1.7%	2.4%	0.5%	12.3%	0.4%	6.0%
2033E Share of U.S. Consumption	89.6%	44.0%	0.2%	1.7%	2.8%	2.8%	0.8%	16.1%	5.3%	15.9%
Incremental Business Investment (\$M)	127,285	55,660	6,490	13,005	21,995	22,905	2,595	265	1,160	3,210
Direct Incremental Job Impact	1,167,000	118,000	1,000	27,000	142,000	153,000	47,000	65,000	173,000	441,000
Indirect Incremental Job Impact	13,703,000	412,000	9,000	214,000	1,322,000	1,208,000	354,000	971,000	2,591,000	6,622,000
One-time Construction Job Impact	3,224,000	653,000	108,000	260,000	449,000	466,000	62,000	37,000	237,000	952,000
Total Incremental Job Impact	18,094,000	1,183,000	118,000	501,000	1,913,000	1,827,000	463,000	1,073,000	3,001,000	8,015,000

<sup>4</sup> Electronics manufacturing includes computers and peripherals equipment manufacturing, communications equipment manufacturing, audio and video equipment manufacturing, and semiconductor and other electronic component manufacturing

<sup>5</sup> U.S. consumption is defined by the GDP expenditure approach, whereby consumption is equivalent to GDP minus net exports



These recommendations across the four sectors included in our research consider each geography's existing capabilities and their potential to increase production capacity with investments between now and 2033:

- **Semiconductor and other electronic component manufacturing**

Focus on the United States, France, Germany, Japan, and South Korea for an expected economic investment of ~\$116 billion and ~5.1 million jobs created.

- **Communications equipment manufacturing**

Leverage India and Vietnam and, to a lesser extent, the United Kingdom for an expected economic investment of ~\$6 billion and ~8 million jobs created.

- **Computers and peripheral equipment manufacturing**

Emphasize the United States and Germany's capability coupled with Mexico's and Vietnam's latent capacity and potential to scale, for an expected economic investment ~\$5 billion and ~3.7 million jobs created.

- **Audio and video equipment manufacturing**

Concentrate on Mexico and Vietnam for an expected economic investment of ~\$125 million and ~1.3 million jobs created.

### Implementing a multi-geography “team approach” will require a long-term commitment and consistent, aligned economic policies

Each consumer technology category requires different sets of underlying economic structures, investments in capabilities, and resources to successfully move technology manufacturing away from Mainland China and Taiwan. In fact, all geographies in our study face labor challenges, including a shortage of skilled workers, a competitive job market attracting talent to other industries, an aging workforce, wage discrepancies, and workforce migration, etc. Others—most notably, Mexico, India, and Vietnam—have considerable work to do to ensure their infrastructure—especially their power grid—can accommodate a significant increase in manufacturing.

Addressing these factors requires a long-term commitment. The recommendations above do not translate into an immediate shift—it will take time to plan, budget, build, test, and ramp up new facilities as well as to attract and train new employees. Furthermore, the move isn't about reducing costs in the short term. Shifting supply chains will almost inevitably incur costs, but the strategy focuses on long-term supply chain resiliency and investing in a sustainable future.

In that light, the “team approach” we espouse is not just practical, but also highly beneficial. It enables the United States to secure the necessary capabilities to meet the continued growth in demand for consumer technology products while providing a significant economic shot in the arm—in both value and jobs created—to the geographies that choose to participate. For all geographies and companies involved, the result would be greater confidence in and control over their supply chains and far less exposure to the kinds of disruptions that have rattled their businesses over the past few years.

The geographies being considered must also make additional policy moves to fully leverage trade partners' latent capacity and shift manufacturing operations—and thus improve trade flow. For example, Vietnam should strengthen its trade relations with the United States to further develop its capital-intensive manufacturing sector and high-skilled workforce. Vietnam has already taken steps to ease investment screenings in the manufacturing sector and now prioritizes projects with multinational cooperation in advanced sectors but maintains minimum export controls, operating with both de facto and de jure controls. In recent years, Vietnam

has joined several bilateral and multilateral free trade agreements (FTAs)<sup>6</sup> such as the Information Technology Agreement (ITA-1) on tariff elimination for information and communication technology products as a part of its 2007 accession to the World Trade Organization (WTO). The planned top-to-top meeting in September points to further openness to more FTAs, including with the United States. Vietnam should meet its commitments under ITA-1 and join its 2015 expansion (ITA-2) to create a more hospitable environment for technology manufacturing.

Mexico is not part of ITA-1 or ITA-2 due to its longstanding policy of not participating in plurilateral tariff elimination agreements. However, given the increasing presence in technology manufacturing, being on the outside of ITA remains a barrier being. Mexico can strengthen trade relations and explore joining ITA-1 and ITA-2 to enhance market access, reduce trade barriers, and bolster growth on the global stage.

For India to enable the required increase in our scenario, the economy will need to further relax investment screening requirements<sup>7</sup> as its current rules still restrict trade flow. India must also relax its strategic trade controls and continue to focus on production-linked incentives to promote domestic manufacturing, as outlined in the “Self-Reliant India Scheme.”

Finally, the United States should also further explore plurilateral trade agreements, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), to amplify its global leadership position and drive economic integration and trade liberalization. Being part of this agreement would give the United States the opportunity to reduce barriers to trade with new trade partners and has potential to improve the overall resiliency of the consumer technology manufacturing sector.

### The “team approach” can provide a foundation to build on over time

Of note, several economies, including the United States, have already started to encourage and enable significant investments by private companies with a variety of government incentives that aim to reap some of the economic rewards. These government incentives don’t always align with the sectors we believe a specific geographical area is currently most suited for; however, they may convince certain companies to “take the leap” and thus, over time, help build capacity and capability that could push these economies up the curve and make them potential United States partners in an area we don’t see them as attractive options today.

An example of this is India, where significant, recent activity has been noted around computer and peripheral equipment manufacturing and even semiconductor manufacturing. Based on its current performance and our assessment that it’ll take more than 10 years to develop the required capabilities, we’re only recommending a relatively modest increase of India’s contribution to U.S. consumption by 2033. Were these investments to provide the boost in capability and capacity that the Indian government is targeting, India may be able to play a bigger role in the future.

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<sup>6</sup> Trans-Pacific Partnership (2016), the European Union-Vietnam FTA (2020), and the United Kingdom-Vietnam FTA (2021) as per CSIS: Economic Security in Emerging Markets

<sup>7</sup> Note that India is exploring easing FDI reviews for investments with a low stake of ownership (less than 10%)

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