

Springer Series in Supply Chain Management

Omera Khan  
Michael Huth  
George A. Zsidisin  
Michael Henke *Editors*

# Supply Chain Resilience

Reconceptualizing Risk Management in  
a Post-Pandemic World

 Springer

# **Springer Series in Supply Chain Management**

Volume 21

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Christopher S. Tang, University of California, Los Angeles, CA, USA

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Editors

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Reconceptualizing Risk Management  
in a Post-Pandemic World

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# Preface

Risk in supply chains has existed for as long as we have had commerce. For many years, the risk of supply chain disruptions and financial volatility were considered just “part of doing business,” and were often mitigated by maintaining ample inventory levels, ensuring dual or multiple sourcing, acquiring insurance, hedging, or simply building it into the business model.

The 1980s and 1990s, highlighted by insights from the Toyota Production System (TPS) and popularized with the publication of *The Machine that Changed the World* (Womack et al., 1990), witnessed a significant shift for many business and supply chain processes. The new philosophy and business practice of lean provided justification for firms to reduce or eliminate the traditional risk mitigation strategies and adopt lean production and just in time delivery processes. The financial rationale for adopting these practices is to free organization cash flows by reducing the need for both current assets (such as inventories) and long-term assets (like warehousing and production equipment). Unquestionably these practices contributed toward significantly increasing the profitability and market share for many organizations.

The structure of firms and supply chains likewise started to shift in conjunction with the adoption of lean business practices. Additionally, considerable advancements in technology development in combination with shorter product life cycles made it difficult for companies to remain “experts” in a wide variety of industries. As highlighted by Prahalad and Hamel in their classic 1990 *Harvard Business Review* publication, firms in response started to “focus on their core competencies” and significantly increased their outsourcing practices. As a result, many of these enterprises experienced greater efficiencies and profitability but, at the same time, became more dependent on other firms in their day-to-day operations of producing products and services for customers.

Although supply chains have existed globally (among continents) for millennia, the sheer quantity and complexity of international trade skyrocketed from the 1980s onward. The further advancements of intermodal shipments through containerization, the development of computers, data analytics, and the Internet, in conjunction with political policy changes in China, provided a ripe environment for opening new

global trading partners. Many companies in Western Europe and North America started to exploit opportunities for low-cost country sourcing, initially with a focus on Chinese suppliers and then stretching to other Asian markets. These shifts in production sources, including key industries such as pharmaceuticals and electronics, further provided financial benefits for many Western firms and lower costs for consumers, but also started the journey toward greater dependence on global supply chains.

The confluence of these factors created vulnerabilities in many supply chains. Unfortunately, managing risk and ensuring supply chain resilience often became secondary issues.

There are debatably several different events that can be identified for fostering industry and academic interest in supply chain risk and resilience. These include the well-cited supply chain disruption experienced by Ericsson in 2000, hoof-and-mouth livestock disease outbreak in the UK during early 2001, and the terrorist attacks on the World Trade Center on September 11, 2001.

These incidents provided the initial baseline for a large-scale inquiry into supply chain risk and resilience, with the intention of providing insight and solutions for firms and industries to ensure efficient supply chain continuity. It was during the turn of the millennium that we started seeing the publication of empirical studies investigating supply chain risk, resilience, and ultimately supply chain risk management (SCRM) from a behavioral perspective. In order to start advancing this nascent field of supply chain risk and resilience, scholars from the UK, the USA, and Sweden decided to meet and hold a 3-day seminar in 2001 to share our ideas and recent research findings. This became the genesis for the International Supply Chain Risk Management (ISCRiM) network.

The inaugural meeting of what became ISCRiM occurred on October 11–14, 2001, hosted by Professor Bob Ritchie in Crewe, UK. The initial members, including Bob Ritchie, George Zsidisin, Andreas Normann, Ulf Paulsson, Robert Lindroth, and Clare Brindley, spent 3 days sharing insights on the nascent discipline of supply chain risk. From this initial meeting we decided to (1) establish a network with the title ISCRiM as a collaborative, informal organization to share insights on supply chain risk and its management, (2) publish a book highlighting our recent research projects, and (3) meet on an annual basis, with the second meeting occurring in Lund, Sweden, in 2002. From these foundations and throughout the years, we have and continue to meet as a collective group to share our work and insights on supply chain risk. To date, we have published four books as a network, including *Supply Chain Risk* (2004; Ashgate), *Supply Chain Risk: A Handbook of Assessment, Management, and Performance* (2009; Springer), *Handbook for Supply Chain Risk Management: Case Studies, Effective Practices and Emerging Trends* (2012; J. Ross), and *Revisiting Supply Chain Risk*, Springer Series in Supply Chain Management (2019; Springer). Below are the dates and locations of our (almost) annual meetings throughout the past two decades.

- October, 2001—Crewe, UK
- September, 2002—Lund, Sweden
- October, 2003—Crewe, UK
- October, 2004—East Lansing, Michigan, USA
- September, 2005—Cranfield, UK
- October, 2006—Oestrich Winkel, Germany
- October, 2007—Verona, Italy
- September, 2008—Trondheim, Norway
- October, 2009—Cullowhee, North Carolina
- September, 2010—Loughborough, UK
- October, 2011—Denton, Texas, USA
- September, 2012—Porto, Portugal
- September, 2013—Verona, Italy
- September, 2014—Dortmund, Germany
- October, 2015—Richmond, Virginia, USA
- September, 2016—Steyr, Austria
- September, 2017—Lappeenranta, Finland
- September, 2019—Copenhagen, Denmark
- September, 2021—Online

Our most recent meeting in person occurred in Copenhagen, Denmark, during September 2019. This seminar was bittersweet. During our seminar we had the honor of providing Ms. Celia Ritchie, the wife of Bob Ritchie (one of the founders of ISCRiM who recently passed away), a signed copy of our most recent book which was dedicated in his name and to honor the work he had done in supply chain risk scholarship. However, we were not aware that this would be the last in-person meeting for the foreseeable immediate future.

Initially reports and stories of a virus started emerging from China in December 2019 with little fanfare. There had already been several other outbreaks in recent years, such as SARS and the avian bird flu, which had unfortunately resulted in the deaths of thousands of people. However, the effects of these outbreaks had relatively temporary detrimental effects on commerce and supply chains. However, by mid-March 2020, the world appeared to have stopped, and COVID-19 became a harsh reality throughout the entire globe. The pandemic also provided a platform for the term “supply chain” to become part of the everyday language and lexicon of the public—something not quite experienced before.

It became quickly evident to the ISCRiM community that COVID-19 will provide us a once-in-a-lifetime opportunity for studying supply chain risk management and how firms ensured (or failed) to create resilience in their operations and supply chains. What are the critical learning lessons we can take away for ensuring organization and supply chain resilience? We cannot think of any other incident occurring within our lifetime that has had such a long-term influential effect on local, regional, national, and global supply chains.

Shortly after experiencing the initial shocks of product shortages (we all remember the lack of hand sanitizer, toilet paper, and masks) and widespread lockdowns,



we decided to virtually meet as a network to determine an appropriate course of action we can pursue as a scholarly association. It was quickly decided to start our fifth book as an organization. We had already published two prior books with Springer Publishers with great success, and decided, with the assistance of Professor Christopher Tang, to publish again with Springer. This edited book is the result of the hard work done by scholars investigating how COVID-19 has affected supply chains and the risk management and resilience strategies pursued by firms for ensuring supply continuity and profitability in meeting customer and societal needs.

There has been no shortage of recent research examining the effects that COVID-19 had on supply chains. These studies are still being published, frequently with special issue calls for papers by various scholarly journals. In addition, one of the first books examining the effect of COVID-19 on supply chains was published by Yossi Sheffi titled *The New (Ab) Normal: Reshaping Business and Supply Chain Strategy Beyond Covid-19* at the end of 2020. However, we are not aware of any other books bringing together a variety of industry observations, practices, and research studies in one volume.

The purpose of this book is to provide insight from research and practice in how organizations were able to sustain resilience in their global supply chains during the COVID-19 pandemic and to advance our understanding of supply chain risk management. The individual chapters of the book contribute to a considerable gain in knowledge in science and practice by:

- Explaining empirical and analytic findings from research
- Examining new models and methods
- Providing examples of best and effective risk management practices

The emergence of COVID-19 and how it has affected supply chains globally has made us “re-conceptualize” how we understand supply chain risk and resilience. In some ways, we are entering the phase of “Supply Chain Risk Management 2.0.” The initial impetus for supply chain risk and resilience scholarship started near the turn of the new millennium. Slightly over one score later, and especially from our experiences with the pandemic, we clearly see that supply chain risk is not going away anytime soon. However, from the challenges almost every firm encountered during the various stages of COVID-19, and even continuing today as of the time this book is published, we believe many of the learning lessons promoted in this book provide insight for firms to more effectively and efficiently ensure supply chain resilience from a multitude of threats. Recent events such as the Suez Canal blockage, the war in Ukraine, and global inflation provide us with constant reminders of the pressures that supply chain professionals face in managing supply chain risk.

Ultimately, the intention of publishing this book is to provide the reader greater knowledge, strategic approaches, new methods, and practical tools for proactively ensuring global supply chain resilience. It is only by better understanding supply chain risk and resilience that we can create more robust supply chains that withstand the ever-present threats existing in today’s supply chains. COVID-19 has provided us a “petri dish” for investigating how organizations addressed one of the most, if not

most significant, large-scale supply chain disruption in our lifetime. We hope that this book takes us one step closer in re-conceptualizing supply chain risk in order to create resilience in a post-pandemic world.

Egham, UK  
Fulda, Germany  
St Louis, MO  
Dortmund, Germany

Omera Khan  
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**Johanna Kim Kippenberger** is a research assistant at the Fraunhofer Institute for Material Flow and Logistics (IML) in Dortmund, Germany. The focus of her research is supply chain simulation using the OTD-NET simulation tool. While in the past the simulation tool was mainly used for bottleneck analyses and evaluations of actual and target concepts in the automotive industry, she identifies application cases in other sectors. Triggered by the COVID-19 pandemic, the use of simulation in crisis situations is of particular interest. In this context, she is primarily looking at the supply chains of crisis-relevant goods, such as medical goods. Her work includes

researching the coupling simulation with artificial intelligence for the evaluation of effects of disruptive events and a quick parametrization of the supply chain.

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**Christopher S. Tang** (Ph.D., Yale) is UCLA Distinguished Professor and Edward W. Carter Chair in Business Administration. His current research is focused on social innovation in developing countries, identifying how companies operate in the environment to do good while doing well at the same time. Exposure to real-life industry projects motivated his academic research. He has developed teaching cases on a variety of concerns such as micro-finance for the poor, mobile platforms for developing economies, creating shared values and direct procurement of agricultural products, response management in disasters, and new business models in the age of the Internet.

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# Part I

## Approaches, Methods and Models

One can never really know how exposed to risk one is until one is tested. The COVID-19 pandemic called into question the veracity of models and processes that had until 2020 been staples of the modern supply chain. Before then, the idea that lean and agile, or indeed Just-In-Time, might be the undoing of supply networks would have carried little weight. How times have changed!

In the face of such an uncertain and dynamic environment, almost every single industry was forced to re-examine how they managed their supply chains. In many ways this wake-up call was needed. The challenges firms encountered serve to underline the importance of resilience and risk management and the immediacy with which they should be dealt. The aftermath of the pandemic has provided a new lens in the way we view supply chain risk management and resilience.

Part I of this book, *Approaches, Method and Models*, examines the impact of the pandemic on supply chain theories, models and approaches through systematic literature reviews and the conceptual development of new models and frameworks. It provides an overview of how to create resilience and re-conceptualise supply chain risk management, and investigates measures and methods to plan, prepare, react and evaluate the supply chain disruptions.

Chapter 1, *How to manage impacts of disruptions during the COVID-19 pandemic*, provides a systematic literature review that investigates the impact of the pandemic on supply chain management areas and actors. It seeks to understand the resilience strategies companies can learn and apply, and also describes the key digital approaches that they can take to respond to COVID-19.

The authors argue that the stream of current research could benefit from qualitative and empirical studies examining how firms and supply chains were able to ensure resilience during the height of COVID-19. They add that while there are strategies for mitigating and controlling the effects of COVID-19 on supply chains, no studies measuring their effectiveness exist. They finally suggest that some of the different methods for resilience and risk mitigation—flexibility, visibility and agility—are combined and examined to find ways for companies to improve supply chain performance.