

Service Operations Research Seminar FSS 2020 (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. 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 joining the [ILIAS application group](#) and completing the online form provided there. 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)**. To better match topic and student background, applicants for OPM 781 may in addition send a CV and official grades overview by post to the chair or by e-mail to soma@mail.uni-mannheim.de with subject “OPM 781 Seminar Application”.¹ The application period starts on **November 1st** and ends on **November 15th**, 2019.
3. **Admission** to the seminar is **binding** and will be confirmed by E-mail by **November 22nd, 2019**.
4. Each participant admitted to OPM 781 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).
5. A **kick-off meeting** for all participants will be held on Tuesday, **November 26th, 2019 at 10:15 am** in O 133. During this meeting, general guidelines for conducting scientific work will be discussed.

¹ Data protection: Please note that a breach of confidentiality and the unauthorized access by third parties cannot be excluded when transmitting an unencrypted email. Note on data protection: The submitted documents will be returned only if an envelope with sufficient postage is included. Otherwise they will be destroyed after the application process according to the requirements of the data protection law. Electronic applications will be deleted accordingly.

6. Each student has **eight weeks** to complete the Seminar Thesis. This timeframe can individually be set **between the kick-off day and May 14th** (Note: May 14th is the latest submission date).
7. To start the eight weeks completion time, please follow these **four steps**:
 - a. Go to the **Ilias Group** "OPM 781 Research Seminar"
 - b. Select the **Test** "Seminar Thesis_[YOUR NAME]",
 - c. Follow the **instructions of the Test**,
 - d. The eight weeks completion time **will start automatically after finishing the test**.
8. On your individual submission date, you have to...
 - a. **Upload your report** (Word- / Latex-document and PDF) via Task "Upload of final Thesis & Calculations/Software Output" in the Ilias group.
 - b. *If applicable: Upload your software-output (in a single zip file)* via Task "Upload of final Thesis & Calculations/Software Output" in the Ilias group.
 - c. **Submit a hard copy** at our secretary's office (Mon-Thu before noon) or at your Thesis supervisor. Please make an appointment for submitting the hard copy.
9. Student **presentations** will be held on **May 19th starting at 10:15 in room SO 318**. Attendance is mandatory. Please **upload your presentation slides** (ppt and PDF) on **Task "Upload of Final Presentation"** in the Ilias group one day before the presentation, latest by 18:00 pm – no changes allowed afterwards. The chair's laptop will be used to show the presentations during class.
10. Each participant 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.
11. The report and the presentations can be delivered either in English or in German.
12. The final grade for the seminar is composed of the following components: Written report (60%), presentation (30%), contribution to discussion (10%).
13. For questions concerning the seminar contact us by email at soma@mail.uni-mannheim.de.

Seminar topics

Please note:

The amount of recommended literature does not indicate more or less workload. Your supervisor may have more recommendations for you.

Topics on Service Design and Business Process Management:

Topic S01: Measuring Fit Between a Firm's Competitive Priorities and Process Capabilities

Business Process Management has been long discussed as appropriate tool to manage processes within the company. Processes are first modelled, before they are implemented and continuously improved. Both the initial process definition (modeling) and the subsequent adaptations have to ensure that processes are linked to the firm's strategy and its business environment and market situations. Strategic fit between operations and strategy is thus needed to be obtained in new process definitions and maintained in adaptations to changing environments.

Companies like Apple, Southwest or Zara are said to have a strategic fit as key processes and resources are well aligned with the value proposition, although actually measuring and proving this fit is challenging. For new business model definitions, Osterwalder's Business Model Canvas, for example, helps to define the different aspects of the business model in order to achieve alignment and strategic fit of the value proposition and underlying operations. Still, the canvas does not measure the actual (mis-) fit of assets and processes to the firm's competitive priorities.

The objectives of this thesis are to:

- Review, describe, and assess existing approaches and tools proposed in the (interdisciplinary) literature to measure the strategic fit of competitive priorities and process capabilities
- Identify potential differences between goods and services in these approaches
- Make recommendations how to apply an existing approach to measure strategic fit to assess if the elements of the business model canvas are well aligned.

Basic Literature:

Joshi, M. P., Kathuria, R., & Porth, S. J. (2003). Alignment of strategic priorities and performance: an integration of operations and strategic management perspectives. *Journal of Operations Management*, 21(3), 353-369.

Hill, A., & Cuthbertson, R. (2011). Fitness map: a classification of internal strategic fit in service organisations. *International Journal of Operations & Production Management*, 31(9), 991-1021.

McLaren, T. S., Head, M. M., Yuan, Y., & Chan, Y. E. (2011). A multilevel model for measuring fit between a firm's competitive strategies and information systems capabilities. *MIS quarterly*, 909-929.

Topic S02: Business Process Management - State of the Art, Future Research Opportunities and Implications for Service Design

Business Process Management (BPM) is a comprehensive system for managing and transforming organizational operations, based on what is arguably the first set of new ideas about organizational performance since the Industrial Revolution. Different disciplines have discussed process management in their own research field, but an interdisciplinary analysis is still lacking. Many of the ideas from other disciplines can be transferred to service operations, delivering important implications for service designers. The objective of the thesis is to review the current state of the art of BPM in theory and practice, and to discuss positive impact and challenges of BPM in reality, as well as future research opportunities. Furthermore, discuss what service designers can learn from BPM, given that services are basically processes.

The objectives of this thesis are to:

- Review, describe, and assess the current state of the art of BPM concepts and tools in theory and practice (interdisciplinary) with a particular focus on applicability to service design
- Review, describe, and assess approaches for designing processes end-to-end (Customer Journey, Customer Experience Design)
- Discuss impacts and challenges of BPM in reality, as well as future research opportunities
- Discuss what service designers can learn from BPM, given that services are basically processes

Basic Literature:

Bititci, Umit S., et al. (2011): Managerial processes: business process that sustain performance. *International Journal of Operations & Production Management* 31 (8), 851-891.

Hammer, Michael (2015): What is business process management?. Handbook on business process management 1. Springer, Berlin, Heidelberg, 3-16.

Sidorova, Anna, and Oyku Isik (2010): Business process research: a cross-disciplinary review. *Business Process Management Journal* 16 (4), 566-597.

Topics on Product Design and Sustainable Operations:

Topic S03: Product durability and planned obsolescence – Empirical evidence and best practices

Planned obsolescence is a policy of designing a product with an artificially limited useful life, so it will become obsolete, i.e. no longer functional after a certain period of time. The rationale behind the strategy is to generate long-term sales volume by reducing the time between repeat purchases. Such a policy goes hand-in-hand with several side effects, in particular high impact on environment in terms of resource use as well as waste disposal.

The objective of the thesis is to provide a review on the topic of planned obsolescence from marketing and operations management perspective. Focus should be placed on prescriptive optimization models as well as case examples for products and industries, where this phenomenon occurs most

The objectives of this thesis are to:

- Focus on empirical evidence and case examples, review the literature for planned obsolescence and classify it)
- Discuss the pros and cons of planned obsolescence
- Highlight (successful) companies which do not practice planned obsolescence or otherwise move towards more sustainable practices and thereby gain strong reputation as a “sustainable brand”
- Discuss practices and capabilities that are needed to move beyond unsustainable practices that may motivate companies to move beyond planned obsolescence
- Optional: Highlight the 5 most relevant contributions to this field of research from your personal perspective. Point out the facts that lead you to the selection of these contributions

Basic Literature:

Echegaray, F. (2016): Consumers' reactions to product obsolescence in emerging markets: the case of Brazil. *Journal of Cleaner Production* 134, 191-203.

Guiltinan, J. (2009): Creative destruction and destructive creations: environmental ethics and planned obsolescence. *Journal of business ethics* 89(1), 19-28.

Satyro, W., Sacomano, J., Contador, J., Cardoso A., & Silva, E. (2017): Planned Obsolescence and Sustainability. *Ten Years Working Together For a Sustainable Future*, São Paulo-Brazil-May 24th To 26th.

Topic S04: Customer experience and learning – How can customer learning be integrated in optimization models?

Positive consumer experience is a key lever increase demand and to achieve consumer loyalty, which in turn is a key precondition for long-term success. Product decisions typically have an influence on customer experience.

From an operations perspective, modelling learning is not a trivial task. In particular, there are different types of learning. For example, consumers can learn by experience or from other consumers (social learning). The main goal of learning models is to describe consumer preference formation, updating a consumer's utility (or satisfaction) based on learning inputs.

The objectives of this thesis are to:

- Highlight the importance of learning for company success
- Differentiate the different types of learning based on examples from practice
- Review the literature for consumer learning models and classify the literature, focusing on recent literature
- Select one model and discuss potential extensions to the model, in particular considering sustainability aspects
- Highlight the 5 most relevant contributions to this field of research from your personal perspective. Point out the facts that lead you to the selection of these contributions
- Optional: Select one model and implement it in AMPL

Basic Literature:

Ching, A. T., Erdem, T., & Keane, M. P. (2017): Empirical models of learning dynamics: A survey of recent developments. In Handbook of marketing decision models (pp. 223-257). Springer, Cham.

Hao, H., Padman, R., Sun, B., & Telang, R. (2019): Modeling social learning on consumers' long-term usage of a mobile technology: a Bayesian estimation of a Bayesian learning model. Electronic Commerce Research, 19(1), 1-21.

Roberts, J. H., & Urban, G. L. (1988): Modeling multiattribute utility, risk, and belief dynamics for new consumer durable brand choice. Management Science, 34(2), 167-185.

Topics on Assortment Optimization:

Topic S05: Constrained Assortment Optimization under the Mixed Multinomial Logit Model

The constrained assortment optimization problem under the mixed multinomial logit model is highly relevant in practice. However, even moderately sized instances of this problem are challenging to solve directly using standard mixed-integer linear optimization formulations. This has motivated recent research exploring customized optimization strategies and approximation techniques. Sen et al. (2017) develop a novel conic quadratic mixed-integer formulation. This new formulation, together with McCormick inequalities exploiting the capacity constraints, enables the solution of large instances using commercial optimization software.

The objectives of this thesis are to

- review the recent literature on the assortment problem
- discuss the approach of Sen et al. in detail.

Basic Literature:

Sen, A., Atamturk, A., and Kaminsky, P. (2017): A conic integer programming approach to constrained assortment optimization under the mixed multinomial logit model. arXiv preprint arXiv:1705.09040.

Topics on Service Scheduling:

Topic S06: Bidding approaches in Crew Scheduling

Crew assignment is part of the complex crew scheduling problem in transportation. While the Crew pairing problem creates pairings by deciding which flights are combined to become a work schedule of several days for a crew, the crew assignment problem targets assigning these pairings to particular crew members for a planning period such as a month. Here, often the opinion of the crew members is considered by the bidline approach or the preferential bidding approach. These two approaches include the crew preferences by either letting them choose their preferred option from a set of offered bidlines or by collecting information about their structural preferences and including them in the assignment of pairings & bidlines.

The objectives of this thesis are to...

- introduce and compare the difference between both model types,
- to show how bidding systems are used in operating airlines,
- to analyze one model and its formulation in detail,
- to provide open research gaps and future trends.

Basic Literature:

Achour, H., Gamache, M., Soumis, F., & Desaulniers, G. (2007): An exact solution approach for the preferential bidding system problem in the airline industry. *Transportation Science*, 41(3), 354-365.

Boubaker, K., Desaulniers, G., & Elhallaoui, I. (2010): Bidline scheduling with equity by heuristic dynamic constraint aggregation. *Transportation Research Part B: Methodological*, 44(1), 50-61.

Kasirzadeh, A., Saddoune, M., & Soumis, F. (2017): Airline crew scheduling: models, algorithms, and data sets. *EURO Journal on Transportation and Logistics*, 6(2), 111-137.

Topic S07: Cost Functions in Crew Scheduling

The Airline Crew Scheduling problem is one of the most complex crew scheduling problems in transportation, therefore a sequential solution approach is state of the art: The Crew pairing problem creates pairings by deciding which flights are combined to become a work schedule of several days for a crew while in the crew assignment problem these pairings are assigned to particular crew members for a planning period such as a month. Recently, some integrated approaches were developed which cover both steps in one model and provide a better solution. In most papers, cost minimization is the objective. The underlying assumptions of what is included in the used cost functions vary not only between the different frameworks of paying by the minute of operation (US) or paying a fixed salary for a fixed amount of work (EU), but also by factors such as deadheads, layovers, waiting time etc.

The objectives of this thesis are to...

- introduce and compare the three crew scheduling model types,
- introduce and classify different cost functions regarding their assumptions and included factors,
- to analyze one model and its cost function in detail,
- to provide open research gaps and future trends.

Basic Literature:

Dück, V., Wesselmann, F., & Suhl, L. (2011): Implementing a branch and price and cut method for the airline crew pairing optimization problem. *Public Transport*, 3(1), 43.

Kasirzadeh, A., Saddoune, M., & Soumis, F. (2017): Airline crew scheduling: models, algorithms, and data sets. *EURO Journal on Transportation and Logistics*, 6(2), 111-137.

Saddoune, M., Desaulniers, G., Elhallaoui, I., & Soumis, F. (2012): Integrated airline crew pairing and crew assignment by dynamic constraint aggregation. *Transportation Science*, 46(1), 39-55.

Topics on Process Design:

Topic S08: How Stochastic Modeling can help in Planning and Management for Emergency Medical Services?

Emergency medical services (EMS) refer to the provision of out-of-hospital acute medical care and the transport of patients to hospitals for definitive care. In EMS, responsiveness of the service provider plays a vital role in deciding the fate of human life at risk. Response times are influenced by: (i) the random nature and volume of calls for service, (ii) service time variabilities, (iii) limited resources, (iv) the location of ambulance stations, and (v) the dynamic allocation of ambulances to stations based on demand and travel times. Hence, planning and management for EMS, consists of forecasting demand, response times, and workload; measuring performance; choosing station locations; and allocating ambulances to stations, based on predictable and unpredictable changes in demand and travel times. Furthermore, in case of EMS dynamic server assignment is crucial, as any server available or within minimum distance of customer's location can provide service.

The objectives of this thesis are to

- review the various characteristics of EMS planning and management w.r.t. stochastic modeling approaches,
- comment theoretically on the relevance of dynamic server assignment in services other than EMS.

Basic Literature:

Ingolfsson, A. (2013): EMS planning and management. In *Operations research and health care policy*, 105-128.

Topic S09: How Analytics can help in Improving the Service Delivery Process?

In the information technology (IT) industry, service delivery modeling and optimization has the two-fold objective of improving quality of service and simultaneously reducing delivery costs. The fulfillment of these objectives requires an assessment of industry's organizational structure, skills of their resources and their internal processes using analytical modeling approaches, e.g., simulation-based optimization. Analytics based approaches like Simulation and optimization are not only relevant to IT industry but also useful in other service industries like mass services and the hospitality industry for the purpose of delivery process improvement. However, the service delivery improvement measures might vary across service industries. For example, in case of emergency medical services, minimizing average response time might be considered as a key measure of service delivery improvement. Modeling and improving the service delivery process becomes more complex in face of heterogeneous customer requests, multiple product offerings, multiple processes, and multiple service levels.

The objectives of this thesis are to

- review analytics based approaches to improve the service delivery process along with their applications to the service sector,
- comment theoretically on the industry-specific performance measures for service delivery process improvements,
- provide academic example from the service industry to support the findings of the thesis.

Basic Literature:

Diao, Y., Heching, A., Northcutt, D., & Wallace, R. (2015): Service-Delivery Modeling and Optimization. *Interfaces*, 45(3), 243-259.

Topics on Service Design:

Topic S10: Using the Kano model in service design decisions

With the growing significance of the service sector for our economy, the research field of service design has also gained importance. Companies competing for customers, sales volumes and market size have a strong need to design new services and optimize existing ones. The basis for these measures is a good understanding of what customers actually want or need. One tool that can help to define the features that a new service offering should have is called Kano model. It assigns features or attributes to three categories: threshold, performance, and excitement attributes. The model has been extended since its first introduction by Kano and there is a variety of possibilities to qualitatively or quantitatively assess to which category an attribute belongs.

The objectives of this thesis are to...

- provide an introduction to service design and (service) product development,
- introduce the original Kano model and present extensions and adaptations from other researchers,
- present details on the qualitative and quantitative measurement / categorization of Kano attributes,
- show possible ways of applying the Kano model – in the original or adapted version – to the field of service design and evaluate benefits and drawbacks.

Basic Literature:

Easton, F. F., & Pullman, M. E. (2001). Optimizing service attributes: The seller's utility problem. *Decision Sciences*, 32(2), 251-276. //mainly relevant for basics of service design – optimization itself not in focus of thesis

Matzler, K., & Hinterhuber, H. H. (1998). How to make product development projects more successful by integrating Kano's model of customer satisfaction into quality function deployment. *Technovation*, 18(1), 25-38.

Xu, Q., Jiao, R. J., Yang, X., Helander, M., Khalid, H. M., & Opperud, A. (2009). An analytical Kano model for customer need analysis. *Design studies*, 30(1), 87-110. Source 2 (please use APA format)

Topic S11: Service Design for online and mobile services

When designing services, there is a strong interrelation of the questions of what to offer to the customers and how to offer it. While the what perspective is focused on defining a service that is most appealing to the customers, the how perspective usually analyzes how the company processes need to be configured to be able to deliver the service offering. A service provider with a focus on customer excellence and low wait times for example may need more employees in direct customer interaction than a company competing just on low prices – leading to higher personnel costs for the first service provider. For companies mainly providing their services via a website or app, this link between service offering and costs for internal processes might be less strong. If Uber for example decides to introduce a new feature that evaluates driving skills based on GPS data, this feature will not have strong implications on processes or costs when running. Nevertheless, the costs for the IT-project implementing the service need to be considered – leading to a new interpretation of the how-perspective.

The objectives of this thesis are to...

- introduce the concept of service design and explain the classical what- and how-perspective,
- collect relevant research papers in the area of service design with a specific focus on online or mobile services,
- analyze to what extend these papers consider the what and how-perspectives described in the introduction above.

Basic Literature:

Edvardsson, B., & Olsson, J. (1996). Key concepts for new service development. *Service Industries Journal*, 16(2), 140-164.

Kim, C., Choe, S., Choi, C., & Park, Y. (2008). A systematic approach to new mobile service creation. *Expert Systems with Applications*, 35(3), 762-771.