

# **SCHOOL OF INDUSTRIAL ENGINEERING**

## **SEMINAR**

### **Integrated Network Design Models for Crossdocking and Warehousing Strategies with Tactical Considerations**

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#### **ABSTRACT**

In this thesis, we identify the critical tactical considerations for various distribution strategies, and then develop integrated distribution network design models by taking into account those operational factors.

The first part of this thesis presents a crossdocking network design problem for a two-stage and single commodity supply chain. Since the effectiveness of a crossdocking strategy primarily depends on the successful management of the lead time and load balancing which are a function of inventory decisions as well as the network topology, both the lead time and inventory decisions should be considered at the strategic network design stage. We present a capacitated crossdocking network design model that minimizes the total logistics cost while controlling the lead times, inventory levels, and load-balancing. The proposed heuristics that are based on Lagrangian relaxation show good performance in terms of solution quality as well as computational requirements.

The second part of this thesis is devoted to warehouse capacity acquisition-location models. Since the capacity of a warehouse should be measured by its physical size, not the throughput, the capacity management of warehouses is closely related to the inventory management of the warehouses. We present integrated capacity-acquisition location models for warehouse distribution networks with inventory considerations in which the capacity cost exhibits both economies and diseconomies. Heuristics based on Lagrangian relaxation and improvement algorithms that reduce the computational requirements are proposed.

The third part of this thesis compares crossdocking and warehousing distribution strategies in a quantitative form. The ultimate goal of our research is providing decision support tools for companies to aid them in determining the appropriate distribution strategy under their own business environment. As a first step towards deriving comparable models for various distribution strategies, we propose analytical integrated network design models under deterministic demand as well as simulation models under stochastic demand. Analytical and numerical results showing the performance of these two strategies and the relation between the level of uncertainty in demand and the total cost of each distribution strategy are presented.

**Seminar**  
**Wednesday, April 8, 2009**  
**4:00 PM, GRIS 274**

**Final Exam**  
**Tuesday, April 9, 2009**  
**1:30 PM, GRIS 273**