

The Takeaway

Policy Briefs from the Mosbacher Institute for
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Data-Driven Next-Gen Resilient and Sustainable U.S. Supply Chains

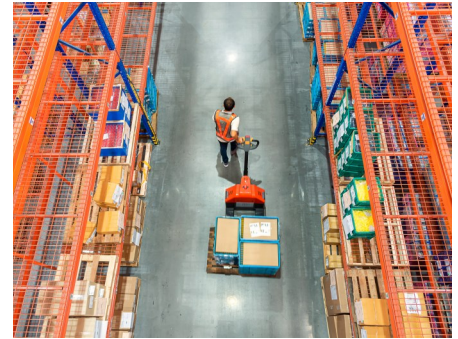
At the Front Lines of the Geopolitical New Normal

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The increasing exposure of global supply chains to severe disruptions, such as the ones created by COVID-19 and the war in Ukraine, requires novel data-driven risk management paradigms that monetize data from internal and external stakeholders to promote cost-competitive supply chain resilience and sustainability, while supporting employment, social cohesion, and national security for the United States.

Well before the pandemic, technological, geopolitical, and economic forces introduced risks and shifts toward regionalization that led to “slowbalisation”/deglobalization. The financial crisis of 2008 was an inflection point as corporations began realizing that their overstretched supply chains had left them exposed to a plethora of risks leading to the shrinkage of global trade from 61% in 2008, to 58% of global GDP in 2019.¹



WHAT'S THE TAKEAWAY?

A rebalancing between cost efficiency and resilience is needed to boost sustainability and security in supply chains.

Next-gen supply chains need novel interdisciplinary, science-based, data-driven frameworks that include secure data sharing and data monetization.

Together academia, industry, and government can strengthen the resilience, competitiveness, and security, of supply chains, further boosting the United States' global economic, technological, military, and geopolitical prowess.

Global supply chains (SCs) are the epicenter of both the rise and slowdown in globalization. Economic, environmental, geopolitical, societal, and technological risks are disrupting SCs. Extreme weather events, port logjams, labor issues, cyber-attacks, IP issues, trade and conventional war, regulations, pandemics, and other geopolitical events are increasing costs, eroding profitability, and undermining SC reliability.

Threats to U.S. national security and competitiveness precipitated private and public sector calls for SC resilience, agility, and re-shoring. U.S. companies increasingly realize that efficiency may come at the expense of SC resilience, and the seven SC “mega processes” (plan, buy, make, move, distribute, sell, reuse) require both efficiency and resilience. The U.S. government now considers SC resilience as a policy priority.^{2,3}

NEXT-GENERATION SC RESILIENCE

Cost minimization motivated offshore manufacturing, but shareholder primacy and a singular focus on operating margins undermined resilience. Rampant outsourcing, aggressive deregulation, monopolization, mergers and acquisitions,⁴ and just-in-time logistics produced lean but brittle supply chains. Next-gen supply chain resilience is now necessary.

Iakovou and White⁵ deconstruct supply resilience by providing definitions and discussing the resilience lifecycle (plan, detect, respond, recover to the pre-disruption state, all with continual learning) and argue that SC resilience requires: agility and responsiveness; end-to-end SC visibility, integration, and transparency; knowledge of physical and informational SC structures; flexibility/redundancy in inventories, manufacturing capacity, and diversified sourcing; reduction of uncertainty with business process reengineering; and collaboration between public and private SC stakeholders.

SC resilience can be strengthened by increasing input and output inventories and increasing the number and capability of suppliers, but these strategies increase costs. Competitive advantage must now be based on costs *and* resilience. Iakovou and White further make the case that data-driven supply chains can increase resilience while mitigating cost increases.

DATA-DRIVEN SUPPLY CHAINS

Digitization and other technological innovations make data-driven rebalancing of inventories, in real time based on real-time data, possible. SC resilience, risk and disruption mitigation, and agility can be further enhanced by relocating portable, modular production capacity (e.g., small and mobile 3D printers, bioreactors) and/or storage capacity based on real-time data-driven demand analysis. These enhance supply chain performance without undermining customer service levels. The dynamically resilient data-driven supply chain network will quickly detect disruptions and respond by increasing manufacturing capacity where needed and then reducing manufacturing capacity once recovery has been achieved.

A NEW FRAMEWORK

Iakovou along with Bechtsis, Tsolakis, and Vlachos stress the need for new modelling frameworks and propose a new framework based on data sharing and data monetization.⁶ In their review of the literature they identify five key gaps that hinder SC capabilities:

- There is no substantial research on how security affects SC operations.
- Agility is a critical resiliency-related ability in the post COVID-19 era, requiring some SC operations and systems to be redesigned.
- The environmental, economic, labor, and social dimensions of sustainability, needed for a

“net positive” footprint⁷ across SCs, are often ignored.

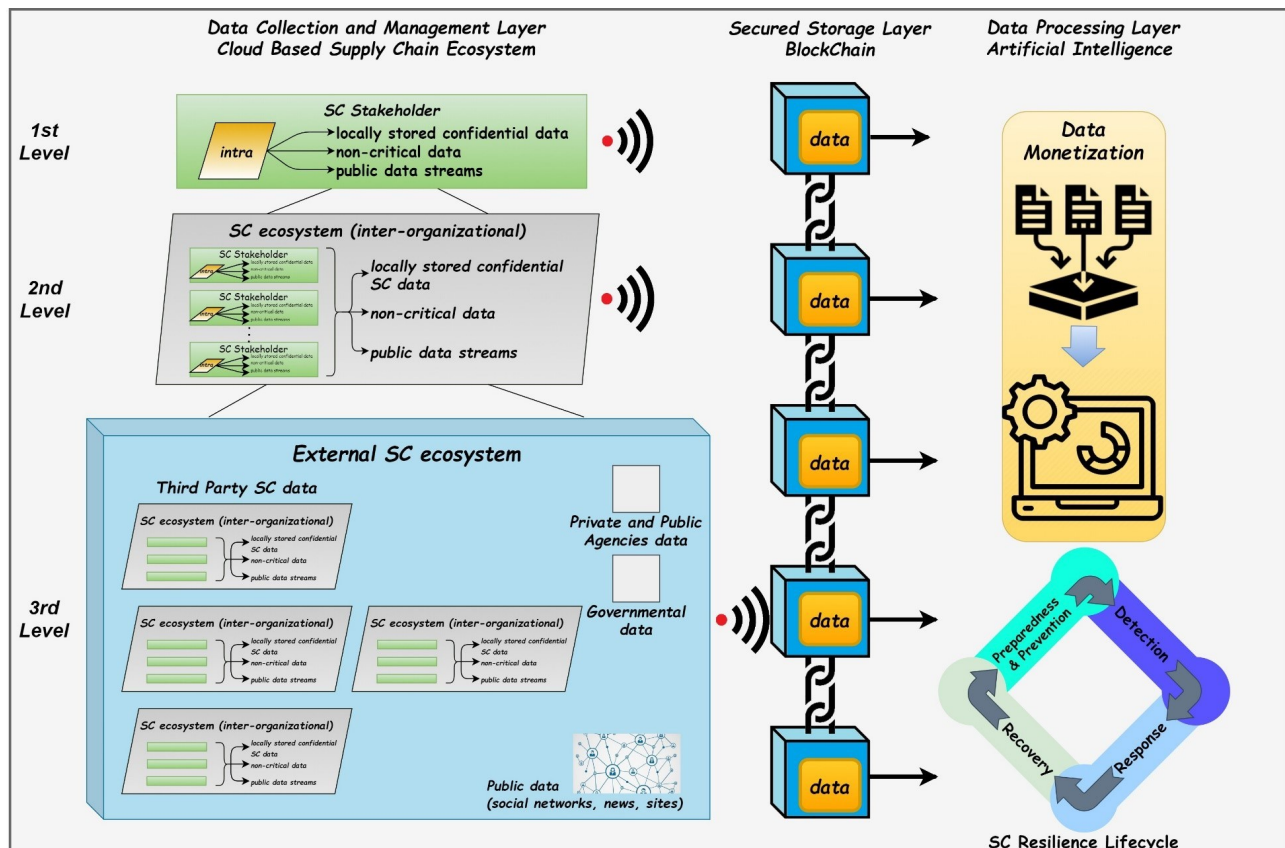
- The existing SC risk management paradigms do not have enough provisions for sharing data with external data sources.
- Implementations of secure data streams, data processing, and AI technologies are limited.

In response to these gaps, they propose a new all-encompassing industry-agnostic generalized framework based on data sharing and data monetization that could act as a guide for future research and industrial practices to address the emerging issues that global SCs are facing (see the figure below). It consists of three levels corresponding to the increasing data sharing boundaries among the SC stakeholders, and another three layers of monetization strategies. The agility and effectiveness of the framework

was validated using the European Union’s organic food SC as a case study.

CONCLUSIONS AND LOOKING AHEAD

SCs are at an inflection point. Under the “new normal” they will be required to operate in a portfolio of operating models that are designed to reduce national and corporate risk and deliver customer service at optimal cost. The United States has an opportunity to fill a pressing gap in the global trade and supply chain infrastructure by working with its willing and able trading partners (“friend-shoring”) to support employment, trade, social cohesion, national security, and the geopolitical prowess of the nation as a beacon of liberal democracy. A “smart reshoring” strategy would further support the emergence of quasi-independent SCs (in North America, Europe, and Asia) consisting of diversified,



Source: Bechtsis, Tsolakis, Iakovou, & Vlachos (2021)

resilient, and competitive regionalized networks embracing a sophisticated portfolio of offshored, nearshored (both “friend-shored”), and reshored manufacturing.

The new grand challenges demand pragmatic, novel, ambitious, “moonshot,” interdisciplinary initiatives embracing the public and private sectors along with willing and able academic partners. To this effect, we have been leveraging the capabilities of several assets across Texas A&M: the SecureAmerica Institute of TAMUS, a private-public partnership using technology, economics, and policy to enable a secure and resilient U.S. manufacturing and industrial base; the Global Value Chains Program of the Mosbacher Institute; and the Texas A&M Energy Institute. Our efforts focus on supporting national policy, economic, and supply chain management research and infrastructure, and on educating the next generation of leaders of government and industry. This “triangle” constitutes an “honest broker” developing the necessary science and quantitative-based strategies that business and government need to implement across the energy and manufacturing SCs under the “new normal.” More interdisciplinary research of this kind, targeting materials, technology, operations, logistics, public health, supply chain, policy, economics, decarbonization, and digitization is vital for strengthening the resilience, competitiveness, and security of U.S. supply chains.

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Notes:

¹ The Economist. (2021, October). *Special Report: The world economy*. <https://www.economist.com/special-report/2020-10-10>

² White House Report. (2021, June). *Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth*. <https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf>

³ White House Capstone Report. (2022, February). *Executive Order on America’s Supply Chains: A Year of Action and Progress*. <https://www.whitehouse.gov/wp-content/uploads/2022/02/Capstone-Report-Biden.pdf>

⁴ Lynn, B.C. (2020). *Liberty from all masters: The new American autocracy vs. the will of the people*. New York: St. Martin’s Publishing Group.

⁵ Iakovou, E. & White III, C.C. (2020, December 3). How to build more Secure, Resilient, Next-Gen U.S. Supply Chains. Brookings TechStream. <https://www.brookings.edu/techstream/how-to-build-more-secure-resilient-next-gen-u-s-supply-chains/>

⁶ Bechtsis, D., Tsolakis, N., Iakovou, E., & Vlachos, D. (2021). Data-driven secure, resilient and sustainable supply chains: Gaps, opportunities, and a new generalised data sharing and data monetisation framework. *International Journal of Production Research*. <https://doi.org/10.1080/00207543.2021.1957506>

⁷ Polman, P. & Winston, A. (2021). *Net positive: How courageous companies thrive by giving more than they take*. Boston: Harvard Business Review Press.



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