Chapter 1

SUPPLY CHAIN ANALYSIS AND E-BUSINESS
An Overview

David Simchi-Levi
Department of Civil and Environmental Engineering
Massachusetts Institute of Technology
dslevi@mit.edu

S. David Wu*
Department of Industrial and Systems Engineering
Lehigh University
david.wu@lehigh.edu

Z. Max Shen
Department of Industrial and Systems Engineering
University of Florida
shen@ise.ufl.edu

1. Introduction

Supply chain analysis is the study of quantitative models that characterize various economic tradeoffs in the supply chain. The field has made significant strides in both theoretical and practical fronts. On the theoretical front, supply chain analysis inspires new research ventures that blend operations research, game theory, and microeconomics. These ventures result in an unprecedented amalgamation of prescriptive, descriptive, and predictive models characteristic of each subfield. On the practical front, supply chain analysis offers solid foundations for strategic positioning, policy setting, and decision making. Over the past two decades, not only has supply chain analysis become a strategic fo-

*S. David Wu is supported by NSF Grants DMI-0075391 and DMI-0121395
Handbook of Quantitative Supply Chain Analysis

cus of leading firms, it has also spawned an impressive array of research that brings together diverse research communities. Adding to this diversity and intellectual energy is the emergence of E-Business. E-Business creates new competitive dimensions that are fast-paced, ever-changing, and risk-prone, dimensions where innovation, speed, and technological savvy often define success. Most importantly, E-Business challenges the premises and expands the scope of supply chain analysis.

The research community has responded to the E-Business challenge. Despite the infamous dot-com bust in the early 2000’s, scores of research initiatives, workshops, technical papers, and special journal issues have been devoted to the subject. E-Business remains a critical subject not only in the research community, but also in corporate boardrooms. Instead of the revolution that would replace every facet of business, the rise of E-Business might be viewed as the emergence of new economic intermediaries that offer opportunities for innovation. These new intermediaries offer different means to respond to market demands (e.g., Internet vs. traditional channels), to facilitate sourcing, procurement, and price discovery (e.g., electronic auctions), and to develop new mechanisms for coordination and execution (e.g., dynamic pricing, revenue management, and collaborative forecasting).

The area intersecting supply chain analysis and E-Business is in its infancy; it is still taking shape and emerging. Indeed, there are still debates and contentions as to whether E-Business offers any fundamentally new research dimensions. We thought that this might be the right moment to put together a book that takes a close look at what has been done in the field of supply chain analysis that may be relevant to the emerging environment of E-Business. We set out to edit a research handbook that pays as much attention to looking back as to looking forward. The handbook is intended as reference material for researchers, graduate students, and practitioners alike who are interested in pursuing research and development in this area, and who need both a comprehensive view of the existing literature, and a multitude of ideas for future directions. The handbook should serve quite nicely as supplementary material for advanced graduate level courses in operations research, industrial engineering, operations management, supply chain management, or applied economics.

The handbook contains 18 chapters organized in five main parts as follows:

1. Emerging Paradigms for Supply Chain Analysis,
2. Auctions and Bidding,
3. Supply Chain Coordinations in E-Business,
4. Multi-Channel Coordination, and