Springer's International Series in Operations Research and Management Science

Call for Chapters in the

Handbook of Ripple Effects in the Supply Chain

Editors

Prof. Dr. habil. Dmitry Ivanov
Professor of Supply Chain Management
Berlin School of Economics and Law
Badensche Str. 50, 10825 Berlin, Germany
E-Mail: divanov@hwr-berlin.de
Web: blog.hwr-berlin.de/ivanov

Prof. Dr. habil. Alexandre Dolgui
Automation, Production and Computer Sciences Dept.
IMT Atlantique LS2N - CNRS UMR 6004 La Chantrerie
E-Mail: alexandre.dolgui@imt-atlantique.fr
Web: http://www.emse.fr/~dolgui/

Prof. Dr. Eng. Boris Sokolov
Laboratory for Information Technologies in Systems Analysis and Modeling
St. Petersburg Institute of Informatics and Automation of the RAS (SPIIRAS)
E-Mail: sokol@iias.spb.su
Web: http://litsam.ru/index.php/en/staff-en/boris-v-sokolov

The ripple effect occurs when a disruption, rather than remaining localized or being contained to one part of the supply chain (SC), cascades downstream and impacts the performance of the SC. This impact might include lower revenues, delivery delays, loss of market share and reputation, and stock return decreases— the cost of all of which could be devastating.

This book offers an introduction to the ripple effect in the supply chain for larger audience. *Ripple effect* describes the impact of a disruption propagation on SC performance and disruption-based scope of changes in SC structural design and planning parameters. As the result of the ripple effect SC structures change. It is different from the bullwhip-effect that affect the SC at the operational level by mismatching demand and supply without structural changes in the SC design, i.e., without SC structural dynamics

The book aims at delineating major features of the ripple effect and methodologies to mitigate the SC disruptions and recover in case of severe disruptions. It reviews recent quantitative literature that tackled the ripple effect and gives a comprehensive vision of the state of the art and perspectives. The methodologies comprise mathematical optimization, simulation, game theory, control theoretic, data-driven analytics, network complexity and reliability theory research. It observes the reasons and mitigation strategies for the ripple effect in the SC and presents the ripple effect control framework that is comprised of redundancy, flexibility, and resilience. Even though a variety of valuable insights has been developed in the said area in recent years, new research avenues and ripple effect taxonomies need to be identified for the near future.

The Chapters of the Handbook of Ripple Effects in the Supply Chain will be united by three basic principles of system-cybernetic research. The *first* principle is the integrated modelling of resilient network structures. New principles and methods of SC structural dynamics control will be developed using a variety of methodologies for multi-criteria network synthesis and analysis. A particular focus will be directed towards the deployment of post-disruption management, and understanding which factors fit the particular dynamics the SC structures confront. The *second* principle is the proactive planning and network redundancy optimization. The given paradigm combines both SC robustness (i.e., the ability to absorb disturbances and continue execution with minimal impact on performance), monitoring (i.e., real-time disruption identification and data-driven re-planning preparation), and resilience (i.e., the ability to sustain and restore SC functionality using recovery and adaptation policies). The *third* principle is the situational proactive control. A disruptive event, planning of the recovery control policy, and implementation of this policy are distributed in time and subject to SC structural and parametrical dynamics. In other words, both environment, SC structures and its operational parameters may change in the period between the planning of the recovery control policy and its implementation. As such, situational proactive control with a combined usage of simulation-optimization and analytics is needed to improve the transition processes from a disrupted to a restored SC state. This allows reducing investments in robustness and increasing resilience by obviating the transition process control problems. A combination of these three principles builds a framework of future decision support systems for SC disruption risk management which utilizes two major ideas, i.e., (i) low-certainty need SC designs and network redundancy optimization with an optimal combination of robustness and adaptation elements to ensure both efficient and resilient SCs and (ii) integrated SC ripple effect modeling with simulation, optimization, and analytics components to support situational forecasting, predictive simulation, prescriptive optimization, and adaptive learning.

The book is expected to furnish fresh insights for SC management and engineering regarding the following questions:

- In what circumstance does one failure cause other failures?
- Which structures of the SC are especially susceptible to the ripple effect?
- What are the typical ripple effect scenarios and what is the most efficient way to respond them?

Given these reflections, multiple ways to apply quantitative analysis to ripple effect modelling arise. Several research gaps might be addressed by the ability to dynamically change parameters during experiments and to observe how these changes impact performance in real time, e.g. considering:

- disruption propagation in the SC;
- dynamic recovery policies;
- gradual capacity degradation and recovery;
- multiple performance impact dimensions including financial and operational performance.

Distinctive Features of the book:

- It considers ripple effect in the SC from inter-disciplinary perspective
- It offers an introduction to the ripple effect mitigation and recovery policies in the framework of disruption risk management in the SCs for larger audience
- It integrates management and engineering perspectives on disruption risk management in the SC

- It presents innovative optimization and simulation models for real-life management problems
- It considers examples from both industrial and service SCs
- It reveals decision-making recommendations for tackling disruption risks in the SC in proactive and reactive domains

The Intended Audience:
Management and engineering graduate and PhD students, supply chain and operations management professionals, industrial engineers, operations and supply chain researchers

Chapter Submission
The handbook is intended to be designed at three levels:

- SC network analysis level (reliability theory, graph theory)
- SC design and planning level (math programming, control theory, game theory, fuzzy logic)
- SC control level (simulation, inventory control, data-driven control)

The variety of quantitative analysis methodologies, hybrid methodologies and the analytics-driven approaches, and survey papers are welcome.

The book will consist of about 20 chapters. The length of each Chapter should be about 15-20 pages, including references and all figures and tables. Springer template should be used for Chapter preparations, including Springer reference style: https://www.springer.com/gp/authors-editors/book-authors-editors/manuscript-preparation/5636. All the permissions should be obtained by the authors prior to the Chapter submission.

Submission Deadline: October 31, 2018.
Chapters should be submitted to Managing Editor:
Prof. Dr. Dmitry Ivanov; E-Mail: divanov(at)hwr-berlin.de

Bibliography

Akkermans, H., van Wassenhove L.N. (2018). Supply chain tsunamis: Research on low probability high impact disruptions. Journal of Supply Chain Management, 54(1), 64-76.

Dolgui, A., Ivanov, D., Sokolov, B. (2018) Ripple Effect in the Supply Chain: An Analysis and Recent Literature. International Journal of Production Research, 56(1-2).

Han, J., Shin, K.S. (2016) Evaluation mechanism for structural robustness of supply chain considering disruption propagation. International Journal of Production Research 54(1):135-151.

Ivanov D. Simulation-based ripple effect modelling in the supply chain. International Journal of Production Research, 55(7), 2083-2101, 2017a

Ivanov D. (2017b). Revealing interfaces of supply chain resilience and sustainability: a simulation study. International Journal of Production Research, DOI:10.1080/00207543.2017.1343507

Ivanov D., Sokolov B., Dolgui A. (2014a). The Ripple effect in supply chains: trade-off ‘efficiency-flexibility-resilience’ in disruption management, International Journal of Production Research, 52(7), 2154-2172.

Ivanov D., Sokolov, B., & Pavlov, A. (2014b). Optimal distribution (re)planning in a centralized multi-stage network under conditions of ripple effect and structure dynamics. European Journal of Operational Research, 237(2), 758–770.

Ivanov D., Sokolov B., Pavlov, A. (2013). Dual problem formulation and its application to optimal re-design of an integrated production-distribution network with structure dynamics and ripple effect considerations, *International Journal of Production Research*, 51(18), 5386-5403.

Ivanov, D. (2018). Structural Dynamics and Resilience in Supply Chain Risk Management. Springer, New York.

Ivanov D., Dolgui A., Ivanova M., Sokolov B. (2018) Simulation Vs. Optimization Approaches to Ripple Effect Modelling in the Supply Chain. In: Freitag M., Kotzab H., Pannek J. (eds) Dynamics in Logistics. LDIC 2018, Bremen 20-22, 2018. Lecture Notes in Logistics. Springer, Cham, pp. 34-39

Levner E., Ptuskin A. (2017). Entropy-based model for the ripple effect: managing environmental risks in supply chains. International Journal of Production Research, published online.

Liberatore F, Scaparra M.P., Daskin M.S. (2012). Hedging against disruptions with ripple effects in location analysis. Omega, 40, 21–30

Macdonald, J.R., Zobel, C.W., Melnyk, S.A., Griffis, S.E., (2018). Supply chain risk and resilience: theory building through structured experiments and simulation. International Journal of Production Research, DOI: 10.1080/00207543.2017.1421787

Mizgier, K. J. (2017). Global Sensitivity Analysis and Aggregation of Risk in Multi-Product Supply Chain Networks. International Journal of Production Research, 55(1), 130-144.

Pavlov A., Ivanov D., Dolgui A., Sokolov B. (2018) Hybrid fuzzy-probabilistic approach to supply chain resilience assessment. IEEE Transactions on Engineering Management, DOI: 10.1109/TEM.2017.2773574

Sawik T. A portfolio approach to supply chain disruption management. International Journal of Production Research, 55(7), 1970-1991, 2017.

Scheibe K.P., Blackhurst, J. (2018) Supply chain disruption propagation: a systemic risk and normal accident theory perspective. International Journal of Production Research, DOI: 10.1080/00207543.2017.1355123.

Schmitt T.G., Kumar S., Stecke K.E., Glover F.W., Ehlen M.A. (2017). Mitigating disruptions in a multi-echelon supply chain using adaptive ordering. Omega, 68, 185-198.

Sokolov, B., D. Ivanov, A. Dolgui, A. Pavlov (2016). Structural quantification of the ripple effect in the supply chain. International Journal of Production Research, 54(1), 152-169.

Zobel, C.W. and Khansa, L. (2014), “Characterizing multi-event disaster resilience”, Computers and Operations Research, Vol. 42, pp. 83–94.