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Advances in Distribution Logistics



Springer

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Advances in Distribution Logistics

Editorial

Distribution Logistics is concerned with the design and control of all processes necessary for delivering the products of manufacturers to the customers so as to satisfy their demand. These processes - transport, warehousing, administration and communication - are part of the supply chain where they are linked with the production and the purchase of materials. Physical distribution in its proper sense addresses a great number of customers spread over a large area, a country, a continent or all over the world, and is performed in a distribution network consisting of factories, warehouses, transshipment points, retail shops, etc. It involves different actors - manufacturers, carriers, retailers - with different but overlapping distribution networks and different logistics objectives.

Distribution Logistics has been a subject of research for some thirty years which has produced a rich body of literature concerning problem analysis, various quantitative models and planning methods both for the design of distribution systems and for the control of the operations, in particular inventory control and vehicle routing. However, the circumstances of the distribution business are subject to continuous change. In the seventies and eighties, several trends have gradually increased the complexity and the importance of the distribution tasks and costs: the concentration of the production locations in industry, which implies longer distances for the distribution, the increasing multiplicity of product variants and the growing part of just-in-time deliveries to the retailers. The recent trend of accelerated globalization of the markets favours, on one hand, the development of international distribution systems, on the other hand it has produced a tremendous cost pressure on all distribution processes for all participating parties. As a result, a strengthened confrontation between these parties, but also an increasing number of strategic cooperations can be observed. In addition, the installation of the Single European Market has strongly affected the distribution business in Europe: Transport tariffs have been deregulated, the international competition on the transport market has intensified, and barriers for border-crossing distribution networks have been removed. Finally, environmental aspects of freight traffic play an increasingly important role in the public and political discussion, in particular in view of the dramatic increase of the road traffic in Central Europe.

This development has stimulated an intensification of research on Distribution Logistics since the beginning of the nineties, in particular in Europe. The new conditions are being investigated, new instruments are being developed and first experiences with reorganization projects in practice have emerged.

The volume in hand takes this development into account. It presents recent work of a group of mainly European researchers who have come together at a series of workshops on Distribution Logistics since 1994. The primary orientation of the book is towards both the *practice* of Distribution Logistics and the decision support by quantitative models and techniques. Practice orientation requires a careful rather qualitative analysis of the planning situation as a first step prior to the development of planning methods. This is the subject of some contributions in Chapter 1 and, partly, of most of the other contributions. On the other hand, the majority of the papers presenting various mathematical methods do not deal with the simplifying standard models of plant location, vehicle routing or inventory control, but consider more or less complicated extensions of those models meeting the particular needs of Distribution Logistics in specific practical situations. Some articles focus on a particular application, but also most of the other articles contain a Section on applications. We therefore decided against organizing this volume in separate parts on „Theory“ and „Applications“.

The 21 articles have been arranged in five Chapters. The first one is concerned with general frameworks of Distribution Logistics, the other four deal with the main functions: Strategic design of distribution systems and location of warehouses; tactical and operational planning of transport; operational planning within the warehouse; and control of multi-stage inventory in a distribution system.

In **Chapter 1**, the articles of *Boutellier and Kobler* and of *Hagdorn-van der Meijden and van Nunen* both provide frameworks of the strategic planning process for Europe-wide Logistics Systems and define the role of quantitative decision support tools within this process. The SELD (Strategic EuroLogistics Design) model in the former article is intended to consolidate the more conceptual approach of Logistics and Operations Research. The latter paper reports on applications in the food and electronics industry. The paper of *Henaux and Semal* focuses on the delivery service provided to the customers and highlights its key factors. *Corbett, Blackburn and van Wassenhove* consider partnerships in the supply chain and analyze, by means of several real cases, their development and conditions of success. The paper of *Fleischmann* provides a framework for quantitative models for the design of freight traffic networks, comprising the different views of the actors involved. One focus is on modeling transportation costs after the deregulation.

In **Chapter 2**, the articles of *Bruns, Klose, Klose and Stähly* and *Tüshaus and Wittmann* present new models and algorithms for locating facilities, such as warehouses and transshipment points, in a one- or two-stage distribution system. While *Bruns and Klose* provide two different algorithms, the two other papers concentrate on modeling techniques and sensitivity analysis, which were applied in practical situations. Also *Daduna* analyzes a particular real-world distribution system and suggests a model for improving its structure. *Wlcek* considers a network of cooperating piece good carriers. He develops a local search heuristic

for the design problem, including the location of depots and hubs and the decision on the transport relations. Moreover, he reports on an application.

Chapter 3 is concerned with various aspects of transport planning within a distribution system. *Stumpf* considers the same network of carriers as *Wlcek* above. However, she tackles the daily control of the vehicles. For the long distance transports, this is a particular vehicle scheduling problem (VSP), but differs considerably from the classical VSP. *Bertazzi and Speranza* investigate the often neglected relationship between transport costs and inventories in a multi-stage supply chain. *Kleijn and Dekker* consider the typical distinction between large orders which are shipped directly from the factory or a central warehouse, and small orders delivered via regional stockpoints. They show the implications of the use of a „break quantity“ as determinant for direct deliveries. The paper of *Kraus* presents a model for estimating the length of the vehicle tours from a depot to a given set of customers. This is an important interface between the strategic network design and the operational transport planning as well as a useful basis for the evaluation of distribution networks with respect to environmental aspects.

Chapter 4 contains two papers on the control of the internal transports in a warehouse. *De Koster and van der Meer* investigate different strategies for the control of the fork lift trucks in the distribution center of a computer wholesaler. *De Koster, van der Poort and Roodbergen* study the effects of algorithms for minimizing the length of orderpicking routes.

Chapter 5 is concerned with the inventories in a distribution system, which are required for providing a satisfactory service level to the customers. *Diks and de Kok* and *Tüshaus and Wahl* analyze control policies for two-stage distribution systems and provide approximation procedures for the optimization of the parameters. *De Leeuw, van Donselaar and de Kok* investigate the impact of different forecasting techniques on the inventory level. *Van der Laan, Salomon and van Nunen* consider a reverse logistics system, which includes, besides production and distribution, a return flow of used products to be remanufactured. They give an overview on inventory control models for this new field of research.

The editors are indebted to all authors for their valuable contributions and to the referees whose work, subject to tight deadlines, has been essential to guarantee the quality level of this book. Special personal thanks go to Dipl.-Inform. Kay Holte who gave substantial support in organizing and producing this volume.

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