



## Book Selection

Edited by J Crocker

A Artiba, VV Emelyanov and SI Iassinovski: Introduction to Intelligent Simulation: The RAO Language	1212
HP Williams: Model Building in Mathematical Programming: Fourth Edition	1212
M Gaudry and RR Mayes (Eds): Taking Stock of Air Liberalization	1213

### Introduction to Intelligent Simulation: The RAO Language

A Artiba, VV Emelyanov, and SI Iassinovski  
*Kluwer Academic Publishers, 1998. x + 516 pp. £119.00, ISBN: 0 7923 8176 9*

This book introduces a new discrete event simulation language as well as some ideas on new generation simulation systems based upon artificial intelligence tools. This book can be read both as a general introduction to modelling and simulation of complex systems and as a tutorial on the RAO language, a demonstration version of which is available from the Internet. RAO is an acronym for Resources-Actions-Operations. As in most classical simulation frameworks, resources might be workers, tools, conveyors; actions might be manufacturing a part, answering a call, transporting some material; an operation is defined as a rule, or a set of rules, depending on some parameters, which, when instantiated, give rise to a specific set of actions. Operations are described as production rules (if-then statements) which allow for dependency upon time; operations therefore form a sort of knowledge base for a system.

The simulation language described in this book is not an easy modelling tool, but an object-oriented language in which sophisticated applications can be built. Examples are provided which show how RAO might be used to simulate classical flow shops, or some Petri net model, or, through keyboard interaction, the classical Tetris game and many others. The book starts with an introduction to complex system and a survey on existing discrete event simulation tools; then a brief account of knowledge based systems and logical inference is presented. Four chapters are devoted to the basics of the RAO simulation language, while the remaining eight chapters deal with specialised aspects of the language, like animation, and more complex simulation models.

This book is written in a clear and concise way; however it is neither an introduction to artificial intelligence in simulation, nor a tutorial on RAO. While trying to mix the tutorial part and the expository one did succeed in stimulat-

ing the interest of the reader, but I feel that those really interested in using the language would have preferred a true manual, while those readers more interested in the methodological approach might get confused by the many RAO language listings. Also, while in the introduction several interesting aspects of object oriented simulation and of logical inference are outlined, in a later chapter most of the emphasis is given on presenting examples of models built with the language, obscuring somewhat the inherent characteristics of the proposed approach. At the end of the volume I was very positively impressed by the capabilities of the language, but I was not quite sure of the real advantages of this system when compared with others, more traditional simulation software.

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### Model Building in Mathematical Programming: Fourth Edition

HP Williams  
*John Wiley & Sons, 1999. x + 354 pp. £24.95 pbk. ISBN: 0471 99788 9*

Although there are currently several excellent books on mathematical programming available, few of these focus on modelling itself, rather than theory or solution techniques. Yet many students, and indeed practitioners, find the initial modelling of a 'realistic' problem very difficult. Moreover, with fast mathematical programming software now commercially available, the modelling itself, rather than the solution, is the main task which one faces.

In the light of this, John Wiley have made the very sensible decision of releasing a fourth edition of this popular book by Paul Williams. The book seeks to equip people with the skills they need for deciding whether a problem is amenable to solution by mathematical programming techniques, and if so, for creating, debugging and maintaining a model.

The structure of the book is as follows. The book is divided into four main 'parts'. In Part 1, the longest, the main theoretical concepts and tools are introduced. Linear, non-linear, integer and mixed-integer programs are defined, along with various special cases, and there are informative discussions about software, model validity, how to deal with multiple or conflicting objectives, decomposition methods, and so on. Each time a new concept is introduced, examples and pictures are given to aid understanding.

The remaining three parts of the book give the reader a chance to develop modelling skills. In Part 2, twenty-four problems are posed and the reader is invited to formulate them as mathematical programs. The problems are by no means trivial and many of them are based on real-life applications. In Part 3, the author presents several possible formulations for each problem and makes suggestions about which formulation is likely to be 'best' (easiest to solve). Finally, the solutions to the problems are given in Part 4.

The main changes to the previous edition appear to be the addition of a section on Constraint Logic Programming, some new problems involving 'hot' topics (such as Data Envelopment Analysis and Yield Management), and a revision of the references.

In my view this is an ideal book for undergraduate or masters students who are taking a course in mathematical programming, especially given its reasonable price. It may also be a useful text for practitioners.

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### Taking Stock of Air Liberalization

M Gaudry and RR Mayes (Eds)

*Kluwer Academic Publishers, 1998. xvi + 282 pp. £85.00  
ISBN: 0 7923 8387 7*

Air transport has changed considerably in the past twenty years. Air liberalisation, has had a key role in this process of change. Literature on air liberalisation is usually confined to the viewpoint of a single discipline or of a specific stakeholder. This book has the distinct advantage of being multi-disciplinary. The editors bring successfully together three streams of analysis: technology, economy and policy. It also includes a balanced range of viewpoints from airlines to policy-makers and academics. This book results from a symposium organised jointly by the Centre for Research on Transportation—University of Montreal and Transport Canada that was held at ICAO in April 1997.

This book has five parts: Part 1 (Chapters 1 to 3) describes the process of air liberalisation in the US, Australasia and Europe. Part 2 (chapters 4 to 7) analyses the consequences of air liberalisation on pricing, costs and efficiency, safety and the earnings and employment of airlines. Part 3 (Chapters 8 to 11) focuses on policies

towards air liberalisation. Part 4 (Chapters 12 to 15) suggests various tools and approaches to demand modelling and, finally, Part 5 (chapters 16 to 18) concentrates on future tendencies.

Chapter 1, by Steven Morrison and Clifford Winston, provides a comprehensive record of air liberalisation in the USA. The authors present and compare figures between 1978/9 and 1993 to evaluate the impact of liberalisation on fares, profit, safety and service quality. Various benefits of air liberalisation are identified: more competition between airlines at the route level, lower average fares, more frequent flights. However, it is remarked that travellers have experienced some deterioration of the level of service, for example flights take slightly longer or tend to be fuller. Safety does not appear to have been affected by air liberalisation. Analysing the evolution of airline profits since 1979 the authors question whether airlines can be profitable in the long run, whether the low fares charged are sustainable. In Chapter 2, Jim Wolfe from the Department of transport of Australia describes deregulation policies undertaken in Australasia since the late eighties.

Fares are substantially higher in Europe than in the USA. Chapter 3, by Anthony Postert and Robin Sickles, examines two possible sources for this difference: efficiency and airlines' market power. The authors conclude that the gap in efficiency between European airlines and USA airlines has decreased significantly since the period following USA deregulation and that there is little evidence that competitive pricing is violated on average in Europe. The open question at the end of the chapter is why are airline fares higher in Europe. Fares are also the topic of Chapter 4. Philip Barla from Laval University, addresses the impact of airline deregulation on fares. Special attention is paid to the USA case. The author re-examines previous results and confirms the conclusion of Chapter 1 that fares have declined since deregulation. It is also shown that fares are lower on routes where market concentration is lower. This chapter ends on a similar note to Chapter 1 asking whether competition in the aviation sector is really viable in the long run.

It is often claimed that deregulation has increased efficiency in the aviation sector. Chapter 5 by Randal Reed of the Université de Montreal investigates this claim. It is reported that the average cost of airlines has decreased 40% in real terms between 1974 and 1994. This decrease has affected airlines of all sizes. The author holds the view that most of these savings can be attributed to deregulation which has led to changes in technology, pricing and network configurations.

The impact of deregulation on safety is the topic of Chapter 6. Ian Savage from Northwestern University argues that the small decline in safety caused by deregulation in the USA aviation sector, estimated between 9 and 12 fatalities each year, is substantially smaller than the number of lives saved because deregulation encouraged people to travel less by car and more by plane. The net result is

estimated to be a saving of between 198 and 298 lives every year. In addition, the author suggests that the increase in air traffic due to deregulation has stretched air traffic control infrastructure and the FAA surveillance having probably had some impact on safety

Deregulation appears to have had contradicting effects on labour. In Chapter 7, Daniel Rich from Illinois State University aims to reconcile the apparently incompatible results of research in this area. He underlines three consistent findings: (1) real earnings of airline workers and earnings relative to similar workers of other industries have declined from the beginning of the eighties to the early nineties. However, real labour costs have increased over this period; (2) both earnings and employment practices have varied substantially across occupations since deregulation; and (3) labour costs have also become more diverse among airlines. Despite the turmoil and change caused by deregulation he concludes that unique features of airline labour markets, such as a high degree of unionisation and a compensation structure that reflects career investments have remained.

The Organisation for Economic Co-operation and Development (OECD) carried out a project on the policy challenges facing international air transport. Chapter 8 by Wolfgang Michalski summarises the results of this project that were released in 1997. The article discusses current trends and their implications for air transport within the context of globalisation. OECD argues for more liberalisation and competition in aviation markets as a way of improving efficiency and customer service. BC policy regarding air transport is addressed in Chapter 9. Ludolf van Hasselt identifies three future trends and their impact on EC policy: growth related problems, restructuring and liberalisation. The author emphasises the capacity problems posed by air traffic growth at different levels of the air traffic system: airport slots, airport infrastructure, airspace and environment. The issue of state aids is raised along with EC measures taken to deal with it. To stimulate and ensure competition the author argues for the integration of EU and USA regulation policies namely in the areas of anti-trust, ownership and control, and dispute settlement.

Air transport agreements between countries are an arduous and long process involving stakeholders often with conflicting interests. Chapter 10, by Louis Ranger, focus on the Canada and USA agreement that liberalised trans-border markets. It provides good insights not only to the results of the agreement at the time, but also to the process that led to the agreement, including lessons learned. These lessons can be transferred to other fields of policy-making.

IATA appears to agree with OECD on the need to liberalise air transport. In Chapter 11, Geo Besse, argues that the regulatory framework of aviation should be entrusted to WTA and ICAO. However, he adds that the application of GATT trade principles to civil aviation should take into account the legal, technical and commercial

specificities of this sector. Quoting the author '... what we need is a cocktail. A fruit salad... something messy'.

Knowledge of air transport demand is vital to the various stakeholders in air transport: governments, airports, air traffic services, airlines etc. Chapters 12 to 15 focus on modelling air transport demand. Chapter 12, by Marc Gaudry, reviews various types of regression models proposed for transport demand analysis. Benedikt Mandel, in Chapter 13, describes a systemic approach to the modelling of airport choice. Demographic, economic, political, spatial and technical components are considered. The model can be used by private investors, airlines, airports and political decision-makers to simulate different scenarios. For example, airlines may use it to analyse the introduction of a new city pair or changes in the frequency of a service. Richard Laferriere, in Chapter 14, presents ANITA, an air travel demand model that aggregates itineraries (full description of trips) instead of characteristics (examples of characteristics are price, travel time, frequency etc.). Chapter 15, by David Gillen, Richard Harris and Tae Oum, proposes a model to evaluate air liberalisation agreements that integrates both demand analysis and trade theory. The model takes into account not only the improvement to consumers welfare, but also the impact of the agreement on producers and third parties.

Air transport has shown marked cycles of over-capacity and expansion. Considering the evidence in the USA, DeAnne Julius from British Airways, in Chapter 16, asks whether the air transport market will ever reach sustainable equilibrium positions. The author argues that deregulation and globalisation lead both to consolidation and to greater competition. He adds that competition authorities, when analysing alliances, should not look solely to rises in prices but also to the increase in benefits to customers and to the price increases caused by congested airports. Airline alliances are the subject of Chapter 17 by Joseph Berechman and Jaap de Wit. The authors provide a clear and non-analytical overview of airline alliances. They identify five factors that affect alliances: regulation, technology, demand, supply-side economies and market organisation, and assess their impact on the future of alliances. Chapter 18 contains the views of John Panzar from Northwestern on alliances, evolution of networks and airport competition. The author alerts anti-trust authorities to anti-competitive airline mergers and the lack of competition in the airport sector.

Passengers, key stakeholders in air transport, are not organised as such and are not represented in decision-making yet. It would be useful to know the impact of air liberalisation from their point of view. For example, passengers often complain that they are crammed into aeroplanes, that flights are late or cancelled for no apparent reason, that luggage has been lost. Some chapters in this book investigate the impact of air liberalisation on fares. Chapter 1 also analyses frequency of service, flight changes, duration of travel and restrictions on tickets. Future research should

build upon these results to further investigate the impact of air deregulation on quality of service to passengers from its many angles.

This book is recommended to academics and practitioners interested in air transport or in (de)regulation. It provides a sound and comprehensive view of air liberalisation. For readers who do not have time to read the whole book, Chapters 1, 6 and 17 are especially recommended. To fully

understand Chapters 3, 4, 5, 7, 12, 13, 14 and 15 a knowledge of Economics and Statistics is useful. However, the chapters are all worth reading and the main findings of each chapter are clearly stated. This book is essential to understand, in a nutshell, air liberalisation and other related trends in air transport, such as airline alliances.

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