



Interfaces

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

Book Reviews

Benjamin Lev,

To cite this article:

Benjamin Lev, (2010) Book Reviews. Interfaces 40(2):163-168. <https://doi.org/10.1287/inte.1090.0480>

Full terms and conditions of use: <https://pubsonline.informs.org/Publications/Librarians-Portal/PubsOnLine-Terms-and-Conditions>

This article may be used only for the purposes of research, teaching, and/or private study. Commercial use or systematic downloading (by robots or other automatic processes) is prohibited without explicit Publisher approval, unless otherwise noted. For more information, contact permissions@informs.org.

The Publisher does not warrant or guarantee the article's accuracy, completeness, merchantability, fitness for a particular purpose, or non-infringement. Descriptions of, or references to, products or publications, or inclusion of an advertisement in this article, neither constitutes nor implies a guarantee, endorsement, or support of claims made of that product, publication, or service.

Copyright © 2010, INFORMS

Please scroll down for article—it is on subsequent pages



With 12,500 members from nearly 90 countries, INFORMS is the largest international association of operations research (O.R.) and analytics professionals and students. INFORMS provides unique networking and learning opportunities for individual professionals, and organizations of all types and sizes, to better understand and use O.R. and analytics tools and methods to transform strategic visions and achieve better outcomes. For more information on INFORMS, its publications, membership, or meetings visit <http://www.informs.org>



Book Reviews

Benjamin Lev

College of Management, FCS, The University of Michigan–Dearborn, Dearborn, Michigan 48126,
blev@umich.edu

In *Book Reviews*, we review an extensive and diverse range of books. They cover theory and applications in operations research, statistics, management science, econometrics, mathematics, computers, and information systems. In addition, we include books in other fields that emphasize technical applications. However, we do not review software. To submit a book for review, please send it to me at the above address. Although we cannot review all books because of space limitations, we do list all books that we receive. We commission all book reviews and do not accept unsolicited reviews. To become a reviewer, please send me your name, address, and specific areas of expertise. We encourage readers to suggest books for review or to ask publishers to send copies of such books.

The authors or editors of books that we review in this issue are Narendra Agrawal, Stephen A. Smith, Shashi K. Mishra, Giorgio Giorgi, and Jayashankar M. Swaminathan.

AGRAWAL, NARENDRA, STEPHEN A. SMITH, EDS. 2009. *Retail Supply Chain Management: Quantitative Models and Empirical Studies*. Springer, New York. 327 pp. \$129.00.

Retailers are the end points of a supply chain in which products and customers meet and the revenue is generated for the entire supply chain, thus requiring good management of retailers and retail supply chains. The objective of *Retail Supply Chain Management: Quantitative Models and Empirical Studies* is to help retail supply chain decision makers address this management issue.

The book comprises 11 chapters. They cover empirical studies, specific analytical studies, and literature reviews of retailer supply chain issues—including emerging issues. The first chapter provides a detailed description of the book's contents, including empirical studies of retail supply chain practices. The second chapter describes supply chain practices and structures at two major companies in the home furnishings sector. The chapter authors' objective is to illustrate possible unsolved analytical problems and the complexity of supply chain structures in practice. Chapter 3 discusses an empirical statistical analysis of firm size and sales growth rate on one of the most important retail-sector performance measures—inventory-turnover ratio; the analysis uses publicly

available data from financial statements of a large number of companies and retailers.

In Chapter 4, research on the role of execution in managing product availability is reviewed. The chapter's authors focus specifically on the effect of execution on product-availability problems through inventory-record inaccuracy and misplaced products. They summarize the inventory-management research by explicitly considering these effects.

Chapter 5 reviews current practices and problems of a new retailing concept: category captainship, which the authors define as retailers outsourcing the management of a group of products in a category to a "chosen supplier on whom they rely for strategic recommendation and insights" (p. 79). The authors discuss types of category captainship, current industry practices, academic literature, advantages and concerns surrounding this issue, and future research directions.

Chapters 6–9 address two major problems facing retailers: assortment (i.e., the selection of products to be sold in a store) and the related inventory problem. Chapter 6, which reviews assortment-planning research, includes both theoretical studies and current industry practices. The authors start with demand models and review the optimization-based approaches, estimation procedures, and current industry applications. In Chapter 7, a model is presented to

solve an instance of an assortment-planning problem. The authors explicitly consider consumer substitution behavior and modify the objective function to include the long-term costs of stocking out. Chapter 8 discusses assortment planning, which assumes that customers are heterogeneous in their preferences, and uses a multinomial logit model to compute customers' joint probabilities of retailer choice and product choice. Chapter 9 covers a related problem: inventory management given the assortment decision. It gives a detailed review of multilevel inventory models, focusing on the papers that address periodic review systems published after 1993 but excluding very specific models that are not typical of retail inventory management, such as serial systems and deterministic demand.

Chapters 10–12 cover demand management in the retail sector—by offering rebates or markdowns, retailers can modify the demand to their advantage. Chapter 10 addresses rebates. Using a game-theoretic setting, the authors analyze and compare manufacturer-to-retailer and manufacturer-to-consumer rebates and their effects on the supply chain. Chapters 11 and 12 discuss end-of-season inventory pricing. Chapter 11 illustrates a model to find the optimal clearance-pricing strategies for retailers for whom the demand depends on time, current price, and inventory level. Chapter 12 shows a markdown competition model between two retailers with a given inventory level. The retailers in this model must decide when to mark down, given their own inventory levels and their competitors' actions up to this time.

The book reflects the immense experience of Narendra Agrawal and Stephen A. Smith with retail supply chains. They have collected the most relevant and useful topics in the field, covering both traditional and long-studied issues and emerging trends. Academic researchers can use the book as a reference or a starting point for additional research. People in the supply chain community can use the models to develop their own models and software. I highly recommend this book to all who are engaged in retail supply chain management.

Ozlem Bilginer

Stanford University, Stanford, California 94305,
ozlem@stanford.edu

MISHRA, SHASHI K., GIORGIO GIORGI. 2008. *Invexity and Optimization*. Springer-Verlag, Heidelberg, Germany. 266 pp. \$129.00.

Invexity and Optimization is the 88th volume in a series of books that Springer-Verlag has published on nonconvex optimization and its applications. This series includes monographs on up-to-date algorithms for nonconvex problems and applications of such problems. In this volume, the authors address invex functions and discuss their applications in solving optimization problems.

The invex function is an importation generalization of convex functions. During the past century, the convexity of functions or sets has been the subject of much research; to a great extent, this research resulted from the development of mathematical programming, which has established optimality conditions, duality, and related algorithms that are principally used to optimize convex functions over convex feasible regions. However, such convexity assumptions are not always satisfied by practical problems. Therefore, since De Finetti (1949) first introduced quasi-convex functions, many researchers have defined and studied the generalized convexity. Generalized convex functions often preserve some of the valuable properties of convex functions. The invex functions that this monograph addresses are a particular class of generalized convexity, initially introduced by Hanson (1981) for differentiable functions $f: X \rightarrow R$, X an open set of R^n , for which there exists some function $\eta: X \times X \rightarrow R^n$ such that $f(x) - f(y) \leq \eta(x, y)^T \nabla f(u)$, $\forall x, u \in X$. The invex functions generalize the convex functions by replacing the linear term $(x - u)$ by an arbitrary vector-valued function $\eta(x, y)$, which is also called a "kernel." It holds the property that all stationary points of an invex function are global minimizers, leading to many applications in optimization theory and related fields.

The objective of this book is to present an overview of the invexity theory and its application in solving various types of optimization problems, static and dynamic, with single-valued objective functions and vector-valued objective functions. The book, which is based on research performed over the last several decades, includes some new results.

The authors assume that the reader has a basic familiarity with convex analysis and linear and nonlinear programming. Therefore, they introduce basic

notions and preliminaries in the beginning of the book, thus making the rest of the book easy to understand. In each chapter, they present theories, examples, and applications in a precise and concise manner, clearly sketching proofs with references to their details; they also exhibit order and clarity in illustrating theoretical topics.

The book's eight chapters could be divided into two main parts. The first part introduces basic definitions and properties of invexity, its link to generalized monotonicity, and its extensions to nondifferentiable functions. In the second part, the authors explain applications of invexity in solving nonlinear programming, multiobjective programming, and variational and control problems.

Chapter 1 introduces the topic of invexity by demonstrating that some nonconvex functions, such as the quasi-convex functions (De Finetti 1949), can share valuable properties of convex functions. Based on this, one can generalize the definition of convexity to define invex functions for differentiable functions (Hanson 1981) by introducing the kernel function. Because invex functions can be generated by applying a differentiable injective domain transformation to a convex function, Craven (1981) coined the term "invex" as a contraction of "invariant convex."

In Chapter 2, the authors explain the definition of invexity for differentiable functions. They analyze both restricted invexity and pointwise invexity. They also compare invexity with other classes of generalized convex functions and show the relationships of invexity with domain and range transformations. In the last section of this chapter, they examine the question of the continuity of the kernel function.

Chapter 3 studies those functions f with both f and $-f$ pseudo-invex and explains the links between invexity and generalized monotonicity. Chapter 4 studies various extensions of invexity for nondifferentiable functions, including preinvex functions, Lipschitz invex functions, and other types of nonsmooth invex functions. Chapter 5 discusses the role of invexity in nonlinear programming. The authors illustrate the use of invexity for necessary and sufficient optimality conditions, discuss a sufficient condition for invexity on η -pseudolinear programs, and examine the links between invexity and duality theory. Finally, they discuss second and higher-order invexity and study saddle points, optimality,

and duality for invex functions that are not necessarily differentiable.

Chapter 6 discusses the multiobjective programming problems that involve invex and generalized invex functions. Optimality conditions and various types of duality are established for multiobjective programming problems. Nonsmooth multiobjective programming problems are studied on abstract space. The last two sections of this chapter discuss multiobjective composite programming problems under invexity and multiobjective symmetric duality relations, respectively.

Chapter 7 studies optimization problems in infinite dimensional normal spaces, including variational and control problems. In §7.1, the authors illustrate optimality and duality results for scalar variational problems; in §7.2, they study multiobjective variational problems involving invexity; in §7.3, they consider single-objective control problems; and finally, in §7.4, they look at multiobjective control problems with invex functions.

In the final chapter, Chapter 8, they discuss applications of invexity for special functions and problems, such as problems that involve quadratic functions or fractional functions, a class of nondifferentiable problems, and problems of nondifferentiable symmetric duality and invexity.

This book is a classic textbook and a comprehensive reference. It will be extremely useful to graduate students and scientists who are interested in nonlinear programming, operations research, and related fields. In addition, because this book is intended for those who are familiar with convex analysis, linear programming, and nonlinear programming, Bertsekas et al. (2003) would be a good companion book.

References

- Bertsekas, D. P., A. Nedić, A. Ozdaglar. 2003. *Convex Analysis and Optimization*. Athena Scientific, Belmont, MA.
- Craven, B. D. 1981. Invex functions and constrained local minima. *Bull. Austral. Math. Soc.* **24** 357–366.
- De Finetti, B. 1949. Sulle stratificazioni convesse. *Annali di Matematica Pura ed Applicata* **30**(1) 173–183.
- Hanson, M. 1981. On sufficiency of the Kuhn-Tucker conditions. *J. Math. Anal. Appl.* **80**(2) 545–550.
- Zhou Xu
Department of Logistics and Maritime Studies, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, zhou.xu@inet.polyu.edu.hk

SWAMINATHAN, JAYASHANKAR M., ED. 2009. *Indian Economic Superpower: Fiction or Future?* World Scientific Publishing Company Pte. Ltd., Hackensack, NJ. 270 pp. \$42.00.

In a departure from the previous 40 years of controls and licenses, India began liberalizing its economy in 1991. The Indian economy has since been growing at a rapid pace; domestic demand has increased, and the availability of goods and services has expanded similarly. The future economic outlook is optimistic and its growth potential offers tremendous opportunity for business. Domestic as well as international firms are jostling for a toehold in this market. However, many challenges exist. The infrastructure is poor, government policies are only partially liberalized, and competition is intense; in addition, customers are discerning and value-conscious, and the country is economically and geographically diverse.

According to Swaminathan, “A sea change is taking place in India today. Just like the sea, from a distance the Indian economy appears to be calm and smooth. However, there are rapid and turbulent changes happening at [its core]...whose power and energy are not perceived till one experiences and studies it carefully” (pp. 2–3). With this motivation, Swaminathan and several other authors analyze the growth of various sectors of the Indian economy during the past two decades. The sectors include business process outsourcing, software, manufacturing, logistics, aviation, and health-care delivery. Each chapter focuses on one industry sector. The chapters are written by leading experts and scholars in the respective industries. Several chapters present original research and captivating case studies.

Many chapters discuss the unique path to growth that the Indian economy has taken—a path that differs from that taken by other developed and developing nations. Firms are adopting innovative business models to progress within the multifaceted constraints imposed on them because of policy and the nations’ diversity. Thus, the economy is characterized by “islands of excellence accompanying a general improvement on almost all parameters” (p. 106). The book describes these islands of excellence and analyzes their antecedents in several sectors.

The book’s chapters are structured in a uniform way. In each chapter, authors describe the historical

context for an industry, the current trends, and the future outlook. They back their analyses with statistics and examples. For example, in Chapter 4, authors Ananth Iyer, Peter Koudal, Haritha Saranga, and Sridhar Seshadri describe the Indian manufacturing sector. Prior to liberalization, manufacturing firms in India were governed by licensing controls on technology and (based on) scale, high tariffs, and restrictions on industries, in which production was reserved for the small-scale sector or public sector. Government policy allowed process patenting and required firms to “import and adapt technology” (pp. 86–87). This caused firms in some industries, e.g., pharmaceuticals, to develop capabilities for in-house research and development (R&D). After liberalization, these industries rapidly invested in more ambitious R&D to compete in the global market. Prior to liberalization, firms in other industries chose to compete through product differentiation because they could not exploit scale economies. Moreover, they chose to locate close to customer markets. After liberalization, the growth of these firms was varied, depending on the nature of the industry and market growth.

In Chapter 5, Pankaj Chandra and Nimit Jain give an insightful account of the logistics sector in India. According to these authors, this sector is fragmented with many small-scale regional players because of historical reasons as well as India’s geographical diversity, many regional tariffs, and poor physical infrastructure. It is now being transformed through innovation, policy changes, and investment. Large domestic firms, such as Reliance and Bharti, are participating in the creation of the logistics infrastructure. Multinational firms are acquiring Indian firms and offering third-party logistics (3PL) solutions. Smaller firms are using India’s strong telecommunications backbone to circumvent the disadvantages of their scale and manage across a dispersed and complex logistics network. Others have grown from their small size to provide end-to-end logistics solutions in the country.

In Chapter 7, Ravi Anupindi, Madhuchhanda Das Aundhe, and Mainak Sarkar describe the health-care sector in India. They inform us that this sector boasts a vast public sector infrastructure that is facing problems because of a shortage of clinical manpower and underinvestment by the government. Although

an excellent private sector enterprise in health care exists, it is mainly in the urban areas. Thus, although rural areas have lower incomes, higher incidences of disease, and greater population, they face an acute undersupply of health-care facilities. Anupindi et al. describe how telemedicine, through a combination of public and private sector initiatives, holds promise to mitigate the problems of access, affordability, and quality in the delivery of rural health care.

Similarly rich stories are described in other chapters of the book. In Chapter 2, Vivek Kulkarni brings his vast experience in business process outsourcing to bear on the opportunities and challenges of outsourcing to India and provides numerous examples. In Chapter 3, M. S. Krishnan, Narayan Ramasubbu, and Ramanath Subramanian describe how Indian software firms became some of the strongest in the global information technology industry. They explain how these firms are changing their business models from executing large-scale projects focusing on value-added products. In Chapter 6, John Kasarda and Rambabu Vankayalapati describe the growth of the aviation sector after it was opened up for private sector airlines; they also discuss the development and management of airports after privatization. In Chapter 8, Sridhar Balasubramanian and Prabhudev Konana explain various challenges that foreign firms face in entering India. Their first caveat: do not mistake market growth potential for profit potential—the Indian market is brutally competitive. In the last three chapters, Swaminathan describes his future outlook for the economy and reflects on the effect of the global economic crisis on the growth and competitiveness of the Indian economy.

Although the chapters in the book focus on different industries, they have common and interesting themes. Many industries are characterized by a large number of small-scale firms, competition, heterogeneity, and customer focus on value. As we discover throughout the book, these characteristics are related to each other. For example, small scale implies poor logistics capabilities, which prevents firms from growing large. A second theme is that of innovation in serendipitous ways. For example, AMUL developed a large-scale cooperative enterprise that leverages rural dairy farmers (p. 129). Telemedicine has been evolving with the participation of private sector hospitals, universities, information technology firms, and

the Indian Space Research Organization (p. 175). The Dabbawallahs of Mumbai provide an efficient and high-quality logistics network through an organic, decentralized, and low-technology operation (p. 131).

India is a vast country with many developmental problems. Finding areas of underdevelopment and offering prescriptions are easy. However, implementing solutions is considerably harder. This book is refreshing in that it does not go down this clichéd path. Its outlook is positive. It focuses on firms that have succeeded within their physical environment by developing a symbiotic relationship with it and now offer examples of excellence to the world. Thus, the book describes how the historical development and problems of India have led to a unique path to development. In recent years, many authors, including journalists, economists, scholars, and industry experts, have written about the Indian economy. This book, which is based on years of research by the contributing authors, provides an in-depth analysis of several industrial sectors of this economy.

It is worth mentioning that this book does not cover several industrial sectors of India. These include some of the most advanced sectors of the economy, e.g., consumer packaged goods, financial services, telecommunications, and information broadcasting. It does not cover agribusiness, the biggest source of employment for the rural population. Telecommunications is briefly mentioned as an enabling sector for advances in telemedicine, logistics, and software. One would expect that the message of the book, that of innovation in the face of constraints and partial deregulation, would also extend to these environments.

For several years, Swaminathan taught an MBA course at the University of North Carolina (UNC); this course, in which he led students on a field-study trip to India to get first-hand experience on its economy and to meet some of the leaders in its development, motivated him to write this book. He writes it in an engaging and passionate style. He introduces each chapter with a “Connecting Wave” essay and summarizes the chapter to motivate readers. These essays are sprinkled with personal experiences and reflections of Swaminathan and his students over time. When reading the book, one wishes to go along with them on their exciting journeys to India.

This book would be useful to managers and executives of firms that are interested in doing business in

India, to MBA students, and as reading material for a course on emerging markets, perhaps in combination with Lee and Lee (2007). It could also form the basis for a course focused solely on Indian businesses. Its chapters provide rich case studies and contextual information that could be valuable in future research.

Reference

Lee, H. L., C.-Y. Lee, eds. 2007. *Building Supply Chain Excellence in Emerging Economies*. Springer, New York.

Vishal Gaur

The Johnson School, Cornell University, Ithaca, New York 14853, vg77@cornell.edu

Books Received for Review

Baker, K. R., D. Trietsch. 2009. *Principles of Sequencing and Scheduling*. John Wiley & Sons, Hoboken, NJ. 493 pp. \$110.00.

Box, G. E. P., A. Luceno, M. del Carmen Paniagua-Quinones. 2009. *Statistical Control by Monitoring an Adjustment*, 2nd ed. John Wiley & Sons, Hoboken, NJ. 333 pp. \$99.95.

Chiong, R., ed. 2009. *Nature-Inspired Algorithms for Optimization*. Springer, New York. 514 pp. \$229.00.

Cox, L. A., Jr. 2009. *Risk Analysis of Complex and Uncertain Systems*. Springer, New York. 436 pp. \$135.98.

Field, M., M. Golubitsky. 2009. *Symmetry in Chaos: A Search for Pattern in Mathematics, Art, and Nature*, 2nd ed. Society for Industrial and Applied Mathematics, Philadelphia, 199 pp. \$59.00.

Hoff, P. D. 2009. *A First Course in Bayesian Statistical Methods*. Springer, New York. 270 pp. \$69.95.

Kamath, C. 2009. *Scientific Data Mining: A Practical Perspective*. Society for Industrial and Applied Mathematics, Philadelphia, 286 pp. \$71.00.

Lasserre, J. B. 2009. *Linear and Integer Programming vs. Linear Integration and Counting: A Duality Viewpoint*. Springer, New York. 168 pp. \$69.95.

Liu, B. 2009. *Theory and Practice of Uncertain Programming*. 2nd ed. Springer, New York. 202 pp. \$149.00.

Meisel, F. 2009. *Seaside Operations Planning in Container Terminals*. Springer, New York. 168 pp. \$119.00.

Nakayama, H., Y. Yun, M. Yoon. 2009. *Sequential Approximate Multi-objective Optimization Using Computational Intelligence*. Springer, New York. 197 pp. \$139.00.

Erratum

In the [November–December](#) 2009 issue of *Interfaces*, the book review of *Handbook of Marketing Decision Models* edited by Berend Wierenga incorrectly listed two authors for the review. The sole author of the review was John Roberts of the University of New South Wales and London Business School.