Seminar

Operations and Supply Chain Management

Summer 2014
Objective

- Skills and tools for a successful master thesis project
- Read and understand recent research contributions in the field of service parts supply chain management
- Do own literature research on the assigned topic
- Structure the material
- Pursue interesting research questions
- Write a paper
- Present paper and defend in a discussion
Deliverables

• To be submitted to: logistics.wi@tum.de
• Outline and table of contents, due: April 22nd, 2014
• First results on research question: May 20th, 2014
• 15-20 pages paper (pdf-Format): June 16th, 2014
• Presentations (30 min+15 min discussion): June 26th and 27th, 2014
• Discussant: Each participant will be assigned as a discussant to another presentation
  – Wrap-up the presentation
  – Moderate the discussion.
Content of the seminar paper

• **Introduction**
  - Motivation of the relevance of the problem

• **Basics and Literature**
  - Definitions, concepts
  - Overview on existing contributions

• **Research question**
  - Use examples and/or real data
  - Use methods learned in the specialization
    - Forecasting, inventory management, network design, LP, simulation
    - Make recommendations to answer the research question

• **Conclusion and Outlook**
Guidelines

- Paper and formatting guidelines: www.log.wi.tum.de
- Literature search:
  - Library: Databases on scientific literature
  - Internet
    - www.sciencedirect.com
    - www.jstor.org
    - ... many more
- Citations and scientific code of conduct
Seminar topics

Cover the research and potential Master thesis topics with the Logistics and Supply Chain Management group

Inventory Management
• Retail (Topics 1-6)
• Service Parts (Topics 7-11)
• Dual Sourcing Strategies (Topics 12-14)
• Production planning and lot-sizing (Topics 15-20)
• Financial and behavioral models (Topics 21-23)

Transportation Management (Topics 24-31)
Supply Chain Design (Topics 32-36)
Resources and Energy Storage (Topics 37-40)
Retail operations

1) Standard mixed loads
Task: Explain and discuss the ideas presented Implementation as simulation (by using e.g. AnyLogic), Numerical Example

2) Rationing in multi-echelon inventory systems
Task: Explain and discuss the rationing models Simulation of rationing models & existing LP implementation of myopic optimization model of chair (by using e.g. AnyLogic), Numerical Example & comparison
3) The backroom effect in retail operations
Task: Explain and discuss the model, Implementation as simulation (by using e.g. AnyLogic), Numerical Example

4) Lost sales inventory models with batch ordering and handling costs
Task: Explain and discuss the model, Implementation via Dynamic Programming (by using e.g. Matlab), Numerical Example
5) Reverse logistics: handling of merchandise returns
Mostard, J., Teunter, R.H., The newsboy problem with resalable returns: A single period model and case study, European Journal of Operational Research 169(1)
Task: Literature review, empirical examples, application of the model

6) The effect of promotions in retail – comparing the marketing and the operations perspective
Gao, J.-J., A joint decision model of inventory control and promotion optimization based on demand forecasting
Task: how to forecast demand for promotional products (impact of forward buying), comparison of forecasting techniques, simulation of inventory impact
Service parts management

7) Generating Non-Homogeneous Poisson Processes
Task: Implementation of nine short algorithms for generating non-homogeneous Poisson distributed random variables and their comparison

8) Estimating Non-Homogeneous Poisson Processes
Task: Estimation of parameters from real data for spare parts management applications
9) Strategic inventory placement in supply chains: nonstationary demand

Task: Summary, review of related work and implementation of examples
10) When is it feasible to model low discrete demand by a normal distribution?


Task: Summary and numerical study

11) The final order problem


Task: Implementation of model and extension to life-cycle demand patterns
Dual sourcing strategies

12) Integrated safety stock optimization for multiple sourced stockpoints facing variable demand and lead time

Task: Overview of differences between decentralized (SPP) and consolidation (SCC) model, fill rate comparison by simulation study
13) Analysis of a two-echelon inventory system with two supply modes
Task: Review of related work, Implementation of algorithm

14) Dual index policies for dual sourcing
Task: Comparison to state-dependent policy, Interpretation of simulation study
Production planning, lot-sizing and scheduling

15) Quantity discounts in Supplier selection
Stadtler, H. (2007), A general quantity discount and supplier selection mixed integer programming model, OR Spectrum 29: 723-744
Task: Implementing in Mosel XPRESS, Validating by numerical results

16) Optimal initial and final inventory level in rolling horizon planning
Task: Implementing in Mosel XPRESS, Validating by a case study from industry
17) Lot-sizing and dynamic safety stocks
Helber, S., Sahling, F., Schimmelpfeng, K. (2013), Dynamic capacitated lot sizing with random demand and dynamic safety stocks, OR Spectrum 35: 75-105
Task: Implementing in Mosel XPRESS, Validating by a case study from industry

18) Integrating lot-sizing and scheduling
Task: Implementing in Mosel XPRESS, Validating by numerical test
19) Bilevel lot-sizing
Tasks: Implementation and numerical study

20) Quoting manufacturing due dates subject to a service level constraint
Hopp, W. J., Roof Sturgis, M. L. (2000), Quoting manufacturing due dates subject to a service level constraint., IIE Transactions 32: 771-784
Tasks: Review of related work, Conduct a simulation study to investigate due date setting methods to meet different constraints (by using e.g. AnyLogic Simulation Software)
Empirical and behavioral models

21) Measuring the stock market reaction to events regarding Sustainable Supply Chain Management
Tasks: Investigating the impact of events on stock price (Software will be provided); Access to financial database will be provided.

22) Investigating the relation between corporate capabilities and inventory efficiency
Tasks: Investigating the impact of capabilities. Access to financial database will be provided.
23) **Designing behavioral experiments with newsvendor**


**Task:** Explain the study design and discuss ideas further development ideas, (e.g., regarding risks, personality traits)
Transportation logistics

24) Game theory in transportation
Tasks: Review, Examples, Models

25) Freight consolidation and cost allocation
Özener, O.Ö., Ergun, Ö. (2014), Allocating costs in collaborative transportation procurement network, Working paper
Tasks: Application and implementation, comparison of different cost allocation schemes
26) Probabilistic TSP with time windows
Task: Application and implementation

27) Inventory routing with transshipment
Tasks: Implementation and numerical study
28) Empty container repositioning
Tasks: Implementation and own examples

29) Dynamic traffic assignment
Tasks: Implementation and numerical study
30) **System dynamics modeling in transportation**
Task: review literature, implementation in Anylogic, own examples and numerical investigation

31) **System dynamics in urban transportation**
Task: review literature, implementation in Anylogic, own examples and numerical investigation
Supply chain design

32) Dynamic supply chain design with inventory

Tasks: Implementation and numerical study

33) The design of supply networks under maximum customer order lead times
Meisel, F., Rei, W., Gendreau, M., Bierwirth, C. (2011), The Design of Supply Networks Under Maximum Customer Order Lead Times, *CIRRELT*

Tasks: Implementation and numerical study
34) Hazmat network design
Tasks: Implementation and numerical study
35) Tax optimized supply chains with transfer prices
Task: review literature, implementation of a MIP model in XPRESS

36) Tax optimized supply chains and coordination

Task: review literature and investigate extensions
Resources and energy

37) Optimal inventory policies when purchase price and demand are stochastic
Berling, P., Martínez-de-Albéniz, V. (2011), Optimal Inventory Policies when Purchase Price and Demand are Stochastic, Operations Research 59(1): 109-124
Tasks: Implementation of method (or heuristics) and examples for different commodities

38) Supply chain risk management in rare earth procurement
Humphries, M. (2013), Rare Earth Elements: The Global Supply Chain, Congressional Research Service
Tasks: application of SCRM concepts to rare-earth problem, building a simulation model
39) A system dynamics model for energy storage
Task: Implementation in Anylogic

40) Optimizing trading decisions for hydro storage systems using Approximate Dual Dynamic Programming
Task: Review of literature on energy storage and combination with inventory control