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**COVID-19: A Black Swan Event for
the Semiconductor Industry?**

Introduction

In 2019, China accounted for over 50% of worldwide semiconductor consumption.¹ In 2020, total consumption in China is projected to be \$231 billion, with more than \$190 billion coming from foreign semiconductor manufacturers.² Disruption in China will likely have a significant impact on companies across the globe and up and down the electronics value chain.

COVID-19 is having a large impact on both people and companies. As of mid-February, millions of people are under some degree of travel restriction across China.³ In addition, critical electronics manufacturing hubs were temporarily idled to limit COVID-19's spread.⁴ This confluence of events is hitting the global supply chain, impacting both suppliers—via shortages of materials, components, and finished goods—and consumers—by creating reduced spending in China on semiconductor-dependent products (e.g., consumer electronics, automobiles).⁵

While there are different perspectives on how damaging COVID-19 will become, the fact remains COVID-19 is spreading across the globe. New cases have been reported in locations including, but not limited to, the United States of America, Canada, Europe, Africa, the Middle East, India, South Korea, Australia, and Japan.

Although the full impact of COVID-19 is still unknown, the impact across the electronics value chain, from materials to final products, will likely be far reaching—and hard hitting on those parties involved with semiconductor manufacturing. COVID-19 is highlighting the potential risks and vulnerability of today's electronics and semiconductor value chain model and challenging the semiconductor industry to consider transforming its global supply chain model. COVID-19 might become the black swan event that forces the semiconductor industry to transform its global supply chain model.

Near-term disruptions

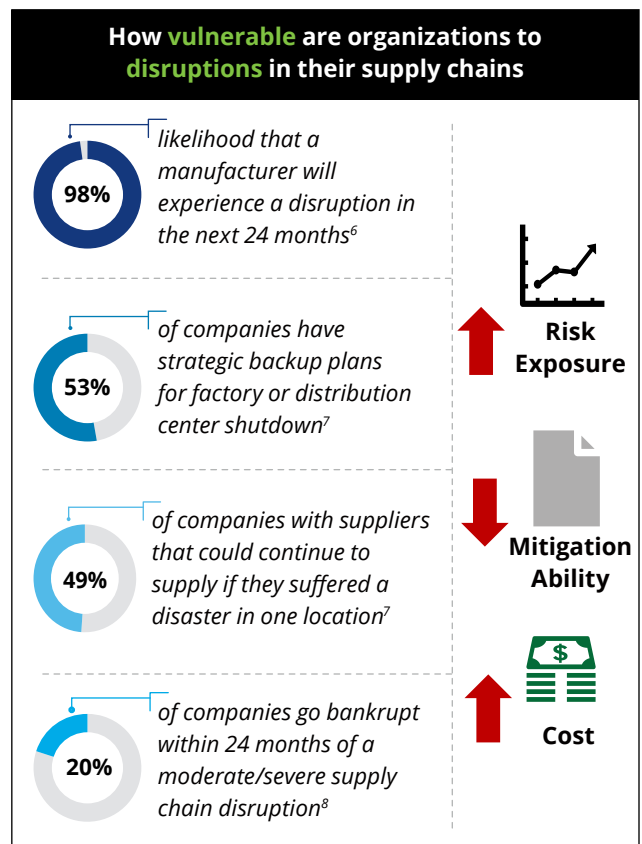
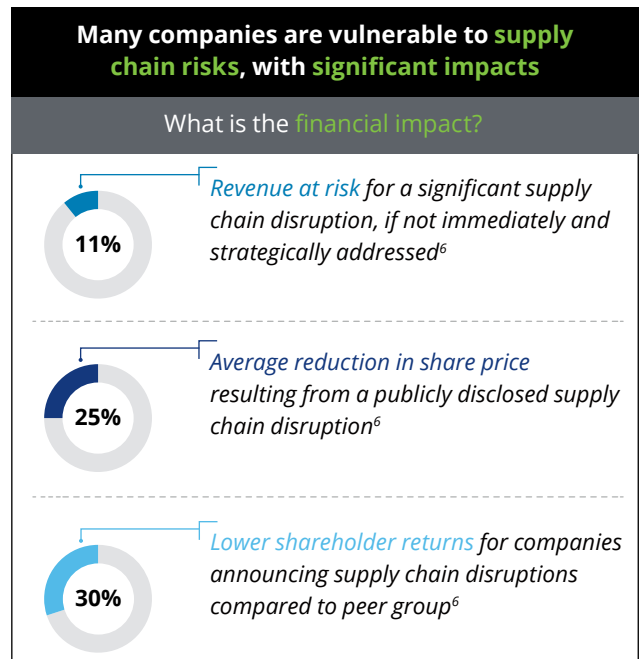
In efforts to limit the spread of COVID-19, comply with government regulations, and manage business risk, semiconductor firms should consider taking action to reduce impact to their global supply chains. These decisions can be categorized into three different types—each of which may cause near-term supply chain disruptions:

- Tactical** – Near-term steps to limit employee and company risk
- Operational** – Supply chain and manufacturing operating changes
- Managerial** – Strategic, organizational-wide decisions

These near-term actions will likely result in supply and fulfillment disruptions up and down the electronic value chain. This could create a shortage (or lack) of components, creating choke points at board and systems manufacturing as well as within logistics—meaning even if companies have components, getting them to the right place may be a challenge. These factors can negatively impact companies across the value chain that are dependent on semiconductors, and the shortage of supply and lowered demand could percolate to the raw material level.

There could also be impacts that are less immediately noticeable, such as the slowing of the velocity within the value chain (designs, decisions, etc.) due to delays in and reduced participation in customer meetings, internal meetings, and external events. This impact will likely be felt longer term as new product schedules are delayed and product go-to-market strategies are changed. The full impact won't be known until the next generation of products.

As evidenced by past disruptions across industries, any supply chain risk—including COVID-19—can cause significant negative impacts:



Managing near-term disruptions

In the near-term, semiconductor manufacturers need to implement their business continuity plans. They should try to ensure “business as usual” continues as much as possible. The unexpected appearance of COVID-19 serves as a reminder for companies to revisit and refresh all existing continuity and safety plans to help ensure every possible angle is covered.

Representative actions firms could take may include:

Type	Action
 Tactical	<ul style="list-style-type: none">• Implementing travel restrictions• Understanding risk of exposure before admitting visitors to facilities• Giving “work from home” directives• Extending time-off options• Using audio and visual tech to conduct critical meetings
 Operational	<ul style="list-style-type: none">• Shutting down or reducing plant operations• Re-planning supply and demand; updating customer commitment• Sourcing components from other countries• Finding alternate locations for order fulfillment• Revising product schedules
 Managerial	<ul style="list-style-type: none">• Establishing war rooms to monitor the situation real-time• Conducting risk reviews and assessments• Implementing and updating continuity planning• Ensuring ongoing integrated business planning, comprehending impacts on forecasts, costs, lead times, backlog commitments, hiring, and workforce management

Long-term implications

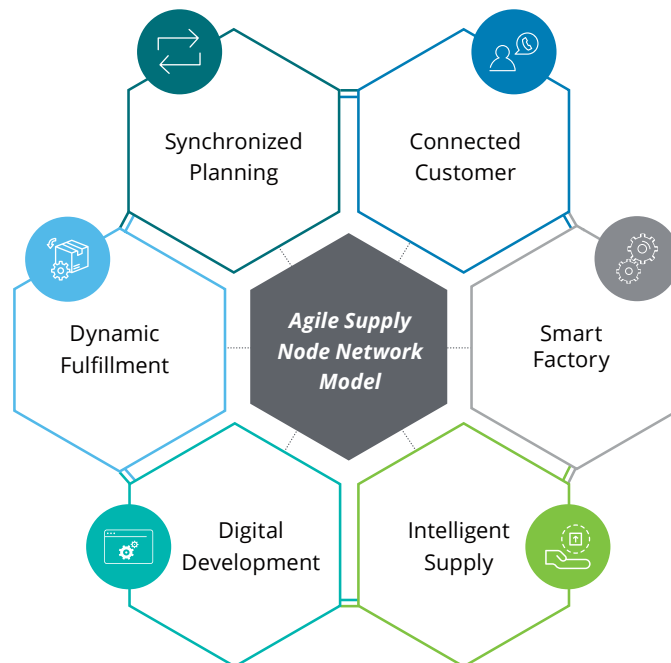
In the long-term, semiconductor companies should consider examining their supply chain strategy and operating model to address the risks of geographical concentration and lack of resiliency. Many companies have geographically concentrated manufacturing to realize the benefits of low-cost labor, favorable tax structures, and synergies with both suppliers and customers.

However, this model also introduces single points of failure into an industry that enables trillions of dollars of revenue worldwide. In the global economy, these single points of failure present significant risks that can result in far-reaching disruptions. The lessons from single points of failure have been experienced during past disruptive events.

One example is the result of the Japan earthquake and tsunami in 2011. At the time, Fukushima prefecture was responsible for 60% of critical auto parts for the global market⁹—which the earthquake and resulting tsunami changed completely. Companies began critically thinking about how to balance cost competitiveness with contingency planning (e.g., more safety stock) and Just-In-Time (JIT) manufacturing principles. As a result, global auto suppliers modified the way they use, produce, and source car parts—including increasing stocks,

standardizing parts across models, establishing alternative manufacturing capabilities, and ensuring access to backup equipment.¹⁰

Rather than relying on the geographically concentrated model, we believe semiconductor companies should consider moving to an “agile supply node network” model—which is flexible and allows for multi-pathways that help eliminate single points of failure. In this model, companies must balance cost with desired levels of continuity and sustainability. This model provides regional scale where companies spread concentrated capabilities to near-region (e.g., fabrication, A/T, tool manufacturing & support) and qualify alternate sources of supply. Sufficient capacity is stored in-country, while other connected regional nodes are also built out. To measure and monitor performance, more regional and global network-based metrics should be considered to monitor country risk, and insure overall supply network continuity, flexibility, and sustainability. Moving from country based hubs to more regional and global supply networks will require industry consortiums and collaborative approaches to invest and develop the talent pools and infrastructure that will allow new manufacturing and supply nodes to be quickly scaled up when needed.



Closing

While the full extent of COVID-19's disruption to supply chains and global growth remains to be seen, it already presents a challenge for the semiconductor industry. In the near-term, companies should focus on implementing contingency plans to manage disruptions. In the long-term, semiconductor companies should assess and consider modifying their supply chain strategy and operating models, working to mitigate single points of failure. COVID-19 serves as a reminder that global supply chains are fragile and disruptive events can come from completely unexpected sources. It also presents an opportunity to rethink and remodel today's paradigms, opening a window for semiconductor manufacturers and suppliers to collaborate to establish more agile semiconductor supply networks that can help create a more resilient future.

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