WAREHOUSE OPERATIONS REVISITED
NOVEL CHALLENGES AND METHODS

In today’s e-commerce business, continuous technological development, high competition, demand fluctuations, and especially service standard requirements pose enormous challenges for the logistics operations of a company. To satisfy these requirements traditional logistics processes have to be reconsidered and potentially restructured to facilitate logistics efficiency on the one hand, as well as quick and reliable delivery guarantees on the other hand.

This dissertation deals with new problems which arise in this context for the operational procedures of commercial warehouses and in particular for the order picking operations. Order picking operations contribute to more than 55 percent to the overall operation costs of warehouses. We propose solution methods, which are capable of integrating product returns in order batching and order picker routing methods, since returns processing has become a substantial part of the daily operations in warehouses.

Many product returns are nowadays common for most e-commerce retailers, since the opportunity to shop online is usually accompanied with very liberal return policies. In warehouses those returns lead to additional cost and labor effort, as the products have to be inspected, re-packaged, and reintegrated in the stock before they can be resold. Cost-efficiency as well as accurate inventory management are therefore significantly affected by the processing of returns.

Besides, we study a staff planning problem for warehouses in situations of high workforce demand fluctuations. Labor is usually highly cost-intensive and has to be used most efficiently by optimal scheduling. We discuss five optimization approaches to incorporate risk management in a staff schedule optimization and present a decision tool for warehouse managers which can assist in deriving low-cost solutions by simultaneously controlling risks of shortages.

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