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Editors

# REVERSE LOGISTICS

Quantitative Models  
for Closed-Loop  
Supply Chains

With 76 Figures  
and 34 Tables



Springer

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## Preface

Today's supply chains no longer are confined to one-way product flows from producers to consumers, but increasingly also need to deal with flows in the opposite direction. Examples of such 'reverse' streams of products range from end-of-life computer equipment to returned merchandise in online channels, from reusable packaging to defective products requiring rework. Managing these complex interrelated flows confronts companies with novel challenges. At the same time, it calls for a broadening of scientific theory.

In 1997, we initiated a European research network, 'Reverse Logistics and its Effects on Industry' (REVLOG), to address these issues (see also [www.fbk.eur.nl/OZ/REVLOG](http://www.fbk.eur.nl/OZ/REVLOG)). Our objective was to help establish a sound theoretical basis for reverse logistics. We focused on developing quantitative models that support decision-making. Six universities participated in the network, namely the Aristotle University of Thessaloniki, the University of Piraeus, the Otto-von-Guericke University of Magdeburg, INSEAD, the Technical University of Eindhoven, and the Erasmus University Rotterdam (project coordinator). The European Union generously sponsored this project within the TMR-framework from December 1997 until December 2002.

We structured the field of our study around five clusters, namely production planning and inventory control, distribution, business economics, information and computational aspects, and environmental impact. Our research approach included mathematical modeling, software development, case studies, and literature reviews. This book presents the major results of the REVLOG project from a quantitative modeling perspective. A companion book appearing with the same publisher provides a detailed description of current industrial practice in reverse logistics through a set of case studies.

This book is organized in four parts. The first part, encompassing two chapters, presents a qualitative framework for reverse logistics and locates the topic within the more general field of supply chain management. Chapter 2 also provides a detailed outline of the book. The subsequent parts, each consisting of four or five chapters, address managerial issues and corresponding quantitative models related to distribution management, inventory control

and production planning, and broader supply chain management issues. Each chapter opens with an illustrative case, highlights key issues, and then explains in detail the available models and theoretical results. Each chapter is written by a team of authors that have made substantial contributions to the literature on the given topic.

This book is aimed at academics and students in the field of supply chain management. It can be used as a basic text for graduate courses in this field. By bringing together all available knowledge on reverse logistics and adding a substantial body of new theory it is, we believe, unique in its kind.

Even though the book may be primarily aimed at academics and students, it should also be useful to professionals in the field of supply chain management, especially people with a specific responsibility in product recovery. The many decision models and decision support tools discussed in the book should provide them with a solid basis in designing effective systems in practice.

Many individuals have contributed to the REVLOG project and to this book specifically. First of all, we would like to thank all participating researchers for their scientific and personal contributions, enthusiasm, and willingness to collaborate throughout the project. No less important, on behalf of all participants we thank the EU for their generous financial support. Professors Dirk Cattrysse (K.U. Leuven), Paul van Beek (U. Wageningen) and Thomas Spengler (T.U. Braunschweig) did a great job in critically reviewing parts of the book. A special thank you also goes to Michelle Baum for assisting us with copyediting the text.

Rotterdam, July 2003

Magdeburg, July 2003

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# Contents

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## Part I A Framework for Reverse Logistics

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### 1 A Framework for Reverse Logistics

*Marisa P. de Brito, Rommert Dekker* ..... 3

### 2 Quantitative Models for Reverse Logistics Decision Making

*Rommert Dekker, Moritz Fleischmann, Karl Inderfurth,  
Luk N. Van Wassenhove* ..... 29

---

## Part II Collection and Distribution Management Issues

---

### 3 Managing Product Returns: The Role of Forecasting

*L. Beril Toktay, Erwin A. van der Laan, Marisa P. de Brito* ..... 45

### 4 Reverse Logistics Network Design

*Moritz Fleischmann, Jacqueline M. Bloemhof-Ruwaard,  
Patrick Beullens, Rommert Dekker* ..... 65

### 5 Collection and Vehicle Routing Issues in Reverse Logistics

*Patrick Beullens, Dirk Van Oudheusden, Luk N. Van Wassenhove* ..... 95

### 6 Product Returns: Handling and Warehousing Issues

*Marisa P. de Brito, M.B.M.(René) de Koster* ..... 135

---

## Part III Inventory Control and Production Planning

---

### 7 Lot Sizing Decisions in Product Recovery Management

*Stefan Minner, Gerd Lindner* ..... 157

**8 Stochastic Inventory Control for Product Recovery**

*Erwin A. van der Laan, Gudrun Kiesmüller, Roelof Kuik,  
Dimitrios Vlachos, Rommert Dekker* ..... 181

**9 Managing Dynamic Product Recovery**

*Gudrun P. Kiesmüller, Stefan Minner, Rainer Kleber*..... 221

**10 Production Planning for Product Recovery Management**

*Karl Inderfurth, Simme Douwe P. Flapper, A.J.D.(Fred) Lambert,  
Costas P. Pappis, Theodore G. Voutsinas* ..... 249

**11 Valuation of Inventories in Product Recovery Systems**

*Ruud H. Teunter, Erwin A. van der Laan* ..... 275

---

**Part IV Supply Chain Management Issues in Reverse Logistics**

---

**12 Coordination in Closed-Loop Supply Chains**

*Laurens G. Debo, R. Canan Savaskan, Luk N. Van Wassenhove* ..... 295

**13 Long-term Analysis of Closed-loop Supply Chains**

*Patroklos Georgiadis, George Tagaras, Dimitrios Vlachos*..... 313

**14 LCA for Evaluating End-of-life Options of Spent Products**

*Costas P. Pappis, Stavros E. Daniel, Giannis T. Tsoulfas* ..... 333

**15 Models for Eco-eco Closed-loop Supply Chain Optimization**

*Jacqueline M. Bloemhof-Ruwaard, Harold Krikke,  
Luk N. Van Wassenhove* ..... 357

**16 ICT Enabling Reverse Logistics**

*Angelika Kokkinaki, Rob Zuidwijk, Jo van Nunen, Rommert Dekker* .... 381

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**Appendix**

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**Notation** ..... 407

**References** ..... 409