Preface

As information and communication technologies (ICTs) radically facilitate the convergence of data, voice, and video; support real-time transactions and interactivity; and enhance access and connectivity, we are confronted with new challenges for designing and building an e-supply chain. An e-supply chain is the use of information technology (IT), electronic means, or cyberspace to bring together widely dispersed suppliers and buyers, to enhance coordination and knowledge sharing, and to manage upstream and downstream value chain channels spanning from the supplier’s supplier to the customer’s customer. E-supply chain enables firms to improve flexibility and move toward real-time operations by sharing information and collaborating dynamically among partners.

E-supply chain activities include plan, source, make, deliver, and return. IT links the separated supply chain activities into an integrated, coordinated system that is fast, responsive, flexible, and efficient. For example, EDI, teleconferencing, and e-mail systems reduce the cycle time in communication. Bar coding, radio frequency identification, and material handling technologies are used for efficient distribution and inventory management. E-supply chain portals and ERP systems enable real-time end-to-end information sharing and real-time decision making. Supply chain technologies will ultimately enable more flexible and agile business practices. They will help companies come together and form virtual organizations to co-create value.

However, issues related to technologies, standards, costs, and management have hindered the creation of a true e-supply chain that seamlessly incorporates all partners. Many challenges need to be addressed to gain a deeper understanding of how to effectively apply and manage these technologies.

The objective of the book is to explore the concepts, modeling, technologies, IT infrastructures, and performance management of the e-supply chain and develop a broad understanding of issues pertaining to the use of emerging information technologies and their impacts on e-supply chain management. The book aims to highlight e-supply chain technologies and their effective management and guide efforts in transforming current business processes to adapt to the digital age.

This book is designed to cover a broad range of topics in the field of e-supply chains in 14 chapters. It is primarily intended for professionals, researchers, and practitioners who want to explore/understand the concepts and principles of the e-supply chain and want to apply various e-supply chain models and systems to solve business problems. Each chapter is designed to be stand-alone, and thus readers can focus on their interested topics.

SECTION I

Section I consists of five chapters on the concepts and modeling of e-supply chain. Chapters I and II deal with the modeling of e-supply chain management. Chapter III discusses the concepts of e-supply chain and SME. Chapters IV and V present the concepts of e-services and service value network.
Chapter I

Procedure for Modeling and Improving E-SCM Processes by Patcharee Boonyathan and Latif Al-Hakim, develops a procedure referred to as eSCM-I to improve the supply chain business processes, taking into consideration the Internet and e-business communication technologies. It is based on the supply chain operations reference (SCOR) model for process standardization and the IDEF0 technique (i.e., a graphical method designed to model the activities, actions, and decisions of an organization or system) for process mapping. The four-step procedure is proposed to improve competitive advantage and customer satisfaction: process standardization, business process modeling, benchmarking and identification of best practices, and gap determination. The procedure identifies process interdependencies and manages supply chain coordination.

Chapter II

Dynamic Transshipment in the Digital Age by Shilei Yang, Bintong Chen, and Charles L. Munson, explores how to handle transshipment among distribution centers in a geographically dispersed network. They investigate transshipment strategies in a continuous review system with dynamic demand and present a dynamic program that identifies the optimal transshipment rule. Since the dynamic program presented is time consuming and difficult for practitioners to implement, they propose three distinct heuristic decision rules for making transshipment decisions. After numerical experiments and simulation analysis based on various combinations of demand rates and delivery costs, they identify a good heuristic rule, which can be conveniently implemented in practice to determine effective transshipment policies.

Chapter III

E-Com Supply Chain and SMEs by Ron Craig, takes the perspective of small and medium-sized enterprises (SMEs) in supply chains. It reviews the important role of SMEs in national and world economies. The chapter provides an extensive overview of literature on supply chain management (SCM), information and communication technologies (ICTs), and e-business. Both opportunities and challenges for supply chains in general and SMEs in particular are considered. The future direction for researchers and practitioners are pointed out.

Chapter IV

Building and Managing Modern E-Services by John Hamilton, addresses the development cycle of an e-services model. Services as a value creation process progress from supply and demand chains, to value chains, to service value chains, and finally to service value networks. This progression pathway develops over time and enables service businesses to develop competitive business solutions. Service value networks, as an advanced value creation structure, house fully integrated e-demand and e-supply chains, working in harmony to deliver flexible business solutions to customer requests. This chapter also offers managers a balanced scorecard structural mechanism through which management controls e-services.

Chapter V

Service Value Networks: Delivering Competitive E-Services by John Hamilton, addresses service value networks as a key pathway to establishing and likely retaining future strong competitive positioning within a service industry sector. He defines service value network as the flexible delivery of a service, and/or product, by a business and its networked, coordinated value chains such that a value-adding and target-specific service and/or product solution is effectively and efficiently delivered to the individual customer. The procedure to research and develop a service value network is described.
SECTION II

Section II consists of five chapters on e-supply chain technologies and IT infrastructure such as radio frequency identification (RFID), security, collaboration tools, software agents, and EDI. Chapter VI deals with automated data capture technologies—RFID. Chapter VII discusses infrastructure security. Chapter VIII handles collaboration tools. Chapter IX presents software agents in the supply chain. Chapter X deals with EDI and e-coalition.

Chapter VI

Automated Data Capture Technologies: RFID by Vidyasagar Potdar, Chen Wu, and Elizabeth Chang, provides an introduction to RFID technology. The authors discuss the main components of the RFID technology, which includes RFID transponders, RFID readers, RFID middleware, and RFID labels. A detailed classification and explanation of these components is provided, followed by the benefits and applications that can be achieved by adopting this technology. They also depict the adoption challenges such as security, privacy, cost, scalability, resilience, and deployment. They describe some successful RFID deployment case studies on the adoption of RFID technology. For business executives and consultants, they provide a comprehensive list of RFID vendors across the globe. For researchers, they list some open issues on adoption challenges. For advanced users, in-depth technical details are provided about security and privacy enhancing protocols.

Chapter VII

Information Security Risk in the E-Supply Chain by Wade H. Baker, Gregory E. Smith, and Kevin James Watson, identifies the sources of IT threats in the supply chain, categorizes those threats, and validates them through a survey of 188 companies representing a range of supply chain functions. They argue that the integration of information flows facilitate collaboration between supply chain partners; however, the interconnectivity also increases supply chain risks. The increased use of information technology has removed an organization’s internal and external protective barriers, and thus supply chains are more vulnerable to IT-specific risks. Through analysis, they suggest that supply chain risk is affected by IT threats, and thus the benefits of collaboration facilitated by IT integration must exceed the increase in risk.

Chapter VIII

The Use of Collaboration Tools in Supply Chain: Implications and Challenges by Ozlem Bak, addresses supply chain integration by the use of collaboration tools, including inter- and intra-enterprise applications such as customer relationship management, supplier relationship management, e-business and employee-business integration, e-supply chain management, Web-enabled services, wireless applications, and software applications. The chapter explains the concept of collaboration tools and its importance in the supply chain integration, evaluates the requirements for supply chain management (SCM), and emphasizes the collaborative problem areas within supplier and SCM relations. A case study of an application of collaboration tools is presented. He argues that collaboration in supply chain is effective only if the collaboration tools are integrated or used jointly by supply chain partners.

Chapter IX

Negotiation, Trust, and Experience Management in E-Supply Chains by Gavin Finnie and Zhaohao Sun, introduces the concept of experience management in multi-agent systems for supply chain management and develops a unified model for cooperation, negotiation, trust, and deception. They argue that agents in the supply chain must be capable of dynamically adapting their behavior, and the experience management paradigm offers a new approach to automated learning. The chapter discusses issues in agent negotiation and cooperation, and
provides an example of multi-agent architecture. The role of trust and deception in supply chains for real-time enterprises is also discussed. Some new areas of research are highlighted.

Chapter X

Trading E-Coalition Modeling for Supply Chain by Pierre F. Tiako, proposes an appropriate infrastructure for modeling and coordinating e-business processes using e-coalitions (i.e., support for collaborations with supply chain partners over the Internet). It discusses EDI systems and EDI over the Internet. It also describes a typical scenario where e-coalitions involve a travel agency and its partners for supplying flight tickets. The idea combines support for modeling and coordinating relationships among e-coalition components located in different places with an architecture for their distribution. The open software infrastructure for supporting supply chain and e-commerce includes CORBA, distributed component object model (DCOM), and Java Virtual Machine (JVM).

SECTION III

Section III consists of four chapters on best practices and performance management of e-supply chain. Chapter XI deals with practices of ERP and SCM integration. Chapter XII discusses satisficing performance targets. Chapter XIII presents an information feedback approach to maintaining service quality. Chapter XIV deals with performance management.

Chapter XI

E-Supply Chain System at Valvex and Its Integration with ERP Systems by Raktim Pal, Indranil Bose, and Alex Ye, presents a case study on a leading Chinese manufacturer of industrial valves that successfully integrated the ERP systems from Entreplan and an SCM system from Excelvision. This chapter describes the implementation of the e-SCM system at Valvex and its integration with the existing ERP system. The integration of ERP and SCM improved the operations at Valvex and resulted in many benefits. The authors point out that the process of implementation and integration poses many challenges, and some of them are unique to a Chinese manufacturing organization. They conclude with several lessons learned from the experience of Valvex that may be useful for organizations that plan to undertake similar projects.

Chapter XII

Coordination of a Supply Chain with Satisficing Objectives Using Contracts by Chunming (Victor) Shi and Bintong Chen, studies a decentralized supply chain consisting of a supplier and a retailer, both with the satisficing objective or performance targets. They examine the supply chain under three types of commonly used contracts: wholesale price, buy back, and quantity flexibility contracts. They identify the Pareto-optimal contract(s) for each contractual form and the contractual forms, which are capable of supply chain coordination with the satisficing objectives. They show that wholesale price contracts can coordinate the supply chain with the satisficing objectives, whereas buy back contracts cannot. Furthermore, quantity flexibility contracts must degenerate into wholesale price contracts to coordinate the supply chain. This provides an important justification for the popularity of wholesale price contracts. The authors also discuss possible extensions to their model.

Chapter XIII

Information Feedback Approach for Maintaining Service Quality in Supply Chain Management by R. Manjunath, considers a feedback mechanism that conveys the status of the supply chain, starting from the tail end with the pre-specified service quality as seen by the end user of the supply chain. Maintaining the service
quality in a supply chain has become a challenging task with increased complexity and number of players down the chain. The chapter highlights the advantages of using a predicted and shifted slippage or loss rate as the feedback signal. Based on the feedback, the source is expected to change the rate of transfer of the commodity over the supply chain. Thus the resources would get utilized effectively, reducing the stranded time of the commodity down the chain and the service quality gets improved.

Chapter XIV

Performance Management by Srikanth Srinivas, designs a performance management framework that helps firms choose, implement, and get significant benefits from e-supply chain technologies. The framework combines critical variables, balanced scorecard, and capability maturity. He organizes the framework using a balanced scorecard revolving around five critical variables of value, variety, velocity, variability, and visibility. The maturity level of each of these critical variables is classified using a six-level capability maturity continuum—ignorance, awareness, understanding, approach, action, and culture. The framework helps managers identify where the gaps are and thus leverage technologies to bridge those gaps.

All chapters have gone through a rigorous, double-blind review process before acceptance. It is hoped that the readers will find these chapters informative, enlightening, and helpful.