Book Selection

Edited by JM Wilson

Advances in Stochastic Modelling and Data Analysis

J Janssen, CH Skiadas and C Zopounidis (eds)

Kluwer Academic Publishers, London, 1995, x + 428 pp. £135. ISBN 0 7923 3564 3

This is an edited collection of research papers, most of which were presented at the Sixth International Symposium on Applied Stochastic Models and Data Analysis (ASMDA) held in Crete during the summer of 1993. Most of the authors are from academic institutions, with more than half of the twenty-four papers originating from Greek institutions and only two from outside Europe.

After a brief preface, the papers are organized into five chapters. Chapter 1 is on *Stochastic Modelling in Finance, Insurance and Economics* (6 papers). The stochastic models considered relate to asset liability management, gambler's ruin applications, portfolio theory, recursive filtering and forecasting. In general, this work appears to be primarily of theoretical interest and only limited practical applicability. Somewhat out of place, the chapter finishes with an essay on the role of ADMDA in engineering education.

Chapters 2 and 3 are respectively called *Data Analysis and Economics* (5 papers) and *Forecasting and Marketing* (5 papers). Most of these papers consider the application of traditional statistical methods to contemporary commercial problems, several of which are based upon European and Greek agriculture. One exception is a paper describing the theory of Variational Data Analysis which is proposed as an alternative to classical classification criteria.

Chapters 4 and 5 stretch the definition of ASMDA slightly to include respectively *Multicriteria Decision Support Systems* (5 papers) and *Artificial Intelligence, Expert Systems and Neural networks* (3 papers). The former includes, for example, the design of an MCDSS for portfolio selection applied to the Belgian Stock Exchange, and an interesting essay on the evaluation of political risk for companies making foreign investment decisions. The AI papers include an approach to inference and learning that is illustrated by an expert system for diagnosing anemia.

All papers are written in English and the overall standard of writing is reasonable but, in a few cases, some additional assistance with the language would have greatly improved the final result. The coverage of topics is so broad that individual researchers would be unlikely to find more than a few papers relevant to their particular research. Hence, this volume is probably more suitable for library, rather than personal, acquisition.

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Decision Aids for Selection Problems

DL Olson

Springer-Verlag, Berlin, 1996. xii + 194 pp DM78. ISBN 0 387 94560 1

While choosing a course of action, decision makers in business and government are invariably confronted by multiple objectives or criteria which are often at odds with each other. Over the years, a number of decision aids (tools and techniques) have been developed to ease the pain of decision making under such circumstances. This book brings together these decision aids in one place and explores them from the practitioners' point of view. The emphasis here is on the applications of the decision aids and not on their theoretical foundations.

The first two chapters of the book describe some general ideas and fundamentals of decision making under multiple criteria. The next ten chapters outline various selection techniques for making decisions and, where appropriate, also include specific software tools developed to automate the technique.

The following techniques (software tools) are described in these ten chapters.

- Multivariate Utility Theory (Logical Decision)
- Simple Multi-attribute Ranking Technique (SMART, SMARTS, SMARTER)
- The Analytic Hierarchy Process (Expert Choice, Criterium)
- Geometric Mean Technique (REMBRANDT)
- Preference Cones
- Outranking Methods (ELECTRE I, II, & III: PROMETHEE I & II;GAIA)
- Qualitative Judgements (ZAPROS)
- Aspiration-Level Interactive Model (AIM)
- Visual Interactive Method (VIMDA)
- Models with Uncertain Estimates (ARIADNE, HIPRES3 +)

Various examples have been given to illustrate the specific feature of these tools and techniques with an emphasis on how each of them works in practice.

Additionally, a nuclear waste disposal site selection problem has been used which not only serves to illustrate each technique but also provides a basis for their comparison carried out in the final chapter. The comparison focuses mainly on the type, dimensionality and uniqueness of the task in hand and also on the cognitive effort required of the decision maker in implementing the technique. This in turn provides the relative strengths and weaknesses of the techniques being compared.

Chapter-specific references are given at the end of each paper. Additionally, for the more inquisitive type, there is an extensive classified bibliography at the end of the book.

This book should be on the shelf of every decision maker. There is a wealth of information one would want to dip into from time to time. The comparison of various techniques in the final chapter will be very useful in deciding upon the technique to use in a particular situation. Although at DM78, the book may not seem beyond the affordability of most practitioners, a paperback version will certainly put it within the reach (and willingness to purchase) of everybody.

As I have mentioned earlier, the book is primarily aimed at practising decision makers in business and government. To this end, the style of the delivery seems just about right. However, one does not remain without feeling that the readers would have benefited by a touch more theoretical exposition.

P.A.   U Dave

Intelligent Scheduling Systems

DE Brown and WT Scherer (eds)
Kluwer Academic Publishers, London, 1995. x + 260 pp. £74.75 ISBN 0-7923-9515-8

There has been a tremendous amount of research in the area of scheduling[1]. Much of this work, despite claims from many authors, fails to address the needs of practitioners[2]. The shortcomings of the work are due, in part, to the rigid assumptions often embarrassed in the literature. Scheduling case studies, that can be found in many OR journals, highlight the discrepancy between the theory and practice. When I received this book to review, which I was initially attracted to by the title, I was concerned that this may be another purely theoretical collection of papers. However, with closer inspection this appeared not to be the case.

This book is part of the Operations Research/Computer Science interfaces series published by Kluwer. It comprises papers that were presented at the Intelligent Scheduling Systems Symposium, sponsored by the Artificial Intelligence Technical Section of ORSA. The papers ' . . . were selected from the symposium and subject to a review process designed to yield the papers with important contributions to scheduling theory and/or practice'.

Essentially the aim of the book is to highlight the cutting edge of the joint work being done by operational researchers, management scientists and researchers in AI in the area of scheduling. This is done through ten papers which are partitioned into three sections. The first section, which follows a brief preface, contains four papers and is titled Issues in Scheduling. The second section, containing four papers, and the third section, comprising of two papers, are titled Production Scheduling and Transportation Scheduling respectively.

The first contribution in the book, written by the two editors of the book and a colleague from the University of Virginia, provides a survey of intelligent scheduling systems and describes some potentially promising areas of future research. The bibliography of this paper is extensive with 137 entries. The three other papers in the first section are titled 'Schedulers & Planners: What and how can we learn from them', 'Decision-theoretic control of constraint satisfaction and scheduling' and 'Guided forward search in tardiness scheduling of large one machine problems'. These papers shy away from any complex mathematics but give the reader a good grounding of the common subtleties of many real scheduling problems. These subtleties often prevent the application of much published work in this area.

The second section contains papers with the following, self explanatory titles: 'An overview of Tabu Search approaches to production scheduling problems', 'Measuring the quality of manufacturing schedules', 'Reactive scheduling systems' and 'Intelligent scheduling with

machine learning'. These papers, as with the others in this book, are well written and, furthermore, they provide the reader with a good explanation of real production scheduling problems. The approaches presented in this section are written with application in mind and are thus of interest to Operational Researchers working in production scheduling.

The final two papers, comprising the third and last section, are titled 'Solving large integer programs arising from air traffic flow problems' and 'Intelligent scheduling support for the U.S. Coast Guard'. Both papers cover the solution of large integer programming models resulting from real, dynamic, scenarios.

It is well known that scheduling problems are among the most difficult known. Heuristic methods are often resorted to in practice and this book gives a good appreciation of why this is so. On the whole the book offers a number of good survey papers and papers describing specific applications of scheduling. However, the content is rather limited which is a great shame given the wide potential readership for a good book on practical scheduling.

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References

1 Lawler EL, Lenstra JK, Rinnooy Kan AHG and Shmoys DB (1993). Sequencing and scheduling: Algorithms and complexity. In: *Handbooks in Operations Research and Management Science*, Vol 4: Logistics of Production and Inventory, pp. 445–524, North-Holland, Amsterdam.
2 Bjorndal MH *et al*. Some thoughts on combinatorial optimisation *Eur J Opl Res* 1995; **83**: 253–270

Learning from Failure—The Systems Approach

J Fortune and G Peters

John Wiley and Sons, Chichester, 1995. xi + 262 pp. £19.99. ISBN 0 471 94420 3

This book deals with the latest state of development of a set of ideas set in train in the early seventies by Open University staff. Originally they set out to study systems failures as a vehicle to teach about systems concepts. After discovering that studying systems failures had merit in its own right a method crystallized that was documented in the earlier book. Understanding Systems Failures[1]. After twenty years of refinement, involving application by over a thousand users, the Systems Failure Method (SFM) is presented in its revised form. Although only one of the pair of authors is common to the previous book, and the authors do not make much of presenting this book as a development of the earlier one, I feel it is useful to make some compar-

isons between the two. The title of the latest book shows the increased emphasis on learning from, rather than simply understanding, the genesis of systems failures. However, the content is still strongly anchored in post-hoc analysis of systems failures. The analytical steps have been mapped out in a clearer way than in the previous book and more guidance presented to the user.

Chapter One introduces the book by, amongst other things, showing the value of studying systems failures. The next chapter establishes some definitions before moving on to the third chapter where various approaches are discussed before introducing the Systems Failures Method. Chapter Four describes a major incident, the fire at Manchester International Airport in 1985. This incident is then analysed in Chapters Five and Six using the SFM. Details of the Bhopal incident are covered in Chapter Seven to provide material for the reader to apply the SFM and compare this with summaries of various other approaches present in the literature. Chapter Eight recounts a case study where SFM is used to synthesise from instances of similar failures in computerised patient record keeping systems implemented in hospitals. These analyses form the basis for guiding a future project. The following chapter also emphasises future application. Details of the Channel Tunnel are presented and the reader invited to investigate the potential for systems failures, particularly in the area of safety systems. The final chapter comments on the potential for using SFM in a complementary manner in conjunction with other systems methodologies such as Soft Systems Methodology and the Viable System Model.

This stimulating book outlines an approach that usefully adds to the armoury of the 'systemist', i.e. those interested in systems theory and its application. The ongoing nature of the systems failures project is present in the evolving nature of the approach. Despite clearer articulation in this latest book the Systems Failures Method is, and seems destined to remain, a reasonably loose framework that provides opportunities for the deployment of other systems-related analytical methods. In this sense, expansion of the final chapter and inclusion of some practical examples might be beneficial. The authors acknowledge that the book can be criticized because of the large scale disasters that are featured. These serve to interest potential users including students. However, an interesting aspect of a future edition would be to include more case studies of the method's application to the smaller scale failures that many of us are likely to meet in practice.

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Reference

1 Bignell V and Fortune J (1984). *Understanding Systems Failures*. Manchester University Press: Manchester.

System Dynamics Modelling: A Practical Approach

RG Coyle

Chapman & Hall, London, 1996. £49 xiv + 413 pp. ISBN 0 412 61710 2

When I first decided to teach system dynamics, one of the two books to which I turned was Geoff Coyle's 'Management System Dynamics' published in 1977. The other was, of course, Jay Forrester's original text, Industrial Dynamics[2]. The two made a useful complement, though in many ways, the subject seemed a minority pursuit. Since then, things have changed and system dynamics, in various forms, appear on many different curricula, though mainly in the Business and Management Schools.

Almost 20 years later, Coyle has revisited the scene, following on the heels of others such as Wolstenholme[3] and Vennix[4]. What does this new book have to offer?

Its description of the basics of system dynamics is much the same as in other accounts of the approach, though he is upfront about his own orientation. System dynamics is 'the application of the attitude of mind of a control engineer to the improvement of dynamic behaviour in managed systems' (page 5). Thus, I assume that system dynamics modelling and simulation is to be viewed as a form of engineering. This is something of a contrast with writers such as Wolstenholme[3] who argue that the method provides a useful way of developing understanding in a more general sense.

With this in mind, the book proceeds to develop a systematic coverage of the main features of system dynamics. As a vehicle for this, Coyle uses COSMIC and COSMOS, these being system dynamics packages which he developed. COSMOS is an extension to COSMIC that allows some form of optimisation. Somewhat strangely, at least in my view, he omits any mention of highly popular packages such as Stella/iThink and VenSim until a short appendix that discusses available software. Some would argue that Stella/iThink has, to some major degree, led to the rekindling of interest in system dynamics.

The book is thorough and has a number of examples which are developed gradually during the text. It is possible that these examples will be one of the major attractions of this book, for their gradual development makes them simple to follow. Alongside these examples is much practical advice about dimensional analysis and of other pitfalls that await the unwary system dynamics modeller. Coyle's extensive practical experience shines through like a beacon in this regard.

As a bizarre twist, Chapter 10, Advanced Modelling, is not printed in the text, but sits on a diskette which comes as part of the book. I presume this must have been done to keep the text to a manageable length. The diskette also contains flow diagrams and example models, though the reader would need a copy of COSMIC to run the models.

In summary then, I think this is a useful book which will sit alongside other texts on system dynamics. For me, the examples are its main attraction.

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References

1 Coyle RG (1977). Management Systems Dynamics. John Wiley & Sons: Chichester.
2 Forrester JW (1961). Industrial Dynamics. MIT Press: Cambridge, MA.
3 Wolstenholme EF (1990). Systems Enquiry: A System Dynamics Approach. John Wiley & Sons: Chichester.
4 Vennix JAC (1996). Group Model Building: Facilitating Team Learning Using System Dynamics. John Wiley & Sons: Chichester.

Total Quality Management–A Cross Functional Perspective

A Rao, LP Carr, I Dambolena, RJ Kopp, J Martin, F Rafii and PF Schlesinger

Wiley, Chichester, 1996. £24.95 xxvi + 630 pp, ISBN 0-471-10804-9

Total Quality Management (TQM) is a new wave in industrial management. Attempts have been made to make it a universal management technique in the United States with at best uneven success. It seems to work well in some manufacturing environments and in others it has not seemed to provide much of the heralded improvements. Many would say that is due to the manner in which TQM was applied to an organization, but one could say the same of chocolate mousse. Some cooks can make it and others cannot. How are we to judge the success of a cookbook on chocolate mousse? Or for the same matter TQM?

Much of what has been written in the past about TQM reminded me of oriental mystery schools. With much patience and an enormous effort one might understand one or two aspects of TQM, but for the entire subject one would require an oriental master. This is not the case with this book. I believe the reason is that the authors adhered to the western engineering philosophy of using as much mathematical and graphical analysis as possible. After reading this book many of the mysteries associated with the TQM cult disappeared. For example, the exploitation of Pareto Diagrams is particularly lucid. Another example is the explanation of the 'House of Quality'. The book however is not perfect. Some of the authors' explanations of existing methods such as 'Benefit Segmentation of Nonintelligent Terminal Market' left this reader staring at the page wishing there was something else to help him gain a better understanding. However, where TQM is concerned,

I found this book to be very lucid, filling in those little details which convert mystery into enlightenment.

I enjoyed reading this book and give it my highest recommendation. TQM is here to stay, and a book such as this has a place in the libraries of those who are convinced that management is a science.

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