Management Science

Book Reviews

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Book Reviews

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In response to the interest expressed by many members of TIMS, we shall list working papers by title and author at the end of the Book Reviews Section. Any interested author of a working paper should send a copy of it to the Book Reviews editor. Any working paper which is received by the editor will be listed without comment. It is hoped that this will provide better communication of the kind of work which is in progress and will permit direct contact among various persons who may be pursuing similar directions in their research.

Three introductions to game theory:

DAVIS, MORTON D., *Game Theory, A Nontechnical Introduction.* New York: Basic Books Inc., 1970, 224 pp., $6.95.

LEVIN, RICHARD I., AND DESJARDINS, ROBERT B., *Theories of Games and Strategies.* Scranton, Pennsylvania: International Textbook Company, 1970, 132 pp., $2.50 (paper).

RAPOPORT, ANATOL, *N-Person Game Theory: Concepts and Applications.* Ann Arbor, Michigan: The University of Michigan Press, 1970, 331 pp., $8.50, ($3.95 paper).

Professor Davis succeeds in his objective of writing a nontechnical introduction to game theory. Written as one of Basic Books' Science and Discovery Series, *Game Theory, A Nontechnical Introduction* discusses the one-person game; finite, two-person, zero-sum games of perfect information; the general, finite, two-person, zero-sum game; utility theory; the two-person, nonzero-sum game; and the n-person game. The author's lucid discussion, employing a minimum of formal mathematics, makes this book an ideal introduction for the general reader.

Theories of Games and Strategies is written for persons who want a clear and understandable yet sound and respectable approach to game theory beyond the introductory level. A brief introductory chapter is followed by a chapter dealing with two-person, zero-sum games where the number of choices open to each player is limited to two. This chapter introduces the concepts of saddle points, pure strategies, mixed strategies, and game value. Chapters Three and Four present a discussion of two-person, zero-sum games in which one of the players has more than two choices while the other player has exactly two choices, and zero-sum, two-person games with no restriction on the number of choices available to each player. These chapters introduce solution methods involving dominance, subgames, and, for larger games, linear programming. Chapter Five introduces nonzero-sum games and discusses the issues involved in cooperation and bargaining, the development of the ideas of status quo points, threat potentials, and security levels. Chapter Six considers n-person games and develops the concept of an equilibrium solution and von Neumann's stable-set solution. Chapter Seven presents a discussion of nonnegotiable games and some psychological concepts of rationality.

Professors Levin and DesJardins have written an attractive textbook for students of business, economics, social science, or those with a limited background in mathematics.

N-Person Game Theory: Concepts and Applications is an attractive and worthy sequel to Professor Rapoport's *Two-Person Game Theory: The Essential Ideas* (University of Michigan Press, 1966). Like the earlier volume, it is addressed to readers with little formal mathematical background, but with an appetite for rigorous analysis of the purely logical structure of strategic conflict situations. The present volume is divided into two parts. Part One is concerned with the basic concepts of n-person game theory, and Part Two discusses applications of the theory to a wide range of problems.

The eleven chapters in Part One discuss the levels of game-theoretic analysis; three-level analysis of elementary games; individual and group rationality; the von Neumann-Morgenstern solution; the Shapley value; the bargaining set; the kernel; restrictions on realignments; games in partition function form; the comparison of n-person theory and two-person theory; and Harsanyi's bargaining model.

Part Two presents a discussion of the application of n-person game theory to various problem situations including small markets (i.e., markets with few buyers and sellers); large markets; voting and elections; symmetric and quota games; coalitions and power; experiments suggested by n-person game theory; a do-it-yourself experiment; and game theory as a tool of the behavioral scientist.

N-Person Game Theory: Concepts and Applications combined with *Two-Person Game Theory: The Essential Ideas* are probably the most attractive and comprehensive introductions to game theory published to date.

WALLDIN, KNUT-ERIK, *Aspects of Operations Research in Theory and Practice.* Uppsala, Sweden: Almqvist and Wiksells, 1969, 233 pp., 50 Kr. (paper).

This attractive short volume contains five case studies and three theoretical papers based on the author's experience over a ten-year period as an operations research consultant to Swedish industry. Part I presents a detailed account of five practical investigations, describing their background, the models employed, and the results achieved. The first case study is based on a survey conducted during the period 1962–1965 for The Swedish Commerical Bank and is concerned with the investment of liquid assets. The objective of this study was to provide the bank with the material for making decisions regarding the investment of liquid assets. The second case study is also concerned with the banking industry. It is a special kind of inventory control problem, the determination of ready cash requirements for local (i.e., branch) offices of a commercial bank. The third case study considers the production and inventory requirements for welding electrodes. The fourth case study involves the development of a sampling plan for auditing expenditure vouchers. The final case study is concerned with the use of queueing theory to construct appointment schedules for the outpatient clinics of Stockholm hospitals. Each case study is skillfully and logically presented.

The second part of this book is devoted to three contributions to theory. The first is a description of two inventory models; the second is a discussion of the use of stochastic models to treat uncertainty; and the third involves the use of variation diminishing transformations in optimization computations.

The author's theoretical contributions are carefully developed, but are not particularly unique. His case studies, however, are excellent. *Aspects of Operations Research in Theory and Practice* would be a highly worthwhile supplementary textbook for any intermediate or advanced course in operations research or management science.

BROWN, REX V., *Research and the Credibility of Estimates: An Appraisal Tool for Executives and Researchers*. Boston, Massachusetts: Division of Research, Graduate School of Business Administration, Harvard University, 1969, 274 pp., $9.00.

This interesting little book should be required reading for every executive who uses the results of sample surveys as a basis for decision-making. Professor Brown argues that executives and others are frequently misled by conventional measures of research accuracy, usually in the direction of overconfidence. He then proposes a research appraisal tool which can be used without technical expertise to plan research or to assess the probable value of variables of direct interest. The proposed methodology comprises a compact array of techniques in a form available for general use both with or without a computer. The principal technique developed is Credence Decomposition (CDC), a version of Bayesian (or Personalist) inference. It is a procedure for splitting a target variable or an estimating error into several components, each of which is subject to a different source of error which can be assessed separately using judgment and/or statistical theory. The proposed procedure is superior to merely using conventional "confidence intervals" which ignore errors other than those due to purely random fluctuations, which may be far more serious, such as faulty measurements or "biased" sample selection.

Parts of the book are difficult to read and at times the author presents too much detail; nevertheless, *Research and the Credibility of Estimates* is well worth reading. The executive with an interest in the planning and interpretation of quantitative research and the research practitioner concerned to meet the executive's needs will find the first five chapters dealing with research appraisal for the executive of particular interest. The last ten chapters are addressed to the technical specialist who may be called upon to actually apply the proposed analytical techniques to specific problems. The procedures described are skillfully illustrated with many interesting examples and case studies. Professor Brown leaves his readers with a new appreciation of the uses and limitations of survey data as a tool for decision-making.

COTTON, DONALD B., *Company-Wide Planning: Concept and Process*. New York: The Macmillan Company, 1970, 235 pp., $8.95.

Not too many years ago, material on Corporate Planning in book form was pretty hard to come by. Now that a good many such books have appeared during the past few years, one notes with interest the diversity of viewpoints and approaches.

Company-Wide Planning: Concept and Process offers a highly structured and intellectualized approach, both in terms of a foundation of business theory and a planning system. It is the product of Don Cotton's personal experiences as consultant to the President at Coca Cola, as Vice President for Corporate Planning at Univis and Investors Diversified Services (I am always grateful for an author's inside industrial experiences), and as a consultant on his own. It also reflects a particular inclination toward a financial/investment point of view. In this sense, Part II concerning a Conceptual Framework is perhaps the strongest and most original aspect of this book. Cotton treats economic theory, ideology, value systems, growth and risk analysis, time, resources and productivity, investment and yield, etc., in scholarly manner.

In the area of the "Planning System" and its relation to corporate line management, Cotton's treatment appears a little doctrinaire. There are good insights into the "painful" nature of planning—and the price to be paid in organizational "dissonance and strain." On the other hand, the planning function appears to be viewed as a mechanism capable of being separated within the management process to a greater extent than many practitioners now believe desirable. A more adaptive process, sensitive to, rather than impatient with, management styles, is likely to alleviate some of the "dissonance" discussed. A good point is made with respect to the destructive effects of "nonrecurring projects," i.e., the consequences of undue diversions of the principal thrust of a Corporate Planning effort. Yet, undue rigidity may be equally harmful to the purposes of company-wide planning. More treatment should be given by authors of this subject to problems of adapting planning modes to the needs, problems, priorities and "personalities" of a given organization—particularly in the light of the actual style and approaches of its chief executive.

In the sections on organizing the Planning Department, there are many good hints on the procedural aspects and a desirable capability profile of the staff. Useful differentiation is made between the managerial role of the Planning leadership and the technical roles of "research assistants."

The chapters on installing the system, selecting the Chief Planner and arriving at acceptable understandings between Chief Executive and Planner are interesting. The approach—at the risk of being somewhat facetious—appears a little like "how to approach the patient without getting hurt." Business life is full of risks. While the risks facing the Planner may be somewhat more critical than those facing better established and understood positions (like the Controller or Chief Engineer), it seems doubtful that detailed contractual advance understandings will help much to assure success (though they may ease possible subsequent trauma). In the final analysis, the Chief Planner must establish himself by getting into the midst of the "battle" and respond to changing situations.

There are many additional helpful observations on the Planning Committee, the inclusion of middle management, the financial community, etc.

The purpose and scope of the book are well summarized by Cotton himself:

> Lest the reader think otherwise, this text is proffered neither as an overview of planning in its many forms nor as an optimal approach to planning in general. The subject is too broad and the profession too heterogeneous to satisfy such majestic aspirations.
>
> Instead, this work offers an organized set of reflections on my eclectic combination of

academic backgrounds, business research, and personal experience in the rapidly developing field of formal, companywide, and comprehensive business planning.

Recognized as such, and applied with discretion, it is hoped this book will aid those interested in becoming acquainted with, contributing to and applying the philosophies, concepts, techniques, and operations of business planning.

All in all, an interesting, comprehensive treatment of a complex subject in the light of particular intense personal experience.

WALTER B. SCHAFFIR
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New York, New York

All unsigned reviews are written by the Book Reviews editor.

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