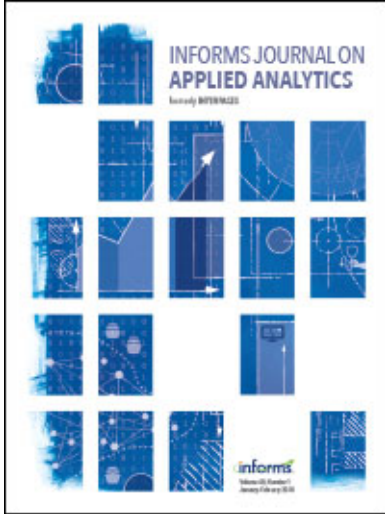




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Book Reviews

MICHAEL E. THOMAS

BENDER, FILMORE E., AMIHUD KRAMER AND GERALD KAHAN, *Systems Analysis for the Food Industry*, AVI Publishing Company, Westport, Connecticut, 1976, 468 pp.

This book is written expressly for a special audience—managers, technologists, and students of the food industry. Emphasis is placed upon systems analysis and operations research techniques for individual firm decision making processes.

Although there is some variability in the mathematical rigor across chapters, the authors are generally quite successful in keeping the exposition at a level comprehensible for readers not skilled in mathematics, statistics, and computer science. Thus, heuristic arguments are relied upon in the discussion of such topics as linear programming, integer programming, and inventory control. Technical appendices are provided for five of the thirteen chapters for the more mathematically trained students.

The major virtue of the book is the authors' reasonable success in meeting their objective of presenting a wide range of systems analysis and operations research techniques at a level of abstraction which requires minimal mathematical training. Particularly useful to students of the food industry are several illustrative examples and problems of the food industry. For example, a common "food" industry problem involves the traditional office party and maximization of the number of drinks from the available liquor supply. The student is asked to formulate the problem as an LP and render the solution in note form so as to be easily understood by his bartender! More seriously, the discussion of EVOP or evolutionary operations in Chapter Five is in my opinion the highlight of the book. EVOP or evolutionary operations are response surface techniques designed to quantify the response of the variable(s) studied to changing conditions. The technique is particularly useful in finding optimal solutions in food quality control situations. The examples, illustrations, problems and references presented in this section of Chapter Five are well tuned to the book's objectives, purposes, and targeted readers.

Readers of this book by Bender, Kramer, and Kahan will be somewhat troubled by the following: (1) the lack of a clear definition of the "food industry"; (2) the use of too many examples and problems of nonfood industries, e.g., brackets, screws and bolts, steel alloys, motels, petroleum blending; (3) a scanty reference list of food re-

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lated publications for most chapters; (4) an overly simplistic and somewhat unrealistic set of problems and examples in relation to real world conditions; and (5) a puzzling and somewhat illogical organization of chapters.

The reader has a very distinct feeling that the book is primarily oriented to the food manufacturing sector of the food industry. Yet, the book opens with a corn and soybean farming situation. It would have been more meaningful to readers if the authors had carefully defined the "food industry" as comprising: (1) individual producers of raw materials, (2) processors or packers, (3) wholesalers and/or distributors, and (4) retailers. More importantly, the realism of the book would have been greatly enhanced with the avoidance of examples and problems of nonfood industries.

While the authors did not intend to discuss nonoptimizing systems techniques, they are used quite widely in studying the behavior of food firms, industries, and subsectors. The industrial dynamics approach, for example, is one of several simulation methods available for analyzing the time varying effects of introducing changes to an economic system. Inclusion of at least one chapter on nonoptimizing computer simulation approaches to food systems problems would have been useful for the targeted audience.

Overall, this book will have particular appeal to nonengineering college students in the food sciences who seek an introduction to systems analysis and operations research techniques. It could have limited use among food managers and food technologists as an introduction to concepts and tools. Because of the elementary nature of the book, it is doubtful that it can serve as a handbook for solving many of the real world operations research and systems analysis problems of the food industry.

Dr. Leo Polopolus
Chairman
Food and Resource Economics Dept.
1157 McCarty Hall
University of Florida
Gainesville, Florida 32612

ENSLEIN, KURT, ANTHONY RALSTON AND HERBERT S. WILF, *Statistical Methods for Digital Computers*, New York, John Wiley & Sons, Inc., 1977, 454 pp.

During the last 15 years, statistical computing has become an important aspect of the field of applied probability and statistics. This book, which is volume IV in the Wiley-Interscience publication, *Mathematical Methods for Digital Computers*, is an important contribution to the field. The individual chapters have been written by authors who have made significant contributions to both the theoretical and computational aspects of statistics.

As statistical computing is a broad field, the book is not comprehensive; however, reasonable coverage of the field of multivariate statistical analysis is provided. Part I (Introduction) gives an overview of statistical computing and a discussion of solving statistical distribution problems by Monte Carlo methods. Part II deals with regression and discriminant analysis, and contains particularly good discussions of stepwise regression and related methods. Part III is concerned with the methods of

principal components and factor analysis, including multivariate analysis of variance and covariance. Part IV treats cluster analysis, multidimensional scaling, and pattern recognition. Part V, which presents time series analysis methods, discusses the fast Fourier transform and time series forecasting using ARIMA models. (No treatment of identification, estimation, and diagnostic checking of such models is given.)

Each chapter in the book is organized in a similar pattern. A concise, mathematically oriented description of the particular statistical method is presented, and, in most cases, sufficient references are provided to give the reader access to the basic literature. Some discussion of the underlying assumptions robustness, and limitations of the technique is usually also given. In addition to the mathematical developments, an algorithmic statement of the computations that must be performed is included, along with a flow chart accompanied by a box-by-box description. A few FORTRAN programs and subroutines are listed in the book. A summary chart in Chapter 1 lists the availability of all programs (in FORTRAN). Sample problems are presented for each technique, usually accompanied by the output from the relevant computer program.

The book has some very good chapters; the ones on variable selection in regression analysis, multivariate analysis of variance and covariance, and multidimensional scaling, for instance. On the other hand, the selection of topics in some sections (such as time series methods) is not as broad as would be desired. On balance, however, the book has much to recommend it, and would be a useful reference for computer scientists, programmers, and statisticians with an interest in statistical computing.

Douglas C. Montgomery
School of Industrial
and Systems Engineering
Georgia Institute of Technology
Atlanta, GA 30332

EVAN, WILLIAM M., *Organization Theory Structures, Systems, and Environments*, John Wiley & Sons, New York, 1976, 312 pp., \$14.95.

Covering over 15 years of research and conceptualization, William Evan has organized 16 of his important articles into a diverse yet coherent volume of organization theory. Unlike many books of this type, the chapters form a logical integration almost as if they were written with this book in mind. The four parts of the volume represent a general theory of organization. Starting from the organization and working outward to the interorganizational field and the wider cultural and social structural environment, the author presents his theory in terms of hierarchical structures, systemic interrelations, and environmental effects. This open-systems framework goes beyond traditional views of the organization and environment relationship to include a thorough explanation of the environment's systematic properties.

Part I conceives of organizations as hierarchical structures where skills, rewards, and authority are differentially allocated. Evan discusses several indices of these dimensions and examines the causes and consequences of different degrees of hierarchical structure. He postulates two ideal types of organizations forming polar ends of a scale of hierarchy: administrative organization (hierarchical) and voluntary organiza-

tion (nonhierarchical). Arguing against the conventional notion that voluntary associations tend to be transformed into administrative hierarchies, he presents six prerequisites for the conversion of the latter into the former. This leads to a counter hypothesis of organizational effectiveness: organizational hierarchy leads to work alienation and reduced organizational effectiveness. Based on this premise, the author examines current attempts at industrial democracy and suggests an experimental perspective for studying these approaches to reducing hierarchy and improving organizational effectiveness.

In Part II the author examines the conflicts and role strains inherent in hierarchical structures which breed inequalities in power, rewards, prestige, and information. Based on empirical studies of chemists, junior and middle executives, and research scientists, Evan shows how certain structural properties of organizations, such as unstructured tasks and the absence of due process norms, lead to conflicts among members. He postulates a new form of organization design, "organizational constitutionalism", to overcome these problems. Specifically, the author proposes that as organizations evolve processes of constitutionalism—due process norms, organizational citizenship, and fiduciary management—abuses of power diminish and conflicts become subject to consensually-valid methods of regulation. Evan ends this section with a discussion of organizational change in which a discrepancy in the rate of technical, as compared with administrative, innovation leads to "organizational lag". To reduce lag, and hence reduce interrole conflicts and strains, the author suggests organizational experiments aimed at increasing innovation from the top and bottom of the organization simultaneously.

Part III of the book moves from internal organizational relationships to direct connections to enviroing organizations—i.e., interorganizational relations. Evan develops the concept of "organization-set" to describe the interorganization system, and he applies this model to analyzing the climate of an organization. The author reformulates the organization-set framework in systems terms, and uses three case studies to examine implications of the model for regulatory agencies.

Evan ends his general theory of organizations by discussing the cultural and social structural aspects of the wider environment. Referred to as "trans-organizational environments", Part IV explains the concepts of culture and social structure as they impact interorganizational and organizational systems. The author begins this section with a discussion of the legal aspects of culture. He distinguishes between public and private legal systems and how the two interrelate. Recent trends in administrative law and organization theory are compared for the purpose of applying the organization-set model to administrative agencies. Evan also examines how different components of the international system—e.g., multinational enterprises and international professional associations—serve to integrate the international system. A nonlinear model is used to examine international system linkages and their effect on system integration. An argument is made for including cultural variables in cross-national studies of organizations. Using the normative dimension of culture as being most relevant for organizational research, Evan applies the Kluckhohn-Strodtback theory of value orientations to organizations. The book ends with a social structural model of organizations.

This perspective sheds light on the interaction of social structure and organizations, and it suggests a new strategy for organization research and design.

Evan's book represents some of the more advanced thinking in organization theory. His hypothesis and research issues alone are worth the price of the volume. They provide new insights into current organizational problems and focus the reader on relevant paths for future inquiry. The author's level of conceptualization and use of sociological concepts, however, make the material best suited for scholars and advanced students of organization theory. Those more interested in application and practice will probably not find the articles particularly useful. Indeed, the author seems to address his writing to theorists and researchers rather than to organizational practitioners. The material is generally quite readable with the possible exception of the chapters on trans-organizational environments. The complexity of this material underscores the difficulty in trying to forge a link between organization theory and macrosocietal theory. Perhaps a better integration of these chapters would make the task easier.

In short, I find little to fault with this book. It serves a valuable function in bringing together some of the significant material of this pioneering theorist and researcher. For the serious student of organization theory, Evan's book is an insightful contribution to the field.

Thomas G. Cummings
University of Southern California
Los Angeles, CA 90007

HARVEY, DONALD F. AND DONALD R. BROWN, *An Experiential Approach to Organization Development*, Englewood Cliffs, Prentice Hall, 1974, 350 pp., \$7.95.

An Experiential Approach to Organization Development is an important addition to our tool kit for teaching the principles of Organizational Development (O. D.). It is really the only experiential¹ text that deals solely with the issue of organizational development. The book is unique in that it presents text material in each chapter along with the exercises. Thus it is more thorough than most experiential texts.

Uses of the book

This book has at least two uses. First, it is an excellent supplemental text for courses in organizational development or organizational change where the instructor wants to provide class participants with the opportunity to use O. D. techniques in a simulated organizational setting. The book will provide students with "hands on" experience using the concepts they have learned in the classroom so that they will develop the ability to apply them as practitioners. The second use of the book would be in management development programs. Managers often have very stereotyped views regarding organization development. It is often seen as fuzzy, idealistic and not really relevant to the manager's real work. Once again, the exercises Harvey and Brown have chosen provide situations whereby managers can *experience* through the simulations the potential usefulness of O. D. techniques.

¹For more general experiential organizational books, see *Experiences in Management and Organizational Behavior*, D. Hall, D. Bowen, R. Lewicki and F. Hall (Chicago, St. Clair Press, 1975); *Management: An Experiential Approach*, H. Knudson, R. Woodworth, and C. Bell (New York, McGraw-Hill, 1973).

Content of the book

The major strength of the book is its breadth of coverage of organization development-change. It, one way or another, covers the change process from beginning to end. After three preliminary chapters on overview which are superfluous, the remaining chapters focus on how to do it.

"Entry and Intervention of the Change Agent" (Chapter 4) focuses on how the change agent should initiate his interaction with the client. A particularly interesting exercise in this chapter is the change agent survey which allows participants to see just what kind of leadership style they have. This allows participants to be sensitive to their own needs and begin to think about how these needs may affect their behavior as change agents. "Developing the Change Agent-Client Relationship" (Chapter 5) focuses on creating a change climate and has a nice discussion on identifying red flags in the change-agent client relationship. The Chung King Electronics Company simulation in this chapter is an excellent role play, helping participants to understand the role of change agent and, equally important, understand the role of the client in assuming responsibility in the change process. Chapter 8, "Motivation of the Client System," also presents important material and simulations that emphasize what the client system needs to do in the change process. This is a particularly useful contribution of the book in that it focuses not only on what the change agent should do but also on what the client system needs to do to make change happen.

Chapter 7, "The Diagnostic Phase," provides a good overview of the process of diagnosis. A very useful simulation here is the "Problem Ownership Survey." This important exercise helps participants become more aware of continuing problems change agents encounter—having the client dump the change problem onto the consultant and thus abdicate all responsibility for solving the problem.

Chapter 9, "O. D. Strategies," is rather short and does not provide a very useful categorization of different O. D. techniques. The authors briefly discuss strategies as structural, technical and behavioral. I think a more appropriate way to categorize techniques may be by depth of intervention—system wide, individual-organizational interface, interpersonal, interindividual. The authors could have said more about the costs and complexities of the different types of interventions.

The next six chapters focus on different O. D. techniques—personal change, laboratory training, managerial grid, team building, intergroup and total system interventions. Each chapter has a good discussion of the technology as well as two or three simulations.

The last chapter is an attempt to discuss the stabilization of change. Here the authors talk about successful O. D. efforts but really don't focus on how to build in or institutionalize the change process.

In summary, this is an exceptional experiential textbook for organizational development and change courses and I highly recommend it.

Robert B. Duncan

Professor of Organization Behavior
Graduate School of Management
Northwestern University
Evanston, IL 60201

MITRA, G. *Theory and Application of Mathematical Programming*, Academic Press, 1976, 207 pp., \$18.00.

This book is poorly written. It attempts to cover too many topics in the area of mathematical programming with the result being a sketchy and superficial treatment of this vast subject. The author states in the preface that the book was used to teach final year mathematics students, but does not state clearly the audience for whom the text is addressed. In this reviewer's judgment, the book is not suitable for mathematics, advanced engineering, or operations research students since the treatment is generally not rigorous and does not provide proper motivation of the subject matter. On the other hand, the book could not be used as a text for students whose primary interest is to learn the techniques and computational methods of mathematical programming. Those students will find the lack of clear and precise statements of the methods and the shortage of illustrative examples not appealing.

Following a brief introductory chapter, Chapters 2 through 6 of the book deal with linear programming and the simplex method, or one of its variants. In many instances, the methods are neither motivated nor well stated. Also, the author often uses undefined terms and notation that is hard to follow. Even though this part of the book covers a good number of topics including the simplex method, the revised simplex method, the simplex method for bounded variables, generalized upper bounding, and duality, no discussion of the important topic of network flows is given. The author, instead, states in the preface that these problems are better analyzed under the generalized upper bounding structure.

In Chapter 7, the subject of integer programming is introduced; both the dual cutting plane algorithm and branch-and-bound are discussed. Chapter 8 gives some simple example problems that could be formulated as mathematical programs. Chapters 9, 10, and 11 cover the subjects of optimality conditions, quadratic programming, and complementary pivoting. In addition to the main text, the book has three appendices covering some results from linear algebra, convex analysis, and gives an introduction to the use of a mathematical programming system.

In addition to omitting network flows, the book also omits the subject of unconstrained and constrained nonlinear programming. Further, the book contains several misleading statements. The following are some examples:

- (1) On page 121, Mitra introduces a nonlinear programming problem and then states, "In the late forties and early fifties Kuhn and Tucker investigated this problem rigorously and later Fiacco and McCormick put forward non-classical methods for its solution." I suppose by "non-classical" Mitra meant interior penalty function methods. In addition to using vague terminology such as this, this could lead the reader to believe that Fiacco and McCormick were the first to develop solution techniques for solving nonlinear programming problems.
- (2) On page 125 Mitra states, "By investigating the saddle point property of the Lagrangian, Kuhn and Tucker deduced the conditions for optimality. For nonconvex problems these are necessary conditions for local optimum, for convex problems the necessary conditions are also sufficient to guarantee global optimality." Rather than using the Lagrangian to develop the

necessary conditions for nonconvex problems, Kuhn and Tucker utilized Farkas' theorem.

After having read the book, I cannot see a specific audience for whom this book would be suitable. Further, I see little justification for its title. Certainly neither the theory nor the applications of mathematical programming is adequately covered in this manuscript.

Mokhtar S. Bazaraa
School of Industrial
and Systems Engineering
Georgia Institute of Technology
Atlanta, Georgia 30332

PARSONS, LEONARD J. AND RANDALL L. SCHULTZ, *Marketing Models and Econometric Research*, New York, North-Holland Publishing Company, 1976, 300 pp., \$22.50.

Empirical research for problem solving purposes has a long tradition in marketing. Marketing executives in many industries seem to be almost compulsive about researching their problems. On the other hand, theory construction and empirical model building is relatively new in marketing. As marketing researchers have become more sophisticated in the use of quantitative techniques, they have tended to concentrate on ways to squeeze facts out of huge quantities of data. They have tended to mine the behavioral sciences for new and more elaborate ways to classify and count buyers and have made very little progress in developing models of unique *marketing* processes and systems.

Parsons and Schultz argue that it is high time that marketing researchers, and the decision makers whom they assist, begin to focus on the development of theoretically based and empirically testable models of complex and dynamic marketing processes. They represent a rather small but growing group of researchers in marketing who feel that the techniques of econometric research have much to offer marketing. They are not suggesting a wholesale effort to run existing marketing data through existing econometric models. Rather, they are suggesting the application of the *econometric approach* to marketing problems by experienced marketing professionals. In philosophical terms, they are suggesting a shift from simple empiricism to logical positivism through the development of a priori postulates which provide a structure for the empirical testing of hypotheses about marketing phenomena.

The authors do not stop with arguments for the econometric approach. This book is a carefully orchestrated effort to explain and demonstrate the potential of econometric model building in marketing. It assumes that the reader has some sophistication in mathematical model building and statistics and is knowledgeable about marketing. Part I is basically a sales message about the usefulness and potential value of the econometric approach, stressing the modelling process for marketing systems. Part II provides a brief but reasonably rigorous summary of the state of the art of econometric model building, stressing alternative approaches to estimation and the problems of model testing. Part III deals with fitting models to marketing problems

to reflect the nature of the manager's decision problems and the structure of the marketing process. Part IV concludes the book with a critical review and evaluation of past econometric research in marketing and an appeal for efforts to build "a marketing science."

This book is "must" reading for the management scientist/operations researcher with an interest in marketing. The econometric approach can help to fill in the gap between the descriptive use of statistical analysis and the application of mathematical optimization techniques.

Professor Ralph L. Day
Graduate School of Business
School of Business Building
Indiana University
Bloomington, Indiana 47401

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