BOOK REVIEW

Operations Research for Management: G. V. Shenoy, U. K. Srivastava and S. C. Sharma Wiley Eastern. Rs. 55/-.

Quite a few books on Operations Research in general or on Operations Research for (or in) Management—including some by Indian authors—are already in the market. Some of these are of course well-written accounts of Operations Research methods and their applications while many more contain lop-sided, if not incorrect, presentations of some of the Operations Research models and some techniques for solving these models. "Operations Research for Management" by G. V. Shenoy, U. K. Srivastava and S. C Sharma—three teachers of management— is one more title on Operations Research, published by Wiley Eastern Limited

The book comprises 9 chapters besides a 7-page long Introduction (to Operations Research), 3 appendices, some tables and references to topics and to literature thereon. The chapters are devoted to Linear Programming; The(?) Transportation Problem; Theory of Games; Network Analysis—PERT/ CPM; Waiting Lines; Inventory Control Models; Replacement Decisions; Integer, Dynamic and Goal Programming and Simulation of Management Systems. Appendices cover three useful subject areas viz. Classical Optimisation Techniques; Vectors, Matrices and Determinants and Mathematics of Finance.

As stated by the authors, "the purpose of the book is to present the *current* techniques of operations research in such a way that they can be *readily* comprehended by the *average business student* taking an *introductory* course in operations research". Possibly this rules out the expectation of a rigorous mathematical treatment of the techniques. However, one can justifiably expect a correct and adequate treatment of the concepts, models and techniques that is amply supplemented by illustrative examples of potential real-life applications. The reviewer feels that the authors of the present book fail to meet this modest expectation.

The 'Introduction' contains several conceptual errors and is a poor prologue to the subject. The authors should note that not all analog models are diagrammatic, they can be physical too. The last but one statement in the last para under the section "Operations Research Models" hardly makes any sense. Just 'an equation' (giving the objection function) by itself alone is not a commonly used symbolic model in Operations Research, as wrongly claimed by the authors. Discussions on 'Types of Mathematical Models' and 'Essential Aspects of an Operations Research Model" are poor and unscientific.

The first two chapters contain a somewhat general over-view of linear programming, transportation and assignment problems. Relevant results and solution procedures (algorithms) have been explained through worked-out examples. However, mathematical proofs of such procedures and results have not been incorporated. Fig. 1.6 gives the wrong impression that points with $x_1 > 9$ and/or $x_2 > 7$ are not feasible solutions. The material content of chapter 2 is fairly good.

Chapter 3 deals with 2-person zero-sum games. It also includes a section on "Limit ations to the use of Games". While the canvas of treatment is fairly broad a few shortcomings are somewhat glaring. E.g. the sub-heading (*ii*) in section 3.5 is confusing, solution of $M \times 2$ or $2 \times M$ games by graphical method is not completely explained (even the manner in which the lines in fig. 3.1 have been obtained has not been told), the term 'person' has not been duly explained, the distinction between 'action' and 'strategy' has not been emphasised and some loose statements have been made [like the first sentence in (*v*) on page 107].

The presentations in chapters 4 and 7 are more or less in order, though fairly elementary topics only have been covered. The p.d.f. of the beta distribution should be given as

$$f(x) = \frac{1}{B(p,q)\,(b-a)^{p+q-1}} (x-a)^{p-1}\,(b-x)^{q-1},$$
$$< p, q, \ a < x < b$$

instead of the particular form where $a=0$ and $b=1$ (which fails to explain the pessimistic and optimistic times). Here also the authors make incorrect statements like "the standard deviation of the expected time for a PERT activity is given by $\sigma = \dfrac{b\ \ a}{6}$." In effect, it is the s.d. of just the time for an activity. In discussing replacement decisions, some account of continuous time models and some applications of dynamic programming would have been welcome additions.

In section 5.3, $1-\lambda \triangle t$ and $1-\mu \triangle t$ have not been properly defined. On page 178, one should read T $C_m = W\ C_m + F\ C_m$ in equation (5.20). On page 179 the expression 'can be served by more than one station' in section 5.4 should better be replaced by 'can be served by any one station'. The expression for $E(\nu)$ in equation (5.37) is incorrect (misleading also). This chapter could profitably include some ideas about the $M/M/1$ model with finite holding capacity or non-constant arrival and service rates, as well as batch arrivals and bulk service.

Chapter 6 is a simplistic presentation of some inventory models and their solutions that may interest a 'business student'. It would have been better to have at the beginning a classification of inventory models to avoid some detailed explanation later. Towards the end of page 214, reorder level and re-order time seem to be confused. The material of section 6.5 is a pre-requisite for understanding the content of section 6.4.

The treatment of dynamic programming in chapter 8 is rather vague and that of goal programming rather sketchy. The integer programming problem and its solution have been better explained through an example. These are important tools for decision-making and the authors have done well to keep the readers informed about these. The chapter on simulation is quite interesting. The appendices also are expected to be of help to the prospective audience.

What strikes the reviewer most is the awfully poor printing of the book. Starting with a spelling mistake right on the cover page, the book is replete with printing mistakes. On top of these are the numerous grammatical errors. One re-deeming feature is the large number of examples—both worked out as well as to be worked out.

The authors and the publisher would do well to carefully and thoroughly revise the book, if they want to benefit the community of Operations Research students

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