Responding to the Coronavirus’s Impact on Supply Chains

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The novel coronavirus (COVID-19) has been a significant humanitarian event, with more than 100,000 cases as of early March. The virus was initially concentrated in China, but outbreaks in South Korea, Italy, Iran, and the US indicate that this already is and will continue to be a global challenge. While first and foremost a human tragedy, COVID-19 is also an unprecedented challenge to global supply chains. Below, we explore the impacts of the virus on supply chains, potential scenarios as the virus advances globally, and how companies should respond.

China’s Experience Offers Insight on What to Expect

The early outbreak and subsequent response in China limited human movement and economic activity, providing a proxy for what to expect as the virus expands to other regions. While comprehensive data on the productivity and economic impact is still emerging, observations on the ground in China offer insight into how conditions will evolve and the likely impacts in other countries.

To respond to the virus initially, the Chinese government (at the central and local levels) required factories and companies to close and restricted the movement of people. Now that China has made progress containing the virus in several areas, the Chinese central government has put forth an aggressive “back to work” campaign. This includes providing financial support and medical supplies, as well as supporting efforts to reestablish core infrastructure to help closed companies and factories resume operations. Local governments are also driving back-to-work efforts, leading to a differentiated approach by city and province. Not surprisingly, provincial back-to-work efforts have been most pronounced in provinces closest to the viral epicenter of Hubei province, indicating that these regions dealt with quite dramatic effects as the virus was contained. But Hubei province itself remains largely locked down in an ongoing containment effort, affecting more than 50 million in the province and surrounding region.

Available data suggest that economic activity in China was well below normal in the weeks following the typical Chinese New Year production downtime. One key indicator is energy use, which did not bounce back to normal after the Chinese New Year. Year-over-year power usage was down around 40% at the top six coastal power plants for the weeks reported February 14 and 21. Additionally, the percentage of employees that had returned to work remained below 50% at six of the top 32 petrochemical refining plants and below 80% at an additional 10, as reported on February 19.

Assessing the Supply Chain Impact: Electronics Manufacturing

COVID-19 has affected supply chain dynamics across industries in China. Electronics
manufacturing is a case in point. Activities related to this industry’s multiple supply chain segments may occur within China. Materials are mined in various parts of the country (for example, rare earth metals in Guangxi) and shipped to facilities that manufacture basic components (for example, chips and printed circuit boards in Hubei). The components are shipped to assembly facilities, and the assemblies may be shipped on to final assembly and testing (likely in Shanghai or Guangdong) before leaving the country through a nearby port.

Activities that occur relatively early in the supply chain, such as chip manufacturing, are largely automated, which has limited the virus’s impact on some players. For example, two major chip manufacturers operated through the Chinese New Year. However, several other chip manufacturers, including Apple’s suppliers outside of Hubei, have seen production delays or stoppages because employees have not been able to come to work. Additionally, some have experienced supply chain challenges that have impeded their ability to get raw materials and execute logistics.

Later stages of the supply chain, such as final assembly, can be labor intensive as well as sensitive to upstream supply shocks. Not surprisingly, then, companies that perform final assembly, such as Foxconn, have been dealing with labor shortages, especially because these companies often utilize migrant workers who must travel through provincial quarantine to reach factories. The impacts can be especially severe for companies that have concentrated supply bases in China or require significant production scale, such as Hewlett Packard.

The impacts extend beyond mainland China. Electronics manufacturing is highly global, leading to challenges as materials flow across regions. For example, source materials may flow in from South America or Africa, components may come from South Korea, the US, or Taiwan, and assembly may happen in Taiwan, Vietnam, or South Korea. (See Exhibit 1.) Constraints on transportation and logistics (T&L) and a lack of workers have limited material flows across Chinese borders and disrupted nearby supply chain flows. Customs clearance at some ports in mainland China was closed until February 10 and remained below capacity until the end of February, leaving a major T&L backlog. Additionally, many shippers remain understaffed.

As a result, components from China and other countries have not been able to reach factories in Southeast Asia on time. This has prompted a variety of responses, such as sourcing directly from Vietnam, switching from land to air freight to catch-up, and rerouting shipping lanes that previously included stops at Chinese factories. Components made outside of China are being rerouted around a previous stop in Hong Kong on the way to Southeast Asian destinations, because Hong Kong has been a bottleneck in recent weeks. These few illustrative examples represent just a piece of the broader situation that is playing out in this complex and globally integrated industry.

Exhibit 1: Global Supply Chains in Electronics Have Many Potential Vulnerabilities

Understanding the Effects on Your Industry

Because supply chains are globally integrated in many industries, the impacts from COVID-19 in China may exceed what many companies would expect. To understand if your industry is likely to be affected, consider two factors: 1) the extent to which your region or locale depends on exports from the impacted manufacturing areas in China and 2) the inventory available across your supply chain to buffer potential disruptions. It is important to understand not only your internal supply chain but also the supply chain of your suppliers, where often there is not as much visibility.

Taking into consideration these two factors, preliminary analyses suggest that electronics and electrical is the highest-risk sector globally, based on impacts in China (See Exhibit 2); spread of the disease to other countries and regions will likely increase the breadth and depth of industries impacted. In comparison, although the automotive industry’s low inventory
levels put it at risk, it is less dependent on China than the electronics industry. While these or more concentrated analyses on the Hubei region provide perspective on industries that are likely to be impacted by the outbreak in China, each company needs a far more granular view to determine its specific regional risk. For example, a company must understand its levels of inventory across the end-to-end supply chain, whether its manufacturing is single, dual, or multi-source, how easily it can ramp up new capacity or sources, and how dependent it is on China or other affected regions.

Potential Scenarios Going Forward

Although the future progression of COVID-19 is uncertain, potential scenarios include serious impacts on global supply chains beyond those seen thus far. As COVID-19 has spread to South Korea, Italy, and Iran, supply chain disruptions have been similar to those seen in China. Additionally, as regions recover and bring production back online, surges in demand are likely to cause capacity challenges, whisking supply chains to a new set of issues.

As the first step to prepare, companies should consider the outbreak in China prior to the global spread as a proxy for the impact of regional outbreaks around the world. China (primarily Hubei) saw plant and company closures, T&L constrained by the response to the virus, and systemic T&L linkages causing cascading impacts. Manufacturing stopped in Hubei, and there were shortages of components and products for many companies that depend on the region. There were delays in T&L through China as well as some global trade imbalances.

With this initial experience as a backdrop, companies can consider two scenarios as they plan a response going forward:

• **Scenario 1: Limited spread to other regions, containment in the near term.** Human activity impacts are limited to various regions with months of impact (such as closures and T&L disruptions). These regions experience the same conditions as initially occurred in China at the local level. Additionally, low inventories and shortages are experienced across supply chains. T&L is disrupted globally, limiting mode and channel options for companies. And volatility of supply and demand leads to planning challenges and capacity constraints.

• **Scenario 2: Global spread, containment late in 2020.** Human activity impacts are experienced across significant portions of the globe with prolonged impacts (such as closures and T&L disruptions). The multiple chokepoints identified along supply chains become extreme and difficult to avoid regardless of where companies conduct their operations. As the virus becomes a global pandemic, companies worldwide face prolonged shutdowns of their overall operations or specific factories and widespread shortage of inventories. Many companies face cash flow crises, and bankruptcies occur.

Actions to Take Immediately

Operations leaders should take action immediately to respond to COVID-19 supply chain disruptions.

• **Keep your people safe, and then plan workforce and facility availability.** Taking care of the safety and well-being of employees comes first in responding to the crisis. After worker safety is secured, companies can alter outcomes by planning where and when employees will work in order to maintain operations. Additionally, companies need to plan how to operate owned facilities, including health safety best practices to protect against the virus and how to sanitize if a local outbreak occurs.
• Establish visibility to supply risks. Rapidly map your supply chain and assess all SKUs and inputs for geographic risks. Companies should maintain this “control tower” for supply chain mapping and risk assessment as scenarios evolve.

• Mobilize a “war room” to evaluate and address supply chain vulnerabilities. Establish a “war room” staffed with the right talent and empowered with clear c-suite mandate and decision rights to respond to crisis. This team will drive required actions while monitoring the evolving risks daily. In addition, be sure the team balances a quick response with a long-term sustainable approach.

• Enact immediate stop-gap measures to preserve supply chain functionality. Stock critical inventory, connect with suppliers, and find backup suppliers for key components. Reroute transportation around affected areas. Additionally, ensure that demand is managed and optimized as supply limitations persist and historical demand patterns are altered.

Actions to Take in the Coming Weeks

While immediate action is paramount, preparation requires substantial changes to supply chain capabilities that need to be developed over the coming weeks.

• Adjust capacity and geographic sourcing in response to evolving conditions. Assessment of future demand should drive adjustments to capacity and sourcing. This includes potentially shifting geographic sourcing or sourcing from new geographies. Supplier risks need to be understood and mitigated as much as possible.

• Build up T&L flexibility. Develop contingency plans to prepare the potential shutdown of additional T&L modes or channels. Build up T&L flexibility through “last step” customization or adding additional modes.

• Plan for the short-term recovery phase in impacted regions. As areas in impacted regions recover, supply constraints shift to capacity constraints. It is important to conduct supply chain and inventory planning for the recovery phase early and lock-in T&L capacity as needed.

Actions to Take over the Longer Term

COVID-19 has brought into sharp focus the extent to which regions of the world have become tightly interdependent. As global risks evolve, companies must adjust their supply chain strategy.

• Major companies should evaluate the option of sourcing from multiple regions to mitigate risks. Redundancy is key as the risk associated with concentrating production in a single location or region may be higher than previously assumed.

• Companies should apply robust digital-twin and scenario-based modeling to assess changing operating conditions in real time and also proactively assess various disruption scenarios.

• Inventory needs to be monitored through a detailed digital supply chain mapping, including components and sources. Companies should differentiate how they hold inventory, using a multi-echelon optimization approach to prevent shortages.

• T&L risks needed to be understood. For their most important supply and distribution channels, companies should identify alternative lanes and modes, understanding the potential impacts of “black swan” events.

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The effects from COVID-19 over the coming months are tremendously uncertain. For many companies, effective supply chain management will be a key factor in determining how well they endure the challenges. The first priority must be to keep your people safe and to implement immediate supply chain stabilization measures. Then, by understanding the scenarios and taking the appropriate actions, companies can build resiliency against the short-term shocks and lay the foundation for a strong recovery.