How a perfect storm of factors led to 'the mother of all supply chain disruptions'

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Marshall Fisher, the UPS professor of operations, information, and decisions in the Wharton School, describes this fall's supply chain crisis as "the mother of all supply chain disruptions." But he also emphasizes one particular point that sometimes gets lost in the narrative: These disruptions are typical.

"COVID is not the first disaster to disrupt supply chains," Fisher says.

The Kobe earthquakes in Japan in 1995, the Great Recession in 2008, and the earthquake and tsunami in Japan in 2011 are just some examples. Not to mention small disruptions that happen routinely, spanning factory fires to labor strikes.

Still, what is atypical of the crisis that's led headlines for months is the scope of the crisis and the uncertainty surrounding it. This uncertainty is exacerbated by the globalized nature of today's world economy—almost endlessly expanding the number of difficult-to-predict events—and a pandemic that refuses to heel.

How the supply chain went haywire

The global supply chain problems, at-large, are not easy to summarize; no single variable explains the crisis on its own.

The seeds of the crisis were planted at the onset of the COVID-19 pandemic, when consumer demand shifted and myriad factory and labor issues surfaced overseas, especially in China, where factories were closed by outbreaks. Add to that port congestion, a seeming labor shortage of truck drivers, and unanticipated shortages of raw materials—ranging from those that produce computer chips to packing materials like foam. It's this confluence of events that ultimately maneuvered a burning spotlight on just how complicated the modern supply chain can be.

Put simply: "Supply chains are long," says Senthil Veeraraghavan, the Panasonic Professor of Manufacturing and Logistics and a professor of operations, information and decisions at Wharton. "Order decisions are made six months in advance," he says, and they're not always the right decisions.

For starters, companies have, in the past 30 years, expanded the steps of the supply chain by moving suppliers overseas. Veeraraghavan says American companies have become overly reliant on ships and trucking—areas that also rely on low-wage labor and, thusly, are volatile.

Therefore, companies need to do a lot more guesswork in their calculations for inventory.

"All these things you're seeing—too many containers waiting at the port, commodities like paper running out of stock, chips running a shortage, groceries having a shortage, gas price going up—all these inventory decisions are made several months ahead of time," he explains. "If you have an item come in in November, that order was placed last winter. And last winter, there was a ton of pandemic restructuring happening where companies didn't see demand, they backed down, ordered less, and anticipated [the pandemic] lasting a while."

These companies, he says, are now the ones paying the price.

Companies like Walmart, Veeraraghavan says, have fared well, in part, because they planned ahead and refrained from cutting warehouse staff and didn't put off orders. Companies that didn't, however, are facing a mismatch of the anticipated demand and the supply available.

"When you need a high demand met, planning needs to be nine months ahead," he says. "So, it's hard to predict ahead if demand will be high or low."

Especially with a pandemic in play.

COVID, the supply chain, and a labor shake-up

COVID-19 remains the outsized variable in the supply-chain-crisis equation.

Part of this problem is the impact it's had on the labor market. After COVID-19 surfaced, workers began reevaluating what jobs they wanted to do, and companies have essentially been asleep at the wheel while these shifts have happened—failing, Veeraraghavan says, to monitor a long supply chain that requires coordination.

"One of the biggest problems exacerbating [the crisis] in the U.S. is companies turn a blind eye and say, "Hey, we put in the order, and it will show up in the warehouse," and that's it," he says. "Because we proceeded this way, there's also not enough skill available to look in the supply chains [for monitoring of problems]."

As for the popular notion that a truck driver shortage in particular is responsible for bottlenecks at U.S. ports, Steve Viscelli, a lecturer in the Department of Sociology in the School of Arts & Sciences who studies the trucking industry, says that's simply not the case.

"The actual shortage of drivers is not a problem," Viscelli says. "We have two or three times the number of people who have the appropriate licenses, and many of them, the majority of them, have left the industry because the jobs are so bad."

These are primarily vulnerable immigrant drivers who are misclassified as contractors. With the backlog of goods in ports, they're often made to wait for long hours just to pick up a container, and because they are not paid hourly, this does not incentivize the efficient use of their time.

"This long-term problem of inefficient use of driver time has been magnified in consequence as the entire system has been thrown out of balance," he adds. "Hopefully, by revealing the importance of this problem to supply chain efficiency, this crisis will also create the opportunity for policy responses that improve labor conditions at the ports."

The executive order by President Biden in early November to keep the Los Angeles port open 24/7, meanwhile, has proven useful, but Viscelli notes that it's only helpful to the extent that all parties are operating 24 hours per day, and not just some.

Ioana Marinescu, an associate professor of economics in the School of Social Policy & Practice who studies the labor market, describes the volatility of the labor market as contributing to the supply chain crisis. In September alone, 4.4 million people quit their jobs, primarily in low-pay positions that required in-person work. This, combined with the unusual speed in which world economies have recovered from the pandemic, has added to the uncertainty, she says.

"Right now, we're in a phase of adjustment where there are a lot of open jobs and companies haven't fully adjusted by offering better pay and working conditions," Marinescu says. "Workers are, understandably, shopping around. Quits are at a record high; people are looking for a better job with better working conditions and pay—those two go together. So, therefore, from the labor market perspective, there's a lot more power to the workers because of this supply-demand circumstance, and that can mean it's hard to keep things moving relative to demand."

Employers, in the meantime, are uncertain about how much to raise wages, drawing out the labor shortage.

"Because things are moving so fast compared to past experiences, employers are not sure whether to raise wages, and they don't want to raise too much, so it's a learning-by-doing situation, and from the worker perspective as well," she explains. "But eventually, it will smooth out."

Political reframing of the supply chain

Regina Abrami, the Chang Sun Term Professor and director of the Global Program for the Lauder Institute, says the COVID-era global supply shortage heightened awareness of the strategic risks associated with the globalization of supply chains, or, as she explains, "everything ranging from semiconductor chips to critical mineral inputs like rare earths, cobalt, or lithium are getting extreme attention." The initial resonant examples were masks and pharmaceuticals.

"Today, when the world shuts down, it profoundly affects what a country can manufacture, as we now see in the auto sector," Abrami says.

What's new as a result of the recent crisis, she says, is that a wider range of goods, and not just dual use or military-related goods, are being viewed as a matter of national security. It spurred President Biden to host a "Global Supply Chain Resilience" multinational summit in October that included 14 other "like-minded" countries, according to the White House. What's come from that, Abrami says, is a new approach that is a multistakeholder dialog about supply chains, ranging from academics to the private sector, local governments to those abroad. This also, potentially, moves the conversation into a more political realm—and certainly as it's discussed through the lens of inflation.

In turn, from a global perspective, Abrami says businesses are being compelled to strike a balance between doing business in China and hedging to build resistance in their supply chain. Some of this is already happening, with recent announcements of multi-billion-dollar semiconductor manufacturing facilities in Texas and Arizona. Japan, too, subsidized the opening of a new semiconductor facility, with Sony partnering with the Taiwan Semiconductor Manufacturing Co. to open the plant in 2024.

"What I think you will see is a domestic supply chain for critical inputs, and certainly for those related to national security where possible, and to lessen a repeat of the early days of COVID-19," Abrami says. In addition, more goods will be reclassified as "dual use" and thus no longer eligible for export.

Politically, the supply chain crisis also opened several new lines of dialog about the possibility of decoupling from China, a bifurcated supply chain as a means to respond to a crisis, and the fact that governments can shape markets by suddenly prohibiting certain exports, as happened during the early days of the pandemic. Both business and government may need to be prepared for this possibility of market shifts.

"It's a geopolitical topic no matter how you cut it," Abrami says.

What's next

While the stress at U.S. ports seems to be easing, there are long-term considerations necessary to prevent the problem from happening again.

One suggestion, says Veeraraghavan, is to reconsider how popular products are assembled in the late-stage portion of manufacturing. He calls it a strategy of modular "mix and match" that allows businesses to be more responsive to consumers and make decisions closer to when the estimation of demand is clearer. In theory, design of products like a T-shirt could be altered so that they're shipped overseas but then dyed locally.

He's also an advocate of companies investing in more local production facilities, which Fisher echoes. Fisher refers to this strategy in his Global Supply Chain Management classes as "dual sourcing."

"Ideally, you might even have quadruple sourcing," he says.

The idea is to reduce financial risk by having a backup supplier that may not be as efficient, but prevents disaster in case a supplier goes bankrupt. As an example, Fisher cited one company he consulted with that, during the height of the pandemic, had a supplier in Shanghai and an alternative in Mexico. When factories were closed in China, the company was able to source from the supplier in Mexico, and then when the pandemic heavily struck Mexico, it was able to revert to its supplier in Shanghai.

"It doesn't take much to go wrong if you have lots of different things, each made in one factory," Fisher says. "Dual sourcing is risk management. But it is expensive."

He also advises increasing inventory buffers and, overall, views the current shortage as a shift in demand that is beginning to stabilize.

"People are eating in restaurants ... and all the demand dislocations are subsiding," Fisher says. "Demand consumption is going back to something more normal."

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