Book Selection

Edited by JM Wilson

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Advances in Applied Business Strategy, Volume 5—Turnaround Research

D Ketchen (ed.)

Academic Press, Stamford, Connecticut, 1998. xiv + 280 pp. \$78.50. ISBN 0 7623 001 9

The book is concerned with developing a strategy to study scientifically the concept of a ‘turn around organisation’. The editors approach this difficult task by providing a set of articles which have been published in scholarly publications. The thesis of the editors is that whatever has been done in the ‘turn around organisation’ might be considered to be a random assortment of publications. This sort of random effort will not lead to a scientific approach to any subject. One needs a common set of definitions and an underlying theory to attain scientific status. My question to the book is: Is presenting a collection of organised articles on a subject an approach to making the subject scientific? The authors’ understanding of the answer to this question is ‘yes’. This approach will provide a beginning so it is a necessary first step.

How well the authors achieved the necessary first step would be in the purview of those who are experts in the field of ‘turn around organisations’, and not in the eyes of an OR analyst. On the other hand, the book is up for sale to our community, and should provide us with insights on how to develop a sufficient understanding of the problem to be able to deal with it at our level. I find this approach of putting together a number of articles to be difficult to extract what I need to conduct an analysis. Someone who is writing a thesis or dissertation might be well served for having a ready made literary search available to them, but for a busy practitioner, it might be a different story.

This leads me to my conclusion about the book. I cannot give it an overall recommendation. I believe that should best be determined by the user of the book. It is definitely recommended for a student doing advanced research in ‘turn around organisations’ as well as academics pursuing theory development, but only a so-so recommendation for

busy OR analysts trying to meet a deadline. We need something more condensed and to the point.

University of Maryland

C Leake

Advances in Computational and Stochastic Optimization, Logic Programming, and Heuristic Search

DL Woodruff (ed.)

Kluwer Academic Publishers, London, 1998. vii + 312 pp. £79.25. ISBN 0 7923 8078 9

This edited volume presents twelve contributions that represent ‘the expanding research frontiers in Operations Research and Computer Science at the time of the sixth conference of the Computer Science Technical Section of INFORMS held January 7–9, 1998 in Carmel, California’. It is not clear whether these papers were presented at a conference or were contributions invited by the editor subsequent to a conference. As three of the papers are long (30–50 pages) it seems unlikely that they were presented in quite the form given.

As with any volume of this type, there is a spread of topics and few readers will be interested in every paper. I shall consider the three longest papers first. Hooker provides an interesting paper on logic/IP when variables are not $\{0,1\}$. Methods of generating cuts are described, and as usual with this author the treatment is very precise and therefore a joy to read. Next in a loosely related paper Fourer describes how the AMPL system can be extended and generalised to logic programming, this is a very specialised paper, but will appeal to users of modelling languages. The third long paper is an annotated bibliography for the equivalent of sensitivity in MIP and combinatorial optimisation, compiled by Greenberg. This paper is again one for the specialist and might have been better received as a journal

publication. After a brief overview Greenberg summarises the content of each of 137 articles.

The set of shorter papers (20 pages) includes one by McAloon *et al* which complements the other two on logic. This time the emphasis is on co-operative solvers that borrow from LP based IP and constraint logic programming. The finite domain solver helps the continuous one by pruning the search tree and the continuous solver helps the finite domain solver by detecting infeasibilities and guiding the search from a relaxation of the full problem.

Later in the volume we find five papers on heuristics; one on tabu search, three on genetic algorithms (GA) and one on a combination of LP-relaxation and heuristics. The tabu search paper by Rangaswamy *et al* looks at list strategies in scheduling and applies the procedure to project scheduling problems. The paper by Haul and Voss uses a GA for the multidimensional knapsack problem. The GA employs several types of crossover, a repair operator. Some local search and uses surrogate constraints. Some good results are obtained. Next a paper by Thangiah and Petrovic reviews the field of vehicle routing problems with complex constraints and proposes a genetic heuristic for the problems. Much pseudo-code is included. In the next paper, by Potvin and Guertin, a GA for the clustered travelling salesperson problem is developed. Good near-optimal solutions are found for test problems. Finally in this group, Chao *et al* investigate the site-dependent vehicle routing problem. A new algorithm is presented—LP relaxation followed by a set of improvement heuristics. There are also three papers for which I have insufficient expertise to comment. One concerns American Football and the other two involve stochastic modelling.

It is hard to tell if this volume fulfils a need, the papers are interesting and complement other journal publications by the authors. Publication has been rapid, which is an advantage but the cost of the volume is a deterrent. However, the editor has done an excellent job in bringing together quickly the twelve contributions in a uniform layout.

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Operational Research for Development

J Rosenhead and A Tripathy (Eds)

New Age, India, 1996. xxiii + 357 pp. \$35.00. ISBN 81 224 1016 2

This publication is a collection of papers presented at the International Conference on Operational Research for Development held in Ahmedabad, India in December 1992 (ICORD '92). It has taken some time, firstly, to publish this publication and then to submit it for review.

The ICORD '92 Conference was the first specialised conference, national and international, that has focused on the practice of Operational Research in developing countries. The volume of papers contains some 25 contributions on a variety of subjects including Agriculture, Water and Energy, Health, Transportation and Distribution, Business Applications and Development Topics. Furthermore, one of the editors, Rosenhead, provides an Introduction while the final chapter contains two contributions on General Issues. The contributors represent people from South America, various African Countries, India, Australia, the USA and the UK.

In the introductory chapter, Rosenhead outlines the background to ICORD '92, how it came to take place and why. He touches on the question of whether OR in developing countries is different from that practised in developed countries and the need to focus on Operational Research for Development. Developing countries are different and suffer from different problems. Poverty, hunger, disease, the lack of proper education and health care, mass and urban migration, etc. are all realities faced by many of these countries. Solutions to these multitude of problems have no ready made answers and can only be worked out by those who are close to and familiar with local conditions. Therefore 'the specific focus of ICORD '92 was on the achievements of and prospects for this strand of professional practice—Operational Research for Development'.

Chapter 1 includes two plenary addresses by prominent practitioners, one from India and one from Peru. Parikli describes his experience of using OR for development. These are mainly around planning and policy issues in fields such as agriculture, energy, transport, water supply and sustainable development. It is amazing to see the wealth and variety of applications. Strategic Planning and Management for Development is the topic of the second paper in this chapter. Experiences gathered from the authors' time at the World Bank and in Peru are described.

Three papers outlining different applications in Agriculture form part of Chapter 2. The first paper reflects on the use of new technologies in less developed countries and specifically describes the use of data processing in dairy cooperatives in Brazil. The next paper addresses the problem of agriculture production in a semi arid region with all kinds of pests to cope with. A linear programming model incorporating risk, credit constraints and debt repayments was used to develop alternative cropping scenarios in this drought-stricken taluk of Tamil Nadir. The last paper also describes a linear programming model to determine optimal agricultural activity levels across regions. The models are used for regional planning and for agricultural planning and policy analysis.

Water and Energy are the topics in Chapter 3. A supply system optimisation model for oil refining, oil import, and the transportation and distribution of petroleum products in India is described in the first paper. The impact of the

world's biggest canal network on humans, and specifically small landowners, is addressed in the next paper. How should these landowners be compensated, if, through the canal, they lost part of or all of their land? The next two papers cover issues on sustainable micro-watershed development and the derivation of parameters for the management of irrigation systems. Both illustrate the contribution of OR to problems in water supply and irrigation.

Health and health care in developing countries are very important and need special attention. The need for planning for health, prevention of blindness and the location of health facilities in rural areas, are the aspects addressed in this section. There is no doubt that developing countries have different priorities and these are illustrated very vividly by the three examples.

Transportation problems occur everywhere and in Chapter 5, covering Transportation and Distribution, the first contribution is on fertiliser distribution in Nigeria. It is a fairly straightforward multi-product model with the associated sensitivity analysis. The question of implementation is raised, but it is not clear if, in fact, this model was implemented. The next two contributions are both from India, the one on food grains distribution and the next on 'simulation models to evaluate railway operating policies'. Both these are almost classic OR problems. Food grains need to be moved from areas of high surplus to areas where the food grains are sold by 'faired priced shops'. Because of large distances transshipment points are required. The study therefore focuses on the location of these. Railway operations are complex and bottlenecks occur regularly. One way of addressing these is to simulate the operations and to determine improved and more effective operational policies. Simulation is used to address two problems, one, the problem of freight locomotive assignment at a junction and, two, the interaction between track and station layout and train movements to measure line capacity and average travel time for two systems of operation. The last contribution in the chapter is on 'Maintenance and Availability Modeling of bus transport in Malaysia'. A bus company operating 100 buses has problems around bus breakdowns and availability. What maintenance practice should be followed to achieve an 80% bus availability target?

A brief description of industrial logistics as it applies to developing economies is given as well as a market share approach to pricing commodities for exports. This is contained in Chapter 6 on Business Applications.

Development Topics are covered in Chapter 7. These contributions are on the fringes of real OR and discuss issues that are specific to development. What does one really say about 'A Contractual Relations Approach to Study Development—Implications for OR'? Omosa describes the potential, but also the problems, of OR in Nigeria and in a second contribution, asks the question 'Which Way for the Developing Countries' around IT and development. Finally, two general papers address 'successful approaches to OR' in

developing countries as well as OR training for managers. Both give useful insights and a different perspective on OR related projects.

I enjoyed reading this book since it relates to many things that we ourselves get exposed to more and more. OR for development is a must and the many examples in this volume indicate the wide spectrum of problem areas that face the developing world. The challenge to OR practitioners is to be bold and take OR into these uncharted waters. The volume gives a variety of applications, some non-standard, which illustrates that OR techniques can be applied anywhere. Being faced more and more with these kinds of problems I was personally struck by what can be achieved. An irritation is the lack of final editing of the volume. There are many instances where either a word was left out of a sentence, or a word was misspelled. One further example of this is the indication in the introduction (Chapter 0) that the full text of the 'Ahmedabad Declaration' will follow the introduction, but it never does!

The volume is a useful collection of contributions covering the use of OR for Development. For those working in development, or those planning to work in development, this will be a useful addition to material on this important topic.

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Tabu Search

F Glover and M Laguna

*Kluwer Academic Press, London, 1997. xix + 382 pp.
£54.50. ISBN 0 7923 8187 4*

Recently 'meta-heuristic' techniques for combinatorial optimisation problems have received much interest in the OR, AI, and Computer Science communities. One of the most popular and successful meta-heuristic approaches is Tabu Search which is an extension of local/neighbourhood search, with the inclusion of memory structures which record and exploit the history of the search so to escape local optima and lead the search towards (hopefully) higher-quality solutions. Unfortunately, despite a number of excellent general introductions to meta-heuristic optimisers (for example Colin Reeves' book¹), there has not been a book that has concerned itself solely with this approach, and covered its more advanced aspects.

Fred Glover (the inventor of Tabu Search) and Manuel Laguna have now attempted to address this by writing a book (now out in paperback) that solely concerns itself with this technique, its applications, and advanced features. The book is organised as follows: the background to this approach is first given, which is then followed by a description of the most commonly used component of Tabu

Search—short term memory (recency). Chapters 3, 4, and 5 then go on to cover the more advanced aspects of this approach such as candidate list strategies, frequency, influence, and path relinking. The remainder of the book then concentrates on the applications (which has its own chapter), special topics, and implementational issues arising from this technique; for example, ejection chains, hash functions, and parallel processing. The book then closes with a discussion of connections between Tabu Search and other methods such as Genetic Algorithms, hybrid methods, and Tabu Search strategies that the authors consider to be neglected.

The book is generally well-written with clear explanations that should be comprehensible to non-specialists in neighbourhood search. A number of improvements could be made however, especially with regards to the more ‘strategic’ aspects of the book’s contents and organisation, especially those regarding pedagogical issues. The second shortcoming is possibly due to the fact that this text appears to be aimed more at being a research resource rather than a teaching aid.

Therefore a number of suggestions can be made to address the above points. First of all, the applications case studies seems to be poorly integrated with the techniques described earlier in the book (which reduces their ability to illustrate ‘good practice’). Therefore the authors may wish in later editions to either cover a few of the applications in more depth whilst making explicit reference to the material covered earlier, or to restructure the description of the techniques around a few illustrative case studies.

From a pedagogical viewpoint, the book covers too much material that could comfortably be accommodated in a single course, and goes into depth possibly a little too quickly for some students’ tastes. Therefore some additional introductory material, and guidelines for a suitable syllabus based on the book’s contents would be of value. Also, though I admit that this is a matter of personal taste, I found the (well-intentioned) questions at the end of each

chapter to be of little help without some form of model answers. In short, it is often easier in practice to write your own material than to figure out the answer to somebody else’s!

Finally, an attempt to address issues pertaining to the design process would also be a welcome addition. More specifically, I would like to see some discussion on the following issues: the design of neighbourhood structures, the structures that should be looked for when solving a problem, suggestions about the order in which the Tabu Search options should be considered, and validation and verification issues. However, these points tend to be a general shortcoming of such texts and should not really be taken as a specific criticism of this book.

In summary, the authors have succeeded in providing a good general text that describes the full diversity of the work on Tabu Search in a reasonably unified manner—I especially appreciated the coverage of the integration of Tabu Search with conventional integer programming approaches. However, there is still some scope for improvement, though this does not detract greatly from the book’s readability. Hopefully these issues will be addressed in later editions as the authors receive feedback. I would therefore strongly recommend this book as an important resource for researchers in tabu search on account of its depth and breadth of coverage (I also found it very useful as a source of fresh ideas). For teaching purposes it should be augmented by additional materials which add further structure to the course, and highlight which parts of the book are to be covered.

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A Tuson

Reference

- 1 Reeves CR (ed) (1993). *Modern Heuristic Techniques for Combinatorial Problems*. Blackwell: Oxford.