Service Operations Research Seminar HWS 2017 (OPM 781)
“Current Topics in Service Operations Management Research”

General Information:

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

2. Each participant will explore one of the research topics listed below – based on the fundamental literature provided. Each participant presents his/her findings in a written report (about 20 pages) as well as in an in-class presentation (20 min + 10 min 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 May 23rd, 2017 at 11:00am in SO318. During this meeting, general guidelines for conducting scientific work will be discussed.

5. The written reports have to be submitted electronically on CD and as a hard copy in two-fold by October 31st, 2017.

6. Student presentations will be held in the beginning of November (exact dates and times tba). Attendance is mandatory. Presentation slides have to be submitted one day before the first presentation day – no changes allowed afterwards.

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. The application procedure for this seminar is combined with those for the seminars of the Chair of Production Management (OPM 761), the Chair of Logistics (OPM 701) and the Chair of Procurement (OPM 791). Students can apply for topics from all chairs by completing the online form. Topics labeled with “L” refer to the Chair of Logistics (OPM 701), topics labeled with “P” refer to the Chair of Production Management (OPM 761), topics labeled with “B” refer to the Chair of Procurement and topics labeled with “S” refer to the Chair of Service Operations Management (OPM 781). Applicants for OPM 781 must in addition send a CV and official grades overview by e-mail to soma@mail.uni-mannheim.de with subject “OPM 781 Seminar Application”. Application deadline is May 14th, 2017.

10. Admission to the seminar is binding and will be confirmed by e-mail on May 22nd, 2017.

11. For questions concerning the seminar contact us by email at soma@mail.uni-mannheim.de.
Seminar topics

**Topic S01: Optimizing product line designs: Efficient methods and comparisons**

Recent advances in optimization methods and computer hardware allow to identify globally optimal solutions of product line design problems that are too large for complete enumeration. This guarantee of global optimality can be used to benchmark the performance of more practical heuristic methods. Belloni et al. (2008) test the performance of heuristics using two sources of data: (1) a conjoint study previously conducted for a real product line design problem, and (2) simulated problems of various sizes. For both data sources, several of the heuristic methods consistently find optimal or near-optimal solutions, including simulated annealing, divide-and-conquer, product-swapping, and genetic algorithms.

The purpose of the thesis is to review the paper by Belloni et al. (2008), discuss limitations and findings in the related literature since then.


**Topic S02: A Nonparametric Approach to Modeling Choice with Limited Data**

Choice models today are ubiquitous across a range of applications in operations and marketing. Real-world implementations of many of these models face the formidable stumbling block of simply identifying the “right” model of choice to use. Because models of choice are inherently high-dimensional objects, the typical approach to dealing with this problem is positing, a priori, a parametric model that one believes adequately captures choice behavior. This approach can be substantially suboptimal in scenarios where one cares about using the choice model learned to make fine-grained predictions; one must contend with the risks of misspecification and overfitting/underfitting. Thus motivated, we visit the following problem: For a “generic” model of consumer choice (namely, distributions over preference lists) and a limited amount of data on how consumers actually make decisions (such as marginal information about these distributions), how may one predict revenues from offering a particular assortment of choices?

Farias, Jagabathula & Shah (2013) propose a nonparametric approach in which the data automatically select the right choice model for revenue predictions. The approach is practical. Using a data set consisting of automobile sales transaction data from a major U.S. automaker, their method demonstrates a 20% improvement in prediction accuracy over state-of-the-art benchmark models; this improvement can translate into a 10% increase in revenues from optimizing the offer set. The authors also address a number of theoretical issues, among them a qualitative examination of the choice models implicitly learned by the approach. The paper takes a step toward “automating” the crucial task of choice model selection.
The objective of the seminar thesis is to review the above mentioned approach as well as closely related literature, and discuss to what extent the approach could be used in service design and revenue management applications.


**Topic S03: Tractable Consideration Set Structures for Assortment Optimization and Network Revenue Management**

Discrete-choice models are widely used to model consumer purchase behavior in assortment optimization and revenue management. In many applications, each customer segment is associated with a consideration set that represents the set of products that customers in this segment consider for purchase. The firm has to make a decision on what assortment to offer at each point in time without the ability to identify the customer’s segment. A linear program called the Choice-based Deterministic Linear Program (*CDLP*) has been proposed to determine these offer sets. Unfortunately, its size grows exponentially in the number of products and it is NP-hard to solve when the consideration sets of the segments overlap. The Segment-based Deterministic Concave Program with some additional consistency equalities (*SDCP*+) is an approximation of *CDLP* that provides an upper bound on *CDLP*’s optimal objective value. *SDCP*+ can be solved in a fraction of the time required to solve *CDLP* and often achieves the same optimal objective value. This raises the question under what conditions can one guarantee equivalence of *CDLP* and *SDCP*+. Strauss & Talluri (2017) obtain a structural result to this end, namely that if the segment consideration sets overlap with a certain tree structure or if they are fully nested, *CDLP* can be equivalently replaced with *SDCP*+. The authors give a number of examples from the literature where this tree structure arises naturally in modeling customer behavior.

The objective of the seminar thesis is to review the paper by Strauss & Talluri (2017) and implement a suitable example.


**Topic S04: Railway rescheduling – minimizing passengers’ discomfort**

Rescheduling trains in case of disruptions has to be done with regard to a feasible solution for the infrastructure. But other topics, e.g. solution quality or minimizing waiting times for passengers, play also important roles. In the paper of Corman et al. (2015), the model aims at minimizing passengers’ discomfort, more precisely the quality of service perceived by passengers after rescheduling decisions. The thesis should describe this model, illustrate it via a small example and explain the heuristics used to find solutions.

**Topic S05: Railway Revenue Management under Customer Choice Behavior**

Revenue management models are already part of the daily business in many railway companies. In recent years, researchers focused on incorporating customer choice behavior into revenue management systems to model the forecasted demand in a different way. One example for a railway RM-model under customer choice behavior is the article from Hetrakul and Cirillo (2014).

The goal of this seminar topic is to analyze and explain the approach developed by Hetrakul and Cirillo in detail. In addition, a literature review should be done to identify and compare other customer choice revenue management models.


**Topic S06: Integrating Queuing Networks in Stochastic Location Models with Congestion**

Stochastic location models are facility location models where consumers generate streams of stochastic demands for service and service times are stochastic. This combination leads to congestion. Therefore, each facility in these models can be modeled as a queuing system. This seminar thesis only focuses on mobile servers i.e. server is fixed and customers has to visit the facility to use the services offered by the server. Retail stores (e.g. Supermarkets, IKEA etc.), ATM machines, government offices and hospitals are examples of immobile servers. The literature streams based on stochastic location models with immobile facilities and congestion (SLMICF) can be classified into various categories based on the objective function, demand allocation, queuing model and solution procedures.

Researchers typically model each facility as single or multi server queuing system. This assumption fits well for a facility like an ATM or a retail store checkout queues. In other facilities, e.g. food outlets (e.g. Vapiano, Starbucks etc.) and public facilities (e.g. bank, government offices etc.) customer encounters a queuing network. Each resource involved in the service process can be modeled as a server of a queuing system and customer navigates from one queue to another based on their needs.

The objective of thesis is to review service facilities, in which underlying service process can be described as a queuing network. The thesis should also provide a theoretical discussion on the evolution of the mathematical models with respect to objective function and constraints, if each facility is modeled as a multi-stage queuing network with multiple servers.

Topic S07: An evaluation and comparison of outcome and process utility

Customers can evaluate any service from two different perspectives: On the one side, they can assess the outcome of a service. In the context of a pizza delivery service such criteria might be taste, temperature or price of a service. On the other side, they can evaluate the process of a service for example with regard to speed of delivery or friendliness of employees. Studies applying the concepts of process and outcome utility in a service context are rare. One such study has been performed by Ryan (1999) in the health care sector. With a conjoint analysis based approach the author tried to find an empirical evidence for both constructs.

The goal of this thesis is to analyze the constructs of outcome and process utility. The literature should take a broad perspective and does not necessarily need to be related to a service context. In specific the research questions are: What studies have been conducted to analyze and measure these constructs? Are there any other constructs related to this topic and need to be considered for further analysis? What implications could be derived from these studies and which future research is needed to advance this field?


Topic S08: Evaluating process design tools – A review on suitable methods

Visualizing service processes is an important step in designing new processes or improving existing ones. Since the introduction of Service Blueprinting by Shostack in the early 1960s, several further techniques like Service Business Process Modelling (BPMN) or Process Chain Network Analysis (PCN) have been developed. With the growing number of concepts the decision which tool to use in which situation has become more complex. Thus, there is a strong need for methods and techniques comparing these tools.

The aim of this seminar thesis is to find research approaches for this kind of comparison. The student should provide detailed explanations on the methodology and illustrate the concepts with some examples from latest studies. In the end, specific ideas and propositions for future research in this field should be formulated.


**Topic S09: On the Use of Experiential Attributes in Conjoint Analysis**

Conjoint analysis has been used for many years in a variety of disciplines – ranging from engineering and architecture to medicine and business. Each discipline takes advantage of this technique in a different way by using verbal representations, 2D or 3D models as well as prototypes. Reviewing these applications leads to two questions with high importance for business in general and service design in specific: 1) Are new procedures of conjoint analysis superior to classical forms? And if so, 2) how can a service process alternatively be described instead of a verbal representation? One idea might be to use the latest advancements in virtual reality. This technique could increase the realism of the hypothetical situation by putting the customer in an active role instead of a passive observer.

The goal of this thesis is to elaborate on the following questions: What forms of representations of a product or service with experiential attributes have been used in conjoint analysis independent of a specific research area? Did these studies prove a benefit of a certain technique over the other? How can virtual reality help to better capture process attributes and which studies did already apply it? Which implications can be drawn with regard to the research design? Are there any methodological changes beyond the interviewing technique itself?


**Topic S10: Improving Service Processes – An Overview of Tools and Techniques**

Companies might engage in the redesign of service processes for several reasons. From an internal perspective, the company can reduce its costs while decreasing process times. From an external point of view, the company can increase the satisfaction among its customers and raise the likelihood of repeated purchase. Because of these benefits the topic of process improvement or optimization is of high importance for both companies and researchers.

This seminar thesis should present a summary of methods that can be applied to optimize service processes. While at it should take a broader perspective at the beginning, the main focus at the end should be on service processes. In this review process, the thesis should clearly distinguish between qualitative and quantitative techniques and allocate relevant studies accordingly.