IISE Transactions Special Issue on

Large-Scale Systemic Shocks in Manufacturing and Supply Chains

Co-sponsored by Two Focus Issues of "Supply Chain and Logistics" and "Design and Manufacturing"

Large-scale systemic shocks in manufacturing and supply chains can be driven by political decisions (e.g., tariffs and sanctions), economic crises, pandemics, long-term shortage of critical components (e.g., semiconductors), and natural and human-induced disasters. The context and scope of these settings is characterized by (i) a combination of both immediate and delayed effects, (ii) ripple effects with shock propagation across industries and ecosystems, (iii) both short-term responses to ensure resilience and long-term adaptations for viability, and (iv) multi-directional intersections of operational, society, and economics decisions. In this context, there is an urgent need to move beyond incremental resilience and toward the design of truly adaptable and viable manufacturing systems and supply chains that thrive in uncertainty, manage risk more intelligently, and ensure performance persistence for businesses and society in a volatile world.

Systemic shock-triggered manufacturing and supply chain decisions may lead to network redesign, shifts in the manufacturing base, adaptation of the supply base, new logistics routes, and reallocation of production facilities to markets, framing a novel research area distinct from traditional resilience analysis for single-point disruptions. We stress that in the settings of long-term systemic shocks and deep uncertainty, the focus is less on probability-based disruption predictions and more on supply chain viability, i.e., the ability to survive in the long-term and approaches accepting risks and developing supply chain adaptability. Building supply chains on the principles of structural diversity (e.g., supplier and production diversification), functional flexibility (e.g., flexible and reconfigurable manufacturing lines), collaborative capacity (e.g., shared warehouses), and network visibility (e.g., digital twins) allows for the creation of structurally reconfigurable and functionally flexible networks.

This Special Issue aims to collate innovative and high-quality research focused on modeling and optimization of value creation systems in anticipation of and during large-scale shock-driven crises, characterized by deep uncertainty. This Special Issue primarily focuses on proactive approaches aiming to propose methods to help companies to transit from ad-hoc reactions to proactive adaptability to survive systemic shocks. Our ultimate objective is to develop a volume which can be used as a reference for a variety of generalized methods applicable to different types of systemic shocks. Most centrally, we welcome research that goes beyond single-point disruptions and ad-hoc recovery policies and develops toward supply chain viability and proactive adaptability. We welcome a broad variety of methodologies including optimization, simulation, network theory, game theory, complex adaptive systems, chaos theory, control theory, AI, data-driven analytics, and experimental analyses. Modeling papers and computational studies supported by empirical data and evidence are strongly encouraged. All the contributions will be evaluated based on the value of the insights they provide and their potential practical impact in the context of industrial and systems engineering. Potential topics include, but are not limited to, the following:

- In the context of trade wars and tariff shocks, restructuring of global manufacturing and supply chains is a long-term effort. In the short run, businesses might turn to countries less affected by tariffs, but switching suppliers is not always easy due to long-term contracts or limited alternatives. Novel methods and models should be developed to guide firms in making "wait or act" decisions when redesigning manufacturing and supply chains in response to systemic shocks.
- One expected effect of systemic shocks is the ripple effect supplemented by delivery delays and disruption tails. Two prominent examples are the COVID-19 pandemic and global semiconductor shortage. New contributions addressing the ripple effect under large-scale systemic shocks are within the scope of this Special Issue. Key themes here include intertwined networks, cross-industry ripple effects, hidden critical nodes, and disruption propagation paths.

- Do systemic shocks push companies toward more regionalized production? For products with high complexity and specialized suppliers, short-term regionalization is unlikely. We invite new models that resolve trade-offs between outsourcing and near-shoring/on-shoring.
- Systemic shocks can disrupt global supply chains by increasing raw materials, finished products, and logistics costs. Firms need methods and models to make short-term decisions regarding adjustments to pricing and ordering policies in response to systemic shocks. On the other side, supply chains can become exposed to the shocks they exacerbate, e.g., higher inflation driven by hikes in material costs. We call for papers on the operations-finance interface in addressing these topics.
- Systemic shocks have industry-specific patterns. For example, automotive, pharmaceuticals, and food supply chains might be affected differently given the scope of connectivity, decentralization, and material flow dynamics. We seek studies that elaborate on industry-specific aspects of systemic shock propagations.
- In the unknown-unknowns settings, firms need an integration of methods, models, and technology for stress testing and visibility. Such integration can be found in digital twins with intelligent agents providing AI-based decision recommendations (e.g., for recovery policies after a disruption), econometrics, causal inference, what-if stress testing, and simulation-based optimization. A practical scenario of stress testing using a digital twin involves supply chain mapping, generating disruption scenarios (possibly using generative AI), and deploying analytics. We call for papers about digital twins, AI, smart and cyber manufacturing, and supply chain analytics for stress testing and predictive recommendations.
- Adaptable supply chains require reconfigurable and flexible manufacturing. Design optimization and design automation for mixed model assembly lines and other adaptive production systems for absorbing large-scale shocks through adaptability at the factory and network levels are in the scope of this Special Issue. We also welcome papers dealing with novel advanced material and manufacturing processes (e.g., additive manufacturing) as well as adaptable product designs in the settings of supply network adaptability.

For these research domains, we expect novel and innovative contributions with high practical relevance, ideally motivated by an industrial context. Papers must be submitted through http://mc.manuscriptcentral.com/iietransactions and prepared according to the journal's Instructions for authors. Select "Special Issue" for the question "Please select the Focus Issue to which the paper is most related" at Step 1 in the submission process, and select the specific special issue at Step 6.

Important Dates	**Guest Editors:**	**Two sponsored Focused Issues:**
Manuscript submission: 12/31/2025 Completion of 1st round review: 3/31/2026 Completion of 2nd round review: 8/31/2026 Final manuscript submission: 10/31/2026 Tentative publication date: 12/2026	Weiwei Chen (Rutgers University, USA) Alexandre Dolgui (IMT Atlantique, France) Dmitry Ivanov (HWR Berlin, Germany) Nikolay Osadchiy (Emory University, USA)	1) Supply Chain and Logistics (SC&L) (leading FI) FIE: Jennifer K. Ryan (Lehigh University, USA) DE: Halit Uster (Southern Methodist University, USA). 2) Design and Manufacturing (DM) FIE: James Kong (Virginia Tech, USA)