PREFACE

Operations and industrial modeling and management have a long history dating back to the first Industrial Revolution. Scheduling, inventory control, production planning, projects management, control charts, statistical records, customer satisfaction questionnaires, rankings and benchmarking. are some of the tools used for the purpose of better managing operations and services. The complexity of operations and logistics problems have increased, however, with the growth of supply chains, rendering traditional operational and risk management issues far more complex and strategic-game-like at the same time. Similarly, we have gained increased experience in defining, measuring, valuing and managing risks that result from the particular environment that supply chains create. Increasingly, there is a felt need for convergence between the traditional tooling of industrial-logistics and the economic realities of supply chains operating on a global scale. This book provides students in logistics, risk engineering and economics as well as business school graduates the means to model and analyze some of the outstanding issues currently faced in managing supply chains.

The growth and realignment of corporate entities into strategic supply chains, global and market sensitive, are altering the conception of operations modeling. Now far more strategic and sensitive to external events and to their externalities, they require new avenues of research. There is a need to rethink and retool traditional approaches to operations logistics and technology management so that these activities will be far more in tune with an era of global, cross-national supply chains.

Today, supply chains are an essential ingredient in the quest for corporate survival and growth. Operations strategy in supply chains have mutated, however, assuming ever-expanding and strategic dimensions and augmenting appreciably the operational complexity and risks that modern enterprises face when they operate in an interdependent supply chain environment.

These operational facets imply a brand new set of operational problems and risks that have not always been understood or managed. Supply chain managers have thus an important role to assume by focusing attention on

these operations and risks and in educating corporate managers about what these operation problems and their risks imply.

Our purpose in this book will be to consider these problems in depth and to draw essential conclusions regarding their management in supply chains. For example, traditional operational problems (such as inventory control, quality management and their like) are expressed in a strategic and intertemporal manner that recognizes the complexity and the interdependency of firms in a supply chain environment. Examples that highlight our concerns and how to deal technically with these problems will be extensively used.

The book is directed necessarily towards advanced undergraduate students but will be made accessible to students, including those in operations engineering, who have a basic understanding of mathematical tools such as optimization, differential equations and some elements of game theory. When necessary, the book will utilize appendices to review basic mathematical tools, emphasizing their application rather than the theoretical underpinnings. Similarly, a number of computer programs will be used for calculations, bridging the gap between theory and practice.

The book consists of three areas, each intimately dependent on one another, each emphasizing important facets of supply chains management operations. These include:

- Supply Chains and Operations Modeling and Management
- Intertemporal Supply Chains Management
- Risk and Supply Chain Management

The first area provides both traditional static and discrete-time models and their gradual extension to a supply chain environment, highlighting the new concerns of the supply chain environment. In addition, it emphasizes both one- and two-period problems while in the second area, we address essentially inter-temporal problems as differential games. The differential games are presented as natural continuous-time extensions of the corresponding static models so that the effect of various types of dynamics on supply chains may be assessed and insights gained. The third area deals with risk and supply chains as well as with numerous applications to the management of quality in a supply chain environment and in managing interdependent (both in substance and in decision-making) operations. In this sense, the book highlights and resolves some important problems that address directly the needs and the complexity of supply chain management in a tractable and strategic setting.

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Supply Chain Games: Operations Management and Risk Valuation

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