

2012 Business Research Conference

“Operations Management and Operations Research”

Magdeburg, February 27 & 28, 2012



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The conference is supported by



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General Information

Presentations

The conference room will be equipped with a video projector and a laptop computer. Speakers are asked to load their presentations on the computer during the break preceding the respective session. 45 minutes have been allocated to each presentation of which 15 minutes should be set aside for discussing.

Coffee Breaks

Coffee, tea, soft drinks, and biscuits will be served.

Lunches

Lunches will be served on Monday and Tuesday. The meals are free, but the participants will be charged for drinks.

Dinner

Dinner on Monday, Feb. 27, 20:00 is also included in the conference arrangement. However, participants will be charged for drinks.

Guided City Tour

A guided tour of the city of Magdeburg will be offered on Monday, Feb. 27. The tour starts from the Roncalli Haus. If you want to join us, please be in the hotel lobby at 18:00.

Conference Schedule

Sunday, Feb. 26, 2012

18:00 - Get Together
Restaurant Fürstenwall, Fürstenwall 3b

Monday, Feb. 27, 2012

09:00 - Registration

09:30 - 09:45 Welcome and Introduction into the Conference Program

09:45 - 12:30 Tutorial, Scientific Sessions

Lunch Break

14:00 - 17:30 Scientific Sessions

18:00 - 19:30 Guided City Tour; Meeting Point: Roncalli Haus

20:00 - Dinner, Restaurant "Chaplin", Roncalli Haus

Tuesday, Feb. 28, 2012

08:30 - 12:00 Tutorial, Scientific Sessions

Lunch Break

13:30 - 17:00 Scientific Sessions

17:00 - 17:15 Wrap-Up, Good-Byes

Program - Day 1: Monday, Feb. 27, 2012

- 09:00 - *Registration*
- 09:30 - 09:45 Inderfurth, K.; Wäscher, G.
Welcome and Introduction into the Conference Program
- 09:45 - 10:45 **Tutorial 1**
Speranza, M. G.*:
Inventory routing problems
- 10:45 - 11:00 *Coffee Break*
- 11:00 - 12:30 **Session 1**
Rieck, J.*; Zimmermann, J.:
Vehicle routing with simultaneous delivery and pick-up in the context of reverse logistics

Schwarze, S.*:
Pricing strategies for the site-dependent vehicle routing problem: a game-theoretic analysis
- 12:30 - 14:00 *Lunch Break*
- 14:00 - 15:30 **Session 2**
Bierwirth, C.; Kirschstein, T.*; Meisel, F.:
On transport service selection in intermodal rail/road networks

Volling, T.*; Grunewald, M.; Spengler, T. S.:
An integrated inventory-transportation system with periodic pick-ups and leveled replenishment
- 15:30 - 16:00 *Coffee Break*
- 16:00 - 17:30 **Session 3**
Ahn, H.; Vazquez Novoa, N*.:
Effects of data envelopment analysis on performance assessment: a cognitive approach

Siebert, J.*:
Aggregate performance factor model: a concept for modeling pair-wise dependent attributes in multiattribute value theory
- 18:00 - 19:30 *Guided City Tour; Meeting Point: Roncalli Haus*
- 20:00 - *Dinner, Restaurant "Chaplin", Roncalli Haus*

Program - Day 2: Tuesday, Feb. 28, 2012

- 08:30 - 10:00 **Session 4**
Kuhn, H.; Hübner, A.*; Röttig, S.:
Integrated assortment, shelf space and inventory management under stochastic demand and substitution effects
- Gönsch, J.*; Steinhardt, C.*:
Using dynamic programming decomposition for revenue management with opaque products
- 10:00 - 10:15 *Coffee Break*
- 10:15 - 11:00 **Session 5**
Gahm, C.*; Dünnwald, B.; Sahamie, R.:
A simulation-based robust resource allocation planning approach for special purpose machinery
- 11:00 - 12:00 **Tutorial 2**
Corbett, C. M.*:
Entrepreneurship and operations
- 12:00 - 13:30 *Lunch Break*
- 13:30 - 15:00 **Session 6**
Ponnath, F.*; Stanger, S.; Hartmann, E.:
Customer orientated supply chain strategies: a fashion industry focus
- Maas, S.*; Hartmann, E.; Kaiser, G.:
Environmental sustainability management and the triple bottom line: a natural-resource-based theory perspective
- 15:00 - 15:30 *Coffee Break*
- 15:30 - 17:00 **Session 7**
Wiedenmann, S.*; Krumke, S. O.; Geldermann, J.:
Supply planning for the material use of renewable resources
- Sahling, F.*:
Short-term production planning in closed-loop supply chains
- 17:00 - 17:15 *Wrap-Up, Good-Byes*

*: presenter

Abstracts

Monday, 09:45 - 10:45 - Tutorial 1

Speranza, M. Grazia; Università degli Studi di Brescia, Italy

Inventory routing problems

Abstract: The class of Inventory Routing Problems (IRPs) includes a variety of different optimization problems that, though often very different from each other, all consider a routing and an inventory component of an optimization problem. IRPs have received little attention, if compared to vehicle routing problems. However, as they are highly relevant in supply chain management, they are attracting an increasing number of contributions.

In this lecture the class of inventory routing problems will be presented. After a review of the literature, with motivations to study this class of problems, the talk will focus on a class of discrete time IRPs that include in the objective function transportation and inventory costs. Contributions in this area will be reviewed, starting from the simplest models to the most complex ones.

Monday, 11:00 - 12:30 - Session 1

Rieck, J.; Zimmermann, J.; Technische Universität Clausthal, Germany

Vehicle routing with simultaneous delivery and pick-up in the context of reverse logistics

Abstract: In reverse logistics networks, products, e.g. bottles or pallets, have to be transported from a depot to customer locations and after use from customer locations back to the depot. Customers may not accept to be served separately for the delivery and pick-up, instead they prefer a simultaneous operation. The resulting Vehicle Routing Problem with Simultaneous Delivery and Pick-up (VRPSDP) is an operational problem which has to be solved daily by many companies. This paper considers the VRPSDP and comments on its usefulness in the context of reverse logistics. We present mixed-integer linear model formulations for the VRPSDP. In order to strengthen the models, domain-reducing preprocessing techniques, as well as effective cutting planes are outlined. Medium-sized instances known from the literature are solved using CPLEX 12.1. Moreover, some benchmark problems are solved to optimality for the first time.

Keywords: reverse logistics, vehicle routing, simultaneous delivery and pick-up, mixed-integer linear programming

Schwarze, S.; Universität Hamburg, Germany

Pricing strategies for the site-dependent vehicle routing problem: a game-theoretic analysis

Abstract: In this paper we propose the Vehicle Pricing Game (VPG), a noncooperative n-person game addressing the vehicles' viewpoints within a Vehicle Routing Problem (VRP). Each vehicle acts as a player that demands a price per km for carrying out a tour. Based on these prices, a VRP is solved under the objective of minimizing the total routing costs. The profit of each vehicle is dependent on the length of the assigned tour and on the demanded price and expenses. We address the question which price a vehicle should choose to maximize the own profit, taking into account that the competing vehicles are facing the same objective. To answer this question, the interplay of the vehicles as well as the impact of site-dependencies is studied. We present theoretical results on existence and computation of equilibria for particular cases of the VPG. Moreover, we provide a numerical study that illustrates how site-dependencies influence the solution of a VPG.

Keywords: site-dependencies, noncooperative game, equilibrium, skill VRP, capacitated VRP

Monday, 14:00 - 15:30 - Session 2

Bierwirth, C.; Kirschstein, T.; Meisel, F.; Martin-Luther-Universität Halle-Wittenberg, Germany

On transport service selection in intermodal rail/road networks

Abstract: Intermodal rail/road freight transport constitutes an alternative to long-haul road transports for the distribution of large volumes of goods. The paper introduces the intermodal transportation problem for tactical planning of mode and service selection. In the rail mode, shippers either book train capacity on a per-unit basis or charter block trains completely. The road mode is used for short distance haulage to intermodal terminals and for direct shipments to customers. We analyze the competition of road and intermodal transportation with regard to freight consolidation and service cost on a model basis. The approach is applied to a distribution system of an industrial company serving customers in Eastern Europe. The case study investigates the impact of transport cost and consolidation on the optimal modal split.

Keywords: intermodal transportation problem, service and mode selection, transport cost rates, freight consolidation

Volling, T.; Grunewald, M.; Spengler, T. S.; Technische Universität Braunschweig, Germany

An integrated inventory-transportation system with periodic pick-ups and leveled replenishment

Abstract: In this paper we develop a combined inventory-transportation system. The principle idea is to integrate a simple replenishment policy with a routing component to derive operationally consistent standard routes as a basis for milk-run design. The most interesting feature of the approach is that we combine stochastic vehicle routing with a replenishment policy which makes use of safety stock to level the variability propagated into transportation operations. To evaluate the approach, we compare its performance with stochastic vehicle routing as well as sequential vehicle routing and safety stock planning. With respect to these approaches, substantial gains are achieved.

Keywords: inbound logistics, milk-run design, inventory routing

Monday, 16:00 - 17:30 - Session 3

Ahn, H.; Vazquez Novoa, N.; Technische Universität Braunschweig, Germany

Effects of data envelopment analysis on performance assessment: a cognitive approach

Abstract: This paper examines Data Envelopment Analysis (DEA) from a cognitive perspective. Experimental evidence regarding the representativeness and the anchoring effects caused by the DEA efficiency score as an overall non-financial performance measure is outlined. The study not only confirms that the efficiency score act as a strong performance marker when deciding on which decision making units (DMUs) should be awarded for their non-financial performance, but also shows that the score may significantly influence a posterior financial assessment. These results have practical consequences for planning, reporting, and controlling processes that incorporate DEA efficiency scores.

Keywords: Data Envelopment Analysis, non-financial performance measures, performance assessment, cognitive limitations, representativeness bias, performance markers, anchoring bias, halo effect, experimental study, behavioral operations research

Siebert, J.; Universität Bayreuth, Germany

Aggregate performance factor model: a concept for modeling pair-wise dependent attributes in multiattribute value theory

Abstract: A brief review of the art of modeling in multiattribute value theory (MAVT) and multiattribute value theory (MAUT) shows that virtually all used model variants are based on an additive approach. Limitations of MAVT and MAUT with respect to modeling attribute interactions are identified and analyzed. Since in practice virtually any product space contains interactive attributes, a real multiplicative model is presented that extends (MAVT) such that attribute interactions can be accounted for. The value of an attribute level is expressed by a performance factor that is formed as a ratio of the value of the considered attribute level to the value of an average evaluated attribute. The product of the performance factors is decomposed by means of a Taylor series and modified such that interactions can be modeled to conform to corresponding preferences. A straightforward step-wise procedure for separately eliciting performance factors for attribute levels and interaction coefficients for quantifying complementary interactions is provided.

Keywords: decision theory, multiattribute value theory, multiattribute utility theory modeling interactions, multiplicative model, preference independence, aggregated performance factor model, bipolar interactions

Tuesday, 08:30 - 10:00 - Session 4

Kuhn, H.; Hübner, A.; Röttig, S.; Katholische Universität Eichstätt-Ingolstadt, Germany

Integrated assortment, shelf space and inventory management under stochastic demand and substitution effects

Abstract: Managing shelf space is a core decision in retail, as increasing product variety is in conflict with the limited shelf space. A retailer needs to define inventory, assortment and shelf space assignment which then meets stochastic consumer demand. However, current literature treats the decision problems separately or applies deterministic demand.

This paper describes a capacitated multi-product assortment, shelf space and inventory management problem under stochastic demand and substitution effects. Our numerical examples show, that substitution effects have a significant impact on total profit. We use sensitivity analyses to quantify the impact of input parameters on the profit and the order quantity.

Keywords: retail management, newsvendor, dynamic substitution, stochastic demand, assortment planning, shelf space management

Gönsch, J.; Steinhardt, C.; Universität Augsburg, Germany

Using dynamic programming decomposition for revenue management with opaque products

Abstract: Opaque products enable service providers to hide specific characteristics of their service fulfillment from the customer until after purchase. Prominent examples include Internet-based service providers selling airline tickets without defining details like departure time or operating airline until the booking has been made. Due to the resulting flexibility in resource utilization, the traditional revenue management process obviously needs to be modified. In this paper, by extending dynamic programming decomposition techniques that are widely used for traditional revenue management, we develop an intuitive capacity control approach that allows the incorporation of opaque products. We analytically derive some promising results regarding its relative performance which are confirmed by a computational study. It is shown that the developed approach significantly outperforms other well-known capacity control approaches adapted to the opaque product setting.

Keywords: revenue management, yield management, airline revenue management, service management, opaque products, resource substitution, capacity control, network capacity control, O&D control, control mechanism, dynamic programming, dynamic programming decomposition, approximate dynamic programming, deterministic linear programming, simulation study

Tuesday, 10:15 - 11:00 - Session 5

Gahm, C.; Dünnwald, B.; Sahamie, R.; Universität Augsburg, Germany

A simulation-based robust resource allocation planning approach for special purpose machinery

Abstract: Operational production planning for special purpose machinery is marked by high uncertainty, caused by information dynamics and disturbances. This article presents a planning approach for the determination of robust resource allocation plans. The approach comprises a concept that integrates the resource allocation planning in the hierarchical planning context, a robust planning method that takes the uncertainty by simulation-based correction factors into account and a constructive heuristic to solve the resulting planning problem (a hybrid flow shop problem with variable-intensity and preemptive operations). The implemented DSS focuses usability as well as adaptability. Its application in an aerospace company shows impressive results.

Keywords: operational production planning, uncertainty, robustness, simulation, decision support system

Tuesday, 11:00 - 12:00 - Tutorial 2

Corbett, Charles J.; UCLA Anderson School of Management, USA

Entrepreneurship and operations

Abstract: Much of the research in operations management focuses, explicitly or implicitly, on relatively large organizations. In this talk we focus on some ways in which small organizations differ from their larger counterparts, such as the more limited resources they have. This leads to a number of interesting research questions which are only just beginning to be explored by the operations management community. We will provide an overview of several themes related to entrepreneurial operations, and briefly discuss some existing research. We then focus in more detail on the role of the entrepreneur in two contexts: managing the trade-off in a small startup between improving internal processes and growing the organization, and examining when the entrepreneur should hire his or her first employee. The intention of this talk is to suggest that entrepreneurs and small businesses are worthy subjects for OM research and potential sources of a large number of exciting new research opportunities.

Tuesday, 13:30 - 15:00 - Session 6

Ponnath, F.; Stanger, S.; Hartmann, E.; Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Customer orientated supply chain strategies: a fashion industry focus

Abstract: For building and sustaining competitive advantages, firms face the challenge of designing and implementing the 'right' supply chain strategy. Common supply chain strategy models have a strong focus on product characteristics as the main influencing variable. However, current research calls for more customer orientation in supply chain management. With this in mind, we have developed a model that integrates customer requirements into strategic supply chain decisions. We demonstrate the usability of the model using the fashion industry as an illustrative example.

Keywords: strategy, customer orientation, demand chain management, fashion

**Maas, S.; Hartmann, E.; Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
Kaiser, G.; Technische Universität Darmstadt, Germany**

Environmental sustainability management and the triple bottom line: a natural-resource-based theory perspective

Abstract: The purpose of this paper is to explain variation in firm triple bottom line performance due to environmental sustainability management. The paper also aims to explore the relationships between single triple bottom line performance dimensions and is theoretically grounded in natural-resource-based theory. A questionnaire-based survey is being conducted within the German third-party logistics industry. The authors deploy partial least squares modeling to test the hypothesized relationships. The results of the study suggest that environmental management practice adoption can explain differences in firm triple bottom line performance. Also, some indirect effects from environmental management practice adoption and single triple bottom line dimensions on economic performance are discovered.

Keywords: third-party logistics, sustainability, natural-resource-based view, triple bottom line, partial least squares, structural equation modeling

Tuesday, 15:30 - 17:00 - Session 7

Wiedenmann, S.; Georg-August Universität Göttingen, Germany

Krumke, S. O.; Technische Universität Kaiserslautern, Germany

Geldermann, J.; Georg-August Universität Göttingen, Germany

Supply planning for the material use of renewable resources

Abstract: Material use of renewable resources is gaining increasing importance in industrial networks. Variations of quantity and quality of the raw materials and of market prices need to be considered in supply planning for industrial production processes. This research considers agricultural and industrial requirements on linseed and linseed oil. A two stage stochastic program is used to model the supply planning of a processor of agricultural products, that is exposed to seasonal supply with uncertain quality and quantity.

Keywords: supply planning, stochastic programming, renewable resources, agricultural products

Sahling, F.; Leibniz Universität Hannover, Germany

Short-term production planning in closed-loop supply chains

Abstract: We present a new model formulation for a multi-product lot-sizing problem with product returns and remanufacturing subject to a capacity constraint. The given external demand of the products has to be satisfied by remanufactured or newly produced goods. The objective is to determine a feasible production plan which minimizes holding and setup costs. As the LP relaxation of a model formulation based on the well-known CLSP leads to very poor lower bounds, we propose a column generation approach to determine tighter bounds. The lower bound obtained by column generation can easily be transferred into a feasible solution by a truncated branch-and-bound approach using CPLEX. The results of an extensive numerical study show the high solution quality of the proposed solution approach.

Keywords: closed-loop supply chains, remanufacturing, column generation

List of Participants

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