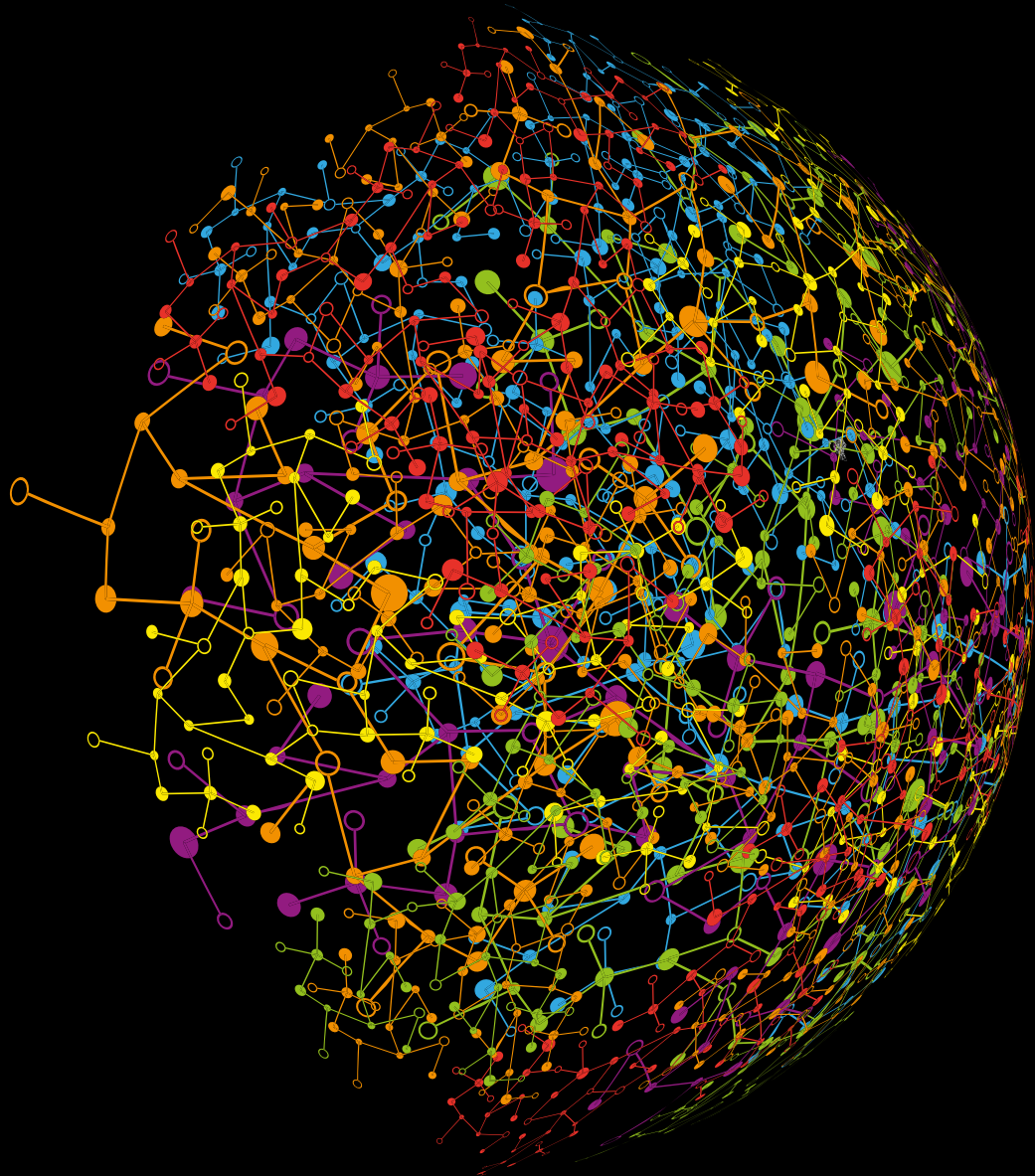
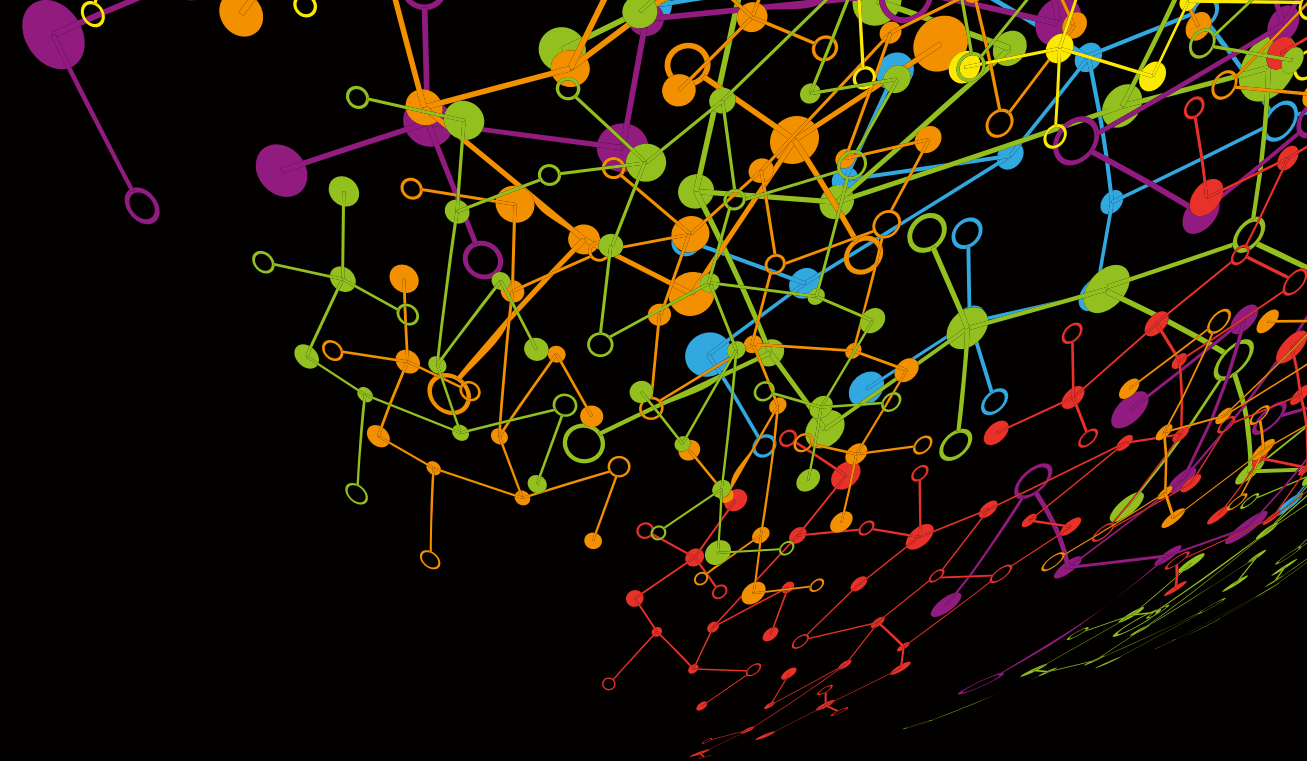


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COVID-19

Managing supply chain risk and disruption



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The black swan of 2020

Could COVID-19 be the black swan event that finally forces many companies, and entire industries, to rethink and transform their global supply chain model?

As a typical black swan event, COVID-19 took the world by complete surprise. This newly identified coronavirus was first seen in Wuhan, the capital of central China's Hubei province, on December 31, 2019. As of the end of February 2020, almost 90,000 people have been infected by the virus, leading to over 3,000 deaths.

Despite significant efforts to contain the spread of the virus, including a travel ban to and from eight cities in Hubei province, COVID-19 has already spread globally. Over 65 countries are now reporting positive cases, with a significant growing number of positive cases in South Korea, Italy, Japan, and Iran. Over 10 percent of the positive cases, and growing, are now outside China putting other communities, ecosystems, and supply chains at risk. Given the characteristics of this virus, and the global movement of people, containment is exceptionally difficult.

The full impact of COVID-19 on supply chains is still unknown, with the most optimistic forecasts predicting "normalcy" in China returning by April.¹ However, one thing is for certain—it will have global economic and financial ramifications that will be felt through global supply chains, from raw materials to finished products.

¹<https://www.reuters.com/article/us-china-health-doctor-exclusive/exclusive-coronavirus-outbreak-may-be-over-in-china-by-april-says-expert-idUSKBN2050VF>



When China, the world's factory, is impacted, global supply chains are impacted

China's role and importance to global trade has grown significantly—as a primary producer of high value products and components, as a large customer of global commodities and industrial products, and as a very attractive consumer marketplace.

Wuhan specifically is very important to many global supply chains. While it has been a traditional base for manufacturing for decades, it has also become an area of modern industrial change. Major industries include high technology (opto-electronic technology, pharmaceuticals, biology engineering, and environmental protection) and modern manufacturing (automotive, steel and iron manufacturing).

Putting that into context, over 200 of the Fortune Global 500 firms have a presence directly in Wuhan. A new Dun & Bradstreet study also estimates that 163 of the Fortune 1000 have Tier 1 suppliers (those they do direct business with) in the impacted area,² and 938 have one or more Tier 2 suppliers (which feed the first tier) in this same impacted area. Just because you don't have any direct suppliers in the

impacted areas in China, does not mean that you are safe from disruption. Visibility to only Tier 1 suppliers will likely be insufficient for most organizations looking to manage supply disruption risks. However, very few organizations can trace their supply chain beyond their Tier 1 suppliers, and advanced digital solutions are generally required to trace supply networks reliably across the multiple tiers of suppliers that are required to fully understand supply-side risk. The domino effect of plant closures and supply shortages across the extended supply network can quickly lead to significant supply chain disruption.

Even for those companies that are not directly reliant for production or suppliers in Wuhan and surrounding impacted areas, logistics within China has been affected. As the transportation hub for many industries, Wuhan is home to the largest inland port in the country, and has a well-developed infrastructure in water, land, and air traffic. Important industrial cities such as Beijing, Shanghai, Guangzhou, Chengdu, and Xi'an, are also all within 1,200 km of Wuhan.

How is COVID-19 affecting industries so far

The outbreak of COVID-19 corresponded with the timing of the Lunar New Year, China's most important holiday, when every factory in the country shuts down for between two and four weeks to allow people the opportunity to travel back home to spend time with their families. In comparison to the US Thanksgiving holiday where approximately 50 million people travel, an estimated 385 million people travel in China during the Lunar New Year period.

Companies that do significant business with China are aware of this shutdown and many placed large inventory orders in advance to ensure that they had supply to cover this period.

At the same time, the planned closure of factories enabled the government to mandate extended factory shutdowns in support of efforts to control the spread of the virus. Typically, the holiday starts January 24 with the expectation that plants are back up and running starting February 2. However, many factories were asked to remain closed for another week until February 9. Historically, most plants would have been up and running fully by mid-February, but given the extended closures and delays in getting workers back to the plants due to health quarantines and travel restrictions, production is restarting at a much slower pace. Based on local government reports, by the end of February, only 70 percent of large industry enterprises had restarted operations in a number of provinces, and at much less than full capacity. Small and medium sized companies have been hit particularly hard with only 43 percent resuming operations. Even as factories reboot, the recovery of China's highly efficient supply chains is likely to take time.

At a high level, most economists believe that there will be limited medium to longer-term economic impact on most industries, and overall growth trends will remain fundamentally unchanged.

In the short term, however, the consumer sector, which contributes the most to economic growth, will be the one that hurts the most. In the first half of this year, catering, retail, and travel services will all experience tremendous cash flow pressure due to declining sales and high fixed costs, and the shortfall in cyclical consumption will not be made up after the epidemic. Over the past month, we have seen many high profile consumer companies downgrade earnings expectations due to COVID-19 and reduced consumer demand in China.

In contrast, the impact on manufacturing so far has been relatively limited. In the short term, influence lies mainly in supply chain obstructions and difficulty in recovering production due to the delayed return of workforces, lack of personnel mobility, and traffic restrictions. The magnitude of these disruptions increases as the time to recovery lengthens. And the impact on the industry will be far more significant if the spread of the virus impacts other key industrial countries beyond China. In the long term, the manufacturing industry should get back on track.



Which companies will mitigate the impact from this event?

Some companies are better prepared than others to mitigate the impact

These companies have developed and implemented supply chain risk management and business continuity strategies. They have also diversified their supply chains from a geographic perspective to reduce the supply-side risks from any one country or region. They have multi-sourced key commodities or strategic components to reduce their reliance on any one supplier, and they had considered inventory strategy to buffer against supply chain disruption.

Some companies are better prepared than others to respond to this event

These companies have built strong relationships with key suppliers and have put systems in place to provide visibility across the extended supply network to better understand their risks and drive specific actions based on their priorities. They developed agility within their production and distribution networks to quickly reconfigure and maintain supply to global demand, and they invested in supply chain planning and control tower solutions to better sense and respond, and even predict, supply chain issues.

Other companies are scrambling

These companies are overly reliant on a single geography or a single supplier for key products. They don't have enough visibility across the extended supply network to see their risks. They don't have the systems to understand their inventory status, to project stock-outs of direct materials and optimize production, or to project stock-outs of finished goods to optimize customer allocation, and they don't have flexible logistics networks to ensure the flow of goods in a profitable manner.

Responding to the immediate challenge

While COVID-19 may be the catalyst for companies to revisit their global supply chain strategy and accelerate the adoption of Digital Supply Network models and capabilities, short-term actions need to be made to respond to the immediate challenge.



For all companies that operate or have business relationships in China and other impacted geographies



1. **Educate employees on COVID-19 symptoms and prevention.** Care of your people is the first priority. Organizations should educate their staff as well as their key suppliers about the symptoms of the virus. HR should review health records of staff who have known immunological issues to help them prepare for alternative work arrangements as they are the most at risk. If this is not possible then communication should be planned and executed.



2. **Reinforce screening protocols.** Enforce precautionary measures where possible, supported by flexible sick leave policies. While symptoms may not ultimately be related to COVID-19 (i.e., common cold or seasonal flu), companies need to err on the side of caution at this time. Lost productivity from the absence of several employees due to sick leave can be significantly less expensive than a possible downtime from closing an office site, entire plant or distribution centre because of sick employees, or from disinfecting the site.



3. **Prepare for increased absenteeism.** Absenteeism will increase as health screening protocols are enforced and employees that may be showing symptoms remain at home. Local containment policies may also contribute to absenteeism, labour shortages and interruptions. This may range from quarantines, for those that may have been exposed to COVID-19 but are not yet showing symptoms, to travel restrictions, to school closures which will impact parents of young families who don't have alternate care options.



4. **Restrict non-essential travel and promote flexible working arrangements.** Travel has been linked to a number of cases of transmission of COVID-19. Many companies have already implemented policies to restrict non-essential travel to protect their employees. Where possible, remote and flexible working arrangements should be considered, which will be more applicable for back office staff than production line or distribution centre workers.



5. **Align IT systems and support to evolving work requirements.** As companies increase remote work policies and flexible workforce arrangements, IT systems and support will need to be aligned. The sudden increase in online activity can have big implications on system stability, network robustness and data security, especially in parts of the world where telecom and systems infrastructure are not as well developed. Companies will need to act quickly to ensure they have the systems, and support staff, in place to ensure smooth operation as the workplace and workforce evolves.



- 6. Prepare succession plans for key executive positions.** As COVID-19 has spread to over 65 countries, there is increasing risk that key executives arriving in foreign locations are required to be quarantined. In the event of illness, key leadership will need to have clear leadership alternatives put into play. There should be short term and long term plans for operating the company up to at least the June time period.



- 7. Focus on cash flow.** Companies should immediately develop a treasury plan for cash management. A focus on collections and reducing aged accounts receivable should be an immediate priority. Extending payables where possible to conserve cash will be also important. A survey jointly conducted by Tsinghua University and Peking University estimates that 85 percent of SMEs will run out of cash within three months and two thirds will run out of money in two months if the crisis does not abate.³ The government will release US\$71 billion in emergency funds for low interest loans to small and mediums sized businesses. This emphasizes the importance of cash flow management for all businesses during this volatile time.

³<https://www2.deloitte.com/us/en/insights/economy/global-economic-outlook/weekly-update.html>

For companies that produce, distribute, or source from suppliers in China and other impacted geographies



- 1. Enhance focus on workforce/labor planning.** As enterprises start resuming work in various regions, they need to consider how to restart business operations amid ongoing epidemic prevention and control measures, and ensure they can return to a normal, healthy work rhythm as soon as possible. Restarting operations following the Lunar New Year has always presented some challenges as workers gradually return to the factories. However, quarantines and travel restrictions mean that the time to ramp back up to full capacity will be much longer than normal for many facilities. Not only will this require additional attention to labor planning, but also additional attention to product quality as plants run with less than a full complement of workers.



- 2. Focus on Tier 1 supplier risk.** Identify the company's key direct suppliers and understand their ability to meet supply requirements and potential risks. Work to get visibility to Tier 1 supplier inventory, production, and purchase order fulfillment status. Work with key suppliers to understand the flexibility that they have to shift production and purchase order fulfillment to other locations. Also understand how you'll be treated from an allocation perspective in the event of inventory and capacity shortages as you are not likely their only customer. Active communication and formulating alternative plans will be critical to minimizing the supply chain impact on the company.



- 3. Illuminate the extended supply network.** It will be important to get as much visibility as possible to key Tier 2 supplier status, and beyond, which will impact key Tier 1 supplier order fulfillment performance—providing maximum time to work with Tier 1 suppliers on alternative plans, and/or to proactively alter supply chain plans to keep plants running at maximum efficiency within the likely supply-side constraints. For those companies with complex supplier networks and without the systems and tools to provide extended supply chain visibility, traditional approaches to getting visibility beyond Tier 1 suppliers are likely to take too long and be insufficient to alleviate supply-side risk. Companies will need to embrace new digital approaches to illuminate the supplier network to gain visibility to critical component supply as quickly as possible.



- 4. Understand and activate alternate sources of supply.** For those companies that have multi-sourced key inputs, it is important to move quickly to activate secondary supplier relationships and secure additional critical inventory and capacity. There may be opportunities within the ecosystem including establishing shared resource pools for raw materials inventory, which is an approach that large companies in China have used in the past in times of crisis. For those companies that have significant exposure to suppliers in the impacted region of China, it will be important to identify alternative suppliers in non-impacted regions of the world. Alternative sourcing markets will vary greatly by supply chain and manufacturing expertise. However, countries like Mexico, Brazil, India, and Chile are the most likely markets as companies look to diversify geographically beyond China.



- 5. Update inventory policy and planning parameters.** For the past couple of decades companies have been implementing practices to reduce inventory across the supply chain and to statistically set safety stock to buffer normal demand and supply variability. Most companies won't have inventory buffers for the magnitude of disruption that will be caused by the COVID-19 epidemic. Safety stock parameters that were tuned to historical performance are not likely to be appropriate in the near future as demand and supply variability increases significantly. Some companies were fortunate enough to naturally inflate inventory positions in consideration of the normal Lunar New Year plant shutdowns, which may provide some additional temporary relief. Some companies have been able to quickly secure additional "strategic stock" from alternate suppliers in anticipation of key supplier disruption. All companies need to quickly consider how they will refine their inventory strategy to mitigate the risks of supply shortages—balancing a number of factors such as assessed supply base risk, cash flow, perishability, etc.



- 6. Enhance inbound materials visibility.** Expect significant declines in on-time in-full delivery performance from your key suppliers. Getting visibility to the status of your inventory at the supplier location, supplier production schedules, and supplier shipment status will help you to predict supplier shortages and respond accordingly. For very critical suppliers, working to get better visibility to their supplier performance (Tier 2 suppliers) can be very beneficial to predicting potential supply disruptions and working proactively to alleviate the impact. For the majority of companies that don't have full electronic connectivity to key direct suppliers and control towers over the inbound flow of products and materials, companies should move quickly to get access to data and build management dashboards to support visibility and decision making. Establishing "Command Centres" (aka "War Rooms") with supply chain experts empowered to make supply chain decisions to maximize supply chain performance during this period of disruption can be an effective tactic.



- 7. Prepare for plant closures.** Given the timing of the Lunar New Year and the initial outbreak of COVID-19 in Wuhan, every organization had prepared for factory closures and the government was able to mandate extended factory shutdowns in support of efforts to control the spread of the virus. So far, entire plant closures have been contained to the impacted areas in China. However, it is possible that plant closures will be mandated, either due to employee illness or broader community lockdown. Companies should have plans on how to initiate a closure and how to reroute production to other locations within your network. In some cases, innovative agile solutions will be required. As an example, several consumer goods companies in China have developed modularized production units that can be mobilized across different sites to help manage supply shortages or other issues. Similar practices have been implemented successfully in the Telecom and High Technologies industries.



- 8. Focus on production scheduling agility.** Prioritize what products you will produce in the event of raw and direct material inventory shortages, especially where a component part may be used in multiple finished goods. With expected supplier and demand disruption, be prepared to refine production schedules based on the inventory available, changing demand and what you are capable to build, while at the same time, ensuring that you do not use component parts that put your most important products at risk of stock-out. Traditional planning and scheduling processes, and frozen periods to allow efficient production execution, are unlikely to work well in this environment. For those companies that don't have the tools to support rapid re-planning and scheduling, a war room type of environment with the required supply chain experts focused on this process is a potential solution in the short term.



- 9. Evaluate alternative outbound logistics options and secure capacity.** With significant port congestion, a significant decrease in air freight capacity, and truck driver shortages, there is a significant backlog in logistics that will take some time to resolve as logistics operations gradually come back to normal. Companies need to work to secure capacity with their logistics partners. In some cases, companies are looking at alternate routes to get product out of China (e.g., Rail to the port of Rotterdam and then Ocean to North America). In some exceptional cases, companies are justifying the economics of charter flights from China into Europe (about US\$250,000 per charter).



- 10. Conduct global scenario planning.** The immediate focus and issues are clearly on China—on the businesses operating in Hubei and the other impacted provinces. However, the virus has spread to over 60 countries, risking further global impact to communities, ecosystems and supply chains. The number of cases in South Korea, a major manufacturing and supply source for many global supply chains, is now over 4,000 and growing. The number of positive cases in Italy and Japan is growing. While addressing the immediate issues in China, companies need to make sure that they understand potential risks in other regions and to determine what actions are appropriate, and when, to protect against those potential risks. Accordingly, companies should consider running business stress tests for different epidemic scenarios, which could include a mild contained outcome, a broader global epidemic, and even a global pandemic. The warning signs are already there with key supply and commercial markets in South Korea and Japan experiencing a significant growth in COVID-19 positive cases.



For companies that sell industrial products, commodities, or consumer products to China and other impacted geographies



- 1. Understand the demand impact specific to your business.** China is a very important market for many consumer products manufacturers. As containment measures were implemented, and employee safety and protection became the top priority, many retailers closed stores. Shopper traffic and consumer purchasing dropped significantly. Luxury goods producers were the first to warn about decreased sales, both in China and internationally given reduced travel by Chinese tourists. The short term impact on tourism and consumer-oriented businesses was expected, and initially viewed to be similar to the SARS epidemic of 2003. In addition to consumer demand, China is also a large industrial customer of commodities and high value components in many industries. China imports more than US\$2 trillion in goods globally. This includes over \$500 billion of electrical machinery and equipment, China's largest import category (24 percent). In some global industry supply chains, China is the dominant customer. China imports about 65 percent of the world's iron ore. As another example, China accounted for over 50 percent of the world's semiconductor consumption, over 80 percent (US\$190 billion) of which was sourced from foreign suppliers. All companies, whether focused on serving consumers in China or industrial customers in China, need to assess if this is simply a shift in demand, or lost demand, and update business plans accordingly.



- 2. Confirm short term demand-supply synchronization strategy.** The impact for some businesses that sell into China may be more felt on the demand side than the supply side. When demand falls significantly, companies must quickly determine how they will respond from a sales and operations planning perspective. Some companies may choose to keep running and build inventory, absorbing fixed costs and preparing for the rebound, while others are better off reducing production. Some companies may be able to stimulate demand or sell available output, but at a different price. Another strategy would be to make decisions with regard to the product portfolio that they will offer during this period of disruption. Whatever strategy makes sense for your business, it is important that it be properly evaluated and that there is full alignment to the strategy and plan across the organization.



- 3. Prepare for potential channel shifts.** China has seen a significant increase in online shopping demand during this epidemic for everything, including fresh food and groceries. This unexpected shift in channels has created challenges for many companies—insufficient ecommerce capacity to meet demand, insufficient inventory allocated to the online channel (while excess allocated to other channels), and a severe shortage of last-mile delivery service capacity. Consumer oriented companies should assess the implications of a potential shift of demand from traditional retail to online, and move quickly to prepare.



- 4. Evaluate alternative inbound logistics options.** Similar challenges exist bringing product into China as getting product out of China—significant port congestion, a significant decrease in air freight capacity, and truck driver shortages. Companies need to evaluate alternative routes to market and logistics options during this period of disruption.



- 5. Enhance allocated available inventory to promise capability.** With expected inventory shortages, it is important to confirm customer and product priorities, and to agree on the strategy by which inventory will be allocated in times of scarce supply. Strategies may range from “first come first serve” to “fair share” (proportional to expected volume) to “differentiated” based on strategic importance.



- 6. Open channels of communication with key customers.** Given potential shortages in inventory, communicate with key customers promptly, to explore alternate supply arrangements and find ways to minimize losses, and to avoid customer attrition due to this difficult time. As part of this effort, companies should understand their contractual commitments to their customers and potential costs, if not covered by “force majeure.”




- 7. Prepare for the rebound.** A lot of companies are feeling the pain of the supply chain disruptions caused by COVID-19. What will separate organizations that thrive post-crisis with ones who don't, will be whether or not they're prepared for the rebound. Companies that are able to move more quickly than their competitors may be able to capture a larger share of the pent up demand, solidify their relationships with their most important customers, and perhaps gain some new ones. Pricing strategy will be an important consideration as business gradually transitions back to normal—both to address normal supply-demand considerations, as well as to maintain profitability while logistics costs, and potentially other costs, will likely be volatile.



- 8. Conduct global scenario planning.** In late February, the stock markets tumbled in anticipation of the negative impact of COVID-19 on demand and corporate earnings. Most companies reporting earnings are issuing warnings or making comments on analyst calls specifically calling out the risks to the business plan attributed specifically to COVID-19. It will be important to update demand plans from a timing and volume perspective, including scenarios where the virus is not contained and other markets are impacted.

In response to COVID-19, the immediate focus for most companies needs to be on improving visibility to supply chain risk—in your own facilities, in your direct suppliers, and beyond. If you don't have visibility into the potential supply chain problems across your end-to-end supply chain then you can't adequately prevent or manage them. Getting this extended supply chain visibility will likely require a more digitized approach than many companies have used in the past. New approaches and solutions are leveraging artificial intelligence and machine learning-powered entity resolution platforms, incorporating structured and unstructured data, and using proprietary and subscription-based databases to illuminate supply networks more quickly and to a level of detail that was previously thought to be impossible.

Once the issues are visible, the solutions will come from achieving increased flexibility, collaboration, and control. The solutions to these issues are not new or particularly innovative—assuming you have the data and tools to execute. Focus and creative execution strategies will be critical when data and tools are lacking, as companies can't afford to fail in their execution, or get their response to COVID-19 supply chain risks wrong. They must move quickly and confidently.



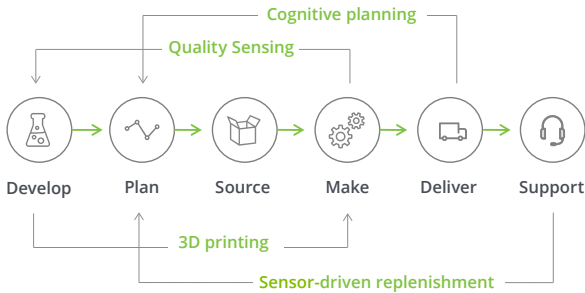
The imperative for a new supply chain model

Supply chains have become highly sophisticated and vital to the competitiveness of many companies. But their interlinked, global nature also makes them increasingly vulnerable to a range of risks, with more potential points of failure and less margin of error for absorbing delays and disruptions. A decades-long focus on supply chain optimization to minimize costs, reduce inventories, and drive up asset utilization has removed buffers and flexibility to absorb delays and disruptions. COVID-19 illustrates how many companies may not fully appreciate their vulnerability to global shocks through their supply chain relationships.

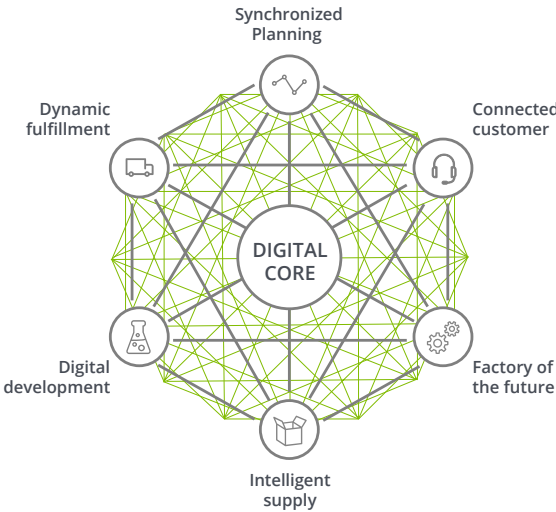
Fortunately, new supply chain technologies are emerging that can dramatically improve visibility across the end-to-end supply chain and support much more supply chain agility and resiliency, without the traditional “overhead” associated with risk management techniques.

The traditional view of a linear supply chain and optimizing for your own business is transforming into digital supply networks (DSNs) where functional silos are broken down within your organization and you are connected to your full supply network to enable end-to-end visibility, collaboration, responsiveness, agility, and optimization. Increasingly, these digital supply networks are being built and designed to anticipate disruptions and reconfigure themselves appropriately to mitigate their respective impacts.

TRADITIONAL SUPPLY CHAIN



DIGITAL SUPPLY NETWORKS



Advances in information and communications technology are making evolution to the supply chain more possible. Technologies such as IoT, cloud computing, 5G, AI, 3D printing, and robotics are all critical to enabling the digital supply network of the future. At the same time, a volatile business environment is making it all the more necessary. Whether it's a "black swan" type event like COVID-19, a trade war, an act of war or terrorism, regulatory change, labor dispute, a spike in demand for a particular product in a specific region, or supplier bankruptcy, companies are learning to count on the unexpected.

The details of how to create a digital supply network will vary from industry sector to sector and even company to company. However, the digital supply network must not only be aligned with business strategy after it is set, but be integral to its formulation. And, risk management will be an integral element of that design, as risk management and business continuity is also an integral element of overall business strategy. From a risk management perspective, the key will be to build a "resilient" supply chain that not only seeks to reduce risks but also is prepared to quickly adjust and recover from any unanticipated supply chain disruptions that occur.

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