

The Coronavirus Pandemic Disrupts Supply Chains Around the World

CASE STUDY

The COVID-19 pandemic has tested supply chains like no other event in recent history. Entire populations were isolating and quarantining, creating spikes in demand for certain products (such as hand sanitizer) and large drops in demand for others. Many businesses were shuttered for months, with small businesses, retail stores, and restaurants especially hard-hit. Large drops in demand, shortfalls in cash flow, worldwide port congestion, factory shutdowns, and disruptions to air cargo, trucking, and rail services paralyzed companies all over the world.

Customers changed their purchasing habits. Many started spending more on essentials, creating shortages across both e-commerce and brick-and-mortar retail stores. Changes in consumer spending behavior upended predictive models as customers shifted spending to new stores, channels, and product lines. At the same time, companies that didn't deal in essentials faced spending shortages, as millions of people found themselves out of work.

According to a March 11, 2020 analysis by Trading platform Forex.com, nearly 75 percent of all companies had already reported supply chain disruptions and that number was expected to rise to 80 percent. Manufacturing firms worldwide were especially affected by the shutdown of industrial activity in Wuhan, China, where the pandemic started. These firms had depended on components, materials, and finished goods made in China.

Most companies were unable to respond quickly and flexibly to supply chain disruptions caused by the order of magnitude of the coronavirus pandemic, which can only be done if the entire supply chain is visible. Most companies don't have supply chain visibility. (Supply chain visibility is the ability of parts, components, or products in transit to be tracked from the manufacturer to their final destination.) The majority of enterprises have only 20 percent visibility into their supply chains. Experts believe 70 to 80 percent visibility is required to deal with major supply chain disruptions.

The modern supply chain is incredibly fragile. Companies have built global supply chains based on outsourcing to external suppliers and incredibly thin margins of safety stock. (Safety stock is an additional quantity of an item held by a company in inventory in order to reduce the risk that the item will be out of stock.) The prevailing wisdom in supply chain management has embraced "lean" principles that try to optimize costs by minimizing safety stock, using "just in time" delivery to keep only 15–30 days of products on hand, and concentrating sourcing in a few countries. For example, over 80 percent of manufacturing facilities that produce components for drugs in the United States are located abroad, mainly in China. Many companies found it cheaper to manufacture goods in China and elsewhere in Asia, rather than do so closer to home. Auto parts, fashion, technology, medical gear, and drug components are especially vulnerable to supply chain disruptions in Asia.

To make supply chains more resilient, businesses need to eliminate their dependence on sourcing from a single supplier, region, or country. Large companies can build regional supply chains and diversify the location of their manufacturing plants and their suppliers (see the Chapter 15 Interactive Session on Management). They should also consider pulling back from inventory-optimization and safety stock calculations that optimize costs by keeping stock to a minimum and build some level of reserves to absorb shocks, even if this increases costs.

The cost of manufacturing has been one of the key justifications for moving manufacturing offshore. However, the labor cost component of manufacturing has been steadily growing smaller as new automation tools have been developed. Thirty years ago, when labor costs represented 30 to 40 percent of the cost to manufacture goods, U.S. manufacturers were tempted to move production offshore to Chinese factories replete with low-cost laborers assembling products by hand. Today, the trend is toward more automated factories, which lower the labor component and reduce profit-and-loss pressures. U.S. leadership in factory automation will

undoubtedly help bring some offshore manufacturing back home.

Switching to more digital tools for supply chain management can also be helpful. A contemporary supply chain management system increases transparency and responsiveness because all the activities in the supply chain are able to interact with one another in near real-time. There are new digital applications and platforms to help companies establish interconnected networks of what had been discrete, siloed supply chain processes and to manage their supply chains more flexibly. Gartner Inc. predicts that by 2023, at least 50 percent of global companies will be using artificial intelligence (see Chapter 11), advanced analytics, and the Internet of Things (IoT) in supply chain operations. Firms such as Procter & Gamble (P&G) are using artificial intelligence machine learning algorithms to perform demand planning for products such as Tide detergent multiple times per day. Other companies are implementing IoT technologies such as GPS and radio-frequency identification (RFID—see Chapter 7) devices to identify and track items in stores and warehouses, as well as real-time data on variables such as speed of delivery.

A word of caution: Even if a company uses digital supply chain management tools, they may need updating and fine-tuning in order to deal with major global shutdowns. The algorithms used by the supply chain management systems of large companies didn't work during the coronavirus pandemic. For example, Walmart, noted for its efficient state-of-the-art supply chain management systems (see Chapter 3), found that disruptions during the pandemic made these systems unable to accurately predict how many diapers and garden hoses it needed to keep on store shelves.

Normally Walmart's system is able to accurately analyze inventory levels, historical purchasing trends, and discounts to recommend how much of a product to order. But the worldwide disruption caused by the COVID-19 pandemic caused the software's recommendations to change more frequently.

Most retail companies base their prediction of what customers will want and how much to order on some type of model or algorithm. Their models incorporate some understanding of how shocks like natural disasters disrupt supply chains and impact demand, using historical data to predict future

trends. Under normal conditions, these algorithms work fairly well. But global pandemics are something new that the models don't know how to take into account. Disasters like floods or hurricanes tend to be regional, but the COVID-19 pandemic disrupted the entire world. Production, transportation, and people's behavior changed dramatically during the pandemic. Because of these massive worldwide disruptions, the normal data feeding the models, including historical buying patterns, aren't as relevant.

The models in supply chain management software can still be used, but the data need to be changed. The people who manage supply chains will need to be more active in interpreting the projections rather than assuming the models will be able to capture everything that is going on. For example, Alloy, a consumer goods analytics company, has worked with a company that saw sales for its product rise 40 percent at a major retailer in March 2020 as the pandemic started to surge in the U.S. The retailer placed a very large order for April to handle the spike in sales, but Alloy's analysts knew that demand for the product had plummeted, and that the retailer wouldn't be able to sell everything it had ordered. Alloy told the retailer not to purchase so much of the product.

Technology for strengthening supply chains, in the form of innovations such as analytics, artificial intelligence, and machine learning alone won't shore up vulnerabilities and inefficiencies. Companies must rethink their strategies and redesign supply chains so that they're able to source product from multiple locations, depending on where a disruption occurs. One key lies in supply-chain mapping, without which companies can't devise workable recovery plans.

The small number of companies that had mapped their supply networks prior to the pandemic were better prepared to deal with disruptions. These companies were able to determine exactly which suppliers, sites, products, and parts were at risk, which could help them arrive at a solution more quickly. A company might assume that its biggest vulnerability lies with a primary supplier. A detailed breakdown of its supply chain could show instead that the highest risk comes from a small lower-tier supplier of a critical component that costs 10 cents.

However, supply network mapping is time-consuming and expensive, and most companies have not done so. (After the 2011 earthquake and tsunami, it took a team of 100 people at a Japanese semiconductor manufacturer over a year to map the company's supply networks into sub-tiers.) Instead, firms rely on human-supplied (and often anecdotal) information from their top-tier and a few lower-tier suppliers.

Sources: Nicole Wetsman, "The Algorithms Big Companies Use to Manage Their Supply Chains Don't Work During Pandemics," *The Verge*, April 27, 2020; Sundar Kamakshisundaram, "The Coronavirus Is Shattering Traditional Supply Chains," *Supply Chain Brain*, March 25, 2020; Fred Schmalz, "The Coronavirus Outbreak Is Disrupting Supply Chains Around the World—Here's How Companies Can Adjust and Prosper," *Kellogg Insights*, March 26, 2020; Lizzie O'Leary, "The Modern Supply Chain Is Snapping," *The Atlantic*, March 19, 2020; David Parker, "In 2020, Supply-Chain Disruption Is No Longer Optional," *Supply Chain Brain*,

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CASE STUDY QUESTIONS

- 9-13** Define the problem described in this case study. What management, organization, and technology factors contributed to this problem?
- 9-14** To what extent can information technology solve this problem? Explain your answer.
- 9-15** What management, organization, and technology issues should be addressed to redesign supply chains to deal with major disruptions such as the coronavirus pandemic?

Chapter 9 References

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