Research Seminar Supply Chain Management (OPM 701)

“Current Topics in Supply Chain Management Research”

General Information:

1. The goal of this seminar is to introduce the participants to the conducting of scientific research. It thereby prepares the students for the writing of their diploma / MSc thesis. The seminar is geared towards students intending to write their thesis at the Chair of Logistics.

2. Each Participant will explore one of the research papers listed below. The task is to review and critically assess the assigned research paper and to relate it to the corresponding stream of scientific literature. Each participant presents his/her findings in a written report (about 20 pages) as well as in an in-class presentation (20 min + 20min discussion).

3. Each participant also acts as a discussant for one of the other presentations. The discussant is responsible for critically assessing the presented work and for opening the ensuing discussion.

4. A kick-off meeting for all participants will be held on Friday, May 22, 13:30 hrs. in Room SO 318. During this meeting, general guidelines for conducting a scientific literature review will be discussed.

5. The written reports have to be submitted electronically and as a hard copy in two-fold by November 6, 2015.

6. The presentations will be held as a blocked session around Calendar Week 47 (exact times + room to be announced). Attendance of the presentations is obligatory.

7. The final grade for the seminar is composed of the following components: Written report (60%), presentation (30%), contribution to discussion (10%).

8. The report and the presentations can be delivered either in English or in German.

9. There is a joint application process for all seminars offered by the chairs of the Area Operations Management. In the HWS 2014, this includes the following seminars:

   - OPM 701: Research Seminar Supply Chain Management (Chair of Logistics and Supply Chain Management), topics labeled with ‘L’

   - OPM 761: Research Seminar Production Management (Chair of Production Management), topics labeled with ‘P’

   - OPM 781: Research Seminar Service Operations (Chair of Service Operations), topics labeled with ‘S’
• OPM 791: Research Seminar Procurement (Chair of Procurement), topics labeled with ‘B’

Detailed information on the seminar topics is available on the home pages of the respective chairs. In their application, students can indicate up to five preferred topics from all seminars.

10. Students can apply for the seminars by completing the following online form (click here). Applicants for OPM 701 must in addition send a CV + official grades overview by e-mail to logistik@bwl.uni-mannheim.de, mentioning “Seminar Application Documents” in the subject row.

11. Applications will be accepted until May 13. Admission to the seminar is binding and will be confirmed by e-mail by May 20.

12. For questions concerning the seminar, contact Prof. Fleischmann at logistik@bwl.uni-mannheim.de.

Seminar topics

Each participant will be assigned one of the topics listed below. The task then is to identify the main issues addressed by the paper, explain its methodology, including potential quantitative models, position it in the corresponding stream of scientific literature, and critically assesses the paper’s contribution to the literature as well as to practice.


  Traditionally, researchers have claimed agility as an attribute closely tied to the effectiveness of strategic supply chain management. Because of its association with customer effectiveness, some researchers have considered agility to be fundamentally different from lean, which has been linked to cost efficiency (Goldsby et al., 2006). Therefore, the relationship between agility and cost efficiency is not clear due to limited empirical scrutiny from researchers. Since elimination of waste is the cornerstone of lean, unraveling the relationship between agility and efficiency can also offer a better perspective on relationship between the fundamental paradigms of agility and lean. The manuscript makes a key contribution to the agility literature by examining the association between supply chain agility (FSCA), cost efficiency and customer effectiveness across various environmental situations. We use archival data to examine the moderating effects of environmental munificence, dynamism, and complexity. It has been argued that firms should embrace agile strategies when operating in highly uncertain environments, and embrace lean strategies when operating in more stable environments (Lee, 2002 and Sebastiao and Golicic, 2008). We empirically question this premise to determine whether supply chain agility can also lead to superior performance for firms operating in stable environments. The study results also provide a better understanding of how FSCA contributes to firm financial performance. We evaluate the impact of FSCA on the firm’s Return on Assets.
using archival data from the Compustat database. Thus, we provide evidence to managers that deploying resource to enhance FSCA can positively impact the firm's bottom line.


We consider a two-period closed-loop supply chain (CLSC) game where a remanufacturer appropriates of the returns’ residual value and decides whether to exclusively manage the end-of-use product collection or to outsource it to either a retailer or a third-service provider (3P). We determine that the manufacturer outsources the product collection only when an outsourcee performs environmentally and operationally better. On the outsourcees side there is always an economic convenience in managing the product returns process exclusively, independently of returns rewards and operational performance. When outsourcing is convenient, a manufacturer always chooses a retailer if the outsourcees show equal performance. Overall, the manufacturer is more sensitive to environmental performance than to operational performance. Finally, there exists only a small region inside which outsourcing the collection process contributes to the triple bottom line.


We consider the revenue management problem of capacity control with integrated upgrade decision-making. The dynamic programming formulation of this problem is hard to solve to optimality, even in the single-leg case, because multiple hierarchical resource types must be considered simultaneously. Therefore, in this paper, we propose a new heuristic approach that generalizes the idea behind the well-known single-leg EMSR-a procedure to multiple resource types. Similar to EMSR-a, our approach is based on the computation of protection levels, but additionally allows for the integrated consideration of upgrades. In addition, we derive control policies for typical demand arrival patterns. As an extension, we propose a generalization of our approach that allows for arbitrarily ordered prices with respect to the upgrade hierarchy. Furthermore, we perform a number of computational experiments to investigate the performance of the new approach compared to other capacity control methods that incorporate upgrades. We consider typical airlines 0 single-leg scenarios with 10 (re)optimizations throughout the booking horizon. The results show that our approach can significantly outperform existing methods in terms of the total achieved revenue, including dynamic programming decomposition approaches that are proposed in literature, as well as successive planning approaches that are widely used in commercial revenue management systems.


Product reclamation is a critical process in remanufacturing. It is generally assumed in the literature that customers simply want to get rid of their used products without expecting any
compensation for them. Some authors have only recently started looking into firms that offer a posted (fixed) price for them. Following recent reports suggesting that customers are increasingly open to bargaining, we compare using a posted price and bargaining to obtain used products. In our analysis, we consider an original manufacturer acting as a monopolist as well as a manufacturer and an independent remanufacturer acting in a duopoly. We analytically show that bargaining is always beneficial to the monopoly manufacturer. In the duopoly case, we distinguish a Cournot competition and a market with the manufacturer as Stackelberg leader. The results of a numerical study show that both firms will use posted pricing in the Cournot competition, especially if bargaining is not costless. By contrast, the remanufacturer can significantly increase his profit by using negotiations if he is the Stackelberg follower.


This paper develops and analyzes a principal-agent model for product specification and production motivated by “core buying” decisions at an automobile manufacturer. The model focuses on two important elements of the “core” buyer’s responsibility: (1) assessing the supplier’s capability, and (2) allocating some or all of a fixed level of some buyer-internal resource to help the supplier. Under the contracting scheme we model, the buyer (principal) delegates the majority of product specification and production activity to the supplier (agent), but retains the flexibility to commit a given, observable amount of an internally available, limited resource (e.g., engineering hours) to help the supplier. The supplier, in turn, allocates his resource (e.g., engineering hours) to produce the finished product. As in the motivating scenario, both the supplier’s resource allocation and capability are assumed to be hidden from the buyer. Hence, the principal’s problem is to determine a menu of (resource-commitment, transfer-price) contracts to minimize her total expected cost. Our analysis demonstrates that if buyer resource and supplier capability are substitutes, then the buyer’s second-best involvement in the supplier’s production process will be greater than first-best. The opposite is true if they are complements. Further, when the opportunity cost for the buyer’s resource is zero, then in the substitutes case the buyer will commit all of its resource, while in the complements case the buyer may withhold some resources to screen the supplier type. We describe two applications of the model—one in inventory management and one in pharmaceutical drug discovery—to illustrate its applicability and versatility. Finally, we use insights from the model to suggest hypotheses for empirical study.


Relative to brick-and-mortar retailers, online retailers have the potential to offer more options to their customers, with respect to both inventory as well as delivery times. To do this entails the management of a distribution network with more decision options than a traditional retailer. The online retailer, not the customer, decides from where items will ship, by what shipping method, and how or whether multiple-item orders will be broken up into multiple shipments. What is the best way to fulfill each customer’s order to minimize average outbound
shipping cost? We partner with an online retailer to examine this question. We develop a heuristic that makes fulfillment decisions by minimizing the immediate outbound shipping cost plus an estimate of future expected outbound shipping costs. These estimates are derived from the dual values of a transportation linear program (LP). In our experiments on industry data, we capture 36% of the opportunity gap assuming clairvoyance, leading to reductions in outbound shipping costs on the order of 1%. These cost savings are achieved without any deterioration in customer service levels or any increase in holding costs. The transportation LP also serves as the basis for a metric that provides information on the quality of the inventory position. Based on initial successful piloting, our industrial partner has implemented the metric as well as a version of the heuristic that it is applying to every fulfillment decision for each of its stock keeping units in North America.

**Topic L07:** Roberto Pulido, Juan Carlos Munoz, Pedro Gazmuri (2004), A continuous approximation model for locating warehouses and designing physical and timely distribution strategies for home delivery. EURO Journal on Transportation and Logistics.
This article proposes a methodology based on continuous approximation to address the common logistics problems of locating warehouses and designing physical distribution strategies for a delivery firm with short and immediate time windows of different urgency (e.g., 1 or 2 h). An objective function is developed that includes the principal cost factors (warehouse rental, transportation, inventory cost, and wages). The methodology was applied to the real case of a company in Santiago, Chile, generating a demand model and an optimal logistics design that produced satisfactory results in terms of optimal warehouse locations and associated costs.

The dynamic pricing problem concerns the determination of selling prices over time for a product whose demand is random and whose supply is fixed. We approach this problem in a novel way by formulating a dynamic optimization model in which the demand function is isoelastic but the random demand process is quite general. Ultimately, what we find is a strong parallel between the dynamic pricing problem and dynamic inventory models. This parallel leads to a reinterpretation of the dynamic pricing problem as a price-setting newsvendor problem with recourse, which is useful not only because it yields insights into the optimal solution, but also because it leads to additional insights into how pricing recourse affects the actions and profits of a price-setting newsvendor. We make contributions in three areas: First, we develop structural properties that define an optimal pricing strategy over a finite horizon and investigate how that policy impacts a newsvendor’s optimal procurement policy and optimal expected profit. Second, we establish a practical and efficient algorithm for computing the optimal prices. Third, we examine how market parameters affect the optimal solution through a series of numerical experiments that utilize the algorithm.

**Topic L09:** Ozsen, Daskin, and Coullard (2009), Facility Location Modeling and Inventory Management with Multisourcing. Transportation Science 43(4):455-472.
In this paper we consider a centralized logistics system in which a single company owns the production facility and the set of retailers and establishes warehouses that will replenish the retailers’ inventories. We analyze the potential savings that the company will achieve by allowing its retailers to be sourced by more than one warehouse probabilistically, through the use of information technology. We facilitate the discussion on the impact of multisourcing by introducing a capacitated location-inventory model that minimizes the sum of the fixed warehouse location costs, the transportation costs, and the inventory costs. The model is formulated as a nonlinear integer-programming problem that has a cost term that is neither concave nor convex. We propose a Lagrangian relaxation solution algorithm to solve the model and successfully test the algorithm on problems with 88 and 150 retailers. Based on the model properties and the sensitivity analysis results, we conclude that multisourcing becomes a more valuable option as transportation costs increase, i.e., constitute a larger portion of the total logistics cost. In addition, we show that in practice only a small portion of the retailers need to be multisourced to achieve significant cost savings.

**Topic L10:** Herbert Meyr (2009), *Customer segmentation, allocation planning and order promising in make-to-stock production.* OR Spectrum 31:229–256.

Modern advanced planning systems offer the technical prerequisites for an allocation of “available-to-promise” (ATP) quantities—i.e. not yet reserved stock and planned production quantities—to different customer segments and for a real time promising of incoming customer orders (ATP consumption) respecting allocated quota. The basic idea of ATP allocation is to increase revenues by means of customer segmentation, as it has successfully been practiced in the airline industry. However, as far as manufacturing industries and make-to-stock production are concerned, it is unclear, whether, when, why and how much benefits actually arise. Using practical data of the lighting industry as an example, this paper reveals such potential benefits. Furthermore, it shows how the current practice of rule-based allocation and consumption can be improved by means of up-to-date demand information and changed customer segmentation. Deterministic linear programming models for ATP allocation and ATP consumption are proposed. Their application is tested in simulation runs using the lighting data. The results are compared with conventional real time order promising with(out) customer segmentation and with batch assignment of customer orders. This research shows that—also in make-to-stock manufacturing industries—customer segmentation can indeed improve profits substantially if customer heterogeneity is high enough and reliable information about ATP supply and customer demand is available. Surprisingly, the choice of an appropriate number of priority classes appears more important than the selection of the ATP consumption policy or the clustering method to be applied.


We demonstrate how system resilience can be improved by focusing on a supply chain network as a whole. We analyze inventory placement and back-up methodologies in a multi-echelon network and view their effect on reducing supply chain risk. We focus on risk from both supply disruptions and demand uncertainty and compare their impacts and mitigating strategies. A
simulation model developed to capture an actual network for a consumer packaged goods company is used for the analysis. We present analysis and insights for multi-echelon networks and show how network utilization and proactive planning enable reductions in supply chain disruption impact.


The two critical factors distinguishing inventory management in a multifirm supply-chain context from the more traditional centrally planned perspective are incentive conflicts and information asymmetries. We study the well-known order quantity/reorder point (Q, r) model in a two-player context, using a framework inspired by observations during a case study. We show how traditional allocations of decision rights to supplier and buyer lead to inefficient outcomes, and we use principal-agent models to study the effects of information asymmetries about setup cost and backorder cost, respectively.

We analyze two “opposite” models of contracting on inventory policies. First, we derive the buyer’s optimal menu of contracts when the supplier has private information about setup cost, and we show how consignment stock can help reduce the impact of this information asymmetry. Next, we study consignment and assume the supplier cannot observe the buyer’s backorder cost. We derive the supplier’s optimal menu of contracts on consigned stock level and show that in this case, the supplier effectively has to overcompensate the buyer for the cost of each stockout.

Our theoretical analysis and the case study suggest that consignment stock helps reduce cycle stock by providing the supplier with an additional incentive to decrease batch size, but simultaneously gives the buyer an incentive to increase safety stock by exaggerating backorder costs. This framework immediately points to practical recommendations on how supply-chain incentives should be realigned to overcome existing information asymmetries.