

“The global economy’s whiplash effect, the supply chain has collapsed”

[WEEKLY BIZ] [Cover Story] Global Supply Chain Scholar, MIT Professor Yossi Sheffi

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“The biggest factor that sustains the global supply chain (GVC) crisis is government and central bank intervention.”

This is the answer given in a written interview with WEEKLY BIZ by MIT (Massachusetts Institute of Technology) Professor **Yoshi** Sheffi, one of the world's leading scholars in the field of supply chain management . Regarding the protracted cause of the global supply chain crisis triggered by the novel coronavirus pandemic, Professor Sheffey said, “The Federal Reserve (the central bank of the United States) can solve trillions of dollars right away with a single signature, but parts or finished products can cost thousands of miles. It's on the other side of the planet,” he pointed out. This means that rapid liquidity and rising consumer demand are exacerbating supply chain bottlenecks.

In fact, according to Mastercard's [Spending Pulse report](#) released on the 26th of last month, during the last two months (November 1 to December 24), the special year-end period in the United States, online and offline retail sales increased by 8.5% compared to the same period of the previous year. . It is the highest figure in 17 years and is 10.7% higher than the same period in 2019, just before the pandemic. "Industry and logistics organizations are forced to face harsh laws of physics to extract, process, assemble and transport billions of tons of materials," he said. did.



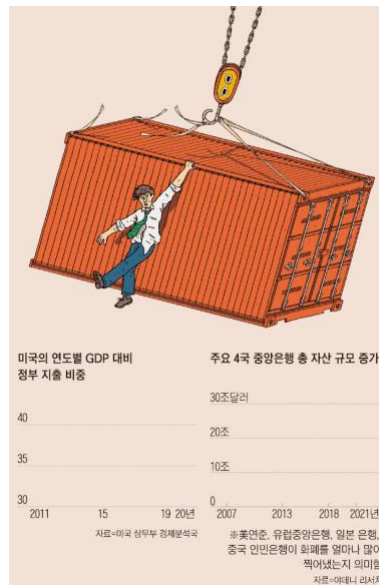
The unresolved supply chain problem is raising the prices of various raw materials and logistics to all-time highs, fueling concerns about stagflation, the biggest enemy of the capitalist system. [The Shanghai Container Freight Index \(SCFI\)](#) alone, which is an index of container freight rates on major routes around the world, is 5046 as of the 31st of last month, nearly five times higher than in early January of last year, just before the pandemic, and is breaking new records every day. WEEKLY BIZ visited Professor Sheffey to inquire about the specific cause, solution, and future prospects of the global supply chain problem that is crippling the global economy.

Prof. Sheffey, who serves as both the head of the Engineering Systems Department and the Director of the Center for Transportation and Logistics Research (CTL) at MIT, is a scholar who has been studying supply chain management for over 40 years. He has been leading the global supply chain research network by establishing logistics research centers in Spain, Colombia, Malaysia, Luxembourg, and China.)' was published and received a lot of attention.

◇ Economic stimulus package with a whip effect

How long will the supply chain crisis last?

“The spread of the Omicron mutant virus may change the situation, but looking at the current situation, I think the worst crisis will be over by the middle of this year. After the end of the year, there will be less demand and less pressure on the flow of goods. The problem is the policy of the US government. If the \$1.8 trillion new social infrastructure investment bill (American Family's Plan) is passed, things will get worse and it will take longer for global supply chains to recover.”



How does the stimulus package cause supply chain problems?

“Governments around the world, led by the United States, responded to the pandemic with massive stimulus funds, unemployment benefits and payroll protection, while central banks provided liquidity through quantitative easing and low interest rates. While these measures provided support for struggling households, many other households (not in need of help) at the same time enjoyed doubling the bonus of reduced spending and increased incomes. Personal savings rates have quadrupled in the United States, and consumers worldwide have oversaved about \$5.4 trillion (in the year following the pandemic). This accumulated money led to a sharp increase in

consumption this year. This imbalance between supply and demand is amplified as you move up the supply chain. It's called the 'bullwhip effect'."

The whip effect mentioned by Prof. Sheffey means that just as a small force applied to the handle of a whip turns into a big shock at the tip of the whip, as demand changes along the supply chain, it expands or contracts too much, paralyzing the entire supply chain. For example, a retailer that sells 100 toilet papers a day and holds a four-day supply (400 pieces) will place an additional order of 600 to maintain a four-day supply (800 pieces) when the daily sales volume increases to 200. In this case, the number of orders that were only 100 for the retailer suddenly jumped to 600. This process is amplified as it goes upstream in the supply chain, including not only distributors, but also manufacturers, tier 1 and tertiary suppliers, and raw material companies behind them, and eventually reaches a level that the supply chain cannot handle.



◇ Stockpiling is not a countermeasure

Some point out that the just-in-time (JIT) method in which companies do not stock up and replenish according to sales volume is the background of the supply chain crisis. JIT is a production operation management technique originally developed by Toyota of Japan in the 1950s. Thanks to its advantages of reducing inventory costs and maintaining product quality, it innovates production and is used not only in automobiles but also in various industries around the world such as fashion, food, processing and pharmaceuticals has been propagated. However, as the supply chain crisis emerged after the coronavirus pandemic, foreign media such as [The New York Times](#) argued that “excessive reliance on JIT that minimizes inventories combined with the pandemic has fueled supply chain turmoil,” arguing that companies should increase their inventory holdings.

-Some have pointed out that JIT has fueled the supply chain crisis.

“This is an incorrect claim. Giving up JIT will not help solve current supply chain problems. In a situation where we are faced with a continuous shortage of parts worldwide, such as a pandemic, maintaining additional inventory cannot prevent production issues. It just delays the moment of a greater supply shortage.”

Professor Sheffey cited Toyota as an example, saying that even if a company increases its inventory holdings, it is only a workaround in a pandemic situation.

“In fact, many companies are building some safety stock to counter short-term volatility while maintaining JIT. The same goes for Toyota. After the 2011 Fukushima disaster, Toyota reviewed supply chain vulnerabilities and secured a large safety stock of semiconductor chips to respond to short-term volatility. As a result, Toyota returned to near-maximum production levels in the first half of 2021, while most automakers cut production or shut down factories. In the second quarter of this year, for the first time ever, it surpassed General Motors (GM) in the US to become the number one sold car in the US. But what about next? In September, we ended up having to cut 40% of our total production due to the continued shortage of semiconductors .”

Prof. Sheffey said that maintaining the JIT method could be more effective in responding to supply chain crises. “JIT is a system that responds immediately to changes in demand, so it fosters close relationships between suppliers, manufacturers, and customers, and promotes continuous communication,” he said. did.

◇A flexible corporate culture is a solution to supply shortages

-Then, how should companies respond to supply chain crises?

“I think the most important countermeasure is a 'flexible corporate culture'. A flexible enterprise has several distinct characteristics. 'The norm to speak the truth freely' 'Enable the people closest to the problem to make decisions when there is no time for a hierarchical approval process' 'Respect expertise rather than rank when work is paralyzed' Information moves quickly when team members can tell the truth to power (higher levels). Centralization of information helps organizations detect problems as quickly as possible and make decisions quickly. For example, global fashion company **Zara empowers** line operators or regional supervisors to quickly take corrective action when problems arise, without the approval of senior management. When decisions are made at the level closely related to the problem, mitigation measures can be taken quickly to prevent a small crisis from turning into a big problem. To do that, we need a culture that doesn't punish those who make mistakes.”

-How do you evaluate the response of Korean companies to the pandemic?

“I have never worked with a Korean company, so it is difficult to give many answers, but **Korean Air** focused on the cargo transportation business faster than anyone else when travel was blocked, and was the only airline in the world to make a profit in 2020. It is cited as a representative example of overcoming crises by flexibly moving and responding.”

At the same time, Professor Sheffey emphasized that it is difficult to predict when, where, and what kind of problems the coronavirus will cause like a 'mole game', so it is necessary to have tools that can quickly identify information that is occurring locally in the supply chain. The 'tiger team' and 'supply chain mapping' are representative means. Tiger Team is a small organization operated by leading companies such as **Flex** (the world's third-

largest electronics subcontractor) and **Johnson & Johnson** . do By contacting government officials and tracking local media and social media posts, they collect and support primary information and take proactive measures. Thanks to the performance of the Tiger Team, Flex had already detected signs of a pandemic before the 2020 Chinese New Year (February 1-2), and was able to immediately stockpile personal protective equipment (PPE) that could be used by 60,000 employees in China. .

Another countermeasure, supply chain mapping, starts from the realization that many companies do not even know where their suppliers' facilities are. It is said that it is impossible to quickly respond to supply chain problems if you know only the office or delivery department, but do not know which regional factory the delivered parts are produced in. Even if it takes time, Professor Sheffey said that by finding and mapping the location data of suppliers as much as possible, as soon as one supplier is paralyzed, the company will know which products will be in short supply, which customers will be affected, and how much profit will be affected. He said he could figure it out quickly.

Prof. Sheffey cites Resilinc, which was founded by his MIT student, **Bindiya Bakil**, as an example. The company maps enterprise customers' supply chains and then uses artificial intelligence (AI) analysis to identify problematic regions and suppliers in advance. "Regilink AI has already detected an unknown pneumonia in Wuhan, China at the end of 2019 and issued an alert to customers on January 4, 2020," said Professor Sheffey. "We were able to see if there were vendors and what parts they were making and how much of an impact it would have on them."

◇ 'China+1' strategy rather than reshoring

-I'm curious about the outlook after the pandemic. How do you view the prospect of accelerating protectionism and reshoring (return of production bases to their home countries) in the aftermath of the US-China conflict and the pandemic?

"Such a situation is not easy to predict because it is driven by political forces, not economics. However, from an economic point of view, free trade and globalization are of great benefit to society. A tariff is a tax on a citizen (in terms of consumption) because it calls for a retaliatory tariff on the other side. And reshoring by many companies actually drives them further away from consumers. China, which has been investing in facilities for decades, is

now too important a market to lose. **For example, Ralph Boucher, director of supply chain at BASF**, a global chemical company in Germany, says, 'If we make in China, it's for China or Asia, so we'll make it in China'. Companies that have already optimized their global presence portfolio are more likely not to engage in reshoring. Several companies refer to the 'China+1' strategy as their next-generation capital investment plan. We are looking at neighboring Asian countries to spread the risk, leaving the Chinese supply chain aside."

-If another pandemic occurs in the future, will the global economy be able to respond differently than it does now?

"It will not be. As history shows, people, businesses and governments all tend to forget bad things very quickly. And the next crisis may not be a pandemic. A malicious cyberattack may paralyze the Internet, credit cards, and Zoom (video conferencing platform) and stop working. In that case, offline stores will become more important than e-commerce, and we will have to respond in the opposite direction to what we did during the pandemic. That's why corporate flexibility is so important."

☛ **Bullwhip effect**

Just as a small force applied to the handle of a whip turns into a big shock at the tip of the whip, end-consumer demand expands or contracts excessively as it moves up the supply chain, including retailers, distributors, manufacturers, and suppliers. When demand volatility is extreme, it paralyzes the supply chain.

☛ **Keyword: JIT (Just in time, just-in-time supply and production)**

A production operation management technique developed by Toyota in the 1950s, it is a method of producing and supplying only what is needed at the right time to meet demand without accumulating inventory. It has spread to many industries around the world because it can reduce inventory costs and maintain quality.