



## **Navigating Supply Chain Challenges Under COVID-19: the Road to Recovery for Hampton Roads**

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### **I. INTRODUCTION:**

COVID-19 has impacted global value chains with unprecedented disruptions and challenges. For example, medical supply chains were significantly affected by a demand spike for COVID-related medications and personal protective equipment (PPE), which wiped out inventories and eliminated the buffer between manufacturing and consumption. Closures of meat processing plants strained inventories and deliveries, and the shift in demand from commercial channels to household channels impacted supplies of household products (e.g. paper goods/cleaning supplies, etc.). By the same token, global and domestic value chains play a crucial role in COVID-19 recovery efforts and in long-term economic growth.

Supply chains make vital contributions to regional productivity and the geographic distribution of economic development. The transportation and supply chain industry provides the basic inputs for many economic sectors and supports the development of many other sectors. More efficient maritime supply chains lower costs and enhance accessibility to inputs and technologies. These benefits lead to long-term productivity gains. For Hampton Roads, additional investments in maritime and supply chain infrastructure and human capital would enhance the region's accessibility and connectivity and generate productivity gains, fostering economic growth.

### **II. UNPRECEDENTED CHALLENGES:**

#### **1. Global value chains suffered a double hit.**

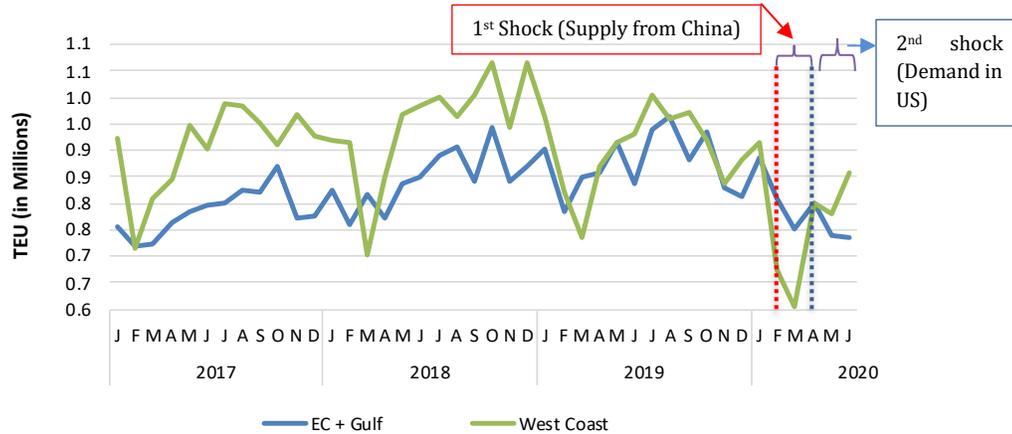
The early stages of the COVID-19 pandemic were mainly confined to China. China's response measures included extending the Chinese New Year holiday break and later quarantining parts of the country. With workers unable to return to their jobs, manufacturing plants were unable to return to production. The halt in both work and production created a supply-side shockwave. Promised orders were delayed, and scheduled vessel calls were cancelled in a flurry of blank sailings. As COVID-19 propagated around the world, other economies were hit by a second, larger shock that reverberated across the globe: a dramatic halt of economic activity. Countries in Europe and the Americas began to apply drastic public health mitigation measures that included the lock downs of their own economies. This created a demand-side shockwave. With consumers and workers confined in their homes, huge changes to consumer demand occurred. Consumer preferences shifted from wanting a diversified range of goods and services to prioritizing the essentials in times of the pandemic. Although we anticipate that previous consumption patterns will resume once the COVID-19 threat is completely mitigated, if the mitigation measures are not comprehensive, some consumption changes will persist in the near future.

This double-sided shock was unprecedented for global supply chains, and its impact was amplified because global economies are now much more interconnected and global supply chains regularly span multiple countries. The WTO has indicated that value-added activities as a proportion of the GDP by domestic supply chains decreased from 1995-2017, whereas value-added activities by complex global chains gained a significant share in the same period.<sup>i</sup>

The global value chains connecting the US with China first received a supply disruption from the Chinese side in order delays, which generated a first round of capacity cuts in transportation links (blank sailings, etc.). In Figure 1, we depict the recent evolution of the import volumes for each coast (West Coast vs. East Coast + Gulf). Typically, the high season starts around mid-year in preparation for December sales. In the first months of the year, there is a low season which is also impacted by the Chinese New Year. When we compare the period February-March for different years, we can see that the first shock wave impacted the West Coast differently than the East Coast in 2020. The loaded import TEUs (twenty-foot equivalent unit) decreased faster for the West Coast ports than for the East Coast ports due to a higher concentration of North East Asia cargo for West Coast ports. This highlights an important feature: the sourcing for the East Coast ports is more diversified.

As COVID-19 spread in the US, many states issued "Stay at Home Orders" which created a generalized slowdown of economic activity. The economic slowdown triggered a second shock of supply chain capacity cuts to accommodate the reduced activity level (more blank sailings, idle truck fleets, reduced intermodal volume, etc.). Figure 1 reflects a drop in loaded imports for both coasts from March to June vs. previous years. Despite this, some specific sectors (e.g. medical supplies, household essentials, etc.) witnessed huge increases in demand.

Figure 1. Loaded Imports (East Coast ports vs. West Coast ports) (YTD June)



Source: ODU Logistics Cluster Monitor and port authorities' websites, January-June 2020

At a port level, we can observe the negative impacts of the first shockwave in the first quarter of 2020 (Figure 2). The first quarter of 2020 posted significant West Coast cargo volume reductions (-13%) especially in the ports of LA/Long Beach and Tacoma/Seattle, whereas the East Coast and Gulf ports showed only moderate reductions (-3%) for the same period. The negative effects of the second shockwave are evident in the results of January-June 2020 as well, with ports on both coasts witnessing a generalized import volume reduction. However, the West Coast cargo volume declined by 12%, whereas the East Coast plus Gulf ports declined 8% for January-June 2020 vs. the same period in 2019.

Figure 2. Import loaded TEUs by Coast

Import Loaded TEUs (in millions)	YTD		Growth	Import Loaded TEUs (in millions)	YTD		Growth
	Mar20	Mar19			Jun20	Jun19	
Hampton Roads	0.31	0.32	-5.1%	Hampton Roads	0.59	0.67	-12.6%
NY/NJ	0.89	0.91	-1.2%	NY/NJ	1.71	1.85	-7.4%
Charleston	0.25	0.26	-1.5%	Charleston	0.48	0.52	-7.6%
Everglades	0.08	0.08	0.6%	Everglades	0.15	0.16	-11.0%
Baltimore	0.12	0.13	-5.5%	Baltimore	0.24	0.26	-7.0%
Savannah	0.51	0.55	-7.3%	Savannah	0.99	1.08	-8.1%
Houston	0.28	0.29	-2.9%	Houston	0.57	0.60	-5.8%
East Coast & Gulf	2.45	2.54	-3%	East Coast & Gulf	4.73	5.15	-8%
LA/LB	1.70	1.95	-12.9%	LA/LB	3.61	4.07	-11.4%
Oakland	0.22	0.23	-3.6%	Oakland	0.45	0.47	-4.2%
Tacoma/Seattle	0.28	0.35	-19.3%	Tacoma/Seattle	0.57	0.69	-18.3%
West Coast	2.20	2.52	-13%	West Coast	4.63	5.24	-12%
Total	4.65	5.06	-8.2%	Total	9.36	10.39	-9.9%

Source: ODU Logistics Cluster Monitor and port authorities' websites, March-June 2020

## 2. Demand shock is asymmetric.

The demand-side shock of the pandemic showed two distinctive features. First, the shock was asymmetric across supply chains. The main drivers of this asymmetry were the shifts from commercial to household channels and the switch from non-essential to essential goods and services.

When the lockdowns were implemented, many commercial locations closed, and workers shifted from spending much of their time at work and consuming at restaurants to spending more time at home and consuming groceries. Their general habits and activities also changed from doing activities outside of the home to spending virtually all their time at home. This resulted in a significant shift in consumption patterns. Food that had been delivered to restaurants had to be redirected to groceries, and e-commerce became the primary outlet for household consumption. Activities that could be done at home (and their complementary products such as board and yard games, video downloads, etc.) were prioritized over activities and products that were previously experienced outside the home (cinemas, shopping malls, etc.).

Another demand change from the pandemic was the reduced consumption of non-essential items and the increased consumption of essential items, as well as modified consumption patterns. As the economic shutdowns resulted in a significant increase in the US unemployment rate, many consumers cut back on purchases or switched their purchase outlets, such as visiting lower-cost grocery retailers. The demand for luxury goods decreased, creating surpluses for those markets, while increased demand for COVID-related items, such as disinfecting wipes, resulted in stockouts for those. These demand shifts increased pressures on the US domestic supply chains including rail, trucks and distribution centers.

Second, the global impact across countries was heterogeneous. When considering COVID-19's impact on different countries, we find that the pandemic did not hit all our trading partners at the same time or with the same force. Our trading partners have been emerging/will emerge at different times than the US due to their better or lesser ability to mitigate the negative impacts of COVID-19. Hence, we will not be able to fully restore global supply chains until all of our global partners fully open their borders.

### **3. Acceleration of supply chain current trends.**

COVID-19 accelerated current trends in supply chains. Contactless supply chain operations are a must in a social distancing environment. This necessity sped up the current trends of digitalization, automation, and visibility in supply chain operations. Supply chain digitalization and automation offer a clear way to create social distancing in operations; for example, texting the acceptance of deliveries by distribution center employees keeps truck drivers safer.

The need for a coordinated response to the supply of essential items, particularly medically related, during the pandemic required complete visibility of the supply chain. The need for coordination and complete visibility will also accelerate the creation of public/private partnerships to provide a

full control tower approach during crises, as was witnessed with the activation of the Defense Production Act.

Another trend accelerated by the pandemic was e-commerce. With many brick and mortar retailers closed and consumers prioritizing social distance, consumers began a rapid switch to e-commerce and changed their previous consumption habits from store visits to home delivery or contactless pick up. While the e-commerce industry had been making substantial inroads on home delivery of non-food goods, pre-pandemic consumers were not as interested in grocery home delivery. Many post-pandemic consumers, experiencing the convenience of e-commerce and preferring less risky shopping, have now made the switch to e-commerce grocery services and are likely to remain users of those services.

#### 4. **Resilience is key.**

Over the last few decades, domestic and global supply chains became lean by optimizing inventory levels and more complex through specialization. Although those drivers provided certain cost benefits, they also simultaneously made the lean supply chains more vulnerable to external shocks. The COVID-19 pandemic has emphasized the need to re-evaluate supply chain resilience, which is the tradeoff between external vulnerabilities (shocks) and internal capabilities to mitigate the risks (higher levels of inventory/alternate suppliers). While resilience may result in higher levels of safety stock and some increased supply chain costs, the diversification of sources and prioritization of supply sources with greater flexibility are necessary to continue functioning successfully in an era of double-sided supply chain disruptions. We expect to see new criteria for the design of national stockpiles and emergency inventories of essential items. For example, the Department of Homeland Security in its Intelligence Note of April 6, 2020, indicated, "An opportunity exists for the US government to work with the private sector to shore up critical infrastructure supply chains...and that a stockpile is maintained based on expert forecasts"<sup>ii</sup>

The Hampton Roads logistics cluster will need to reevaluate the resilience of its maritime supply chains in the face of not just a new pandemic, but also other potential sources of disruption such as hurricanes, sea-level rise challenges, geo-political turmoil in source countries, etc.

### III. THE ROAD AHEAD

What do we see in the long term for Hampton Roads?

1. **A greater emphasis on investments that improve our regional resilience.** Resilience is as much a tool for surviving during crises (or “shifts”) as it is for thriving after. We need to build capabilities to mitigate our vulnerabilities which means we must plan ahead to prevent or lessen the impact of future potential disruptions. Our global supply chains are intertwined

supply networks; thus, we see a greater focus on risk management, crisis management and contingency plans. As climate change increases the frequency and ferocity of natural disasters, we will also see more awareness of the regional impacts of climate change and the incorporation of strategic mitigation efforts in our resilience plans. There is one vitally important advantage: Cities that prepare for natural disasters more regularly are not only more prepared to respond to crises due to the planning process that takes place, but those that take forceful action are also rewarded with more favorable insurance rates. Hampton Road's planning efforts for hurricanes and sea-level rise will pave the way for more comprehensive planning processes.

2. **More diversification of global value chains to reduce over-reliance on few countries/suppliers.** The beneficial cargo owners (BCOs) will seek more balanced supply networks to spread potential disruption risks across multiple geographic regions and partners. As manufacturing migrates to different countries or economic units, Hampton Roads can benefit from this rebalancing of global value chains. For example, if some manufacturing moves from North East Asia to South East Asia, this would imply a change in transportation routes. Instead of going transpacific to the US West Coast, product can be moved by an all-water route through the Suez Canal or around the Cape of Good Hope to the US East Coast. By building more robust logistics cluster capabilities, Hampton Roads will be in a stronger position to attract potential cargo. These capabilities should aim to enhance and extend the influence area of Port of Virginia, which is our main logistic asset.
3. **Re-shoring or near-shoring the supply chains of products considered part of national security or part of the strategic stockpiles, such as critical medical supplies.** Under the threat of supply chain disruptions, many countries will seek to shorten their supply chains by producing closer to the domestic market (near-shoring) or eliminating their reliance on global supply chains all together (re-shoring). Re-shoring national security or strategic stockpile products is especially appealing since it potentially lessens our dependence on other trading partners, mitigates disruption risks, and reduces negative impacts on a retail market that may take years to recover from a pandemic disruption. However, there will be a tradeoff between higher costs and a reduction in disruption risks. For example, the US International Development Finance Corporation (DFC) will support financing projects that "help re-shore production—or strengthen related domestic supply chains—of personal protective equipment, medical testing supplies, vaccines, pharmaceuticals, ventilation equipment, or relevant ancillary materials and technologies." <sup>iii</sup> In July, the Go Virginia State Board approved a grant to "...back strategic initiatives in response to the economic crisis caused by the COVID-19 pandemic... efforts will also support rebuilding Virginia's medical and non-medical personal protective equipment (PPE) supply chain." <sup>iv</sup>

Reorganizing supply chains from global to regional and emphasizing longer term business relationships with fewer, closer suppliers are both likely options for the future, but these efforts must be balanced with supply diversification efforts to avoid over-reliance on one or few partners. For example, in the case of non-critical supplies, global supply chains will continue to provide low cost imports for the American consumer but under a more diversified approach. Maintaining low cost items for the American consumer will require global sourcing from multiple regions. This will also create an incentive for more centralized supply chain visibility through public private partnerships (PPP) particularly for essential products, e.g. medical. The services that facilitate on-line information sharing and promote supply chain visibility, transportation and logistical services are important to maintain and support, particularly as consumers and stakeholders pay more attention to where and how supply networks extend.

**4. Attracting more investments that strengthen Hampton Roads' logistics cluster competitive advantage.**

In 2019, the Port of Virginia handled 2.3 million loaded TEUs, and ranked as the third most important East Coast port in terms of loaded TEUs, after New York/New Jersey and Savannah. In dollar value, the Port of Virginia handled containerized cargo flows for \$23.7 billion in 2019. Nearly 25,000 people work in the transportation and warehousing sector in Hampton Roads, and an additional 31,000 are employed in shipbuilding activities. Hampton Roads' maritime logistics cluster is an asset with a vital impact on regional productivity and the essential supply chain services that go through our cluster. For example, the Port of Virginia offers "...2.5 hours to open sea, a two-day drive from 75% of the U.S. population, direct Interstate highway access from all terminals...double-stack rail service by Norfolk Southern and CSX reaching 16 Midwest and Southeast inland destinations, and direct service to 45+ countries"<sup>v</sup>

Long-term productivity gains can be achieved by strengthening our competitive advantage. We need to ensure that we have all the required key investments for main port functions (berth and terminal operations, main navigational channel, improvements in inland terminals) that enable the other critical functions of the logistics cluster: warehousing, transportation and support services. Hampton Roads has already invested in much of the needed port support infrastructure and most planned investments have continued despite COVID-19 to ensure readiness to support the economic recovery process.

Complementing port investments, we need to consider all related infrastructure investments such as highways, rail improvements, and site development activities. To attract new maritime supply chains and partners to our logistics cluster, we also need to provide incentives for the establishment of new distribution centers and flexible manufacturing facilities. For example, the Port of Savannah has focused on attracting warehouses and distribution centers to the area

surrounding the port. As of the first quarter of 2020, more than 5.6 million square feet of warehouses were under construction in Savannah<sup>vi</sup>. More logistical assets around our Port will attract more supply chains and partners to our maritime ecosystem and increase our market share.

An example of infrastructure improvements with a positive impact on market share is the expansion of barge services in the Richmond Marine Terminal (RMT) which attracted dozens of new companies to the area around the terminal. Another example is the announcement of the new Amazon fulfillment facilities in Hampton Roads this year, which has generated considerable interest from complementary supply chain partners. Markets moving at an accelerated rate towards online purchasing have triggered the development of new distribution centers and reconfigurations of existing ones. Hampton Roads can and should benefit from these market shifts by strategically investing in site development and its crucial role in supporting the long-term success of our logistics cluster.

While planning for those distribution centers and manufacturing facilities, we still need to take into account the resilience of the ecosystem as a whole. Flexible manufacturing facilities that can handle surge capacity and can access flexible storage options are needed to be able to adjust to demand fluctuations<sup>vii</sup> and value chain disruptions. Flexible storage options can include the buildings themselves, with flexible layouts that can open or shut off areas in response to demand fluctuations or use robotics to complement human effort (e.g. Prologis Global), as well as the development/expansion of on-demand websites that match excess capacity with consumers' demand, such as FLEXE.com.

#### 5. **More automation and electronic information exchange along the entire supply chain.**

Social distancing (and supply chain transparency) will become crucial for our industry. For example, drone inspections at the Port and drone deliveries of medical supplies and prescriptions already reflect the contactless supply chain of the future. Industry 4.0 represents the enhancement of our computerized and automated systems with data and machine learning that feeds ever more intelligent and autonomous systems. The additional data captured and exchanged among these systems will require substantial investments in IT technology along the supply chain together with more automation investments in terminals and facilities (marine, rail, truck, distribution centers).

Our maritime ecosystem should include digital tracking to simplify and speed up logistics operations. Digital visibility will enhance our ability to develop supply-chain network maps, which can be used to analyze the geographic concentration of vendors/contractors. For example, the Asian Development Bank compiled the supply chain network maps for PPEs in response to the COVID-19 pandemic to address potential bottlenecks<sup>viii</sup>. In addition to the

supply-side importance of digital tracking, consumer interest in the background and sourcing of products can be addressed by publicly sharing supply chain network maps with consumers who can then make more informed purchasing decisions. Today’s consumers are more informed and connected, and have enough purchase options that they can and often will differentiate their purchases based on sourcing information; e.g. “conflict-free” diamonds, avoiding products that contain palm oil from non-sustainably managed forests, etc.

The vast amounts of information that are now routinely gathered can also help support more flexible and efficient use of network resources. For example, the on-demand and virtual economy allows for the connection of independent supply chain partners where one has scarcity and the other has surplus. This is accomplished through websites that match excess capacity at one supply chain node or with one supply chain carrier, with capacity need at another. It is a growing industry sector that can effectively address demand fluctuations, whether pandemic-driven or seasonal.

**6. An increased need to diversify and balance regional economic activities to improve overall regional resilience.**

Hampton Roads has a known economic over-reliance on government/military spending. More analysis is required to: a) strengthen the value proposition for major maritime supply chains that are already operating within our logistics cluster, and b) attract new supply chains, whether related or independent, through the expansion of manufacturing capabilities and warehousing capacity of the region. The emergence of an offshore wind supply chain is a good example of such a diversification in our economic ecosystem. By the same token, upcoming expansion of solar energy projects in Virginia by Dominion Energy could generate new solar supply chains.

Figure 3. Hampton Roads: Exports and Import by Major Maritime Supply Chains, January-May, 2020

Main Supply Chains through the port	Export Value			Import Value		
	(in million \$US)			(in million \$US)		
	2020 YTD	2019 YTD	Change	2020 YTD	2019 YTD	Change
Antisera and other blood fractions	993	950	4.5%	53	39	37.8%
Coal **	1,824	2,828	-35.5%			
Soybeans	212	314	-32.3%			
Parts & Access. For Motor Vehicles	322	284	13.5%	549	728	-24.5%
Chemical Woodpulp	253	271	-6.6%			
Tobacco unmanufactured	218	263	-17.2%	154	180	-14.7%
Medicines in dosage	147	74	99.4%	1115	1,327	-16.0%
Toys and video games	58	56	3.5%	87	250	-65.2%
Print Machines (printers)	54	60	-8.5%	786	896	-12.3%
Furniture (incl. seats)	37	50	-25.6%	348	931	-62.6%

\*\* Coal data is for the Norfolk/Mobile/ Charleston  
Source: ODU Logistic Cluster Monitor, US Census

The following table summarizes the major maritime supply chains for the Hampton Roads economic cluster. In general, we can observe a significant decline in exports and imports of coal, soybeans, furniture, toys and videogames for the period of January-May of 2020, whereas there was a surge of 99.4% in exports of medicines vs. the same period of last year. Diversifying our regional economic partners would help smooth out potential supply chain disruptions that could occur from pandemics, natural disasters, consumer preference shifts, or other unexpected events.

Furthermore, we will need to develop a wider network of support services for the existing and new supply chains, such as telecommunications (data centers), banking (financing, brokerage), energy (off-shore wind and other renewable sources), education (human capital), etc. For example, the expansion of the fiber landing hub of Virginia Beach will improve the telecommunication support capabilities for the logistics cluster with its two high-speed subsea cables (MAREA and BRUSA), and two more (Dunant and SAEX) on the way. Therefore, Hampton Roads is well positioned to foster the development of innovation centers that would thrive on this infrastructure and will contribute to the creation of next generation supply chains.

An additional regional supply chain area with both growth potential and economic resilience is medical/health care. Hampton Roads is a regional health care destination, serving patients from the Outer Banks to Richmond, from western North Carolina to the Eastern Shore. Hampton Roads offers unique medical specialties (e.g. Jones Institute for Reproductive Medicine, Hampton University's Proton Therapy Institute, CHKD), and well-established educational and scientific institutions (e.g. EVMS, ODU, Norfolk State, Dept. of Energy's Jefferson Lab). In addition, military medical specialists regularly choose to stay in Hampton Roads once transitioned from active service. This results in a highly centralized concentration of unique medical expertise, e.g. cutting edge knowledge combined with previous exposure to a wide variety of ailments and operating conditions. This knowledge could be leveraged to develop advancements in PPE, vaccine technologies, etc. Growth in this supply chain would benefit the overall logistic cluster and could prove highly attractive for possible investments in re-shoring of medically related manufacturing and development to Hampton Roads.

#### IV. CONCLUSION:

##### **What does this mean in the long term?**

Every shock or recession leaves a mark, and history, as we know, tends to repeat itself. Whether SARS in 2003, the Swine Flu in 2009, or MERS in 2012, pandemics cause major supply chain disruptions and yet also offer companies valuable lessons in supply chain design. The on-going events and repercussions of the COVID-19 pandemic have stress-tested domestic and global

supply chains and reinforced the importance of resilience in the design and re-design of these value chains. We see the following changes becoming permanent features of the supply chain landscape:

1. Continuous evaluation and monitoring of resilience of the supply chains.
2. Diversification of global supply chains with a potential cargo rebalancing from the US West coast to the East/Gulf coasts.
3. Greater focus on re-shoring and near-shoring of critical or strategic supplies.
4. Acceleration of current trends of digitalization, automation and visibility.
5. More emphasis on coordinated public-private responses on securing the provisions of essential items.
6. A greater shift away from brick-and-mortar retail and towards e-commerce.

### **How can Hampton Roads prepare for the road ahead?**

1. **Develop detailed resilience analyses of the major supply chains operating in the region.** This will identify areas of improvement in the supply chains themselves, as well as identify additional support capabilities that are needed to increase the resilience of our maritime ecosystem, and generate expanded opportunities for new economic activities.
2. **Attract global, diverse value chains and new potential cargo to our region** by taking advantage of upcoming global rebalancing of the supply chains, and the movement towards re-shoring and near-shoring.
3. **Accelerate supply chain automation, digitalization, and visibility.** This includes advancing the adoption of mechanisms such as Blockchain, AI, IoT, etc., and mechanisms that support contactless supply chains.
4. **Foster investments that strengthen the Hampton Roads maritime logistics cluster and build on our competitive advantage.** This includes investments related to port functions and logistics-related investments in warehousing and site development, as well as investments that would mitigate the regional impacts of climate change. This requires developing integrated, complementary regional growth strategies for all of Hampton Roads.
5. **Enhance supply chain visibility through PPPs.** This includes incentivizing the development of centralized entities that would facilitate on-line information sharing and analysis among supply chain partners, particularly for essential or strategic supplies.
6. **Incentivize Industry 4.0 innovation and investments.** This includes leveraging Virginia Beach's fiber landing hub, as well as Hampton Roads' current tech partners, to augment our next generation of digital supply chains.

COVID-19 has presented a changed landscape of new challenges and opportunities. Addressing the challenges and taking advantage of the opportunities will allow us to better position Hampton Roads for economic recovery and future success.

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## Endnotes:

<sup>i</sup> WTO. Global Value Chain Development Report 2019. Chapter 1, page 12.

<sup>ii</sup> Department of Homeland Security, *Intelligence Note*, April 6, 2020.

<sup>iii</sup> <https://www.dfc.gov/media/press-releases/dfc-dod-sign-memorandum-agreement-defense-production-act>.

<sup>iv</sup> [https://www.prweb.com/releases/genedge\\_leverages\\_federal\\_cares\\_act\\_appropriation\\_to\\_accelerate\\_statewide\\_response\\_for\\_reshoring\\_critical\\_industries\\_in\\_virginia/prweb17230333.htm](https://www.prweb.com/releases/genedge_leverages_federal_cares_act_appropriation_to_accelerate_statewide_response_for_reshoring_critical_industries_in_virginia/prweb17230333.htm)

<sup>v</sup> Port of Virginia, <http://www.portofvirginia.com/capabilities/>

<sup>vi</sup> Journal of Commerce. New warehouses blooming across Savannah. June 26, 2020.

<sup>vii</sup> <https://www.wsj.com/articles/the-rush-is-on-to-secure-holiday-season-warehouse-space-11596136191>

<sup>viii</sup> Asian Development Bank, <https://www.adb.org/multimedia/scf/#/>