Abstract (en)

The planning of operational logistics is an important part of operations dispatching in logistics networks. A given network, created in tactical and strategic planning, shall be used for cost minimal supply of material for production purposes. The method introduced in the thesis supports detailed operations planning of the given network.

In past optimizations, the calculation of an appropriate material flow plan was based on vast simplifying assumptions. This thesis presents a new linear mixed integer optimization model which overcomes most of the simplifications. This model considers several practical aspects, such as complex tariff systems, alternative crates, transport routes, storages areas and further aspects. It integrates a wide range of degrees of freedom, such as operations, crates, resources, transport modes, choice of suppliers, and transport routes.

To solve the newly created model, two separate optimization methods are presented. An exact method, using a branch and bound technique , is used to solve instances optimally. By applying several reformulation and improvement techniques, the mathematical reformulation is altered to speed up optimization runs. A newly designed primal heuristic, integrating a construction and an improvement heuristic, is presented as an alternative solution approach.

A web based decision support system was designed to support logistics planners applying the methods to their practical problems. The concept of the system allows individual process design. These individual process chains can be transformed into the model formulation.

Based on two case studies it is confirmed that the shown solution approach is capable of solving real world instances in appropriate time.