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WEBINAR SUMMARY

Global Supply Chains in a Post-Pandemic World

Featuring Willy Shih

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Global Supply Chains in a Post-Pandemic World

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Overview

Supply chain issues have never been more prominent than in 2020 and 2021. The shocks of the past year—trade wars, COVID-19's effects on supply and demand, and the subsequent logistics chaos resulting from the rapid return to trade—have exposed vulnerabilities in firms' production strategies and supply chains.

The challenge that companies now face is to make their global supply chains more resilient without weakening their competitiveness. Forward-leaning firms will use these crises to build greater flexibility by adopting process innovations and new technologies such as robotics and automation.

Context

Willy Shih shared insights into how global supply chains came to be the way they are and how their vulnerability has been revealed through numerous crises. He discussed tradeoffs and opportunities for firms seeking to make supply chains more robust to withstand future challenges.

Key Takeaways

Established global production systems are the results of trade expansion and ultra-specialization.

The foundation of global production systems is the expansion of the tradable sector. This expansion was enabled by advances in communications and transportation technology, labor arbitrage, and other factors in a largely benign trading environment.

As supply chains evolved, they became global, specialized, multi-tiered, and fragile. Supply chains have achieved maximum efficiency by applying the principles of lean manufacturing. As this has occurred, historically vertically integrated firms have become increasingly "dis-integrated." They have outsourced parts of their supply chain rather than maintain all expertise internally and have relied on more external specialization.

Accelerating over the past two decades, elements have been offshored and fragmented into smaller and smaller pieces. For example, 30 years ago a laptop would be completely manufactured by one company. Today, a laptop is the result of numerous sub-assemblies, each of which relies on a network of specialized suppliers.

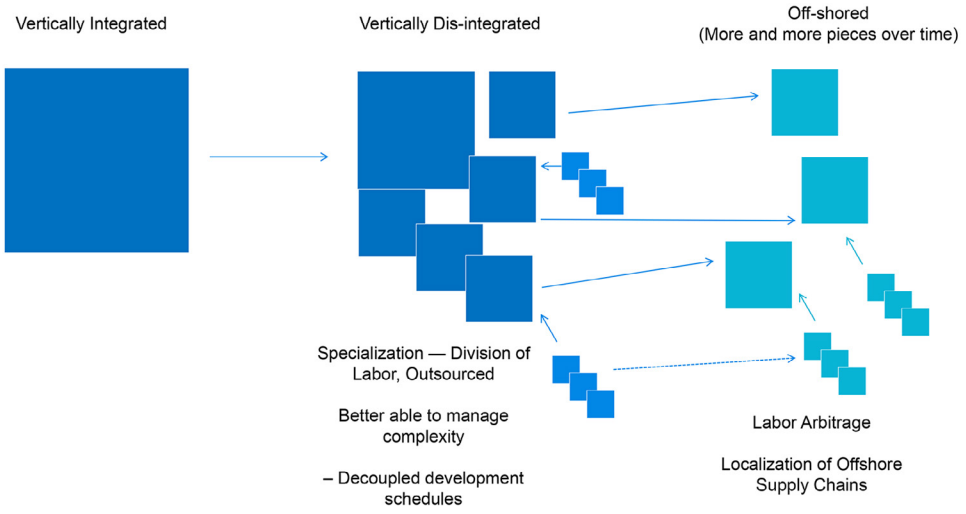

FIGURE 1: EVOLUTION FROM VERTICALLY INTEGRATED TO DIS-INTEGRATED AND OFF-SHORED

In this dis-integration and off-shoring, China plays a key role. China was previously a place for labor-intensive manual assembly of parts sourced from all over the world. Today, local supply chains are a mainstay in China, as many components are now made there.

Numerous sophisticated products are produced through global supply chains, requiring multiple trans-Pacific journeys. The process is part of a sequential production system that is dependent on reliable logistics.

A result is that today's supply chains are marked by "deep tiering" and limited visibility.

Deep tiering is the system by which each manufacturer relies on suppliers who in turn rely on more tiers of supplier networks, leading to complex interdependencies.

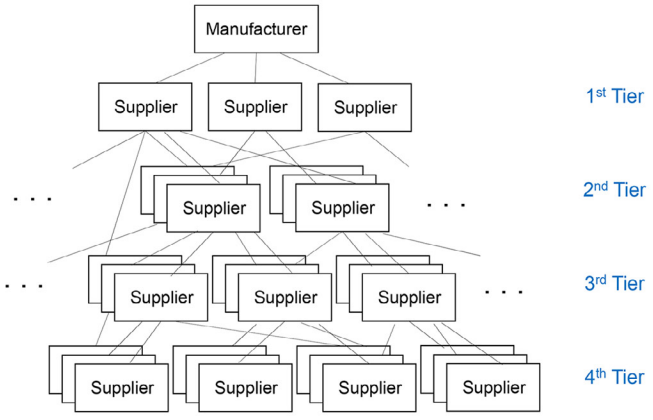

FIGURE 2: DEEP TIERING

Each product, from shampoo to pharmaceuticals, may involve ingredients passing through numerous countries from origin to mixing to manufacture. The final manufacturer typically lacks knowledge of suppliers further downstream beyond tier one or two. Limited visibility of the entire supply chain presents a barrier to building resilience.

> "The consequences of this tiering are very limited supply chain visibility . . . it's hard to figure out all the people in that work."
> —Willy Shih

Global supply chains have been destabilized by a series of shocks over the past 12 months.

The volatility of the past year exposed vulnerabilities in the global supply chain.

- **Enthusiasm for free trade has waned.** Several years of increasing momentum around freer trade was reversed by an escalation of the US-China trade war.
- **COVID-19 led to twin shocks, first on supply and then on demand.** In February 2020, the supply shock rippled through the network of suppliers, starting in China. This was followed by a demand shock as Western economies shut down. With a huge decline in global trade, shipping networks found insufficient demand to even sail cargo ships.

By mid-2020, amidst this drop in trade, organizations such as McKinsey were forecasting declining trade for the year.

The rapid increase in trade at the end of 2020 presents severe logistics challenges to fragile supply chains.

After concluding that trade would fall for the year, a rapid economic uptick in the second half of 2020 led to a surge in trans-Pacific trade, marked by the highest spot rates ever recorded for eastbound trans-Pacific container freight and dramatic increases in logistics costs.

These disruptions cut across sectors. Ford and other automakers were forced to cut output due to parts shortages and US agricultural exports have been impacted, resulting in empty cargo carriers being sent back to China to meet the surge there rather than sending them to the US Midwest to take on agriculture.

> "These kinds of equipment shortages are a reflection of a delicately balanced system, where everything was optimized. That has been suddenly thrown out of whack."
> —Willy Shih

The results of this year-long disruption is a focus on supply chain resilience.

Confronting the fragility of global supply chains requires diversifying sourcing and reducing exposure to geopolitical risk. However, these changes present economic and political pressures of their own. While firms may seek to move from a just-in-time to a just-in-case mindset, there remains little tolerance of higher pricing. Moreover, economic principles persist, so diversifying supply sources risks losing economies of scale and the efficiencies that have been developed over time. Unpriced risks of disruption, such as maintaining greater inventory, must be paid for.

The trend of supply diversification that predated the pandemic has accelerated. Certain labor-intensive goods such as textiles and shoes are growing rapidly in emerging markets like Vietnam, Thailand, and Indonesia. But there are costs to these moves. China made significant investments in its export infrastructure while other countries, such as Indonesia and Vietnam, lag in infrastructure. Moreover, China's rapid recovery from the pandemic has led some business that had left China to return. The result is that certain products such as furniture, bedding, toys, footwear, and apparel lend more readily to shifting sourcing. This supply diversification will be led by lower value-added goods with less dependency on specialized expertise or component supply networks.

Ensuring continuity of supply presents other challenges. For example, in the United States where production capacity is sized for efficient utilization of factories, how can a stable domestic source of N95 masks be maintained? If a crisis creates a 20x surge in demand, how can that capacity be justified outside of the crisis? The economics do not support running a factory at 5% load.

The shock of this year and need for supply continuity offer opportunities for innovation, simplification, and distribution.

Crises historically represent a chance to reinvent ways of working. The current situation similarly offers an opportunity for process innovation as existing processes become "unfrozen." Forward-looking firms will lean into this. But leaders are often hesitant and are rarely the first to adopt newer production technologies, as they are faced with sunk costs—giving an opening to smaller competitors.

However, times of upheaval shift the calculus, especially with lower capital cost or lower minimum efficient scale. The multiple crises—trade wars, the pandemic, and dislocation—make newer technologies and regionalization more attractive. Examples of important technologies include:

- **Continuous flow chemistry.** This is an opportunity for pharma APIs that are under pressure to move toward more regionalized, distributed manufacturing and be less dependent on China.
- **Robotics and automation.** Investment in these technologies could build resilience by reducing labor costs and mitigating exposure to labor shortages, especially collaborative automation focused on simple processes like packaging and palletizing.

Also, reducing the number of SKUs in consumer goods presents an opportunity to simplify and strengthen the supply chain. Forecasting has been made vastly more difficult by the explosion in offerings, and supply chain capacity planning has relied on outdated methods. Reducing SKUs simplifies and reduces variability in forecasting.

Supply chain scrutiny this year has been accompanied by a sea change in distribution, accelerating existing distribution changes already underway due to e-commerce. New blended picking and fulfillment strategies have grown, such as omni channel and direct to consumer, requiring back-end changes to fulfill this demand. Seeking to build resilience in the supply chain has led to new distribution patterns and smaller footprint distribution centers to speed up local or direct-to-consumer distribution. Similar efforts involve disintermediating some middle distribution tiers. In addition, the need to reduce labor dependency has increased the focus on light but flexible automation.

> "The crisis has un-frozen a lot of these established processes . . . and I see organizations that are seizing that opportunity, and saying, 'I'm going to look for new ways of working' . . . and I think those organizations are destined to thrive."
>
> —Willy Shih

Willy Shih is the Robert and Jane Cizik Professor of Management Practice in Business Administration at Harvard Business School. He is part of the Technology and Operations Management Unit, and he teaches in the MBA and Executive Education Programs. His expertise is in manufacturing and product development, and he has written or co-authored numerous cases and teaching materials in industries ranging from semiconductors, information technology, consumer electronics, aerospace, transportation equipment, manufacturing processes and tools, and intellectual property. His paper, "Restoring American Competitiveness," co-authored with Gary Pisano, won the 2009 McKinsey Award. His book, *Producing Prosperity – Why America Needs a Manufacturing Renaissance*, co-authored with Gary Pisano, has called attention to the link between manufacturing and innovation. He is also the author of "Back Bay Battery," a best-selling innovation simulation.

Prior to coming to HBS in 2007, Shih spent 28 years in industry at IBM, Digital Equipment, Silicon Graphics, Eastman Kodak, and Thomson SA. He worked in product development and manufacturing in a wide range of areas. Shih has two S.B. degrees from the Massachusetts Institute of Technology, and a Ph.D. from the University of California at Berkeley. He is a Life Member of the IEEE.

Steven E. Prokesch is a senior editor of the *Harvard Business Review*, where he acquires and edits articles on a variety of topics, including health care, strategy, operations, and innovation. An award-winning journalist, he has worked as a reporter and editor at *The New York Times*, *Businessweek* magazine, and *The Arizona Republic* and also was an editorial director at the Boston Consulting Group.

Build Supply Chain Resiliency with Synchronized Design & Planning

COVID-19 has significantly accelerated several trends that had been gradually building over the years. eCommerce sales grew by 16.5% across the globe.[1] 39% of consumers tried new brands during quarantine.[2] Such shifts are not isolated to any one industry. For example, Carvana's stock more than doubled in 2020 as consumers got comfortable with buying used cars from vending machines. Video game sales in the U.S. broke new records, rising to $11.2 billion in the third quarter of 2020, a 24% increase compared to the same period from the previous year.[3]

Such radical shifts in consumer buying behavior, when coupled with pandemic-induced, supply-side disruptions due to plant, DC closures, or port shutdowns, cause significantly elevated risks to supply chains. One such example is the choked capacity of U.S. ports and ocean lanes from China to the U.S. to meet the insatiable demand of quarantined consumers. Major U.S. ports imported 2.21 million 20-foot containers in October 2020, up 17.6% from a year earlier and setting a new record.[4]

Because supply chains are subject to simultaneous demand and supply side shocks, many organizations have struggled to keep pace. Supply chains have entered the C-suite and the boardrooms, as business continuity planning has come front and center. Executives are realizing that building optionality into supply chains is essential to ensure continuity of supply in a world where the pace of change is relentless.

All of this calls for reassessing supply chain design for resiliency. Gone are the days when companies could consider supply chain design as an episodic, project-based activity. Supply chain design needs to be constantly reassessed, refreshed, and synchronized with supply chain planning. The policies that governed the supply chain can no longer be 'set and forget' exercises. Supply chain nodes, modes, and flows need to be continually revisited and tuned as conditions change. Any changes recommended through such continuous design need to be factored into supply chain planning for execution.

This opportunity is incentivizing organizations to accelerate the adoption of supply chain design technologies that are far more agile and continuous than the project-based approaches of the past. Many organizations with the world's largest and most complex supply chains—including all five Gartner Supply Chain Masters and 23 of the Gartner Supply Chain Top 25—have chosen Coupa Supply Chain Design & Planning powered by LLamasoft to optimize their supply chain performance. Those who are innovating with continuous supply chain design built on data and powerful AI are making smarter, faster supply chain decisions—and forging a leadership position in their markets.

Regardless of where you are on your supply-chain-design maturity journey, the right technology partner will offer the solution you need today and help prioritize the adoption of additional capabilities aligned to your evolving business priorities. For more information on how Coupa can help you reimagine supply chain design and planning for resiliency, visit www.coupa.com.

Dr. Madhav Durbha

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[1] Shopify, The future of eCommerce in 2021

[2] https://www.marketingdive.com/news/consumers-form-loyalties-to-new-brands-they-bought-in-quarantine-survey-fi/584781/

[3] The NPD Group, *Q3 2020 Games Market Dynamics: U.S.* report

[4] https://www.wsj.com/articles/covid-19-shipping-problems-squeeze-chinas-exporters-11609675204?mod=itp_wsj&ru=yahoo