

JEFFREY H. SCHUTT, PH.D.

DIRECTING THE FLOW OF PRODUCT

**A Guide to Improving
Supply Chain Planning**

DIRECTING THE FLOW OF PRODUCT

**A Guide to Improving
Supply Chain Planning**

JEFFREY H. SCHUTT, PH.D.



Copyright ©2004 by Jeffrey H. Schutt

ISBN 1-932159-19-3

Printed and bound in the U.S.A. Printed on acid-free paper

10 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging-in-Publication Data

Schutt, Jeffrey H., 1950-

Directing the flow of product : a guide to improving supply chain planning / Jeffrey H. Schutt.

p. cm.

Includes bibliographical references.

ISBN 1-932159-19-3

1. Business logistics. 2. Production management. 3. Strategic planning. I. Title.

HD38.5.S39 2004

658.7—dc22

2003027451

This publication contains information obtained from authentic and highly regarded sources. Reprinted material is used with permission, and sources are indicated. Reasonable effort has been made to publish reliable data and information, but the author and the publisher cannot assume responsibility for the validity of all materials or for the consequences of their use.

All rights reserved. Neither this publication nor any part thereof may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the publisher.

The copyright owner's consent does not extend to copying for general distribution for promotion, for creating new works, or for resale. Specific permission must be obtained from J. Ross Publishing for such purposes.

Direct all inquiries to J. Ross Publishing, Inc., 6501 Park of Commerce Blvd., Suite 200, Boca Raton, Florida 33487.

Phone: (561) 869-3900

Fax: (561) 892-0700

Web: www.jrosspub.com

CONTENTS

Preface	vii
About the Author	ix
Acknowledgments	xi
About APICS	xiii
Web Added Value™	xv

Chapter 1: Introduction to Product Flow Planning: Defining Our

<i>Context and Some Key Concepts</i>	1
The Supply Chain and Supply Network	4
What Is Planning?	7
Planning in the Context of Operations Philosophy and Strategy	10
Planning in the Context of Process Execution Skills	11
The New Challenge in Operations Planning	12
Diversity of Planning Needs	13
The Objective	15
Planning Is Inescapable	16
Good Planning Is Valuable and Worthy of Resources	17

Chapter 2: Our Heritage of Planning Techniques: The Tools in

<i>Our Toolbox</i>	21
Classic Techniques: Inventory Control and Probability Models	22
Big Planning Around the Plant: MRP II, DRP, JIT, and the Theory of Constraints	25
Planning Heuristics: I Need a Good Decision Right Now	34
Powerful Algorithms from Mathematical Researchers	35
Getting the Organization to Dance Together: Sales & Operations Planning	43

Packaged Supply Chain Planning Software Meets the Enterprise Resource Planning Establishment	45
Event Management and Order Promising	47
Forecasting and Demand Management	49
The Shape of Planning Technology Today	54

Chapter 3: Principles of Product Flow Planning: The Foundation

<i>on Which We Build</i>	57
Planning Is Performed to Make Decisions	57
What Is the Essence of Good Planning?	60
There Is No One Best Way to Plan	61
When Do We Not Plan?	63
Planning Is a Process, but Requires Organization, Data, and Software	64
Planning Is Really Replanning	65
We Always Plan for an Uncertain Future	67
Good Planning Is Not a Band-Aid® for Poor Operations	69

Chapter 4: Planning Structures: Concepts Underlying Our

<i>Design Work</i>	73
Getting a Handle on Planning Decisions	73
Elements of the Planning Approach	84
Designing Planning Structures	87
Minimum Number of Plans	93
Centralization and Decentralization in the Enterprise	98
Planning Is Always Hierarchical	99
Degree of Planning Integration	100
Collaborative Planning in the Supply Chain	105

Chapter 5: Planning Under Different Operating Philosophies and

<i>Supply–Demand Strategies</i>	109
Variation in Manufacturing and Supply Chain Design	110
Operating Philosophies and Their “Sweet Spots”	118
Specific Planning Techniques in the Context of Operating Philosophies	134
There Is No One Best Way to Plan (Reprise)	143

Chapter 6: Methodology — Creating Better Product Flow Planning:

<i>From a “Gleam in Your Eye” to Improved Operating Results</i>	145
Overview of Methodology	146
The Methodology, Step by Step	149
Identifying When to Rethink Planning Processes and Systems	169

Caveat: When You Are Not in the Driver’s Seat	171
People, Organization, and Change	172
Outsourcing of Planning	178
Conclusions on Methodology	180
<i>Chapter 7: Cases in Planning Structure Transformation: Successes and Partial Successes</i>	183
Production Planning and Master Scheduling of Tire Manufacturing	184
Advanced Techniques in a Rapid-Cycle Production/Distribution Operation	188
A Modern Solution to a Classic Problem in Paper	191
Planning Near-Term Logistics Operations	196
Common Themes Drawn from These Cases	199
<i>Chapter 8: Data and Systems for Planning: The Computer’s Contribution</i>	201
Software Selection and Implementation	202
Model Building	205
Data Acquisition and Consistency	206
Data and Plan Retention	209
Tuning: Are You Feeling Relentless?	209
Information or Optimization?	210
Architecture of Planning Data and Systems	211
Interview Results: Challenges in Implementing Advanced Planning Tools	217
<i>Chapter 9: The Most Successful Planning Approaches: Elegant Simplicity and Other Reasonable Goals</i>	229
Our Principles Are Essential	229
Staying in Touch with Fundamental Planning Concepts	233
Common Mistakes in Designing and Implementing Planning Approaches	234
Primary Processes and Systems That Maintain Great Plans	236
Conclusion	238
<i>References</i>	241
<i>Index</i>	245

PREFACE

This is a book about how to construct effective planning approaches for managing product flow. Planning the movement of product through manufacturing and distribution has been a concern for businesses for more than a century, but doing it truly well remains a worthy challenge for us.

The typical book about planning is either a textbook that teaches a broad variety of generally accepted techniques or an explication of a particular planning technique that is “just what you need to solve your problems.” This book is a bit different. It includes a high-level survey of planning approaches, but it is focused on helping the reader understand those techniques in a new light, understand certain principles that are requirements for good planning system design, and learn a methodology for designing the right planning system for a given enterprise. This book is intended primarily for practitioners who already have considerable background in the planning field, although it can also be used as supplemental reading for advanced courses in operations management or supply chain planning.

Product flow planning is a vast subject and could easily fill a multivolume tome. Instead, this book has been consciously kept to a reasonable size because:

- Anyone thinking seriously about how to plan operations is a busy person, and we respect the reader’s time.
- We have tried to not duplicate topics that are covered well elsewhere, and we provide many references to other material.
- We are far too lazy to create and manage a massive book!

We have attempted to maintain a light touch and sense of humor throughout this volume. Product flow planning is a complex and subtle subject, leading to

mistakes that can seem absurd in retrospect. We hope that the reader's understanding is increased rather than lessened by our attempts at levity. The book is written in a very informal style, although we have retained one feature of more formal tomes: frequent references to other published work. Again, because we do not attempt to actually teach the techniques referenced here, we want to let the reader know where to find more detail.

THE AUTHOR



Jeffrey H. Schutt consults on supply chain planning and execution for Menlo Worldwide's Professional Services Group. He has taught in the Management Department at the University of Texas and served as a Partner in the Supply Chain Solutions practice of CSC Consulting. He is also an alumnus of optimization pioneers Analysis, Research and Computation, Inc. and of the seminal logistics firm Cleveland Consulting Associates.

Dr. Schutt holds bachelor's, master's, and Ph.D. degrees from Stanford University. His unique insights on supply chain planning are based on over twenty years of experience approaching it from multiple perspectives. He has led consulting projects to create new planning processes in the consumer goods, industrial products, automotive, paper, aerospace, high-tech, and distribution industries. He has designed and created custom planning systems for clients. He has led the design and development of packaged planning software and implemented software suites from other providers. He has performed postmortem evaluations of the effectiveness of new planning techniques.

This body of work has given him a unique perspective on the challenges businesses face in improving their planning, and led to this book.

ACKNOWLEDGMENTS

This book is dedicated to my loving wife June, son Robert, and daughter Katherine, who have supported me through many long nights and weekends of work on it.

I would like to thank numerous colleagues who have helped to develop the understandings presented here, contributed ideas, or reviewed the draft: Jim Kilpatrick, Dr. Bob Carlson, Atul Garg, Mike Ledyard, Tom Moore, Roger Kallock, Jeff Benesch, Steve Simco, Steve Goble, James Fehlberg, and Brad Scheller. I must, in particular, thank Dr. G. Terry Ross, whose brilliance has often influenced me.

ABOUT APICS

APICS — The Educational Society for Resource Management is a not-for-profit international educational organization recognized as the global leader and premier provider of resource management education and information. APICS is respected throughout the world for its education and professional certification programs. With more than 60,000 individual and corporate members in 20,000 companies worldwide, APICS is dedicated to providing education to improve an organization's bottom line. No matter what your title or need, by tapping into the APICS community you will find the education necessary for success.

APICS is recognized globally as:

- The source of knowledge and expertise for manufacturing and service industries across the entire supply chain
- The leading provider of high-quality, cutting-edge educational programs that advance organizational success in a changing, competitive marketplace
- A successful developer of two internationally recognized certification programs, Certified in Production and Inventory Management (CPIM) and Certified in Integrated Resource Management (CIRM)
- A source of solutions, support, and networking for manufacturing and service professionals

For more information about APICS programs, services, or membership, visit www.apics.org or contact APICS Customer Support at (800) 444-2742 or (703) 354-8851.



*Free value-added materials available from
the Download Resource Center at www.jrosspub.com*

At J. Ross Publishing we are committed to providing today's professional with practical, hands-on tools that enhance the learning experience and give readers an opportunity to apply what they have learned. That is why we offer free ancillary materials available for download on this book and all participating Web Added Value™ publications. These online resources may include interactive versions of material that appears in the book or supplemental templates, worksheets, models, plans, case studies, proposals, spreadsheets and assessment tools, among other things. Whenever you see the WAV™ symbol in any of our publications, it means bonus materials accompany the book and are available from the Web Added Value Download Resource Center at www.jrosspub.com.

Downloads available for *Directing the Flow of Product: A Guide to Improving Supply Chain Planning* consist of an exploration of leanness with agility, an illustration of the intellectual process of redesigning planning, a man-machine planning template, an analysis of the simplicity/accuracy trade-offs in planning, and the Conservation of Flow.

INTRODUCTION TO PRODUCT FLOW PLANNING: DEFINING OUR CONTEXT AND SOME KEY CONCEPTS

*There was much attention to partial insights, but the effects
on other parts of the system or other objectives were overlooked.*

Jan Riezebos¹

This book explores how enterprises can do a better job of planning the flow of goods. It is thus directed toward businesses for which material flow is important: basic materials producers, manufacturers, distributors, and retailers of physical goods. Our objective is to illuminate the fundamental issues of product flow planning in a comprehensive way, to consider both the fundamental challenges and the context in which planning is performed. We will take an unusually broad view of *all* the types of industries that produce and distribute physical products: consumer goods, industrial goods, high-technology products, chemicals, and so on.

Rather than being a textbook, this is a guide for the advanced practitioner or graduate student who is ready to hone his or her knowledge of how to design and implement better planning approaches. We do not teach the basic concepts

here or the details of various techniques. Rather, we try to provide perspective on what planning techniques work well, under what circumstances, and teach how to design a comprehensive planning approach for an enterprise.

This book is also an attempt to persuade the reader about the truth of certain propositions. Not being coy, we can introduce the most important of those propositions now:

- Planning should be an integrative function of the enterprise, and hence the operations planning processes need to be considered as a whole — at least occasionally — and rationalized. We advocate beginning with a comprehensive supply chain view of the scope of planning, and then letting the most natural way to plan a specific business drive us toward the particular kinds of plans that may be necessary for manufacturing, order promising, physical distribution, inbound materials management, and so on. The need for a unifying map or vision of planning is a theme that we will return to repeatedly, and we will present various ways to express that vision, such as the backbone diagram introduced in Chapter 4.
- With modern computing and data communication capabilities, there are few remaining technical limitations on what we can do. There are, however, practical trade-offs we must make on how much planning we should perform and appropriate levels of expenditure on systems and staff. More planning is not necessarily better planning. Unlike aerobic exercise, having everyone plan for an hour every day does not necessarily improve our health.
- While good planning often requires powerful software, the core of better planning is *process improvement* driven by professionals who feel strongly that there is a better way to plan in their environment. This fact implies a different approach to improvement than the software sales-driven approach that has predominated in recent years.
- The best approach to planning for a specific business is highly dependent on the nature of that business. Indeed, finding the right approach to planning its operations is part of the way a business should differentiate itself from its competitors and achieve competitive advantage.
- Most comparisons of planning approaches, e.g., the MRP (material requirements planning) versus JIT (just-in-time) discussions of the last twenty-five years, are far too narrow and neglect important types of planning. We will introduce and compare more of the range here.
- Planning is performed primarily to make decisions, and a methodology of planning design that considers what decisions we have to make and

how those decisions interrelate in a particular business is a good way to rationalize how we plan. We believe that in practice it is fundamentally simpler to begin from the decision-requirement perspective than to try to begin from the vast array of “best practice” planning methodologies offered to us.

The book’s title refers to “directing the flow of product” because they are the best words we have found to describe the challenge of planning the complete movement of materials and finished goods. We have chosen to de-emphasize the more common name “supply chain planning” because:

1. Manufacturing-oriented professionals sometimes feel excluded by that term and planning production is a very important part of what we will discuss here.
2. We do not want to overemphasize the word “planning” because we are not selling more planning; sometimes less planning is better.
3. Some commentators prefer the use of “demand chain” over “supply chain” to emphasize the importance of product “pull” over product “push” in contemporary thinking, or prefer “value chain” to emphasize the importance of value creation or outsourcing opportunities at each stage, or advocate other terms that emphasize specific strategies.

So we have employed a somewhat unique title that, we hope, carries little baggage. We do emphasize the term “flow,” which is a very powerful theme in contemporary thinking about supply chains and manufacturing. We will also occasionally use the term “operations planning” as a synonym for product flow directing/planning, recognizing that to some people operations means manufacturing and to others in, say, service industries it does not refer to product flow at all.

Perhaps the hottest topic in planning the last few years has been collaborative planning, particularly collaboration between enterprises using the Internet. One of our objectives in writing this volume has been to make collaboration a fundamental part of how we present the product flow planning discipline, rather than something exotic or separate from the rest of planning. Similarly, the event management–based “planning” that occurs in near-real time to decide on the best immediate response to new information about operations is fundamental to our approach.

After this introductory Chapter 1, we will devote Chapter 2 to a high-level summary of some of the most important operations planning techniques that have been developed over the last century, with the objective of trying to