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BOOK REVIEWS

Operations Research Methods for Agricultural Decisions, R. C. Agrawal and Earl O. Heady. Ames, Iowa: the Iowa State University Press, 1972. Pp. x, 303. \$U.S. 10.95.

This book brings together into one volume some of the operations research techniques which have been, or could be, applied to solving agricultural decision problems.

Following a short review of the need for scientific planning in agriculture, the types of operations research tools available to assist in this task are noted, and some of their uses to date briefly described. Chapter 2 is devoted to emphasizing the need for realism and appropriateness when building operations research models which are to be applied to agricultural situations.

Succeeding chapters deal with linear programming and some of its developments (parametric, integer, dynamic, recursive, and quadratic); game theory applications and extensions; markov chains; inventories; queues; networks; linear fractional functionals programming; and last but not least, simulation. A mathematical appendix covering aspects of set theory, calculus, and matrix algebra completes the exposition.

Agrawal and Heady aim at reviewing "the major tools and theories of operations research . . ." and applying them to simple micro-level agricultural problems. In doing so they confine themselves to solving deterministic optimization questions, hence "The task of expanding and developing the rather modest basic models to the most urgent and realistic conditions of agriculture is left to the reader".

Agrawal and Heady successfully achieve their objectives, and do so in quite an acceptable manner. There is a fairly broad coverage of operations research methods, the text is easy to read and comprehend, and mathematical demands are minimal. Examples are provided for every technique discussed, and a useful reference list rounds off each chapter. Additionally, the chapter on linear programming has a mathematical appendix which very concisely describes the simplex method and the primal-dual relationship.

Another noteworthy feature of the book is the way in which the relationship between various techniques is shown, e.g. between linear and dynamic programming, linear programming and game theory (and vice versa), and markov processes and dynamic programming. This is a definite help in comprehending the relative positions of each method in the whole spectrum of techniques described.

Some dissatisfaction exists however. It is not so much with the way in which the objectives of the book are achieved, but more with the objectives themselves.

Firstly, there appear to be several important omissions from the list of "major" operations research tools. One of the most realistic and agriculturally applicable extensions of linear programming, multi-period L.P., does not rate a mention. Similarly with sequencing theory, which could have a very useful future in the areas of labour and machine optimization over time. The whole body of replacement theory, which should affect a vast number of agricultural decisions, receives a scant one page, and then only as an area for the application of dynamic programming. Surely these tools are important enough to be included too?

Secondly, even though most problems encountered in agricultural decision making contain some degree of uncertainty, Agrawal and Heady stick rigidly to their deterministic framework. Stochastic modifications, especially in programming where it is a common feature, are barely mentioned. After the plea in chapter 2 for realism when applying these techniques, shouldn't we expect the remainder of the book to conform to this line of reason?

A minor point is that since linear fractional functionals programming is really a follow on from ordinary linear programming, it should have been located as chapter 5 and called Extensions to Linear Programming III, rather than being relegated to chapter 12.

All in all this book turns out much the same as other texts of the "collected techniques" group, i.e. brief expositions covering the important features of each method give the reader a taste of the subject matter, and some examples are presented to show that the techniques work. The contents however are not detailed enough for use as a "cookbook" reference, and the examples through oversimplification are usually inapplicable in real situations.

Hence a dilemma—yes or no? For anyone wanting a simple introduction to operations research in agriculture, its not too bad. For those who wish to delve deeper, though, I would recommend instead investing in texts which deal specifically with only a single operations research method.

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Economic Analysis of Agricultural Projects, J. Price Gittinger. Baltimore: The John Hopkins University Press, 1972. Pp. viii, 221. \$3.

The aim of this book is to sharpen the pre-investment analysis tools of those people in developing countries who must decide on how to spend scarce money on agricultural development. The author discusses practical ways to ensure that when investment decisions are made, resources will be used economically and efficiently. The book deals primarily with the straightforward application of what are known as "most probable outcome" evaluation methods to compare alternative agricultural developmental projects.

BOOK REVIEWS

Chapter 1 discusses project definition and analyses project investment decision. It neatly and concisely summarizes the difference between economic and financial analysis and details the types of agricultural programmes for which analysis is appropriate.

Chapter 2 indicates how the benefits and costs of a project can be identified, how to apply the “with” and “without” tests and the nature of secondary costs and benefits and intangibles.

Chapter 3 explains the pricing of costs and benefits. The author points out that it is not always appropriate or practicable to express these in terms of market values and in such cases it is necessary to impute “shadow” prices. The chapter also deals with inflation and the impact this has on the valuation of costs and benefits. An explanation is also given of the Little-Mirrlees valuation method, a modification of the system of shadow prices, claimed to more adequately reflect true social costs and benefits.

Chapter 4 emphasizes the necessity of comparing projects which have differently shaped future cost and benefit streams. The usual method of comparison is through discounting and this chapter focuses on the three measures commonly applied to agricultural projects: benefit cost ratio; net present worth and internal rate of return. This chapter also advises the reader how far it is necessary to carry out computations of discounted measures and discusses the vexatious problem of selecting the discount rate—the author supports the adoption of the opportunity cost of capital. He describes the limitation of partial analysis and the relationship between project analysis and national income growth.

Chapter 5 discusses some of the practical problems encountered in applying discounted measures of project worth for economic and financial analysis of proposed projects. These include the treatment of uncertainty; contingency allowance; replacement costs; salvage values; sunk costs; working capital; interest during construction; internal foreign exchange rate; choosing between mutually exclusive alternatives; and the presentation of results of discounted project analyses.

Chapter 6 discusses the importance of financial analysis considerations for agricultural projects. Not only is it important to analyse a proposed agricultural project to be certain it will be beneficial to the economy as a whole, but it is crucial to assess whether the farmers, private firms, government corporations, and other project entities which are to participate will have sufficient incentive and suitably timed cash flows that they will be able and willing to participate. Some of the more important financial analysis applications—financial projections, incentive assessment, computation of loan payments and joint cost allocation—are discussed in this chapter.

Chapter 7 cites the Ivory Coast cocoa project as a case study and gives details of the analytical procedures used, while chapter 8, the final chapter, outlines sources of assistance for project preparation and evaluation.

This book should be of invaluable assistance to agricultural administrators who have responsibilities of programme evaluation and selection in the

developing countries. It will also be useful for agricultural economists who have had limited opportunities to familiarize themselves with the methodologies of applied project analysis.

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Marketing Decision Making: A Model Building Approach, Phillip Kotler. New York: Holt, Rinehart and Winston, 1971. Pp. xi, 720. \$14.

Kotler's *Marketing Decision Making: A Model Building Approach* is an outstanding contribution to the development of analytical techniques for marketing decision making.

Using concepts and methodology from both the disciplines of economics and operations research, Kotler develops a normative theory for marketing decision making. This is orientated to guiding decision making in areas such as the best assortment of products; the best level of total marketing effort; the best allocation of total marketing effort over products, territories and customers; the best mix of different types of marketing effort; and the best timing of marketing effort.

The book is arranged in four parts. Part 1 deals with the macro-marketing relationships, or more particularly the decision problems facing a firm that is attempting to optimally programme its marketing resources. The theory accounts for marketing being dynamic, non-linear, lagged, stochastic and interactive. To discuss these relationships, Kotler uses a method he calls "successive approximation". This initially involves making some unrealistic assumptions—one monopoly firm, one marketing decision variable, one sales territory, one product, one time period, one goal and complete certainty. From this starting point, each assumption is relaxed in successive chapters to permit the study of the effect of these different real world complications on sales.

Part 2 deals with some of the micro-marketing decision models—distribution, pricing, sales force and advertising. These are regarded as inputs of marketing effort. By the use of mathematical models, Kotler analyses the effect that each has on sales, as this has important implications for planning and decision making.

Part 3 considers the dependent side of the demand equation, that is, sales or the buyer behavioural process. Sales are not treated as the output of marketing effort, but rather, their components and dynamics are examined to hopefully improve marketing strategy. Models are constructed to explain total sales and brand sales for both established and new products.

In Part 4, Kotler concludes with a discussion of the relationship between theory and practice. He shows that the normative theory developed in the book can be incorporated into managerial operations and decision processes, but it should only be regarded as an aid to judgment.

The book can be recommended to any person interested in marketing—executives, researchers, economists, and students. It is quantitatively orientated, yet the mathematics in the text are not so complex as to be incomprehensible to a person with average mathematical knowledge. The more detailed mathematical arguments are developed in an appendix for people wanting to pursue this aspect further. Questions and exercises are also provided at the end of each chapter, adding to the book's attraction as a teaching text.

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Cost-Benefit Analysis, Richard Layard (editor). Penguin Modern Economics Readings. Pp. 496. \$3.25.

The increasing use being made of economists by society has been accompanied by an increased outpouring of economic and pseudo-economic literature. While the profession is mercifully spared the coffee-table genre, there is a burgeoning mass of paper associated with new areas of research, ancient authors discovered, *nth* editions of the classics (and not-so-classic) and collections of bits-and-pieces of the rest. A recent example of the latter is Layard's collection of cost-benefit writing.

No useful purpose is likely to be served by analysing each reading within the collection—except, probably, to expose the reviewer's predilections, prejudices and ignorance. It seems profitable however, to list the inclusions and to comment on the value of this particular collection.

The first group of readings concerns a general survey of what cost-benefit analysis is about. The two readings in this part are a condensed version of Prest and Turvey's survey (*Economic Journal*, 1965) and Musgrave's "Cost-Benefit Analysis and the Theory of Public Finance" (*Journal of Economic Literature*, 1969).

The second part, which covers the measurement of costs and benefits, contains sections of McKean's "The Use of Shadow Prices" (*Problems in Public Expenditure Analysis*, 1968); Sen's "Feasibility Constraints: Foreign Exchange and Shadow Wages" (*Economic Journal*, 1972); part of Little and Mirrlees' "The Use of World Prices" (*Manual of Industrial Project Analysis in Developing Countries*, 1969); excerpts from Harrison and Quarmby's "The Value of Time" (European Conference of Ministers of Transport, 1969); part of Mansfield's "The Value of Recreational Facilities" (*Regional Studies*, 1971); and Mishan's "The Value of Life" (*Journal of Political Economy*, 1971).

Part Three, concerned with the social time preference rate and social opportunity cost of capital, has the following papers: Feldstein—"The Social Time Preference Rate" (*Economic Journal*, 1964); Sen—"The Social Time Preference Rate in Relation to the Market Rate of Interest" (*Quarterly Journal of Economics*, 1967); Marglin—"The Opportunity Costs of Public Investment" (*Quarterly Journal of Economics*, 1963); Harberger—"The Opportunity Costs of Public Investment Financed by

Borrowing" (*Cost-Benefit Analysis of Manpower Policies*, proceedings of a conference 1969); Feldstein—"The Inadequacy of Weighted Discount Rates (forthcoming).

The treatment of risk covered in Part Four is analysed in two papers: Arrow and Lind—"Uncertainty and the Evaluation of Public Investment Decisions" (*American Economic Review*, 1970); and part of Dorfman's "Decision Rules under Uncertainty" (*Design of Water Resource Systems* 1962).

The field of income distribution is dealt with in only one paper—Weisbrod's "Deriving an Implicit Set of Governmental Weights for Income Classes" (from *Problems in Public Expenditure Analysis*, 1968).

An analysis of the Roskill Commission's Report concludes the collection. The Commission's view is summarized by Flowerdew in a paper written for the volume under review. Mishan's "What is Wrong with Roskill?" (*Journal of Transport Economics and Policy*, 1970) offers a critique of the Commission's analyses.

In what would primarily appear to be a collection of introductory readings in cost-benefit analysis, the editor seems to have been over-concerned about the discount rate. While it has been (and is) a perplexing problem it is doubtful whether it is 25 per cent of the cost-benefit problem as the size of Layard's section on discount rates would suggest. In view of the number of problems in enumeration of costs and benefits listed by Prest and Turvey, but not covered in the relevant readings, there would appear to have been at least one section which could have benefited from a reduction of interest in the discount rate. Further, the rather sketchy treatment afforded uncertainty and income distribution combined with an apparent lack of concern about institutional and other constraints, would also appear to be the consequence of Layard's concern for discount rates.

Of some interest to the theoretician is Layard's introductory essay on cost-benefit analysis (pp. 9-69). The editor attempts both to arouse an interest in the whole realm of cost-benefit analysis and also to introduce the readings which follow. In his introduction, Layard briefly summarizes the major types of problems which occur in each section of the readings. The brief introductions he gives to the foreign exchange component of costs and benefits, recreational facilities, and time, *inter alia*, could serve as a very useful introduction to beginners in cost-benefit analysis.

This commendation of the introduction is not however a general commendation. Many of Layard's statements concerning the "common-sense" foundations of cost-benefit analysis are, at best, misleading. Consider Layard's "definition" of cost-benefit analysis: "But cost-benefit analysis is not in itself a 'democratic' process. It is a thought process which attempts to throw light on what is *right*" (p. 37; reviewer's emphasis). Somewhere, somehow, Layard has lost sight of the difference between objectivity in (social) science and ethics. Indeed, this points to a serious omission in this collection of readings: there is no explicit mention made of the close links between cost-benefit analysis and economic theory; and, in particular, between the former and welfare

economics. Despite the tenor of parts of his introduction, Layard is primarily concerned with methodology, not with its foundation in economic theory.

This set of readings would appear to be most useful as an introduction to cost-benefit analysis, or as a refresher course for the economist who infrequently dabbles in formal cost-benefit analysis. The professional analyst would probably be better off in his own library.

DAVID GODDEN

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The Economics of Advertising, R. Schmalensee. Amsterdam: North-Holland, 1972. Pp. xiii, 312. \$ca. 19.

This book (Volume 80 in the series Contributions to Economic Analysis) is based on the author's doctoral dissertation. It consists of a number of econometric analyses of the effects of advertising on consumer behaviour and the market performance of firms and industries. The conclusion is refreshingly open: "there is barely a molehill of hard evidence behind the mountain of prose on the subject of advertising".

Following a brief general discussion of the emotional and theoretical approaches to advertising, the author surveys and discusses the construction of models to analyse the impact of advertising. His primary concerns in model specification are (1) the incorporation of advertising decision rules, and (2) to take explicit account of the simultaneity problem (sales depend on advertising and advertising depends on sales).

An empirical analysis of quarterly data for U.S. national advertising expenditure concludes that total national advertising does not affect total consumer spending or consumer spending for goods (rather than services). The effects of national advertising spending by the various consumer goods industries cancel out in the aggregate. It is also found that changes in total national advertising can be best explained by a model in which advertising adjusts with a short lag to changes in the sales of consumer goods. As almost all the adjustment takes place within one year, it is argued that the use of annual data for consumer demand studies will make it very difficult to measure the impact of advertising on demand.

The author next turns to the analysis of advertising within the context of the effects at firm and industry level. His empirical investigation uses data on cigarette advertising in the U.S. This is apparently the best data of its kind available. Empirical analysis includes both market share and industry sales models. As in the case of studies by other workers, Schmalensee fails to establish a reliable relationship between advertising and sales; neither does he obtain significant coefficients in his estimates of income and relative price elasticities. All of which leads the author to bring into question the data, the estimation methods, and the model specifications, as he cannot really believe that cigarette firms are irrational. Given these results, it seems somewhat unrealistic for the author to maintain his position in criticizing earlier studies for

not placing more emphasis on the determinants of advertising expenditures.

In the final chapter, Schmalensee looks at the impact of advertising on the ability of firms and industries to earn monopoly profits. From a brief survey of empirical research, he concludes that there is no evidence to support the contention that advertising raises barriers to entry.

The study is a competent display of applied economics. However, given the concern with the lags in adjustment of advertising to sales and vice versa, sole reliance on the Koyck lag is disappointing. It is also disappointing that the author did not display a little more variety in the selection of hypotheses for testing; especially in the face of the negative results he obtained. For instance, what about the sigmoidal responses observed in the adoption of new products and processes. The author demonstrates his expertise in a number of mathematical forays, but these are more in the nature of exercises designed to impress dissertation examiners, rather than breaking ground in developing new hypotheses for testing.

Overall the study makes worthwhile reading for those interested in the economics of advertising as well as those working in any field of applied economics. For the latter reader the benefits are to be gained from the thorough manner in which the author sets about the specification of models, the testing of the models, and the estimation of the regression coefficients.

However, given the results of the study, I have to conclude that this review will have no impact on the sales of the book.

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Microeconomics: The Theory of Economic Allocation, C. A. Tisdell. Sydney: John Wiley, 1972. Pp. viii, 424. \$10.95 cloth. \$7.96 W.I.E.

This book by Clem Tisdell, Professor of Economics at Newcastle University is designed to serve as a text for a one-year course in microeconomics at the intermediate level. Broadly, the book consists of two parts. The first half of the book is concerned with a reasonably detailed discussion of microeconomic theory; covering such topics as optimization, pricing, consumption and production theory, and markets. In the second half of the book, Tisdell introduces the student to a number of subjects which have their theoretical basis in microeconomics, or which are concerned with problems of economic allocation. There is a discussion of general equilibrium analysis, followed by chapters on input-output analysis, welfare economics, linear programming, econometrics, research and innovation, cost-benefit analysis, and the operation of socialist economies, to mention some.

Tisdell's main emphasis in differentiating his product is to place the subject of allocation in as wide and as topical a framework as possible. And in presenting the neoclassical theory, he gives a historical perspective as well as introducing conflicting theoretical developments.

I think he succeeds very well in his attempt to make the economics of allocation a meaningful subject for students, and as well, introducing them to a disciplined approach to an area of scientific enquiry.

The chapters in the latter half of the book are of varying depth and quality, reflecting perhaps the authors own interests. Some may feel that chapters such as the brief introduction to econometrics could have been more extensive and more up-to-date. However, I feel that the greater emphasis given to welfare economics and income distribution is timely at this stage in the student's economics training.

In chapter 7 on the theory of production, more could be said about the duality between production and cost functions, in view of the recent developments in this area of theory. I think that some might find the use of x_i for firm output and Y for aggregate output throughout the text confusing, as the use of X_i for inputs is widely used. As is traditionally done to demonstrate that the reviewer has indeed read the book, I would mention two misprints. On page 137, line 12, figure 7.4 should read 7.5; and on page 138, line 2 from the bottom, figure 7.8 should read 7.7.

This handsomely presented book is worthy of a place as a basic text in any economics student's library.

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