

## America's 21<sup>st</sup> Century Manufacturing Relies on 20<sup>th</sup> Century Infrastructure

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**By: Fran Inman, Senior Vice President, Majestic Realty Co.**

**Elaine Nettle, Executive Director, Coalition for America's Gateways and Trade Corridors**

### Executive Summary

U.S. manufacturing is growing and evolving to meet increased consumer expectations and demands; it is no longer simply turning raw materials into finished products. Today's manufacturing is dynamic and the line between manufacturing and retailing is blurred. To remain competitive, companies are forced to meet increased consumer demands while driving advances that decrease costs and increase productivity.

21<sup>st</sup> century manufacturing means the infrastructure of yesterday – designed to accommodate large shipments for smaller populations consuming fewer goods – does not meet the needs of today's consumers. Manufacturing and the transportation of materials and finished goods are interwoven. While the private sector shifts to meet new demands, our national freight infrastructure network – once the envy of the world – has stalled due to years of underinvestment, challenging economic growth potential. States and regions are not just competing against each other for the economic boon brought by manufacturing. Rather, the U.S. is competing in the global marketplace and when companies evaluate locations, quality and reliability of local infrastructure play a role in decision making.<sup>1</sup> And yet the U.S. spends less on transportation infrastructure as a percentage of GDP than any of its major trading partners, and less than at any point since WWII. Globally, the U.S. ranks 13<sup>th</sup> in quality of overall infrastructure and 14<sup>th</sup> in quality of roads.<sup>2</sup>

Gateways, roads, rail, or inland waterways – and frequently a combination of two or more of these – allow businesses to cost-effectively and efficiently ship and receive raw materials and sub-manufactured parts necessary to begin, continue, or finish production of goods. Major investments are needed to alleviate chokepoints, address first- and last-mile connectors, and fund projects of national and regional significance. In order to support domestic goods production, a strategic campaign of infrastructure investment is necessary.

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<sup>1</sup> Kemmsies, Walter, "In Focus: Has the Moment for Infrastructure Revival Arrived?," *Area Development*, 2017, <http://www.areadevelopment.com/logisticsInfrastructure/December-2017/aligning-in-support-of-greater-infrastructure-funding.shtml>.

<sup>2</sup> Schwab, Klaus, "The Global Competitiveness Report 2015-2016," World Economic Forum, 2015, [http://www3.weforum.org/docs/gcr/2015-2016/Global\\_Competitiveness\\_Report\\_2015-2016.pdf](http://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf).

## Introduction

This paper provides a brief overview of the United States' evolving supply chain and the challenges that domestic manufacturers have met head-on to remain competitive in the global marketplace. In order to foster this private sector innovation and success, freight infrastructure must be improved to meet demand.

### **Domestic manufacturing growth requires strong infrastructure.**

Since 2010, over 800,000 domestic manufacturing jobs have been created and the sector has grown almost two times as quickly as the economy overall.<sup>3</sup> In 2014 alone, U.S. manufacturers sold \$4.4 trillion of goods that were “Made in the U.S.A.”<sup>4</sup> Manufacturers account for roughly nine percent of the U.S. workforce.<sup>5</sup>

Domestic manufacturing is succeeding, in part because supply chains are adapting to changing consumer demands. A “supply chain” typically refers to the end-to-end process of manufacturing and selling a product. Supply chains often encompass any number of steps, from demand forecasting, to production planning, to manufacturing (which today is often a complex combination with multiple entities participating before a product is complete), to consumption. Manufacturing and supply chains are intrinsically linked – if you coordinate and integrate the flow of your materials, information, and finances, you can reduce the cost and complexity of making things. Today’s manufacturing is often termed “advanced manufacturing.”

Transportation of materials and products is a significant piece of a manufacturer’s bottom line and manufacturers rely heavily on the multimodal freight network to get goods from point of conception to point of consumption, unimpeded and cost-effectively. \$1.8 trillion – a whopping 12 percent of GDP – of goods and services are moved each year, according to the National Association of Manufacturers (NAM).<sup>6</sup> Meanwhile, the federal government is investing less than needed in the freight transportation network. To increase our domestic production, we need the transportation infrastructure required to support that growth.

According to a 2014 study by NAM, manufacturers are taking notice: 70 percent of the 401 members surveyed believe American infrastructure is in fair or poor shape. 65 percent do not believe that the infrastructure, especially in their region, will be able to respond to the competitive demands of a growing economy over the next 10 to 15 years.<sup>7</sup>

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<sup>3</sup> “Revitalizing American Manufacturing,” *The White House*, October 2016, [https://www.whitehouse.gov/sites/whitehouse.gov/files/images/NEC\\_Manufacturing\\_Report\\_October\\_2016.pdf](https://www.whitehouse.gov/sites/whitehouse.gov/files/images/NEC_Manufacturing_Report_October_2016.pdf).

<sup>4</sup> Nicholson, Jessica, and Ryan Noonan, “What is Made in America?,” *U.S. Department of Commerce, Economics and Statistics Administration*, October 3, 2014, [http://www.esa.doc.gov/sites/default/files/whatismadeinamerica\\_0.pdf](http://www.esa.doc.gov/sites/default/files/whatismadeinamerica_0.pdf).

<sup>5</sup> “Top 20 Facts about Manufacturing,” *National Association of Manufacturers*, 2016, <http://www.nam.org/Newsroom/Top-20-Facts-About-Manufacturing/>.

<sup>6</sup> “Top 20 Facts about Manufacturing,” *National Association of Manufacturers*, 2016, <http://www.nam.org/Newsroom/Top-20-Facts-About-Manufacturing/>.

<sup>7</sup> Horst, Ronald and Jeffrey Werling, “Catching Up: greater Focus Needed to Achieve a More Competitive Infrastructure,” *National Association of Manufacturers*, September 2014, <http://www.nam.org/Issues/Infrastructure/Surface-Infrastructure/Infrastructure-Full-Report-2014.pdf>.

The cost of congestion is not insignificant for domestic goods producers. Freight bottlenecks on highways throughout the U.S. cause more than 243 million hours of delay to truckers annually, a loss of about \$6.5 billion per year.<sup>8</sup> The burden is substantial, particularly when considering that small manufacturers play an outsized role in the American manufacturing ecosystem. According to NAM out of 251,901 manufacturing sector firms in 2014, all but 3,749 had 500 or fewer employees. Three quarters had 20 or fewer employees.<sup>9</sup>

## **Customers are demanding complex, customized products.**

“Building to order” is replacing “building to stock” and the demand for customized products is forcing companies to re-evaluate high-volume supply chains and the practice of mass producing products. Proliferation leads to smaller portions of total markets being dominated by a single product. This means that manufacturers cannot rely on high-volume and steady demand when building out supply chains and storing products. Instead, companies are finding they need to splinter their supply chain and respond immediately when demand decreases to avoid needlessly storing excess inventory.

Nike offers another example of product proliferation. NIKEiD is the company’s customizable shoe and accessory service. Customers can select upper and lower patterns, shoelace and sole colors, and are also offered the chance to inscribe text on the heel, side, or bottom of the shoe. Nike sees product customization as key to growth and a positive driver for business, both top line and bottom line, according to a June 2015 earnings call with Nike COO Mark Parker. “We are putting a lot of money and a lot of resources against how our supply chain evolves to increase speed and make sure we deliver to consumers as quickly and innovatively as we can,” Parker said during the call.<sup>10</sup>

The acceleration of product proliferation is creating a demand for low-volume products that might not be economically viable to produce overseas. Companies like Walmart, Ford, Caterpillar, GE, GM, and Boeing are returning jobs back to the U.S. This is in part to respond to product proliferation and also to protect themselves from factors outside their control, including the availability and cost of skilled labor, rapidly evolving information technology, and trade policies.<sup>11</sup>

## **E-Commerce is changing the way goods are delivered, creating new stress on infrastructure.**

For nearly 100 years, the smallest shipments moved by logistics providers were pallets or large boxes. These were moved from manufacturing plants to warehouses or distribution centers, and eventually to big-box stores via highways. Today, consumers are demanding precise and immediate deliveries. Consumers represent the end of the supply chain, so logistics companies facilitate the hiring of third-party delivery services to drop off single

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<sup>8</sup> “Beyond Traffic 2045,” *The U.S. Department of Transportation*, 2015, [https://cms.dot.gov/sites/dot.gov/files/docs/Draft\\_Beyond\\_Traffic\\_Framework.pdf](https://cms.dot.gov/sites/dot.gov/files/docs/Draft_Beyond_Traffic_Framework.pdf).

<sup>9</sup> “Top 20 Facts about Manufacturing,” *National Association of Manufacturers*, 2016, <http://www.nam.org/Newsroom/Top-20-Facts-About-Manufacturing/>.

<sup>10</sup> Russell, Michelle, “In the Money: Innovation and Supply Chain Remain Key for Nike,” *Just-Style*, March 20, 2015, [http://www.just-style.com/analysis/innovation-and-supply-chain-remain-key-for-nike\\_id124712.aspx](http://www.just-style.com/analysis/innovation-and-supply-chain-remain-key-for-nike_id124712.aspx).

<sup>11</sup> “The Reshoring Trend,” *Reshoring Initiative: Bringing Manufacturing Back Home*, Summer 2016, <http://www.reshorenw.org/blog/the-reshoring-trend/>.

item deliveries at residential addresses in suburban or urban settings. To illustrate this impact: in preparation of the 2016 holiday season, FedEx hired 50,000 more workers and opened four massive distribution hubs and 19 automated sorting stations.<sup>12</sup>

Amazon has pioneered the E-Commerce revolution and accounted for an amazing 38 percent of online sales between November 1 and December 29 in 2016.<sup>13</sup> The company provides its customers rapid delivery thanks to its fulfillment centers located strategically close to population centers.<sup>14</sup> Amazon Prime, a subscription service that gives members free or low-cost shipping as well as other benefits for a flat annual fee, allows consumers to select a range of delivery opportunities, from free two-day shipping to discounted one-day delivery.<sup>15</sup> As a result of the prolific reach and influence of Amazon, consumers now expect similar experiences from other retailers.

As manufacturing and distribution move closer to population centers to accommodate this growing trend, the average truckload length of haul is being shortened and instead less-than-truckload carriers are experiencing a significant uptick. The rise in E-Commerce and on-demand delivery have put increasing pressure on fast-growing cities such as Seattle to rethink how they manage traffic congestion.<sup>16</sup> Last miles can be costly and congested and the challenges of urban delivery are enormous.

## **Manufacturers are selling to each other.**

According to a recent Forrester Research report, U.S. manufacturers, wholesalers, and distributors sold \$780 billion to companies online in 2015, or more than twice the \$305 billion in retail sales of the same year. All indications for 2016 show even larger gains in E-Commerce. These business to business (B2B) trends indicate that companies are building out their own networks, sub-sourcing goods, and adapting to provide 24/7 purchasing. B2B E-Commerce will grow 7.7 percent annually between now and 2020, according to Forrester Research, hitting \$1.13 trillion by the end of the decade.<sup>17</sup>

Manufacturers are no longer building entire finished products in one facility, requiring the transportation of parts from Plant A to Plant B for assembly and completion. Industries like car manufacturing are seeing increasing trends towards shared parts. For example, windshield wipers, ignition switches, and airbags are all manufactured by third parties and then sold to various car manufactures such as Toyota, GM, and BMW.<sup>18</sup> Streamlining

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<sup>12</sup> Parmley, Suzette, "FedEx and UPS are seeing record online shipments; delays abound," *The Philadelphia Inquirer*, December 22, 2016, <http://www.philly.com/philly/business/FedEx-deluged-by-online-shipments.html>.

<sup>13</sup> Gustafson, Krystina, "Amazon's holiday dominance solidified by last-minute shoppers," *CNBC*, January 5, 2017, <http://www.cnbc.com/2017/01/05/amazons-holiday-dominance-solidified-by-last-minute-shoppers.html>.

<sup>14</sup> "Adapting to Changing Consumer Demands With a Flexible Supply Chain," *Now That's Logistics.com*, July 12, 2016, <http://nowthatslogistics.com/product-land-transport/adapting-to-changing-consumer-demands-with-a-flexible-supply-chain/>.

<sup>15</sup> Bradley, Peter, "Rapid Fulfillment on an Unprecedented Scale: Interview with Amazon.com's Dave Clark," *DC Velocity*, December 17, 2012, <http://www.dcvelocity.com/articles/20121217-interview-with-amazons-dave-clark/>.

<sup>16</sup> Le, Phuong, "New Seattle freight lab tackles urban delivery congestion," *The Associated Press*, October 12, 2016, <http://bigstory.ap.org/article/7caff2308cd04ea7a0ab57dbf0d93ba7/new-seattle-freight-lab-tackles-urban-delivery-congestion>.

<sup>17</sup> "B2B E-Commerce: Doing It Right to Remain Competitive," *Advantage Business Media iReport*, 2016, [http://learn.inddist.com/b2b-ecommerce-doing-it-right-to-remain-competitive?cmpid=regwallcontent&utm\\_source=Deeper%20Insights](http://learn.inddist.com/b2b-ecommerce-doing-it-right-to-remain-competitive?cmpid=regwallcontent&utm_source=Deeper%20Insights).

<sup>18</sup> Plumer, Brad, "First GM, Now Toyota - Why Car Recalls are Becoming More Common," *Vox.com*, April 10, 2014, <http://www.vox.com/2014/4/10/5597244/car-recalls-gm-toyota>.

manufacturing can result in cost reduction for companies looking to save money by using what is available on the market, instead of creating, patenting, and producing these smaller parts.

Meanwhile, the manufacturing workforce is adapting to stay competitive. Today, the sector supports a broader set of high-quality business service jobs than ever before, including software and application development that takes place in new automobiles.<sup>19</sup> Whereas at one point manufacturers were wielding screw drivers and wrenches, often today they're making use of iPads. America's highly educated workforce lends itself to this sophisticated approach to manufacturing, and enables the United States to produce high-value products like medical supplies, appliances, and agricultural equipment.

Southern California produces high volumes of fabricated metal product manufacturing, apparel manufacturing, food manufacturing, and printing and related support activities. In its 2016 *Goods Movement* report, Southern California Association of Governments (SCAG) found that over 87 percent of truck trips in the region are associated with intra-regional goods movement.

Manufacturers surveyed by SCAG also reported that they rely extensively on the rail and air cargo system to get goods to domestic markets. The region's goods are often produced in part, then relocated to other plants in the area for further customization or additional manufacturing, before being distributed to logistics warehouses and sent to big box stores or consumers doorsteps. "Many of the goods manufactured at plants in the SCAG region... are semi-finished goods that receive further modifications and refinements before being transported to warehouses and distribution centers," reports SCAG.<sup>20</sup>

## Conclusion

The U.S. population is expected to increase by 70 million by 2045, and each person uses roughly 63 tons of freight annually.<sup>21</sup> This notion underscores that as population rises, so too does goods production, both of which place stress on an aging system. An increasing population base presents a significant opportunity for domestic manufacturing: increased consumers. In order to seize this opportunity, infrastructure investment must be commensurate with system demands.

While the U.S. exports and imports over \$3 trillion worth of international goods annually, the domestic market encompasses an astonishing \$17 trillion in goods trade between regions—highlighting the implicit link between the state of infrastructure and the viability of domestic goods production.<sup>22</sup> Without a robust infrastructure investment program, the growth and sustainability of domestic manufacturing is jeopardized. The time to invest is now.

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<sup>19</sup> "Revitalizing American Manufacturing," *The White House*, October 2016, [https://www.whitehouse.gov/sites/whitehouse.gov/files/images/NEC\\_Manufacturing\\_Report\\_October\\_2016.pdf](https://www.whitehouse.gov/sites/whitehouse.gov/files/images/NEC_Manufacturing_Report_October_2016.pdf).

<sup>20</sup> "Goods Movement: Appendix," *Southern California Association of Governments*, December 2015, [http://scagrtpscs.net/Documents/2016/draft/d2016RTPSCS\\_GoodsMovement.pdf](http://scagrtpscs.net/Documents/2016/draft/d2016RTPSCS_GoodsMovement.pdf).

<sup>21</sup> "Beyond Traffic 2045," *The U.S. Department of Transportation*, 2015, [https://cms.dot.gov/sites/dot.gov/files/docs/Draft\\_Beyond\\_Traffic\\_Framework.pdf](https://cms.dot.gov/sites/dot.gov/files/docs/Draft_Beyond_Traffic_Framework.pdf).

<sup>22</sup> Kane, Joseph and Adie Tomer, "Mapping Freight: The Highly Concentrated Nature of Goods Trade in the United States," *The Brookings Institute Global Cities Initiative*, November 2014, [https://www.brookings.edu/wp-content/uploads/2016/06/Srvy\\_GCIFreightNetworks\\_Oct24.pdf](https://www.brookings.edu/wp-content/uploads/2016/06/Srvy_GCIFreightNetworks_Oct24.pdf).

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**Fran Inman** is a nationally-recognized expert in the supply chain industry and leader in transportation infrastructure policy development. She is a Senior Vice President with Majestic Realty Co., one of the nation's leading privately held real estate development companies. She is also Vice Chair of the California Transportation Commission, a position for which she has been appointed for consecutive terms by two California governors. In 2013, U.S. Transportation Secretary Ray LaHood named her a founding member of the National Freight Advisory Committee. Majestic Realty Co. is among the Coalition for America's Gateways and Trade Corridors' charter members.

**Elaine Nettle** is Executive Director of **The Coalition for America's Gateways and Trade Corridors** (CAGTC), a diverse coalition of more than 60 public and private organizations dedicated to increasing federal investment in America's intermodal freight infrastructure. In contrast to single mode interests, CAGTC's primary mission is to promote a seamless goods movement transportation system across all modes to enhance capacity and economic growth. For more information on the Coalition for America's Gateways and Trade Corridors, please visit [www.tradecorridors.org](http://www.tradecorridors.org).

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