

FOREWORD

Multi-Criteria Decision Making (MCDM) has been one of the fastest growing problem areas during at least the last two decades. In business, decision making has changed over the last decades. From a single person (the Boss!) and a single criterion (profit), decision environments have developed increasingly to become multi-person and multi-criteria situations. The awareness of this development is growing in practice. In theory many methods have been proposed and developed since the sixties to solve this problem in numerous ways.

Two main theoretical streams can be distinguished. First, multi-objective decision making models which assume continuous solution spaces (and therefore are based on continuous mathematics), try to determine optimal compromise solutions and generally assume, that the problem to be solved can be modeled as a mathematical programming model. This is primarily the realm of theoreticians since continuous mathematics is very elegant and powerful and readily allows for many modifications of a basic model or method. Unfortunately mathematical programming does not solve the majority of MCDM-problems in practice, and so these nice and powerful methods are only of limited value for the practitioner. The second stream focuses on problems with discrete decision spaces, i.e. with countable few decision alternatives and basically uses approaches from discrete mathematics, which are mathematically not as elegant as the former. This stream is often called **“Multi-Attribute Decision Making”**. In this book the more general term MCDM is used. These models do not try to compute an optimal solution, but they try to determine via various ranking procedures either a ranking of the relevant actions (decision alternatives) that is “optimal” with respect to several criteria, or they try to find the “optimal” actions amongst the existing solutions (decision alternatives). Even though this type of problem is much more relevant and frequent in practice, there are many fewer methods available and their quality is much harder to determine than in the continuous case. Therefore, the question *“Which is the best method for a given problem?”* has become one of the most important but also most difficult to answer.

This is exactly where the book of Dr. Triantaphyllou has its focus and why it is that important. Rather than suggesting another MCDM method without any convincing justification, he concentrates on the best known and most frequently used methods. He extensively compares them and makes the reader aware of quite a number of abnormalities of some of the methods of which users are often not conscious. He also considers very critically the touchiest points in solving real MCDM problems, namely, quantification of qualitative data, deriving weights from ratio and difference comparisons, and especially sensitivity analysis of MCDM methods. This to me seems as

valuable or even more so than suggesting a new method which may solve another variant of the MCDM problem. At the end of the book Fuzzy MCDM methods are described and evaluated.

What makes this book so valuable and different from other MCDM books is, that even though the analyses are very rigorous, the results are described very clearly and are understandable even to the non-specialist. Also, very extensive numerical studies and comparisons are presented, which are hard to find in any other text that I know. This book, in fact, provides a unique perspective into the core of MCDM methods and practice. The presented theoretical and empirical analyses are complementary to each other, thus allowing the reader to gain a deep theoretical and practical insight into the topics covered in this book. In addition to this, the author offers at the end of each chapter and at the end of the book suggestions for further research and I can only hope, that his suggestions will be accepted by many scientists.

Dr. Triantaphyllou has been involved in MCDM for almost two decades. He has become internationally known as one of the leading experts in the field and he is, therefore, qualified as hardly anybody else to write this book. I can only congratulate him on his achievement and hope that many practitioners will benefit from this excellent book and that scientists will accept his suggestions for further research as fascinating challenges.

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