



Operations Research

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

The Analyst's Bookshelf

To cite this article:

(1972) The Analyst's Bookshelf. Operations Research 20(6):1196-1200. <https://doi.org/10.1287/opre.20.6.1196>

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.

© 1972 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>

The Analyst's Bookshelf

Reviews

M. SAKAROVITCH, *Notes on Linear Programming*, Van Nostrand-Reinhold, New York, N.Y., 1971, 175 pages, \$5.95 (\$3.95 in paper).

W. ALLEN SPIVEY and ROBERT M. THRALL, *Linear Optimization*, Holt, Rinehart and Winston, New York, N.Y., 1970, 530 pages, \$15.75.

IN THE LAST decade or so, a multitude of books on linear programming has been displayed in book stores all over the world, and this in spite of the excellent treatise by GEORGE DANTZIG. This is, of course, not surprising, because linear programming has become a standard subject that provides a student with his first rigorous tools in a variety of management-science disciplines ranging from economics to mathematical programming: many instructors then designed tailor-made LP courses that often led to the publication of a textbook.

The two books examined here are no exception, but they essentially differ from one another in that SAKAROVITCH's text is merely a written version of the corresponding undergraduate course, while SPIVEY AND THRALL's book is more mature and ambitious.

In fact the first resembles in every way the lecture notes on linear programming circulating in most universities where the instructor has opted for an individual exposition of the simplex method (relation to linear algebra, geometric and economic interpretation, parametric and duality theory) rather than for the use of a standard textbook (like SIMONNARD's *Linear Programming*). Whenever he found it adequate, Sakarovitch has wisely adopted examples, theoretical results, or notations from previously published texts (Dantzig, for instance) and he presents us with a good adaptation, to his particular didactic needs, of the existing mass of knowledge available in the linear programming community. These 'notes on LP' are intended for undergraduate students with little knowledge of mathematics (one year of calculus). The book consists of some 170 typewritten pages printed by photo-offset process.

The second book is a much more complete presentation of a constructive approach to linear programming. Although it is not primarily intended for mathematicians, it is rigorous and based on the "pedagogical philosophy that mastery of mathematical programming is most rapidly achieved by most students by a multi-layered approach in which a topic may be explored via a special case and then attacked in more and more generality until finally the research frontier is reached. This approach has in its favor the feature that a student who stops short of the most general theory still may have achieved a usable introductory understanding of many important topics."

The early chapters introduce the reader to linear programming with simple models and practical examples, using extensively geometrical intuition as well as elementary algebra and common sense. The list of modeling exercises contains some excellent practical problems of moderate size that are used in later chapters in connection with more sophisticated aspects of LP (such as post-optimality analysis, for instance).

In the intermediate layer, one finds a constructive development of the simplex method and a separate treatment for the assignment problem. The application of the simplex method is illustrated by practical examples; the method is also used to prove some theoretical results, such as Farkas' Lemma.

Special topics of particular importance (duality, parametric linear programming, post-optimality, decomposition, and upper-bounding techniques) complete the presentation of the theory of the simplex algorithm. The assignment problem and the Graves-Thrall algorithm for capacitated transportation problems are also discussed.

Another attractive feature of this book is found in the last 130 pages where two appendices, one on "Foundations, Sets, and Functions" and the other on "Linear Algebra" have been added; they constitute a well designed exposition of the mathematical notions that are relevant to linear programming.

As announced in the preface, the book is entirely devoted to linear programming and contains no chapter on integer, quadratic, or other nonlinear programming topics.

The book is quite adequate for graduate students attending an intermediate to advanced LP course. A good mix of theoretical and practical exercises can be found at the end of each chapter (including the appendix) and some applications of relatively large size are also presented. This should perhaps have been an incentive for the authors to include a chapter on computer and software considerations linked with large-scale linear programs; it would be very desirable indeed that a textbook on linear programming appearing this late in the game contain more information on 'open questions' and recent developments of the simplex method, concerning numerical stability or sparseness, for instance.

CLAUDE-ALAIN BURDET
Carnegie-Mellon University

CHAIHO KIM, *Introduction to Linear Programming*, Holt, Rinehart and Winston, New York, N.Y., 1971, 544 pages, \$14.95.

GERALD E. THOMPSON, *Linear Programming: An Elementary Introduction*, The Macmillan Company, New York, N.Y., 1971, 384 pages, \$10.95.

IN HIS PREFACE, CHAIHO KIM states that his text is designed "for those who wish to explore in detail the relation between the mathematical foundations of linear programming and the management decision process for the resource allocation problem." The book maintains this balance and should be able to satisfy a wide range of students and practitioners. It is organized well with suitable illustrative problems and with ample problems for solution at the end of each chapter.

The part of the book titled "Basic Mathematical Concepts" provides an excellent introduction to vectors, matrix operations, and convex sets. The concepts are treated with sufficient depth to provide a good introduction to those with a limited background. The second part of the book starts out with models and applications. The author provides the standard problems of product-mix, blending, and planning. The use of diagrams in model formulation are helpful and again the problems at the end of the chapter are abundant although not very challenging. The more mathematically inclined may get impatient with the lengthy discussion in the chapter titled "Geometric and Economic Interpretation." How-

ever in a textbook directed to a diverse group this is not out of place and should give students a good 'feel' for linear programming. The next chapter, which treats the simplex method as a computational procedure, is compact and presents the basic algebraic approach of transformations. This chapter may come as a rude shock to the reader who may have become used to the conversational mood of the previous chapters. In the computational procedure, artificial variables and the two-phase method are discussed rapidly but with illustrative examples that clarify the procedures. The chapters on duality and the economic implications of duality, as well as on sensitivity analysis, are excellent. Together with the chapter on parametric programming, these three chapters provide one of the best comprehensive expository treatments that this reviewer has seen in any single linear programming textbook. In another chapter, the author gives a good treatment of computational as well as managerial and organizational aspects of decomposition in a matter-of-fact version of DANTZIG's "Decomposition Principle, Animated." The revised simplex method is placed in a chapter towards the end of the text and has numerical examples that illustrate various aspects of the method. Under "Other Variants of the Simplex Method" the author treats resolution of degeneracy, and upper and lower bounding, as well as WOLFE's composite simplex algorithm. The last chapter is devoted to a conventional treatment of the transportation and transshipment problems.

To summarize, Kim's *Introduction to Linear Programming* sets out with an ambitious goal of trying to satisfy a wide range of readers and accomplishes this difficult task rather well.

In contrast, the appearance of GERALD THOMPSON's *Linear Programming: An Elementary Introduction* appears to be as redundant as the redundancy inherent in the title. There is nothing new or novel about the approach in this text. Most of the material can be found in one or two chapters of the classic *Linear Programming and Economic Analysis* by DORFMAN AND SAMUELSON or in BAUMOL's *Economic Theory and Operations Analysis*.

In addition to the basic treatment of linear programming from an economic viewpoint, the author attempts to cover simplex based on nonlinear programming methods, integer programming, and linear programming under uncertainty.

The only target audience for this book may be a nontechnical one that wishes to get a glimpse of a powerful analytical tool.

JULIUS SURKIS
Columbia University

KATHLEEN TRUSTRUM, *Linear Programming*, Routledge and Keegan Paul, Boston, Mass., 1972, 88 pages, \$1.25 (paper).

C. VAN DE PANNE, *Linear Programming and Related Techniques*, North-Holland Publishing Company/American Elsevier, New York, N.Y., 1971
364 pages, \$15.00 (\$10.50 in paper).

THESE TWO TEXTS complement each other. While the first presents a concise (83 pages) mathematical treatment of linear programming including convex sets, duality, the transportation problem, and game theory, the second stresses applied aspects of linear programming, such as computer implementation and applications to business and economics.

Among the qualities of KATHLEEN TRUSTRUM's book are its straightforward

proofs of such difficult theorems as the minimax and separating hyperplane theorem, her overall approach to the geometric aspects of the linear programming problem, and her early introduction of duality accompanied by a clear explanation of its conceptual significance. A minor criticism is that, in achieving brevity, adequate elucidation was occasionally sacrificed. For example, even a student familiar with linear algebra would profit from an explanation of the statement that $\lambda \bar{u}_1 + (1 - \lambda) \bar{u}_2 = \bar{u}$ for $0 \leq \lambda \leq 1$ represents the line segment joining $\bar{u}_1$ and $\bar{u}_2$. Nor will he necessarily be acquainted with even the basics of matrix calculus. In addition, certain topics were given short shrift. The treatment of the revised simplex and dual simplex techniques was skimpy, and peripheral material (network theory, economic applications, and integer programming) was not included. Nevertheless, this book serves as an excellent outline of linear programming with the stipulation that its material be supplemented and amplified at points by either the teacher or the student.

The second text is directed at students of economics and business administration. It is comprehensive in its coverage of sensitivity analysis, economic, network, and transportation models, and branch-and-bound techniques. The author succeeds in providing a linear-algebra-free presentation of linear programming. However, a prerequisite to student comprehension is the ability of the latter to concentrate appropriately on a rather verbose and intricate treatment. It occurs to me that a simple matrix approach, explained properly, might be more readily comprehensible, *especially* to less mathematically-sophisticated students. If, however, it is desired to emphasize the technique and its applications exclusively, why bother with mathematical justifications at all? An intuitive explanation would suffice. At any rate, most students using the text in its present form will achieve no more.

ABRAHAM ENGELBERG
BEN TABBAI 4
Jerusalem, Israel

PHILIP KOTLER, *Marketing Decision Making: A Model Building Approach*, Holt, Rinehart and Winston, New York, N.Y., 1971, 720 pages.

THIS BOOK IS another fine example of the author's talent for writing a very comprehensive textbook in an exceptionally clear and interesting fashion. It is an extensive, almost encyclopedic, review of quantitative techniques for solving marketing problems.

The author has constructed the book with a logical order and in a most understandable fashion. His initial chapters contain simplifying assumptions that are systematically peeled away in later chapters by means of the addition of increasingly complex parameters. The book is divided into four parts. Part one is concerned with "Macromarketing Decision Theory," which is subdivided into: aggregate sales response to a single marketing instrument; multiple marketing instruments; competitive strategy; carry-over effects; multiple territories; multiple products; joint marketing, and production planning company goals; and uncertainty. The second part is concerned with "Micromarketing Decision Models." This section is subdivided into distribution decision models; price decision models; sales force decision models; and advertising decision models. The third part is concerned with "Models of Market Behavior." These are mathematical representations of buyers' behavior for established products, brand shares, and new products. The

final part of the book deals with the problems of operationalizing quantitative theory into the decision process of practicing management. Specifically discussed are the marketing information system; the planning and control process in the marketing organization; implementing management science in marketing; and developing the corporate marketing model.

The book's major problem stems from its encyclopedic nature. Since so many techniques and models are discussed, many of them are not sufficiently explained for the reader to attempt to use them in marketing practice without completing further research.

One example of this problem is the pricing decision section, which deals with competitive bidding models. Kotler's explanation of competitive bidding models is operationally insufficient in that he fails to discuss how one deals with varying numbers of competitors. He also fails to give an extensive enough explanation of how to obtain information concerning competitors' behavior, and, once this information has been obtained, how to calculate the probability that a given bid will be lower than that of the competitor. Furthermore, the author merely mentions the existence of other game-theory models for dealing with the competitive bidding process, but does not even attempt to explain any of them.

The book will be most useful for those individuals with backgrounds in both marketing and operations research. As a text book, it is suitable for graduate students in marketing who have strong quantitative backgrounds or for management-science students who have some basic knowledge of marketing processes and problems.

The book may well have its greatest value for the management scientist, market researcher, analyst, or economist who is called upon to analyze, explain, justify, or predict the outcome of a particular action or expenditure affecting marketing effectiveness.

This book is far more comprehensive and for the most part better written and organized than the other recent books about quantitative decision making in marketing. For these reasons it is expected that this book may well become a standard reference for serious students and practitioners of marketing management.

RICHARD W. RAHN

Polytechnic Institute of Brooklyn

Books Received

- DONALD R. BARR AND PETER W. ZEHNA, *Probability*, Brooks/Cole Publishing Co., Belmont, Cal., 1972, 414 pages, \$13.95.
- F. BAUER, P. GARABEDIAN, AND D. KORN, *Supercritical Wing Sections*, Springer-Verlag, New York, N.Y., 1972, 211 pages (paper).
- JOHAN G. F. BELINFANTE AND BERNARD KOLMAN, *A Survey of Lie Groups and Lie Algebras*, Society for Industrial and Applied Mathematics, Philadelphia, Pa., 1972, 164 pages.
- ELWOOD S. BUFFA, *Operations Management: Problems and Models*, John Wiley & Sons, New York, N.Y., 1972, 762 pages, \$12.95.
- R. E. BURKARD, *Methoden der Ganzzahligen Optimierung*, Springer-Verlag, New York, N.Y., 1972, 292 pages, \$21.90 (paper).

- ALVIN W. DRAKE, RALPH L. KEENEY, AND PHILIP M. MORSE, editors, *Analysis of Public Systems*, MIT Press, Cambridge, Mass., 1972, 532 pages, \$14.95.
- A. S. C. EHRENBURG, *Repeat-Buying—Theory and Applications*, North Holland/American Elsevier Publishing Co., New York, N.Y., 1972, 322 pages, \$14.50.
- FREEMAN F. ELZEY, *Business and Economic Statistics: A Programmed Introduction*, Brooks/Cole Publishing Co., Belmont, Cal., 1972, 419 pages, \$4.50 (paper).
- W. EVERLING, *Exercises in Computer Systems Analysis*, Springer-Verlag, New York, N.Y., 1972, 184 pages, \$5.70 (paper).
- W. J. FABRYCKY, P. M. GHARE, AND P. E. TORGERSON, *Industrial Operations Research*, Prentice-Hall, Englewood Cliffs, N.J., 1972, 578 pages.
- HANS GEBELEIN, *Statistische Modellbau- und Untersuchungstechnik*, Verlag Berliner Union GMBH, Stuttgart, West Germany, 1972, 223 pages (paper).
- MURRAY A. GEISLER, director, *Proceedings of the NATO Conference on the Applications of Operational Research to Transport Problems, 14-18 August, 1972*, Western Periodicals Co., North Hollywood, Cal., 1972, 503 pages (paper).
- I. V. GIRASANOV, *Lectures on Mathematical Theory of Extremum Problems*, Springer-Verlag, New York, N.Y., 1972, 136 pages, \$5.10 (paper).
- R. HENN AND O. OPITZ, *Konsum- und Produktionstheorie II*, Springer-Verlag, New York, N.Y., 1972, 134 pages, \$5.10 (paper).
- S. L. S. JACOBY, J. S. KOWALIK, AND J. T. PIZZO, *Iterative Methods for Nonlinear Optimization Problems*, Prentice-Hall, Englewood Cliffs, N.J., 1972, 274 pages, \$14.00.
- JOHN T. KEMENY AND J. LAURIE SNELL, *Mathematical Models in the Social Sciences*, MIT Press, Cambridge, Mass., 1972, 145 pages, \$10.95.
- J. F. C. KINGMAN, *Regenerative Phenomena*, John Wiley & Sons, New York, N.Y., 1972, 190 pages, \$14.95.
- ROGER E. KIRK, *Statistical Issues—A Reader for the Behavioral Sciences*, Brooks/Cole Publishing Co., Belmont, Cal., 1972, 401 pages, \$5.95 (paper).
- DAVID H. KRAUS, PRANAS ZUNDE, AND VLADIMIR SLAMECKA, *National Science Information Systems—A Guide to Science Information Systems in Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and Yugoslavia*, MIT Press, Cambridge, Mass., 1972, 325 pages, \$12.50.
- F. W. LANCASTER, *Vocabulary Control for Information Retrieval*, Information Resources Press, Washington, D.C., 233 pages, \$17.50.
- RICHARD C. LARSON, *Urban Police Patrol Analysis*, MIT Press, Cambridge, Mass., 1972, 288 pages, \$12.50.
- PETER A. W. LEWIS, editor, *Stochastic Point Processes: Statistical Analysis, Theory and Applications*, John Wiley & Sons, New York, N.Y., 1972, 894 pages, \$17.50.
- J. LOECKX, *Computability and Decidability*, Springer-Verlag, New York, N.Y., 1972, 76 pages (paper).
- JOSEPH D. McEVILLA AND MARLANE GAINOR, *Drug Use Data: Assessment of Terminal Devices Used for Acquisition and Retrieval*, Department of Health, Education and Welfare, DHEW Pub. No. (HSM) 72-3032, U.S. Government Printing Office, Washington, D.C., 1972, 75 pages (paper).
- G. MENGES, *Grundriss der Statistik, Teil I: Theorie*, Westdeutscher Verlag, Opladen, West Germany, 1972, 374 pages, DM 62.- (DM 38.50 in paper).
- NORVAL MORRIS AND MARK PERLMAN, editors, *Law and Crime: Essays in Honor of Sir John Barry*, Gordon and Breach, New York, N.Y., 1972, 257 pages, \$10.50.

- J. M. NORMAN, *Heuristic Procedures in Dynamic Programming*, Manchester University Press, Manchester, England, 95 pages, £2.24.
- RADNOR J. PAQUETTE, NORMAN ASHFORD, AND PAUL H. WRIGHT, *Transportation Engineering—Planning and Design*, Ronald Press Co., New York, N.Y., 1972, 760 pages.
- JOHN R. K. ROBSON, FRANCES A. LARKIN, ANITA M. SANDRETTO, AND BAHRAM TADAYYON, *Malnutrition—Its Causation and Control*, in 2 volumes, Gordon and Breach, New York, N.Y., 1972, 613 pages.
- R. D. ROSS, *Air Pollution and Industry*, Van Nostrand-Reinhold Co., New York, N.Y., 1972, 489 pages, \$18.95.
- SHELDON M. ROSS, *Introduction to Probability Theory*, Academic Press, New York, N.Y., 1972, 272 pages, \$12.50.
- BURT W. RUST AND WALTER R. BURRUS, *Mathematical Programming and the Numerical Solution of Linear Equations*, American Elsevier, New York, N.Y., 1972, 218 pages, \$13.50.
- JAMES E. SCROGGS, *Linear Algebra*, Brooks/Cole Publishing Co., Belmont, Cal., 1972, 248 pages, \$8.95.
- JAMES N. SIDDALL, *Analytical Decision-Making in Engineering Design*, Prentice-Hall, Englewood Cliffs, N.J., 1972, 431 pages, \$14.95.
- GERALD E. THOMPSON, *Statistics for Decisions—An Elementary Introduction*, Little, Brown and Co., Boston, Mass., 1972, 297 pages.
- RAY WILD AND BRYAN LOWES, *The Principles of Modern Management*, Holt, Rinehart and Winston, Ltd., London, England, 1972, 356 pages.

Books for review, reviews and correspondence with respect to *The Analyst's Bookshelf* should be addressed to its Editor, WALTER HELLY, The Polytechnic Institute of Brooklyn, 333 Jay Street, Brooklyn, N.Y. 11201.