

HARTMUT STADTLER  
CHRISTOPH KILGER  
Editors

# Supply Chain Management and Advanced Planning

Concepts, Models, Software,  
and Case Studies

**Fourth Edition**

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Software, and Case Studies

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# Preface

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## Preface to the Fourth Edition

The hype is over - and this is fine!

Advanced Planning Systems (APS) have become a mature technology in the past years. Investments in APS have to undergo the same standard software evaluation and financial appraisal process as any other investment. It no longer suffices to argue that “we have to be at the front edge of technology”.

And still there is a large number of rewarding applications for APS. Three of these have become new case studies in this fourth edition. Unfortunately, a fourth case study has been withdrawn in the last minute because the client company regards its APS solution a key element of becoming the leader in its sector - expertise which they do not want to share with their competitors.

A second development to mention is the tendency to avoid the term “System” in AP“S”. Instead some prefer the term Advanced Planning Modules which better reflects the capability to combine some of its modules with other software components (e.g. for Supply Chain Event Management) to form an individual Supply Chain (SC) solution. However, the information flows among modules described in this book now even become more important for the quality of the SC solution generated. Hence, there is no reason for us to refrain from the term APS or to change the concept of our book.

Readers familiar with the third edition will realize that not only chapters have been reorganized and updated to the state-of-the-art but also that there has been much fine-tuning of technical issues like for the index and the references. This is due to Christian Seipl who took over the “burden” of administering the chapters. Many thanks to him! We are also indebted to a number of consultants and practitioners for providing advice and proofreading parts of the book, especially with respect to the description of selected APS.

Now it is up to you, dear reader, to make the best use of this fourth edition!

Hartmut Stadtler  
Christoph Kilger

Hamburg, June 2007  
Mannheim, June 2007

## Preface to the Third Edition

Four years have passed since the first edition of our book – and still its readership is growing rapidly: You may even be able to buy a Chinese translation soon!

The field of Supply Chain Management (SCM) and Advanced Planning has evolved tremendously since the first edition was published in 2000. SCM concepts have conquered industry – most industry firms appointed supply chain managers and are “managing their supply chain”. Impressive improvements have resulted from the application of SCM concepts and the implementation of Advanced Planning Systems (APS). However, in the last years many SCM projects and APS implementations failed or at least did not fully meet expectations. Many firms are just “floating with the current” and are applying SCM concepts without considering all aspects and fully understanding the preconditions and consequences. This book provides comprehensive insights into the fundamentals of SCM and APS and practical guidance for their application.

What makes this book different from others in the field? Firstly, the material presented is based on our experiences gained by actually using and implementing APS. Furthermore, we have tried to extract the essence from three leading APS and to generalize the results – instead of merely reporting what is possible in a single APS. Secondly, this book is not just a collection of papers from researchers who have come together at a single conference and published the resultant conference proceedings. Instead we have structured the area of SCM and Advanced Planning into those topics relevant for turning APS successfully into practice. Then we have asked prominent researchers, experienced consultants and practitioners from large industry firms involved in SCM to join our group of authors. As a result, this edition (product) should be the most valuable source of knowledge for our readers (customers).

You may have observed that creating our team of authors has much in common with forming a supply chain in industrial practice. This story can be expanded even further: Several authors are also partners (contributors) in other supply chains (author groups). It is the task of the steering committee (editors) to make our supply chain work and make it profitable for every partner. This model not only worked for the lifetime of a product’s life cycle but also twice for its relaunch. We hope that our supply chain will stick together for some time in the future for the best of our customers – YOU!

What is new in this third edition, apart from the usual update of chapters?

- A section on strategic issues in SCM has been added as a subsection of Chap. 1.
- The contents of Chaps. 2 and 3 are restructured with a greater emphasis on Supply Chain Analysis.
- Latest issues and recommendations in Strategic Network Planning now have been prepared by two authors (Chap. 6).

- A new chapter has been added showing how to generate production and purchasing orders for uncritical items by utilizing the well-known MRP logic (Chap. 11).
- The chapters on the Definition of a Supply Chain Project (Chap. 15) and the Selection Process of an APS (Chap. 16) have been rewritten in light of new experiences and research results.
- Demand Fulfilment and ATP (Chap. 9) now is based on several APS and thus presents our findings in a more generalized form.
- There are two new case studies, one from the pharmaceutical industry (Chap. 22) and one from the chemical industry (Chap. 23). Also, all case studies now follow a common structure.

This edition would not have been possible without the advice from industry partners and software vendors. Many thanks to all of them for their most valuable help. This is also the last edition, where Jens Rohde has administered all the papers and prepared the files to be sent to the publisher. Thank you very much, Jens, for this great and perfect service and all the best for the future!

Hartmut Stadler  
Christoph Kilger

Darmstadt, April 2004  
Mannheim, April 2004

## Preface to the Second Edition

### Success stimulates!

This also holds true when the first edition of a book is sold out quickly. So, we have created this second edition of our book with great enthusiasm.

Attentive readers of the first edition will have realized an obvious gap between the scope of Supply Chain Management (SCM), namely integrating legally separated companies along the supply chain and the focus of Advanced Planning Systems (APS) which, due to the principles of hierarchical planning, are best suited for coordinating intra-organizational flows. Now, collaborative planning is a new feature of APS which aims at bridging this gap. Consequently, this new topic is the most apparent addition to the second edition (Chap. 14).

But there are also many other additions which are the result of greater experience of the authors – both in industrial practice and research – as well as latest APS software developments. Examples of new materials included are:

- The different types of inventories and its analysis are presented in Chap. 2.
- The description of the SCOR-model and the supply chain typology have been enlarged and now form a separate chapter (Chap. 3).



- There is now a comparison of planning tasks and planning concepts for the consumer goods and computer assembly industry (Chap. 4).
- New developments in distribution and transport planning have been added (Chap. 12).
- Enterprise Application Integration is explained in Chap. 13.
- Chapter 17 now presents implementation issues of APS in greater detail.
- Some case studies have been updated and extended (Part IV).
- Rules of thumb have been introduced to allow users and consultants to better estimate and control computational times for solving their decision models (Part VI).

Like in the first edition we have concentrated on the three most popular APS because we have realized that keeping up-to-date with its latest developments is a very time consuming and challenging task.

SCM continues to be a top management theme, thus we expect our readers to profit from this update and wish them great success when implementing their SCM solution.

Many thanks to all who contributed to the first and second edition!

Hartmut Stadtler  
Christoph Kilger

Darmstadt, January 2002  
Mannheim, January 2002

## Preface to the First Edition

During the late 80s and throughout the 90s information technology changed modern manufacturing organizations dramatically. Enterprise Resource Planning (ERP) systems became the major backbone technology for nearly every type of transaction. Customer orders, purchase orders, receipts, invoices etc. are maintained and processed by ERP systems provided by software vendors – like Baan, J. D. Edwards, Oracle, SAP AG and many more. ERP systems integrate many processes, even those that span multiple functional areas in an organization, and provide a consistent database for corporate wide data. By that ERP systems help to integrate internal processes in an organization.

Mid of the 90s it became apparent that focussing on the integration of internal processes alone does not lead to a drastic improvement of business performance. While ERP systems are supporting the *standard* business workflows, the biggest impact on business performance is created by *exceptions* and *variability*, e.g. customers order more than expected, suppliers deliver later than promised, production capacity is reduced by an unforeseen breakdown of equipment etc. The correct reaction to exceptions like these can save a lot of money and increase the service level and will help to improve sales and

profits. Furthermore, state-of-the-art *planning procedures* – for planning sales, internal operations and supply from the vendors well in advance – reduce the amount of exceptional situations, helping to keep business in a standard mode of operation and turning out to be more profitable than constantly dealing with exceptional situations.

This functionality – powerful planning procedures and methodologies as well as quick reactions to exceptions and variability – is provided by *Advanced Planning Systems*. An Advanced Planning System (APS) exploits the consistent database and integrated standard workflows provided by ERP systems to leverage high velocity in industry. Due to these recent developments, software vendors of APS boost a major breakthrough in enterprise wide planning and even collaborative planning between the partners along a supply chain.

Do APS hold the promises? What are the concepts underlying these new planning systems? How do APS and ERP systems interact, and how do APS supplement ERP systems? What are the current limits of APS and what is required to introduce an APS in a manufacturing organization successfully?

These were the questions we asked ourselves when we started our project on “Supply Chain Management and Advanced Planning” in summer 1998. Since we realized that there were many more interested in this new challenging field, the idea of publishing this book was born.

This book is the result of collaborative work done by members of four consultancy companies – aconis, j & m Management Consulting, KPMG and PRTM – and three universities – University of Augsburg, Darmstadt University of Technology and Georgia Institute of Technology. Our experiences stem from insights gained by utilizing, testing and implementing several modules of APS from i2 Technologies, J. D. Edwards and SAP AG. Tests and evaluations of modules have been conducted within several projects including students conducting their final thesis.

On the other hand, some members of the working group have been (and still are) involved in actual APS implementation projects in several European enterprises. The real-world experience gained from these projects has been merged with the results from the internal evaluation projects and provided valuable insights into the current performance of APS as well as guidelines how to setup and conduct an APS implementation project.

Since summer 1998 our group has spent much time gaining insights into this new fascinating field, working closely together with colleagues from academic research, vendors of APS and customers of APS vendors. However, we are aware of the fact that APS vendors are constantly improving their systems, that new areas come into focus – like supplier collaboration, Internet fulfilment, customer relationship management – and that, because of the speed of developments, a *final* documentation will not be possible. Hence, we decided to publish this book as a report on the current state of APS, based on our current knowledge and findings, covering the major principles and concepts underlying state-of-the-art APS.

This book will be a valuable source for managers and consultants alike, initiating and conducting projects aiming at introducing an APS in industry. Furthermore, it will help actual users of an APS to understand and broaden their view of how an APS really works. Also, students attending postgraduate courses in Supply Chain Management and related fields will profit from the material provided.

Many people have contributed to this book. In fact, it is a “Joint Venture” of the academic world and consultancy firms, both being at the forefront of APS technology. Hans Kühn gave valuable input to Chap. 2, especially to the section on the SCOR-model. Daniel Fischer was involved in the writing of Chap. 9 on Demand Fulfilment and ATP. The ideas of the KPI profile and the Enabler-KPI-Value Network, described in Chap. 15, were strongly influenced by many discussions with Dr. Rupert Deger. Dr. Hans-Christian Humprecht and Christian Manß were so kind as to review our view of software modules of APS (Chap. 18). Dr. Uli Kalex was the main contributor to the design of the project solutions, on which the computer assembly case study (Chap. 20) and the semiconductor case study are based. Marja Blomqvist, Dr. Susanne Gröner, Bindu Kochugovindan, Helle Skott and Heinz Korbelius read parts of the book and helped to improve the style and contents. Furthermore, we profited a lot from several unnamed students who prepared their master thesis in the area of APS – most of them now being employed by companies implementing APS. Last but not least, we would like to mention Ulrich Höfling as well as the authors Jens Rohde and Christopher Sürrie who took care of assembling the 24 chapters and preparing the index in a tireless effort throughout this project.

Many thanks to all!

We wish our readers a profitable reading and all the best for applying Advanced Planning Systems in practice successfully.

Hartmut Stadtler  
Christoph Kilger

Darmstadt, June 2000  
Mannheim, June 2000

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