



Florida
TaxWatch



**SUPPLY CHAIN RESILIENCY
IN THE FACE OF ECONOMIC
DISRUPTION:
*CONNEX FLORIDA AS A
PLATFORM FOR RESILIENCE***

JULY 2021



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Dear Fellow Taxpayer

Every day, Florida taxpayers interact with supply chains in some form or another, whether that involves picking up food from the local grocery store or ordering items from an e-commerce website. Many times individuals take for granted the series of steps and processes needed to get a finished product to consumers. When items are able to travel through complex supply chains efficiently, every day Floridians are the biggest benefactors.

Yet during this past year, the COVID-19 economy has clearly shown what happens when major disruptions affect supply chains. Massive shortages, time delays, and production inefficiencies were all outcomes that seemed to be a natural result of the unprecedented global pandemic. Shortages for items like face masks, hand sanitizer, cleaning supplies, and toilet paper, made the importance of supply chains readily apparent to all consumers.

For Florida to continue its steady, yet still challenging, period of economic recovery, there must be a renewed sense of urgency for supply chain resiliency—not only to recuperate from the current crisis but to better mitigate against potential economic shocks down the road. There are sensible strategies and tools to improve supply chain resilience, among which Connex Florida emerges as a crucial leader in this area. By promoting collaboration and connectivity, the online database tool provides manufacturers and suppliers with many diverse solutions to bolster supply chain resilience.

Florida TaxWatch is pleased to present this report which considers the importance and influence of supply chains in today's economy, highlighting the impact that major disruptions can have. The report then discusses Connex Florida as a practical solution to supply chain resiliency going forward, taking a deeper look at the platform's main features and economic value for the state of Florida. TaxWatch is pleased to present this report and its recommendations, and we look forward to a continued discussion with policymakers during the 2022 legislative session and beyond.

Sincerely,

A handwritten signature in black ink that reads "Dominic M. Calabro".

Dominic M. Calabro
President & CEO

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Executive Summary

Supply chains are expansive networks of suppliers, manufacturers, distributors, and retailers that facilitate the movement of products to consumers. From the supplier to the consumer, there is a constant product flow that moves goods and services downstream. At the same time, consumers communicate demand insights upstream to influence production decisions. A well-ordered and optimized supply chain can promote market efficiency while also providing economic benefits to the businesses involved along the way.

Given their complexity and scale, supply chains are prone to major disruptions at any point in the process. Major events—such as pandemics, natural disasters, geopolitical conflicts, trade disputes, and cyberattacks—can severely interrupt functions and impede the timely delivery of products to end-users. As witnessed over the past few years, especially throughout the COVID-19 pandemic, supply chain disruptions in distant portions of the world can have a cascading effect on Florida’s economy. In future years, companies across industries can expect supply chain disruptions to occur every 3.7 years, leading to financial losses that erase half a year’s worth of profits, on average, over ten years.

The growing prevalence of disruptions indicates a pressing need for supply chain resiliency—the ability to be prepared for unforeseen disruptions, responding and recovering swiftly to mitigate consequences. For manufacturers in Florida, digitization and diversification offer two primary channels to improve resiliency. Digital technologies enable companies to identify vulnerabilities, address risks, and improve connectivity to suppliers. Diversifying supplier bases, especially within Florida, also minimizes long-term risks and creates business opportunities for companies in other economic sectors.

Connex Florida is a statewide supply chain connection platform for Florida-based manufacturers to engage in the marketplace and streamline connections to other businesses. Developed in partnership between FloridaMakes, Associated Industries of Florida, and Space Florida, Connex Florida maintains a manufacturing database with information about a manufacturer’s specific production capabilities. Additionally, the platform helps Florida manufacturers identify existing supply chain vulnerabilities through visualizations and assists businesses in diversifying their respective supplier bases. Connex Florida is also interoperable with a national search database of manufacturers that can further expand opportunities.

Connex Florida yields numerous economic benefits by helping companies build their operations and resilience, promoting diversification through local sourcing, and compounding economic growth for the entire state’s economy. Small manufacturers around the state especially benefit from advancements in resilience and operations—an important outcome given 80 percent of Florida’s manufacturing establishments have twenty employees or fewer. The platform also produces an economic benefit by limiting potential costs from future disruptions, such as major hurricanes.

To confront the supply chain challenges inherent in a globalized economy, policymakers and business leaders in Florida should support the Connex Florida platform. Furthermore, the manufacturing industry should identify additional ways to attract and more manufacturers to improve engagement, collaboration, and connectivity. Supply chain resiliency is an optimal solution to minimizing long-term risk and maximizing economic value to the state of Florida and taxpayers who rely on supply chains every day.

Introduction

The goods and services that individuals rely on daily—including food at grocery stores, fuel at gas stations, power from utility companies, and medicine from local pharmacies—depend on numerous systems and processes that interact daily. The supply chain is responsible for organizing these processes to facilitate the timely flow of materials and products from suppliers and manufacturers to retailers and customers. Due in part to rapid globalization in recent decades, the modern supply chain has become more interconnected than ever, creating a complex network around the world—but as witnessed, with greater expansiveness comes greater vulnerability from potential disruption.

The COVID-19 pandemic brought the biggest and broadest disruption to supply chains in recent memory. As lockdowns beset the economy, the pandemic led to widespread economic shocks across the board: manufacturers reported shortages, distribution channels slowed, and consumer demand skyrocketed. According to a McKinsey survey, 73 percent of supply chain leaders encountered shortages in their supplier base while 75 percent faced issues in their production/distribution early on during the pandemic.¹ The end result was a situation where massive supply-demand imbalances permeated the economy.

Even though the pandemic has been the most visible and disruptive event, it is not the only shock to have affected supply chains. Past natural disasters, such as Hurricanes Harvey, Irma, and Maria in 2017, revealed significant vulnerabilities in national and regional networks. The hurricanes constrained relief efforts with devastating outcomes. More recently, a winter storm in February 2021 brought extreme cold weather to parts of the country, leaving millions without power and clean water in Texas. Common to all these events was a strained supply chain, limiting the ability of residents to receive necessary supplies critical to survival.

These disruptions evidence the need for improved supply chain resiliency going forward. Strategies and tools for resiliency are needed to both weather the current economic climate and better prepare for future events. Of particular importance to these strategies is the role manufacturing plays in the supply chain process. As seen during the past year, manufacturing has been crucial to medical facilities and consumers alike, producing much needed face protection, ventilators, and testing kits while also responding to growing demand for household items like toilet paper and cleaning supplies. Accordingly, any efforts to assist manufacturers would go hand in hand with bolstering resiliency.

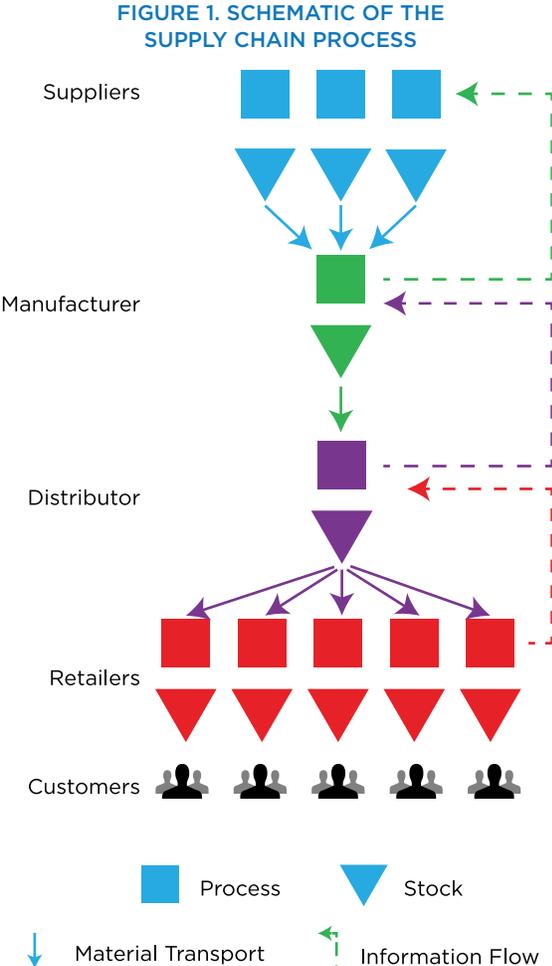
In order to promote greater supply chain resiliency closer to home, leaders in Florida have pioneered a new supply chain database tool, called Connex Florida, which helps manufacturers better connect with prospective suppliers and develop business opportunities. Connex Florida is the result of a collective partnership between FloridaMakes, The Associated Industries of Florida (AIF), and Space Florida. The tool is designed to promote supplier diversity in-state, but more broadly, Connex Florida provides business leaders and policymakers with a unique opportunity to mitigate potential risk from present and future crises.

Florida TaxWatch undertakes this study to highlight the importance of supply chain resiliency during times of natural disaster or broader economic shock, such as the ongoing COVID-19 pandemic, past hurricane seasons, and other unforeseen events.

¹ McKinsey & Company, "Resetting Supply Chains for the Next Normal," July 2020.

Fundamental Concepts of Supply Chains

Supply chains, by nature, are complex networks that arrange the sequential movement of materials and products from suppliers to manufacturers to distributors to retailers, and finally to end users who consume the good or service. A well-ordered supply chain can simultaneously communicate demand information upstream and deliver materials downstream to guide production, distribution, and consumption decisions. Figure 1 below displays a schematic of a typical supply chain under normal conditions (absent of any major disruption).



Source: National Academies of Science, Engineering, and Medicine (2020); image recreated by Florida TaxWatch

At the most basic level, the key players in a supply chain include:

- Suppliers: Extract and procure raw materials to be used in the production process;
- Manufacturers: Assemble and transform basic materials into finished products;
- Distributors: Transport products to distribution outlets where consumers have access;
- Retailers: Sell and deliver the finished product to end users; and
- Customers: Purchase the product and convey important consumption behavior to previous steps in the supply chain process.²

From suppliers to customers, there is a constant product flow that involves the movement of goods and services downstream. Suppliers provide the necessary inputs to manufacturers who in turn develop products to be delivered through distributors and retailers to the end user. At the same time, there is a constant information flow upstream from customers to suppliers, which influences production decisions earlier in the process. Customers provide retailers with key spending and demand insights which in turn makes retailers order more or less of particular goods from manufacturers, and so on.

Ideally, a healthy, high-performing supply chain facilitates the timely delivery of goods and services to customers and is important to the continued functioning of the overall economy. Strong supply chains promote end user satisfaction and promote the efficient use of resources for businesses along the way. This is especially true for manufacturers, who often form the centerpiece in the entire process, a healthy supply chain can foster on-time delivery for inputs, lower overall production costs, and keep up with market demand. Supply chains, however, often involve many moving parts all interacting at the same time; as such, there are various factors that can complicate performance, even under normal economic conditions.

² To read more about the key steps in the supply chain read Blume Global, "The Supply Chain, Explained" <https://www.blumeglobal.com/learning/supply-chain-explained/>

At the core of supply chain operations is a fundamental challenge to adequately match demand and supply in a manner that promotes responsiveness, reliability, and cost-efficiency. Two features always complicate supply and demand optimization: variability and cycle time. Variability refers to any fluctuation in supply or demand that are either predictable or unpredictable. Examples may include a seasonal shutdown of manufacturing plants, which reduces supply, or an uptick in demand as a product becomes more popular.³ Cycle time refers to the total time from start to finish for any process. For example, a manufacturer may experience a longer cycle time to produce a good if the supplier is unable to deliver the raw materials right away.⁴

An additional challenge within supply chains is the natural presence of bottlenecks. A bottleneck is a point of congestion in the supply chain that limits its flow. Oftentimes these result when a process (whether at the production, transportation, or distribution stage) is overutilized relative to its current capacity. An example would be a situation where five separate manufacturers all source from the same supplier but are unable to manufacture goods since the sole supplier is unable to deliver the raw materials. When these bottlenecks occur, the duration of time from an end user's request to the actual delivery of the good or service increases (formally, this is known as lead time).

Under normal circumstances, bottlenecks determine a supply chain's production capacity, and lead times determine a supply chain's responsiveness to customers.⁵ All the while, supply and demand constantly change due to extraneous factors in the broader economy. As will be discussed shortly, when these factors are impacted by major disruptions, supply chains can suffer severe setbacks and prevent the ex-

pedient delivery of goods and services to users. The result is an inefficient exchange between users and businesses in the supply chain with significant cost implications.

Supply Chain Disruptions and The Need for Resiliency

Inherent in every supply chain is a general trade-off between overall size and vulnerability. As systems progressively grow in magnitude, the more susceptible they become to potential interruption from an external event. In particular, major events—such as pandemics, natural disasters, geopolitical events, trade disputes, terrorist attack, cyberattacks—can create supply chain disruptions with devastating, far reaching effects. Generally defined, a supply chain disruption is any major breakdown in the production or distribution segments that constitute the supply chain.⁶

A major event can disrupt supply chains in three ways:⁷

- **Demand Shift:** A sudden surge in customers' willingness and ability to purchase particular goods. Exogenous events can sometimes distort purchasing behavior when certain goods are valued higher for immediate survival. An example would be a spike in demand for water bottles, canned food, generators, and batteries before a major hurricane makes landfall.
- **Capacity Reductions:** A reduction in the production or transportation process that results when there is a lack of plant, power, or people. An example would be if a manufacturing plant is unable to produce goods because water

³ For more information about Variability, refer to the National Academy of Sciences, Strengthening Post-Hurricane Supply Chain Resilience: Observations from Hurricanes Harvey, Irma, and Maria (2020).

⁴ For more information about Cycle Time, refer to the National Academy of Sciences, Strengthening Post-Hurricane Supply Chain Resilience: Observations from Hurricanes Harvey, Irma, and Maria (2020).

⁵ Id.

⁶ NC State University, "How Do Supply Chain Risks Occur?: A Managerial Framework" January 2011. <https://scm.ncsu.edu/scm-articles/article/how-do-supply-chain-risks-occur-a-managerial-framework-for-reducing-the-impact-of-disruptions-to-the-supply-chain>

⁷ National Academies of Sciences, Engineering, and Medicine, Strengthening Post-Hurricane Supply Chain Resiliency, Published in 2020.

has damaged the machines (as the case during a hurricane) or when there are not enough workers due to illness (as is the case during a pandemic).

- **Communication Disruption:** An interruption in the normal channel of information up and down the supply chain when critical infrastructure fails. An example would be if cell towers and the surrounding electricity grid were to cease operating due to extreme weather.

These disruptions can affect various parts of the supply chain and send ripple effects throughout the entire economy. In the end, there is often reduced production capacity and longer lead time for customers to receive the goods and services they seek. The following case studies provide real-world examples of how significant disruptions can prompt major breakdowns in supply chain operations, leading to negative economic and health outcomes for residents in numerous communities.

Case Study: COVID-19 Pandemic

The COVID-19 pandemic is the most apparent and unprecedented supply chain disruption to have affected the global economy in recent decades. In the U.S., a strained supply chain created a perilous situation for localities that struggled to stem the initial wave of COVID-19 cases. During the early spring of 2020, the U.S. faced shortages in personal protective equipment (PPE), ventilators, face shields, gloves, gowns, and hand sanitizer—all items which China had previously exported more than 50 percent of prior to closing off exports.⁸ As a result, many hospitals were nearing full capacity without having the necessary amount of PPE to keep doctors and nurses safe. Complicating the situation further, many average consumers created a sizable demand shift as they sought certain medical-related items in stores.

8 The New England Journal of Medicine, "Critical Supply Shortages—The Need for Ventilators and Personal Protective Equipment during the COVID-19 Pandemic," Published Apr. 30, 2020.

Panic buying mixed with supply chain disruptions led to massive shortages for items such as toilet paper and hand sanitizer at many local stores.

For manufacturers in the U.S., lockdown orders and social distancing measures meant many companies faced capacity reductions as production was scaled back. This was already on top of the slowdown in material inflow from international supplies. Additionally, rising consumer demand placed an added burden on already strained manufacturers. In spring of 2020, The National Association of Manufacturers (NAM) found that 78.3 percent of manufacturers anticipated a financial impact, 53.1 percent anticipate a change, and 35.5 percent were already facing major supply chain disruptions.⁹ To deal with the shortage in medical equipment, and under direction from the federal Defense Production Act,¹⁰ many manufacturers transitioned operations to produce much needed PPE and equipment for hospitals.

For farmers, restaurants, and grocery stores involved in the food supply chain, the pandemic likewise affected normal operations. When many states closed restaurants and schools, distribution channels were upended as many producers were left without a primary outlet for their food. Increasingly, food was stranded upstream in the supply chain, and many farmers had to destroy their products before spoiling. By some estimates, U.S. consumer spending at food service locations (e.g., restaurants, schools) fell by 27 percent in March 2020 compared to the previous year.¹¹ Food service suppliers faced mounting order cancellations, leading to an overabundance in food stock that did not readily go to customers. The greatest risk throughout had been the presence of food insecurity in vulnerable populations.

9 The National Association of Manufacturers (NAM), Economic and Operational Impacts of COVID-19 to Manufacturers. <https://www.nam.org/coronasurvey/>

10 The federal Defense Production Act allows the president, largely through executive order, to direct private companies to prioritize production of particular goods. The president is also empowered to "allocate materials, services, and facilities" for national defense purposes, and take actions to restrict hoarding of needed supplies.

11 McKinsey & Company, "US food supply chain: Disruptions and implications from COVID-19," July 2, 2020. <https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/us-food-supply-chain-disruptions-and-implications-from-covid-19>

Case Study: Texas Ice Storm

A disruption need not be as massive and widespread as the COVID-19 pandemic to evidence how a supply chain can be interrupted. A perfect example occurred in February 2021 when a colder than usual winter ice storm struck Texas, revealing major vulnerabilities and affecting four million residents. The disruption led to widespread power outages as the electric grid in the state was unable to deal with surge in kilowatt usage. For some areas, the disruption in electricity turned deadly as some residents died due to extreme cold exposure or carbon monoxide poisoning. Large scale food shortages were reported as grocery stores had to throw away spoiled food due to power outages and did not have enough food to respond to the sudden rise in consumer demand. A communication disruption prevented many local stores from receiving additional help from upstream in the supply chain, leaving many store shelves bare.

From a trade and logistical standpoint, the Texas ice storm also halted major freight and production activities during this time. Dangerous traveling conditions meant many trucks, trains, and other freight were stranded, unable to travel through Texas—traditionally a busy intermodal location. Oil refineries, meatpacking plants, semiconductor facilities, auto-maker plants, and many more had to cease operations due to the storm, leading to rampant capacity reductions in different industries.¹² These decisions to cease production before the storm struck had an immediate impact on other parts of the U.S., for example, when gas prices rose across the country. The effects from the Texas ice storm demonstrate how economic and health outcomes are interconnected following interruptions in supply chain delivery.

¹² The New York Times, "Winter Storm Disrupts Wide Swath of American Business," Feb. 17, 2021. <https://www.nytimes.com/2021/02/16/business/winter-storm-business-disruptions.html>

Case Study: Hurricane Irma (2017)

Although hurricanes are a usual occurrence every year in the U.S., the 2017 hurricane season was exceptionally noteworthy and featured three large storms: Hurricanes Harvey, Irma, and Maria. Each led large, destructive paths with more than \$200 billion worth of damage—the most expensive hurricane season in U.S. history.¹³ For Floridians in the Sunshine State, Hurricane Irma was a damaging storm that illustrated some limitations and challenges in the state's supply chain.

Prior to Hurricane Irma's arrival, Florida's geographical configuration complicated evacuation and supply routes due to the state's parallel, north-south orientation for major roads. Some important supply chain limitations included: meeting the fuel demand during the evacuation of some six million residents, maintaining a sufficient inflow of supplies during transportation bottlenecks, and ensuring coordination of transport movement during communication problems.¹⁴ As expected, there were widespread power and communications outages as the storm made landfall; however, power was quickly restored due to pre-staged electric utility trucks. Many large retailers were also well prepared and stockpiled food and bottled water for the storm.

The storm's biggest impact on supply chains dealt with the supply of fuel before, during, and after the storm. Since Florida has almost no fuel production in-state, it relies heavily on fuel from foreign countries or Gulf Coast states. Before Hurricane Irma's arrival, major seaports in Miami, Key West, St. Petersburg, Jacksonville, and Pensacola closed, making it more difficult to bring in fuel supplies. The evacuation of coastal residents created surging demand and major bottlenecks at many stations. During the storm, weather damage closed many gas stations,

¹³ National Geographic, "2017 Hurricane Season Was the Most Expensive in U.S. History," Nov. 30, 2017. <https://www.nationalgeographic.com/science/article/2017-hurricane-season-most-expensive-us-history-spd>

¹⁴ National Academies of Sciences, Engineering, and Medicine, *Strengthening Post-Hurricane Supply Chain Resiliency*, Published in 2020.

and after the storm there was another short-term surge in demand for gasoline due to generator use. Overall, however, the supply chain disruptions in Florida were short-term in nature and did not lead to substantial long-term impacts—thanks in part to resiliency efforts.

The Need for Supply Chain Resiliency

Even though disruptions are not a novel feature to supply chains, their prevalence and financial costs are on the rise. Continued globalization, climatic changes, and political risks are some of the main reasons why disruptions are becoming more commonplace.¹⁵ Across different industries, companies can now expect supply chain disruptions that last longer than a month to occur every 3.7 years, amounting to financial losses that erase half a year's worth of profits, on average.¹⁶ As the previous three case studies have shown, catastrophic disruptions have the potential to inflict even larger economic and human costs beyond what can be reasonably forecast. Although these examples differ in size and magnitude, they each attest to the growing need for resiliency.

Supply chain resiliency refers to a supply chain's ability to be prepared for unforeseen disruptions, responding and recovering swiftly to mitigate negative consequences and return back to normal.¹⁷ The broad objective of resiliency efforts is to minimize the impact of some disruptive event on an affected population in an efficient manner.¹⁸ Policies to achieve resiliency may be more readiness oriented, encompassing preparedness actions to avoid and withstand harmful events, or more response oriented, aimed at restoring normal operations quickly.¹⁹

For businesses and supply chain leaders, digitization and diversification offer two principal channels to bolster resiliency efforts going forward.²⁰ Digital transformation enables companies to use emerging technologies to better understand their own supply chain vulnerabilities, improve connections to other companies, and plan for customer demand more accurately.²¹ These digital technologies, which include artificial intelligence (AI) and cloud computing, for example, can better pinpoint risks in the supply chain before they fully emerge during a disruptive event. Diversifying the supplier base is another sensible strategy to minimize long-term risk,²² yet as the COVID-19 pandemic highlighted, diversifying locally and closer to home rather than just internationally may further shield supply chains from major disruption.²³

In the state of Florida, one tool emerges as a prime example for leaders seeking to strengthen resiliency measures. Connex Florida makes use of existing technology to both enhance connection between manufacturers and provide broader diversification of suppliers in the state. Although Connex Florida has the immediate purpose of helping businesses traverse the pandemic-stricken supply chain, the tool can further be used to prepare for future disruptions that regularly affect the state, such as hurricanes.

15 Katsaliaki et al. (2020), "Supply Chain Disruption and Resilience: A Major Review and Future Research Agenda," *Annals of Operations Research*. Published December 2020.

16 McKinsey & Company, "Risk, Resilience, and Rebalancing in Global Value Chains," Aug 6, 2020. <https://www.mckinsey.com/business-functions/operations/our-insights/risk-resilience-and-rebalancing-in-global-value-chains>

17 Ribeiro and Barbosa-Povoa (2018), "Supply Chain Resilience: Definitions and Quantitative Modelling Approaches – A Literature Review" *Journal of Computers & Industrial Engineering*. Published January 2018.

18 National Academies of Sciences, Engineering, and Medicine, *Strengthening Post-Hurricane Supply Chain Resiliency*, Published in 2020.

19 Id.

20 MixMove, "What is Supply Chain Resilience?" Sept. 8, 2020. <https://www.mixmove.io/blog/what-is-supply-chain-resilience#:~:text=If%20you%20have%20a%20resilient,market%20share%20and%20financial%20performance.>

21 Gartner, "The Future of Supply Chain: Resilient, Agile, Purpose-Driven," Feb. 26, 2021. <https://www.gartner.com/smarterwithgartner/the-future-of-supply-chain-resilient-agile-purpose-driven/>

22 Gartner, "Diversifying Global Supply Chains for Resilience," Sept. 2, 2020. <https://www.gartner.com/smarterwithgartner/diversifying-global-supply-chains-for-resilience/>

23 In June 2021, the White House released a comprehensive supply chain resilience study, "Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth," which recognized the critical need to adequately address supply chain disruptions and vulnerabilities on a national level. Although not specific to Florida, the recommendations outlined in the report would create further economic benefits for Florida's manufacturing industry.

Connex Florida: Florida's Supply Chain Solution

Description and Features

Connex Florida is a statewide supply chain connection platform for Florida-based manufacturers to engage in the marketplace and streamline connections to prospective suppliers and customers. The interactive tool provides information about manufacturers across the state, highlighting their specific production capabilities and capacities. In addition, Connex Florida helps companies visualize their supplier ecosystem to identify existing gaps and weaknesses in their supply chain. All of the features assist manufacturers in connecting with each other, identifying alternative suppliers, and increasing business opportunities during times of critical demand.

One of Connex Florida's most important features is the tool's extensive search database of small and large manufacturers around the state of Florida. To date, the database includes more than 8,900 manufacturers in a variety of industries ranging from medical devices and pharmaceuticals to aviation and defense. Manufacturers can create profiles detailing their company's description, contact information, key people, capability statements, certifications, NAICS codes, materials, and equipment. Potential customers and suppliers can then view these profiles when looking for particular goods/services, such as face masks and ventilators. In addition to filtering by industry sector, users can filter prospective manufacturers by the products and services they provide, the material and equipment they use, the production space available, or the relevant certifications. There are also options to search for local small or minority-owned businesses.

The ability to identify regional manufacturers for a more localized supply chain is a principal benefit to the extensive database. The 8,900 manufacturers listed in the Connex Florida system span geogra-

phies across the entire state from Miami to Pensacola. Improved connectivity to local partners can lower transportation costs and reduce the time delay to receive and deliver products and services to new businesses. As Connex Florida progressively scales up in size, this benefit of promoting local connectivity will continue to grow. Connex Florida was also created to be interoperable with the Manufacturers Marketplace—a national search database of manufacturers developed by the National Association of Manufacturers (NAM) and AIF. Connex Florida users have the option to expand their search to view potential partners in other states across the U.S., if local connections are absent or not feasible.

Within Connex Florida, another core feature deals with providing visualizations of supplier, manufacturer, and customer relationships. Companies that create accounts in Connex Florida can create a visual network to illustrate their supplier chain. For manufacturers, this feature allows them to diagnose whether they are at a single supplier risk, and if so, gives them a list of potential alternative suppliers. Potential suppliers are also screened through federal government databases to ensure they are not connected to illicit activities overseas. The primary benefit is that Connex Florida manufacturers can improve their supplier diversity in the event a sole supplier cannot deliver materials during a major disruption.

Connex Florida also maintains an exchange center where companies can post or browse information about their surplus materials or resource needs. The exchange connects those manufacturers who require certain materials and equipment with those who can currently provide those materials. Companies can broaden their Request for Quotes (RFQs) and Request for Proposals (RFPs) to potential partners on the exchange. By connecting supply and demand in a more timely manner, the exchange provides a more efficient manufacturing marketplace.

Although still currently in the development stage, Connex Florida will later include two additional sections to its platform: Workforce and Research & Development. These features will enable users to filter options available in the state by specific training type, degree, skill, and other criteria to meet company needs. By adding these additional resources, the Connex Florida system will expand connection to educational institutions, further developing talent pipelines between manufacturers and schools within the state.

Funding

Connex Florida has been financially supported through a series of grants from the National Institute of Standards and Technology's (NIST) Manufacturing Extension Partnership (MEP) program, which were originally provided to help support Florida's recovery and resilience efforts following Hurricanes Irma and Michael. Additionally, Connex Florida received additional resources during the COVID-19 pandemic from the federal Coronavirus Aid, Relief, and Economic Security (CARES) Act in March 2020. Together, these resources have assisted in launching the Connex Florida database while also enabling FloridaMakes to provide the platform free of charge to Florida manufacturers over the past year.

The cost to support the platform through the end of 2020 was approximately \$600,000, of which \$175,000 went to initial set up; \$205,000 went to licensing, maintenance, technical support, and ongoing updates; and \$220,000 went to staffing and platform marketing.²⁴ Over future years, the platform is expected to cost approximately \$425,000 per year to actively maintain; however, some of the costs may be adjusted over time if broader adoption of the platform were to occur, which would defray some costs. FloridaMakes can also match resources available from the state and other partners with federal resources through the MEP national network.

Case Study: Supporting Ramp-Up in Ventilator Production

Early on during the pandemic, it became clear that hospitals around the country did not have enough ventilators to accommodate the growing number of COVID-19 patients with the most severe symptoms. A national shortage ensued and many large manufacturers became de facto ventilator producers to boost supply. In response, there was a national effort to assist medical device companies to scale up production.

Connex Florida served a pivotal role at the state level, connecting ventilator companies with national partners to deliver much needed ventilators to health-care entities. In one such example, Connex Florida helped a Florida-based ventilator manufacturer—Airon Corporation—source local components and ramp up processes. Connex Florida helped the company collaborate with Ford Motor Company and GE Healthcare to use their existing resources for production. In the end, Airon's production increased from about 30-50 ventilator units per month to 50,000 units in one hundred days. This example, though one of many, demonstrates Connex Florida's benefit to Florida manufacturers, and indirectly, its benefit to end users who use the manufactured products—in this case, those who desperately needed medical ventilators.

²⁴ Financial information was provided by FloridaMakes.

Why Should Florida Support and Invest in Connex?

Economic Value to the Florida Economy

Supply chain disruptions are a costly occurrence for Florida's economy, as past hurricanes and the current COVID-19 pandemic have shown. In response, Connex Florida serves as a crucial disaster mitigation tool to help manufacturers proactively and retroactively respond to major interruptions. Yet beyond just the current crisis, questions remain about how supply chains will operate in a post-pandemic world where global supply lines have been severely damaged and pent-up consumer demand sparks renewed economic activity. Once again, Connex Florida will serve as a vehicle to encounter the macro changes rippling throughout the economy and to posture Florida businesses for the future.

In total, Connex Florida yields enormous economic benefits to supply chains specifically, but more generally to the entire Florida economy. Connex Florida's economic value can be viewed through three principal channels: helping companies build their own operations and resilience; promoting diversification through local sourcing; and compounding economic growth for the entire state economy.

The first major economic benefit of Connex Florida is that the platform helps individual companies build themselves up, whether through improved resilience or increased operations. When manufacturers can visualize their own supply chains—as Connex Florida provides the ability to do—they can perform detailed risk assessments and proactively identify what risks may be present in the supply chain. These actions, if done before disaster strikes, lead to fewer potential costs from disruptions. Companies can also design intuitive re-routes (similar to

methods employed in the telecommunications/energy industries) to find alternative supplier paths in the lead up to, or immediately following, a major storm.

Additionally, when manufacturers have a better understanding of what opportunities for partnerships exist for them in the state, they can engage in business connections that would otherwise be absent without a connective tool like Connex Florida. Small manufacturers around the state, in particular, will benefit from these advancements in resilience and operations—an especially important result given 80 percent of Florida's manufacturing establishments have twenty employees or fewer and comprise the bulk of future growth.²⁵

For supply chains in Florida, Connex Florida has another economic benefit of encouraging local sourcing from around the state. According to a prior Florida TaxWatch study on manufacturing in Florida²⁶, about 74 percent of industrial buyers “always or generally” preferred to source locally, and 46.7 percent of respondents “rarely or never” prefer to source globally at all.²⁷ Sourcing locally creates numerous advantages, each with compounding benefits to not only the companies involved but to the surrounding areas throughout Florida:

- Local supplies are more reactive to disruptions than global suppliers and can deliver faster;
- Localizing interactions can decrease transportation and transaction costs;
- Shorter lead times to customers can improve customer satisfaction and potentially increase sales and business revenues; and
- Reducing a company's bottom line may induce other manufacturers and suppliers to engage in the process and further contribute to the local economy.

²⁵ Florida TaxWatch, From Grease & Grime to Technology & Talent: A Summary of the 2019 Florida Make More Manufacturing Summit, Nov. 2019.

²⁶ Ibid.

²⁷ Ibid.

From a disaster mitigation standpoint, local sourcing can further shield Florida-based manufacturers from exogenous events affecting distant parts of the world.

Lastly, a significant economic benefit of Connex Florida is the platform's ability to spur compounding economic growth. By directly assisting manufacturers and suppliers who use the platform, Connex Florida indirectly benefits all the industries around the state who interact with the manufacturing supply chain on a day-to-day basis. From healthcare to aerospace, there are positive externalities to a resilient supply chain that can operate well under normal circumstances and especially during abnormal conditions. A manufacturing plant that can produce goods efficiently and expediently will benefit the industries that rely on the finished products.

Although not exhaustive in nature, the economic benefits outlined in this section form the basis for why the state of Florida should invest in Connex Florida as a tool to sustain supply chain resiliency. With supply chain disruptions becoming more commonplace and consequential in the globalized economy, it is essential that Connex Florida's functionality, economic value to the state, and place within the broader context of resiliency, are widely known as the state deals with a dynamically changing economy.

Conclusion and Recommendations

Since Connex Florida's inception in 2017, Florida's economy has endured a whirlwind of economic circumstances from hurricane disruptions, periods of economic growth, and now a full-blown pandemic. Despite these peaks and troughs, Connex Florida has proven itself to yield enormous value to the Florida economy during times of crisis and expansion, benefiting economic growth through improved company performance and resilience. The strategies Connex Florida employs to promote supply chain resiliency fall in line with the diversification and digitization goals mentioned previously in this report, further enhancing the platform's economic value. In order to confront the challenges that inevitably arise when economies stabilize and recover from a major shock, policymakers and business leaders in Florida must consider the following recommendations that immediately grow Connex Florida and promote resiliency for the long-term.

RECOMMENDATION 1

The Florida Legislature should support the current operations of the Connex Florida system while also supporting future expansions to include more manufacturers and tools.

As Florida contends with the difficulties of the present economic recovery and positions itself to encounter a post-pandemic world, the state will increasingly need innovative tools to diversify and drive Florida's economy. Connex Florida is an expanding supply chain platform that fulfills this need for newer resiliency tools. Although a useful tool to prevent disaster risks, Connex Florida does more than just mitigate against interruptions—it is an important economic driver during periods of economic expansion. Connex Florida promotes collaboration through a local-focused strategy, which in turn assists small businesses and local communities throughout Florida. Any public support of the Connex Florida platform will likely generate millions in economic benefit beyond the

initial investment due to compounding growth. FloridaMakes can also match resources available from the state or other partners with federal resource through the MEP national network.

RECOMMENDATION 2

The manufacturing industry should identify additional ways to attract small and large manufacturers to the Connex Florida system in order to improve engagement, collaboration, and connectivity.

At the moment, around 8,900 of the state's more than 21,000 manufacturers are currently listed in the Connex Florida database. As additional manufacturers get involved in the system, and leverage the tools/resources available, Connex Florida will confer more and more economic benefits to businesses, communities, and the state of Florida. Yet to capture these benefits, more users must be incorporated into the system and must be active in using it. The state's 14 Regional Manufacturers Associations can serve as important instruments to recruit and attract more Connex Florida users while also marketing the tool's specific advantages to individual companies.

Appendix A

A look at Connex Florida

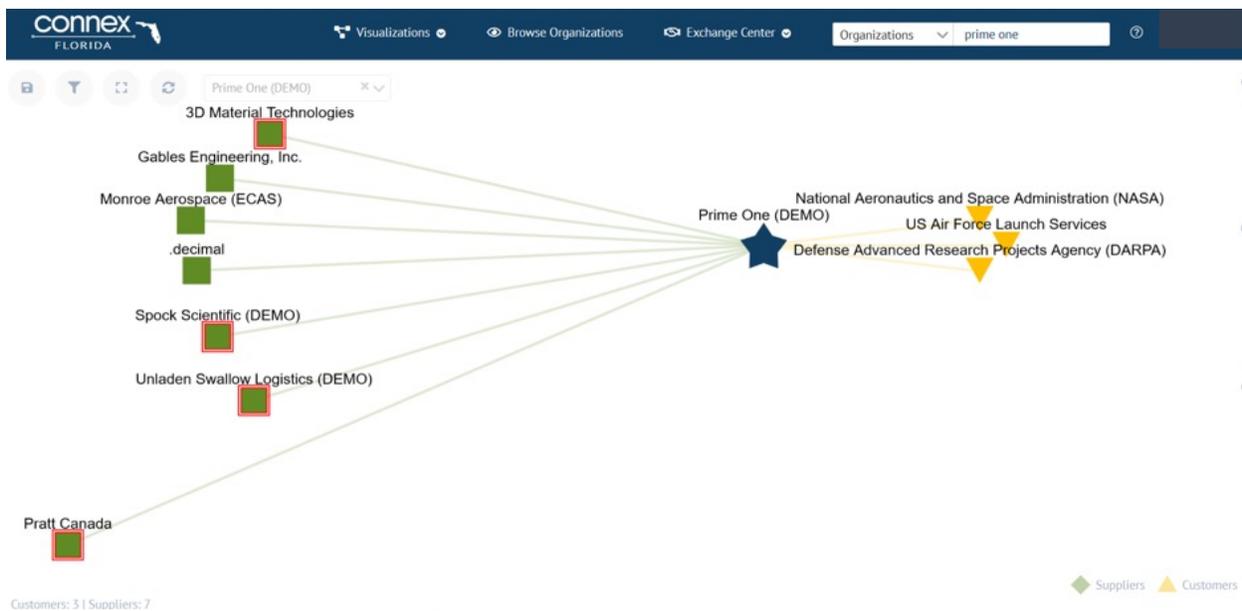
Connex Florida's manufacturer database lists more than 8,900 manufacturers dispersed across the state of Florida. The database also describes each company's specialization and relevant credentials.

All information shown is for demonstration purposes only

The screenshot shows the 'INDUSTRIES' section of the Connex Florida website. On the left is a map of Florida with several red circular markers indicating industry locations. On the right is a table with two columns: 'Name' and 'Description'.

Name	Description
.decimal	COVID-19 Response: CNC machining for medical device components, including: Ventilators, Powered Air Purifying Respirator PAPP, Respirators - other, Diagnostics & Testing Equipment, Vital sign monitors, Medical Device Components/Sub-assemblies On-demand design and delivery of custom, patient-specific treatment devices for cancer patients High-precision machine...
1-800 Design	1-800 Design is primarily engaged in manufacturing electrical, mechanical, cutout, or plate signs and advertising displays, including neon signs, and advertising specialties.
111repair, Inc.	
123 Design	Design, Engineering, Prototyping, Manufacturing
1872 Holdings International, LLC	1872 Holdings International, LLC is primarily engaged in manufacturing alcoholic liquors by distillation, and in manufacturing cordials and alcoholic cocktails by blending processes or by mixing liquors and other ingredients.
2 Bums Aircraft, Inc	
20/20 Components	
21st Century Labels & Packaging, LLC	21st Century Labels & Packaging, LLC is primarily engaged in manufacturing miscellaneous converted paper or paperboard products, not elsewhere classified, from purchased paper or paperboard. Also included in this industry are pressed and molded pulp goods, such as papier-mache articles, other than statuary and art goods.

Connex Florida's Supply Chain Visualizations tool allow companies to analyze their individual supplier ecosystem to identify any vulnerabilities in their supply chain.



Supply Chain Visualizations also allow manufacturers to identify alternate suppliers and resources:

The screenshot displays the Connex Florida platform interface. At the top, there are navigation options: Visualizations, Browse Organizations, Exchange Center, and a search bar. The main content area shows a search for "3D Material Technologies" and "Bansbach Easylift of North America, Inc." with the result "Found 98 alternates to Spock Scientific (DEMO)".

Below the search results, there are tabs for "Capability", "Material", and "Value Offering". A table lists the alternate suppliers with the following columns: Name, Description, Match For, City, and Distance. The table is sorted by "Closest" and has filters set to "Not filtered".

Name	Description	Match For	City	Distance
Spacecoast Cable & Harness, Inc.	Spacecoast Cable & Harness, Inc. is primarily engaged in manufacturing of electro-mechanical assemblies; specializing in electrical and coaxial cable assemblies, electrical harness assemblies, and chassis builds.	Product Producer: Fabrication Product Producer: Integrator Product Producer: Product Producer	Titusville, FL	11.2 miles away
Solutions Manufacturing, Incorporated	Solutions Manufacturing, Incorporated is primarily engaged in manufacturing electronic components, not elsewhere classified, such as receiving antennas, switches, and waveguides.	Product Producer: Fabrication Service Provider: Engineering Services Service Provider: Staffing / Inspection Product Producer: Service Provider	Rockledge, FL	14.0 miles away
Delta Group Electronics, Inc.	Delta Group Electronics is an EMS company specializing in CCA's, Cables & Harness, Over-Molding, Full integration box builds & test.	Testing Service Provider: Testing / Inspection Product Producer: Service Provider	Rockledge, FL	14.9 miles away
KIHOMAC	Founded in 2003 as an engineering consulting company supporting the U.S. Military services, primarily the U.S. Air Force A-10C community, we have expanded to over 300 employees in multiple locations providing high-end engineering, sustainment, and manufacturing services to multiple Government and Commercial customers. We provide complete...	Product Producer: Fabrication Product Producer: Integrator Service Provider: Engineering Services Product Producer: Research & Development	Satellite Beach, FL	23.2 miles away
Compsys, Inc.	Compsys, Inc. manufactures foam-filled fiberglass parts and part kits using our patented PRISMA Preforms technology. The product can be used with open layup, infusion, vacuum-assisted resin transfer molding, and modern wet compression techniques. Both custom and stock preforms are offered. Widely used in boat building and transportation applications, an...	Product Producer: Research & Development	Melbourne, FL	28.2 miles away
Bansbach Easylift of North America, Inc.	Bansbach Easylift of North America, Inc. (Melbourne, FL) is a B2B company Bansbach is primarily engaged in the manufacturing of gas springs, locking gas springs, in-line electric linear actuators, dampers, industrial shock absorbers, pneumatics, hydraulics and traction gas springs. Our high quality products are designed for aviation, marine, aerospace...	Service Provider: Engineering Services Product Producer: Service Provider	Melbourne, FL	28.2 miles away

At the bottom of the table, there are buttons for "View Profile", "Edit Relationship", and "Find Alternates". The right side of the interface shows a sidebar with "Suppliers" and "Customers" icons.

ABOUT FLORIDA TAXWATCH

As an independent, nonpartisan, nonprofit taxpayer research institute and government watchdog, it is the mission of Florida TaxWatch to provide the citizens of Florida and public officials with high quality, independent research and analysis of issues related to state and local government taxation, expenditures, policies, and programs. Florida TaxWatch works to improve the productivity and accountability of Florida government. Its research recommends productivity enhancements and explains the statewide impact of fiscal and economic policies and practices on citizens and businesses.

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