



Book of Abstracts

# 11th Logistics Management

September 18th-20th, 2019

Halle (Saale)



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## Preface

This book of abstracts contains information about the 11th conference Logistics Management (LM 2019) of the Scientific Commission for Logistics (WK-LOG) of the German Academic Association for Business Research (VHB). The LM conference series is continued every two years at different places in Germany. It aims at providing a forum for scientists and practitioners in business administration, IT, and industrial engineering to present and discuss new ideas and technical developments related to the management of logistic systems. LM 2019 is hosted by the Martin Luther University Halle-Wittenberg in cooperation with Merseburg University of Applied Sciences. Previous LM conferences were held in Bremen (1999, 2013), Aachen (2001), Braunschweig (2003, 2015), Dresden (2005), Regensburg (2007), Hamburg (2009), Bamberg (2011), and Stuttgart (2017).

The LM 2019 conference puts a special focus on the digitalization of supply chains and recent attempts to decarbonize the transport industry. Not only do both fields address vitally important concerns bringing out (and together) many new ideas, innovative concepts and future visions; the implementation of digitalized supply chains and the application of electrified mobility are also happening very quickly. Considering a snapshot in 2019, the variety of possibilities and ways towards digital supply chains and green transport processes appear amazing. To give an insight into the field, LM 2019 has invited three keynote speakers to examine ongoing developments, presented by Ola Jabali (Politecnico Milano), A. Michael Knemeyer (Ohio State University), and Jan Fabian Ehmke (Otto-von-Guericke University Magdeburg). In addition to the keynote talks, around 50 presentations were given at LM 2019 of which 21 present a full paper published in the corresponding proceedings. The abstracts of all talks are given in this book along with organizational information about the conference.

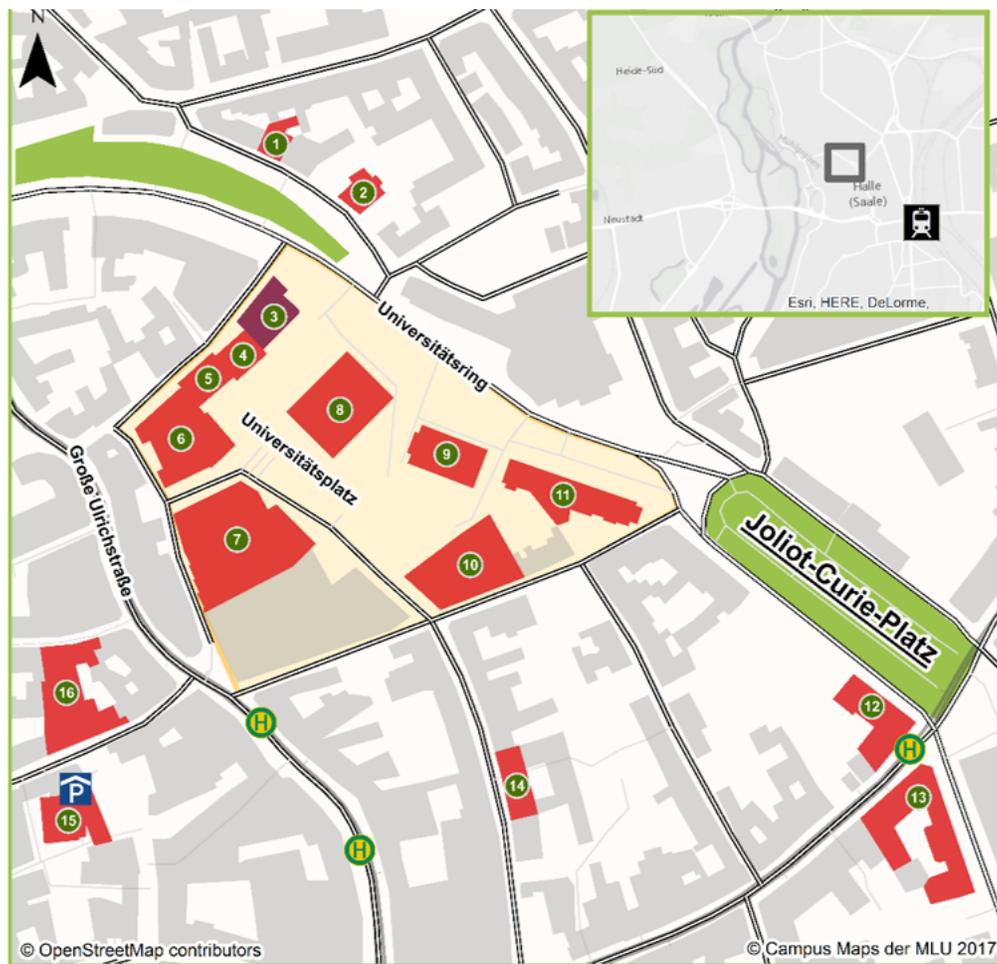
Halle (Saale) and Merseburg  
September 2019

Christian Bierwirth  
Thomas Kirschstein  
Dirk Sackmann

# 1 General Information

## Conference venue:

The conference will take place at the downtown campus (Melanchthonianum, Universitätsplatz 9) of the Martin-Luther-University in the center of Halle. The campus is located within walking distance (400m) from the Market place, which in turn is easily accessible by tram (lines 1, 2, 3, 5, 7, 8, 10, 16).



## Zentral Campus

 Parkhaus	 1 Universitätsring 14	 6 Melanchthonianum	 11 Universitätsring 2-4
 Haltestellen	 2 International Office	 7 Juridicum	 12 Universitätspoliklinik
 Universitätsgebäude	 3 Burse zur Tulpe	 8 Löwengebäude	 13 Wirtschaftswissenschaften
 Mensa	 4 Thomasianum	 9 Robertinum	 14 Barfüßerstraße 17
 Zentral Campus	 5 Rektorat	 10 Audimax	 15 Musik Bibliothek
		 16 Philosophische Fakultät II	

## Conference Office

The conference office is located in room *HS XV* (1st floor Melanchthonianum). The office opens on Wednesday, 18th of September at 12:00 am and is accessible during the conference. Participants should register at the conference desk when they arrive to receive the conference bags.

## Information for presenters

All regular presentations are given in the rooms *HS XVI*, *HS XVII*, and *HS XVIII* (1st floor). Keynote talks as well as the opening take place in room *HS XX* (2nd floor). All rooms are equipped with a beamer, PC, and board. It is also possible to connect laptops via VGA. Presenters are advised to appear in the lecture room 10min before their session starts in order to contact the session chair about their attendance and to copy the presentation. Presentations should either be in Powerpoint or PDF format.

## Lunch/coffee breaks

Lunch, snacks, coffee and beverages are served in the 1st floor of the Melanchthonianum.

## Internet access

Free internet access is available using the wireless LAN of the Martin-Luther-University which covers large parts of the Universitätsplatz. To connect to the WLAN, either use your eduroam credentials to connect to the network "eduroam" or use the network "event-net" with user name: "sv180919@uni-halle.de" and password: "ZeLeCcKH".

## Social program

The social program consists of:

- Welcome Reception, 18.9.19, 19.00 at  
*State Museum of Prehistory*, Richard-Wagner-Straße 9, 06114 Halle
- Conference Dinner, 19.9.19, 19.30 at  
*MahnS Chateau*, Oleariusstraße 4a, 06108 Halle

To gain access to the events vouchers are required which are part of the conference bags and can be obtained in the conference office. The State Museum of Prehistory can be reached by Tram line 7 (towards "Kröllwitz" up to stop "Landesmuseum für Vorgeschichte") or by walking (about 1.5 km or 20 minutes from conference venue). MahnS Chateau is in the city center close to the market square (about 5 minutes walking from conference venue).

## Program Committee

Prof. Dr. Christian Bierwirth, Martin-Luther-Universität Halle-Wittenberg

Prof. Dr. Ronald Bogaschewsky, Julius-Maximilians-Universität Würzburg

Prof. Dr. Udo Buscher, Technische Universität Dresden

Prof. Dr. Jan Dethloff, Hochschule Bremen

Prof. Dr. Jan Fabian Ehmke, Otto-von-Guericke-Universität Magdeburg

Prof. Dr. Kathrin Fischer, Technische Universität Hamburg-Harburg

Prof. Dr. Hans-Dietrich Haasis, Universität Bremen

Prof. Dr. Gudrun P. Kiesmüller, Otto-von-Guericke-Universität Magdeburg

Dr. Thomas Kirschstein, Martin-Luther-Universität Halle-Wittenberg

Prof. Dr. Natalia Kliewer, Freie Universität Berlin

Prof. Dr. Herbert Kopfer, Universität Bremen

Prof. Dr. Herbert Kotzab, Universität Bremen

Prof. Dr. Anne Lange, Université du Luxembourg

Prof. Dr. Rudolf Large, Universität Stuttgart

Prof. Dr. Rainer Lasch, Technische Universität Dresden

Prof. Dr. Dirk C. Mattfeld, Technische Universität Braunschweig

Prof. Dr. Frank Meisel, Christian-Albrechts-Universität zu Kiel

Prof. Dr. Taïeb Mellouli, Martin-Luther-Universität Halle-Wittenberg

Prof. Dr. Dirk Sackmann, Hochschule Merseburg

Prof. Dr. Katja Schimmelpfeng, Universität Hohenheim

Prof. Dr. Jörn Schönberger, Technische Universität Dresden

Prof. Dr. Stefan Seuring, Universität Kassel

Prof. Dr. Thomas S. Spengler, Technische Universität Braunschweig

Prof. Dr. Axel Tuma, Universität Augsburg

Prof. Dr. Guido Voigt, Universität Hamburg

Prof. Dr. Carl Marcus Wallenburg, WHU Otto Beisheim School of Management

## 2 Acknowledgements

The organizers express their gratitude to all participants and to everybody who has contributed to this conference.

In particular, we thank the German Research Foundation (DFG) for granting traveling funds which allowed us to invite internationally renowned keynote speakers. Our special gratitude goes to DHL for awarding the best full paper contribution of LM 2019, and to InfraLeuna GmbH, arvato Bertelsmann distribution GmbH, and the city of Halle (Saale) for their generous support of LM 2019.

Furthermore, we gratefully acknowledge the efforts of the program committee for reviewing the contributions submitted to the conference.



## 3 Scientific Program

### 3.1 Overview

	Wednesday, 18.9.19			Thursday, 19.9.19			Friday, 20.9.19		
	<i>HS XVI</i>	<i>HS XVII</i>	<i>HS XVIII</i>	<i>HS XVI</i>	<i>HS XVII</i>	<i>HS XVIII</i>	<i>HS XVI</i>	<i>HS XVII</i>	<i>HS XVIII</i>
09:00-09:30				Sitzung WK-Log					
09:30-10:00				<i>(Sitzungszimmer)</i>					
10:00-11:00				KN 2: M. Knemeyer			Sus 3	SCM 4	OpM 4
				<i>(HS XX)</i>					
11:00-11:30				Coffee break			Coffee break		
11:30-13:00				Dig 2	SCM 2	OpM 2	Dig 4	SCM 5	OpM 5
13:00-13:30				Lunch			Lunch		
				<i>(1st floor)</i>			<i>(1st floor)</i>		
13:30-14:00				Opening ( <i>HS XX</i> )					
14:00-14:30				KN 1: J. F. Ehmke			KN 3: O. Jabali		
	<i>(HS XX)</i>			<i>(HS XX)</i>					
14:30-15:00	Coffee break			Coffee break					
15:00-15:30									
15:30-17:00	Dig 1	SCM 1	Sus 1	Dig 3	SCM 3	Sus 2			
17:00-17:15	Short break			Short break					
17:15-18:15	WS 1: Speed Dating		OpM 1	WS 2: Third		OpM 3			
	<i>(Sitzungszimmer)</i>			party funds					
18:15-18:45				<i>(Sitzungszimmer)</i>					
18:45-19:00									
19:00-19:30	Welcome reception								
19:30-...				Conference dinner					

## 3.2 Keynote talks

Three keynote talks will be given. The keynote sessions are scheduled for 60 minutes including 10-15 minutes of discussion.

- Wednesday, 18.09.19, 14.00-15.00, Room *HS XX*  
Prof. Dr. Jan Fabian Ehmke (University Magdeburg)  
*Big data for transportation optimization*  
Chair: Dirk Sackmann
- Thursday, 19.09.19, 10.00-11.00, Room *HS XX*  
Prof. A. Michael Knemeyer (Ohio State University)  
*The importance of relationships in the age of digitalization*  
Chair: Carl Marcus Wallenburg
- Thursday, 19.09.19, 14.00-15.00, Room *HS XX*  
Prof. Ola Jabali (Politecnico Milano)  
*Emission oriented modelling and optimization in transportation*  
Chair: Christian Bierwirth

## 3.3 Workshops

There are two one-hour workshops included in LM 2019. Details can be found in the abstracts below.

- Wednesday, 18.09.19, 17.15-18.15, Room *Sitzungszimmer*  
*Logistics researchers speed dating*  
Moderation: Kathrin Fischer and Udo Buscher
- Thursday, 19.09.19, 17.15-18.15, Room *Sitzungszimmer*  
*Acquisition of third-party funding*  
Moderation: Matthias Klumpp and Udo Buscher

### 3.4 Contributed talks

The talks contributed to the conference are organized in four thematic streams:

- Digitalization (Dig)
- Sustainability (Sus)
- Supply chain management (SCM)
- Operations Management (OpM).

Contributed talks are presented in three parallel sessions. They should be no longer than 25 minutes to allow a short discussion after each talk. Talks annotated with '\*' are given in German.

#### Stream Digitalization

##### Session Dig 1: Digitalization - Surveys

Wednesday, 18.09.19, 15.30-17.00, Room XVI

Chair: Hans Dietrich Haasis

- Alexandra Fiedler (Merseburg University of Applied Science), Dirk Sackmann, Hans-Dietrich Haasis  
*A literature review on the state of the art of multi-agent systems in supply chain management*
- Irina Dovbischuk (University Bremen)  
*Logistics performance capabilities in a digitalized world – a mixed methods review*
- Cornelia Elsässer (Bundeswehr University Munich), Andreas H. Glas, Michael Eßig  
*Digital(ization) – a single construct amidst supply management?*

##### Session Dig 2: Digitalization - Blockchain Technology

Thursday, 19.09.19, 11.30-12.00, Room XVI

Chair: Stefan Seuring

- Oliver Bischoff (University of Kassel), Stefan Seuring  
*Blockchain for traceability: Opportunities and limitations for supply chain management and logistics*
- Jacob Lohmer (TU Dresden)  
*Applicability of blockchain technology in scheduling resources within distributed manufacturing*

- Niels Hackius (Hamburg University of Technology), Sven Reimers, Wolfgang Kersten  
*The Privacy Barrier for Blockchain in Logistics: First Lessons from the Hamburg Port*

**Session Dig 3:** Digitalization - Industry 4.0

Thursday, 19.09.19, 15.30-17.00, Room XVI

Chair: Rainer Lasch

- Christian Flechsig (TU Dresden), Jacob Lohmer, Rainer Lasch  
*Realizing the full potential of Robotic Process Automation through a combination with BPM*
- Matthias Klumpp (Georg-August-University Göttingen), Caroline Ruiner  
*Human role in digital logistics: Relevance of intuition in interacting with AI*
- Ralf Elbert (TU Darmstadt), Anne Friedrich, Anne Lange  
*Make or Buy? The Case of Additive Manufacturing in Industrial Applications*

**Session Dig 4:** Digitalization - Industry 4.0

Friday, 20.09.19, 11.30-13.00, Room XVI

Chair: Herbert Kotzab

- Paul Gerken (University Bremen), Herbert Kotzab, Hans G. Unseld  
*Digital Logistics Terminals in intermodal transport and resource sharing*
- Ralf Elbert (TU Darmstadt), Michael Gleser  
*Digital Forwarders - A market oriented taxonomy*

## Stream Sustainability

**Session Sus 1:** Sustainability - Instruments

Wednesday, 18.09.19, 15.30-17.00, Room XVIII

Chair: Matthias Wichmann

- Jayani Ishara Sudusinghe (University of Kassel), Stefan Seuring  
*Social Sustainability Empowering the Economic Sustainability in the Global Apparel Supply Chain*
- Alexander Neske (WHU-Otto Beisheim School of Management), Carl Marcus Wallenburg  
*Using third-parties to implement sustainability*

- Birte Struve (Georg-August-University Göttingen), Timo Christopher Anke, Matthias Klumpp  
*DEA Sustainability Evaluation in Automotive Supply Chains\**

**Session Sus 2:** Sustainability - Sustainable transportation

Thursday, 19.09.19, 15.30-17.00, Room XVIII

Chair: Frank Meisel

- Larissa Löber (Merseburg University of Applied Science)  
*The planning of low-emission freight transportation chains*
- Arne Heinold (Christian-Albrechts-University zu Kiel), Frank Meisel  
*Emission oriented vs. time oriented routing in the European intermodal rail/road freight transportation network*
- Benjamin Siller (Julius-Maximilian-University Würzburg)  
*A green Supply Chain Design Model considering lead times*

**Session Sus 3:** Sustainability - Last-mile logistics

Friday, 20.09.19, 9.30-11.00, Room XVI

Chair: Eric Sucky

- Vanessa Felch (University of Bamberg), David Karl, Björn Asdecker, Amelie Niedermaier, Eric Sucky  
*Reconfiguration of the Last Mile: Consumer Acceptance of Alternative Delivery Concepts*
- Martin Behnke (Martin Luther University Halle-Wittenberg)  
*Recent Trends in Last Mile Delivery: Impacts of Fast Fulfillment, Parcel Lockers, Electric or Autonomous Vehicles, and more*
- Santiago Nieto-Isaza (TU Munich), Pirmin Fontaine, Stefan Minner  
*Strategic Network Design for Last-mile Delivery with Crowd Resources*

## Stream Supply Chain Management

**Session SCM 1:** Supply Chain Management - Systematization concepts

Wednesday, 18.09.19, 15.30-17.00, Room XVII

Chair: Dirk Sackmann

- M. Sebastian Huster (BVL e.V.)  
*Understanding Urban Logistics need for a supporting action theory*

- Sandra Luttermann (University of Bremen)  
*Logistics capabilities of countries as an influencing factor for foreign direct investment*
- Christian Hein (TU Dresden)  
*Systematisation of Humanitarian NGOs from a Logistical Viewpoint: An Exploratory Study in Germany*

**Session SCM 2:** Supply Chain Management - Supply Chain Risks

Thursday, 19.09.19, 11.30-13.00, Room XVII

Chair: Guido Voigt

- Andreas Siman, Carl Marcus Wallenburg (WHU-Otto Beisheim School of Management)  
*Supply Chain Risk Handling: The Human Factor*
- Frank Bodendorf (University of Erlangen-Nürnberg), Joerg Franke  
*Risk Assessment of Data Transfer Between Partners in the Automotive Supply Chain*
- Niels Bugert (TU Dresden), Rainer Lasch  
*Dynamic Responsive Pricing as a Mitigation Strategy against Supply Chain Disruptions: An Agent-based Model*

**Session SCM 3:** Supply Chain Management - Truck driver scheduling

Thursday, 19.09.19, 15.30-17.00, Room XVII

Chair: Irina Dovbischuk

- Rudolf O. Large (University Stuttgart), Michael Schäfer  
*Retention Tactics based on a Taxonomy of Truck Drivers\**
- Michael Schäfer (University Stuttgart)  
*Organizational Commitment of Truck Driver in Times of driver shortages - Impact of HR-activities on the Organizational Commitment of truck drivers\**
- Dennis Johne, Carl Marcus Wallenburg (WHU-Otto Beisheim School of Management)  
*Knowledge configurations for logistics service provider-initiated innovation – a qualitative study*

**Session SCM 4:** Supply Chain Management - Logistics outsourcing

Friday, 20.09.19, 9.30-11.00, Room XVII

Chair: Rudolf O. Large

- Rubén Medina Serrano (University of Allicante), Wanja Wellbrock, María Reyes González Ramirez, José Luis Gascó

*Integration of sustainability aspects in the supplier selection process: the case study of a German electronic firm*

- Fabian Nevries, Carl Marcus Wallenburg (WHU-Otto Beisheim School of Management)  
*Influence of Organizational Culture Dimensions on Improvement Behavior in Logistics Outsourcing Relationships*
- Rudolf O. Large (University Stuttgart), Gilles Paché, Nathalie Merminod  
*Should I participate or should I not? Logistics outsourcing in the light of behavioral theory*

### **Session SCM 5:** Supply Chain Management - Online retailing

Friday, 20.09.19, 11.30-13.00, Room *XVII*

Chair: Jan Dethloff

- Christian Straubert (University of Bamberg), Björn Asdecker, Immanuel Zitzmann  
*Current Trends in B2C E-Commerce Logistics – A Content Analysis*
- Bastian Mrutzek (University of Bremen), Herbert Kotzab, Erdem Galipoglu  
*Exploring Dynamic Capabilities in Omnichannel Retailing: An Analysis of the Literature*
- Josephine Harder, Carl Marcus Wallenburg (WHU-Otto Beisheim School of Management), Daniel Taylor  
*Customers' Order Type Decisions in Online Retailing: Influence of External and Internal Factors*

## **Stream Operations Management**

### **Session OpM 1:** Operations Management - Maritime logistics

Wednesday, 18.09.19, 17.15-18.15, Room *XVIII*

Chair: Jörn Schönberger

- Patrick Specht (University of Bremen), Herbert Kotzab, Frank Arendt  
*The role of cargo availability for planning in maritime transport chains*
- Frank Meisel (Christian-Albrechts-University zu Kiel), Kjetil Fagerholt  
*Ship Traffic Management and Infrastructure Extension for the Kiel Canal*

**Session OpM 2:** Operations Management - Production logistics

Thursday, 19.09.19, 11.30-13.00, Room XVIII

Chair: Udo Buscher

- Eduardo Alberto Alarcon Gerbier (TU Dresden), Udo Buscher  
*Integrated Scheduling of Production and Distribution Operations with Site Selection*
- Tommy Schultz (BMW/TU Dresden)  
*An IP formulation for a machine sequencing problem to minimize job deviation and set-ups*
- Nina Lohnert (TU Hamburg), Kathrin Fischer  
*Booking Limit based Revenue Management Approaches for Make-to-Order Production*

**Session OpM 3:** Operations Management - Warehousing and routing

Thursday, 19.09.19, 17.15-18.45, Room XVIII

Chair: Christian Bierwirth

- Manuel Ostermeier (TU Munich), Daniel Schubert, Heinrich Kuhn, Andreas Holzapfel  
*Zone picking and vehicle routing operations with restricted intermediate storage*
- Herbert Kopfer (University of Bremen), Christian Bierwirth  
*Bewertung von Transportprozessen aufgrund der Kriterien Auslastung und Leerkilometer\**
- Matthias Kiesel (DHL)  
*Luftfrachtumschlag und das Ramp Management System der DHL Hub Leipzig GmbH\**

**Session OpM 4:** Operations Management - Resource management

Friday, 20.09.19, 9.30-11.00, Room XVIII

Chair: Thomas Kirschstein

- Max Zien (Martin Luther University Halle-Wittenberg)  
*Train formation planning without departure tracks*
- Martin Scheffler, Michael Hölscher, Janis S. Neufeld (TU Dresden)  
*An improved LP-based heuristic for solving a real-world locomotive assignment problem*
- Julia Heil (TU Dresden)  
*Network decomposition strategies for scheduling crews in regional railway passenger transportation*

**Session OpM 5:** Operations Management - Facility location planning

Friday, 20.09.19, 11.30-13.00, Room *XVIII*

Chair: Kathrin Fischer

- David Kik (TU Braunschweig), Matthias G. Wichmann, Christoph Johannes, Thomas S. Spengler  
*An integrated multi-criteria approach for the regional facility location development planning*
- Nazanin Haghjoo, Hani Shahmoradi-Moghadam (TU Dresden), Reza Tavakkoli-Moghaddam, Jörn Schönberger  
*Design of a Robust Blood Supply Chain Network with Facility Disruption*
- Bettina Zargini (Martin Luther University Halle-Wittenberg)  
*Multi-objective optimization with respect to variable domination structures*

## 4 Abstracts

### 4.1 Workshops

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#### Workshop 1: Logistics Researchers Speed Dating

Kathrin Fischer<sup>1</sup> and Udo Buscher<sup>2</sup>

<sup>1</sup> Institute for Operations Research and Information Systems, Hamburg University of Technology, Germany,  
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<sup>2</sup> Chair of Business Management, esp. Industrial Management, Dresden University of Technology, Germany,  
`udo.buscher@tu-dresden.de`

**Abstract.** This session is addressed to all conference participants, with young scientists and "established" participants equally welcome.

Participants get the opportunity to talk to other researchers. In short two-person discussions, i.e. for about 3 – 5 minutes, pairs of participants get together and talk about their research interests and the topics they currently focus on in their scientific work. When the bell rings, everybody gets paired up with a different person and a new discussion round starts. Hence, everybody gets to know some of the other LM participants and can gather information regarding shared research interests. By this, people may set the ground for further discussions during the event, e.g. in coffee breaks or at the conference dinner, and even might establish new useful contacts in the Logistics community.

**Keywords:** Workshop, Speed dating, Getting together

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#### Workshop 2: Acquisition of third-party funding

Matthias Klumpp<sup>1</sup> and Udo Buscher<sup>2</sup>

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<sup>2</sup> Chair of Business Management, esp. Industrial Management, Dresden University of Technology, Germany,  
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**Abstract.** The acquisition of third-party funding is becoming increasingly important at universities and also plays an important role in appointment procedures. Third-party funding is primarily used to cover the personnel cost and operating expenses of research projects. This workshop is primarily aimed at junior researchers who have little experience in applying for third-party funding. After a short introduction to the importance of third-party funding and an overview of various funding programs,

the instruments of morphological boxes and canvas for proposal development will be presented and applied in working groups.

**Keywords:** Workshop, Acquisition of third-party funding, Research projects

## 4.2 Stream Digitalization

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### A literature review on the state of the art of multi-agent systems in supply chain management

Alexandra Fiedler<sup>1</sup>, Dirk Sackmann<sup>1</sup>, and Hans-Dietrich Haasis<sup>2</sup>

<sup>1</sup> Hochschule Merseburg, Eberhard-Leibnitz-Str. 2, 06217 Merseburg, Germany,

<sup>2</sup> Universität Bremen, Bibliothekstraße 1, 28359 Bremen, Germany

**Abstract.** Agent-based software attracts great interest in industry and research, the main reasons being the efficiency, robustness and complexity minimization of such multi-agent systems (MASs). In addition, the application possibilities are varied. This paper presents an overview of the different areas and topics in which MASs are used and specifically addresses the question of how MASs are used in supply chain management (SCM). For this purpose, the identified studies are classified in the supply chain planning matrix and gaps in research are subsequently identified.

**Keywords:** Multi-agent systems, Supply chain management, Literature review

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### Logistics performance capabilities in a digitalized world – a mixed methods review

Irina Dovbischuk

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**Abstract.** Starting with a limited number of objects of inquiry, with globalization and the growing importance of environmental and social issues, scholars have started to up-date the scope of logistics management and capture its complexity using different theoretical perspectives. The output of logistics services also encompasses the so-called negative by-products, increasing in past decades, which stresses the need for a standardized, comprehensive, quantitative performance measurement. The reduction of

negative by-production, e.g. decarbonization in the transport industry is commonly associated with a higher degree of logistics performance using different capabilities. As a player of a digitalized world, not only isolated usage of technologies to increase the performance of frequently-repeated activities but seamless integration through the technologies' use is required to show the demand-oriented core businesses of a logistics service provider.

Decisive performance components and logistics service providers' capabilities are outlined in the following using mixed methods review. An overview of beneficial (quantitative evidence) and influential theories (qualitative evidence) rounds up the outline.

**Keywords:** Performance, Digitalization, Mixed methods

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## Digital(ization) – a single construct amidst supply management?

Cornelia Elsäßer, Andreas H. Glas, and Michael Eßig

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**Abstract.** Digital technologies pervade products, services and companies. Keywords like Internet-of-Things, or big data analytics made their way on to almost every presentation and promotional slogan, seemingly becoming the backbone for every business organization, including supply management functions. However, the under-standing of digital and related terms such as digitalization varies significantly. This research addresses the conceptual gap and seeks to identify characteristics and patterns of digital/digitalization. In addition, the terms digital, digitization and digitalization will be delineated. For this purpose, this research reviews existing literature. Digital as a phenomenon is structured through the application of deductive structure-discovering methods. The findings show the discrepancy between a technical and a managerial understanding. This paper proposes a conceptual model that structures the phenomenon into (1) digitization, (2) media convergence, (3) digitalization and (4) digital transformation.

**Keywords:** Digital, Digitalization, Purchasing, Supply management, Supply chain

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# Blockchain for traceability: Opportunities and limitations for supply chain management and logistics

Oliver Bischoff and Stefan Seuring

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**Abstract.** Blockchain is provoking significant disruptions, impacting supply chain management. We strive to progress the research regarding blockchain based supply chain traceability by identifying opportunities and limitations of the technology adoption. We a) reviewed concepts of supply chain traceability, b) conceptualised key elements of blockchain technology and c) highlight opportunities and limitations when implementing traceability using blockchain technology. Many of the blockchain's characteristics represent incremental enhancement to current systems, when the technology features are adopted selectively, rather than the blockchains' privacy model is embraced fully. Opportunities for disruptive change from disintermediation need to become focus of research.

**Keywords:** Supply Chain, Logistics, Traceability, Blockchain, Distributed Ledger

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# Applicability of blockchain technology in scheduling resources within distributed manufacturing

Jacob Lohmer

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**Abstract.** Collaborative production networks are becoming a common setting in modern times. Issues of how and where data from IoT devices is stored and how communication between entities is conducted are not fully resolved. Decentralized approaches provide opportunities compared with centralized approaches in this context, especially in terms of trust and data security. One technology that has emerged recently is the blockchain technology. Although the potential benefits are well known, literature on blockchain in supply chain management and manufacturing is scarce. This paper presents a concept for the use of blockchain technology in distributed manufacturing. By utilizing smart contracts, manufacturing processes are executed on shared resources in distributed collaborative production networks. Benefits and risks of the proposed methodology are identified. The paper is completed by a case study with several companies operating in distributed manufacturing.

**Keywords:** Blockchain technology, Distributed manufacturing, Distributed scheduling

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# The Privacy Barrier for Blockchain in Logistics: First Lessons from the Port of Hamburg

Niels Hackius, Sven Reimers, and Wolfgang Kersten

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**Abstract.** Blockchain technology is associated with greatly beneficial applications for supply chain and logistics (SC&L), two of which are to trace goods across many actors, and to decentralize asset transfers without needing an intermediary. As a first use-case, actors from the Port of Hamburg are planning to implement blockchain to improve the sea freight container release by providing a common data platform for sea freight carriers, terminals, truck companies, and freight forwarders. Currently, releasing containers from the port's terminals to trucks requires proof of ownership for the recipient to take custody. In practice, this proof passes through many hands causing duplication of information flow and ownership evidence. We conducted workshops and short interviews with experts providing first-hand insight into the use-case. Using blockchain in the process provides improvements such as traceable proof of ownership. The technology also faces barriers, with privacy concerns as one of the most prominent obstacles. A decentralized system could lead to business networks and company information being disclosed through data triangulation. We argue that privacy is a vital design consideration that affects the use of blockchain in SC&L generally.

**Keywords:** Blockchain, Port of Hamburg, Privacy, Seafreight

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# Realizing the full potential of Robotic Process Automation through a combination with BPM

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**Abstract.** Robotic Process Automation (RPA) is currently a topic of interest for both re-search and industry. Many administrative tasks in operations consume a vast amount of time and create little value. The possibility that the responsible employees can quickly and easily automate these processes by themselves makes RPA a promising approach for many processes. However, RPA procedures are only able to automate a process in its present form. In this way, redundancies and excessive process steps are

incorporated into RPA process flows. Combining RPA with the popular Business Process Management (BPM) approach poses a useful strategy as the as-is process is optimized first. The RPA procedure is then deployed on the optimized process to reach its full automation potential. This paper proposes a methodology to combine RPA and BPM and demonstrates the potential within a case study. Benefits, limitations, and further research opportunities are likewise addressed.

**Keywords:** RPA, BPM, Automation, Combination

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## Human role in digital logistics: Relevance of intuition in interacting with AI

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**Abstract.** Digital developments for logistics include many general and specific concepts as for example automation and Industry 4.0, Internet of Things (IoT), Physical Internet or Cyber-physical Systems. Overall, the human role in such settings will see profound changes – and many fears from workers are arising especially as there is no positive definition of new human work roles and expectations yet. We analyze the role of human intuition within an IoT and artificial intelligence application environment in logistics and supply chain processes and how it can be developed. Such a positive concept of increased efficiency by human-AI teams is an important cornerstone for digitization as otherwise obstruction and fear may prevail with logistics and production workers.

**Keywords:** HCI, Intuition, Industry 4.0, Physical internet

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# Make or Buy? The Case of Additive Manufacturing in Industrial Applications

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**Abstract.** The technological development of additive manufacturing (AM) has reached a stage that allows companies to rely on AM for industrial applications such as spare parts and small series manufacturing. Potential users of the technology are confronted with a classical make or buy decision for multiple activities related to AM: identifying suitable products, 3D-scanning, creating CAD models as well as complete order processing can be sourced externally or executed internally (Rogers et al. 2016). These activities are generic and will be similar for products across multiple industries and many manufacturers do not have the necessary skills, yet. At the same time, the digital specification of how to manufacture additively a component or an entire product encapsulates its essential engineering achievement.

Outsourcing decisions have been extensively discussed in existing literature. In particular, access to specialized skills (Kakabadse and Kakabadse 2000) as well as costs savings (McCarthy and Anagnostou 2004) argue for outsourcing the related process. Furthermore, transaction cost theory suggests that activities should be outsourced if the transaction costs of doing so are below the costs of in-house production (Williamson 2008). This requires the specification to be easily and unambiguously transferable to an outsourcing partner which is certainly the case for AM. Even though AM qualifies for outsourcing given the above, we observed that manufacturing companies experiment with AM in-house and aim to individually build the necessary skills (Küpper et al. 2017).

**Keywords:** Make or buy decision, Additive manufacturing, Supply chain

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## Digital Logistics Terminals in intermodal transport and resource sharing

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**Abstract.** Rail transport is by far the most energy-efficient form of land freight transport. Shifting transport processes from road to rail can make a significant contribution to reducing greenhouse gas

emissions in transport. Intermodal transport compensates for the lack of spatial flexibility of the railways. However, the existing strategies and technologies to strengthen rail transport are not effective. The market share of rail transport in the freight market has been stagnating since 1995 and will continue to do so as forecasts show. Accordingly, innovative concepts are needed to make rail freight transport competitive and form viable alternatives for shippers. Digital Logistics Terminals (DLT) represent such an innovative concept and support intermodal transport. The contribution of this work is an examination of DLT and an analysis of possible effects on rail transport in case of implementation. Furthermore, the advantages of the joint use and provision of such a technology will be examined.

**Keywords:** Intermodal transport, Resource sharing, Transshipment, Combined transport

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## Digital Forwarders

### A market oriented taxonomy

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**Abstract.** Digital forwarders are a rather new phenomenon in the logistics market. They claim benefits for shippers and freight carriers alike and threaten established players in the market. As a lot of digital forwarders are still situated in a start-up phase, the phenomenon has not yet arrived thoroughly in scientific discussions. Digital forwarders are not necessarily alike each other but try to cover various market segments. To enable a profound analysis of digital forwarders, this paper presents an empirically based taxonomy to serve as a starting point for both theoretical and practical discussions. The taxonomy was created through an iterative process by analyzing major digital forwarders in the market. The taxonomy consists of three major types within the digital forwarding market, being international full service, direct contract trucking and niche digital forwarder.

**Keywords:** Digitization, Freight forwarder, Taxonomy, Platform, Logistics, Disruptive innovation

## 4.3 Stream Sustainability

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### Social Sustainability Empowering the Economic Sustainability in the Global Apparel Supply Chain

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**Abstract.** Little research has been conducted on how companies integrate social sustainability practices to their management approaches in emerging economies in different supply chain contexts (Mani, Gunasekaran, & Delgado, 2017; Yawar & Seuring, 2017). Hence, the purpose of this study is to scrutinize the social sustainability dimension and its interrelation to the economic performance from the suppliers' perspective in a developing country catering to the global apparel supply chain.

A survey questionnaire was pre-tested in semi-structured interviews with experts in the Sri Lankan apparel industry. This allowed to develop a conceptual framework explaining the relationship between social and economic sustainability dimensions. Survey data was collected based on responses from 119 managers in the Sri Lankan apparel-manufacturing sector. This was analyzed using Partial Least Square Structural Equation Modelling technique.

**Keywords:** Social sustainability, Economic sustainability, Interrelation, Apparel, Supply chain, Sustainability

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### Using third-parties to implement sustainability

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**Abstract.** Due to the increasing awareness of customers regarding, for example, resources scarceness, pollution, climate change, and labor issues, firms have realized the need to enhance the sustainability of their supply chains. This is generally a very complex issue as social and environmental sustainability in contrast to economic sustainability focus not only on a large number of suppliers and customers, but also on a large number of relevant dimensions. In order to deal with these complexities and meet their self-defined time-bound commitments, firms are using strategies like buying certified products, mapping and monitoring the supply chain, participating in programs and initiatives or engaging and

collaborating. It is unclear for firms, overwhelmed by ambiguities, which tools or frameworks provided by third-parties (like certification or auditing firms and NGOs) they should rely on, how and which resources they should devote to for the implementation. According to Bain & Company only 4 fully succeeded achieving their sustainability goals (Davis-Peccoud et al., 2018). Even if they succeeded, the strategies they used are customized and individual solutions. The reality is that the landscape of solutions for implementing, support and assess sustainability is characterized by little harmonization. Having said that, it may be argued that the missing harmonization and reporting on activities instead of on results means less accountability to firms and can be seen by the public as window dressing.

**Keywords:** Corporate sustainability, Supply chain management

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## DEA Sustainability Evaluation in Automotive Supply Chains

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**Abstract.** The question of sustainability evaluation in global supply chains is often answered qualitatively with standards and status evaluations. However, dedicated management requires also quantitative approaches to evaluate the existing situation adequately. By applying a quantitative approach, this research work considers the global automotive supply chains with a Data Envelopment Analysis (DEA) sustainability evaluation and matching key performance indicators. In this setting, 13 automotive companies are analyzed for three different years 2015 to 2017. Results show that different OEMs are featuring very distinctive sustainability settings and results – deriving also optimization potential in comparison to the other companies.

**Keywords:** DEA, Sustainability, Automotive supply chains

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# The planning of low-emission freight transportation chains

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**Abstract.** Sustainable supply chains and green logistics have been a focus for logistics research for quite a while now. In these fields the research in the past years focused more and more on emission reduction in transportation. According to statistics of the „Bundesumweltamt“ the transportation sector is the only economic sector in which the emissions are still rising in Germany.

Focused on the whole freight transportation chain the measures of creating intermodal transportation chains, realizing Full Truck Loads by collecting the goods at a certain transshipment point, using rail instead of street transportations as well as the investment in and the usage of new ecological friendly transportation technology have been identified as emission reducing actions.

Because of the high number of different players, the difficulties in managing cooperation's and a high number of influencing factors on emissions in transportation the planning of a low-emission transportation chain is very complex. Furthermore, the actors use different approaches to reach the aim of emission reduction. To face these difficulties a systematic and standardised strategy seems to be necessary.

**Keywords:** Low-emission, Freight transportation chain, Reference model

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# Emission oriented vs. time oriented routing in the European intermodal rail/road freight transportation network

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**Abstract.** This study compares emissions and transit times from an environmentally oriented and a time oriented routing of large freight shipments in the European rail/road transportation network. We use the terminal-and-service selection problem (TSSP) to find the optimal routings under the different objectives. We show that substantial differences exist between the emission oriented routing and the time oriented routing. A large-scale simulation study reveals that shipments in the emission minimizing routing emit on average almost half as much emissions as if they were routed with the objective to minimize transit time. At the same time, the average transit time of shipments in the emission oriented routing almost triples compared to the transit time in the time optimal routing. This

shows by experiment that substantial emission reductions can be achieved in the European freight transport sector by a corresponding routing of shipments but that this comes at the cost of a much lower service quality.

**Keywords:** Emission rates, Transit time, European rail/road network, Intermodal transportation, Mesoscopic model

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## A green supply chain design model considering lead times

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**Abstract.** Lead times and carbon emissions are important factors for the design of supply chain networks since companies' customers and various other stakeholders are getting more and more sensitive regarding both performance factors. In order to reduce lead times, companies apply different strategies like e.g. using faster logistic modes, locate production facilities and warehouses near customers or keep goods at stock. Nevertheless, these measures can have a high impact on both costs and carbon emissions. This paper provides a multi-layer, multi-product and multi-period supply chain design approach with a carbon cap-and-trade system considering lead times. The bi-objective model aims to minimize delivery lead time and discounted total costs. Furthermore, it is possible to keep units on stock and carbon emissions for all necessary processes to fulfill customer demand are taken into account. A computational study evaluates the solvability of the model and gives insight on the influence of delivery lead time and prices of carbon credits on the configuration of a supply chain.

**Keywords:** Supply chain design, Lead times, Carbon cap-and-trade, Mixed integer programming

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## Reconfiguration of the Last Mile: Consumer Acceptance of Alternative Delivery Concepts

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**Abstract.** In the coming years, the growth of e-commerce is expected to continue. Due to the increasing number of parcels delivered and existing capacity bottlenecks within the logistics service providers,

concepts are emerging that are newer and more sustainable than traditional home delivery. This article analyzes (1) how customers perceive four alternative concepts (reception box, controlled access systems, trunk delivery, and crowdsourced delivery among friends) and (2) what influences acceptance, which is the decisive prerequisite for continued application. The data of 207 young German consumers were analyzed using descriptive methods and linear regression. The results show that the reception box achieves the highest acceptance level. In addition, perceived usefulness, security, and privacy are crucial factors in the customers' intention to use delivery concepts. Since the study provides indications of the concepts' success potential, it is of value to decision-makers from e-tailers, logistics service providers, and politicians that intend to incorporate new delivery concepts.

**Keywords:** Last mile, Alternative delivery concepts, E-commerce, Consumer acceptance, Crowdsourced delivery, Controlled access systems, Trunk delivery, Reception box

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## Recent Trends in Last Mile Delivery: Impacts of Fast Fulfillment, Parcel Lockers, Electric or Autonomous Vehicles, and more

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**Abstract.** This paper presents a review of recent trends in urban freight transportation, especially the typical last mile for logistic service providers. The high increase in shipped parcels over the last and presumably future years makes it necessary to particularly tackle the special logistical issues in large urbanized cities. Of course, one leading factor of this effect is the massive increase in online orders and the resulting deliveries. The advanced delivery concepts, which will be highlighted, try to overcome typical image in most urbanized cities, like congested roads, dangerous parking of delivery vans, high environmental effects, etc. The aim of this work is to present and analyze some of the recent trends in the last mile delivery to show their strengths and weaknesses. Especially, the impact of fast fulfillment offers, parcel lockers or stations, and advanced delivery vehicles like electric vans and bicycles or autonomous vehicles is in the focus.

**Keywords:** Last mile delivery, Supply chain coordination, Transport management

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# Strategic Network Design for Last-mile Delivery with Crowd Resources

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**Abstract.** Last-mile delivery is one of the key problems in Urban Logistics which has received much attention from practitioners, academia and the media. The relevance of this problem, enhanced by the growth of urban population and the increasing trend towards e-commerce has brought many innovative initiatives. Crowdsourced delivery, which is the concept of using people, e.g., commuters, instead of professional couriers to deliver orders, is one of the possible solutions to mitigate the negative effects of the growing demand for parcel delivery services in urban areas. We formulate this problem as a two-stage stochastic network design problem for multi-commodity flows where in the first stage mini-depots are located into the city that can be used as cross-docks to separate flows. In the second stage, scenarios define the time-dependent and stochastic capacity (representing the probability of the crowd to transport parcels) and flows are assigned to the crowd or professional couriers used as a back-up option to guarantee deliveries. The problem is used using an enhanced Benders decomposition method and tested on datasets inspired by the city of Munich. The results show the cost and utilization benefits of both crowd couriers and mini-depots as transshipment points compared to professional courier services.

**Keywords:** Network design, Urban logistics, Benders decomposition

## 4.4 Stream Supply Chain Management

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### Understanding Urban Logistics need for a supporting action theory

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**Abstract.** Since 2007, the UN World Urbanization Prospects show the majority of the world population is living in cities. For Europe the number will rise from 74.5% in 2018 up to 83.7% by 2050 (UN DESA 2018). While cities are constantly trying to adapt with new ideas for city planning and design towards this trends, transportation is not yet on their agenda (Hesse 2010; Muñuzuri et al. 2012; Kawamura 2015; Dablanc 2007). With the emergence of green and smart city initiatives throughout Europe, public transportation becomes more and more relevant (Mora et al. 2017). Nevertheless, there is just little thought about how these cities will be supplied with goods in the future. To fill this gap many scholars, mostly from the field of management and engineering sciences, addressed several problems since the late 1980s (Ogden 1992). The corresponding insights and solutions were published with the label city or urban logistics. Their efforts changed the supply chain operation by solving routing problems, delivering answers on how to assess performance of emission reduction or show the relevance of stakeholders in the urban supply chain (Lagorio et al. 2016). In Germany, the focus area for my work, many initiatives and pilots started with the aim to consolidate outbound logistics in the 1990s but unfortunately did not fully cover the entire supply chain of goods in a city (Thoma 1995). The success in reducing emissions and traffic impact of the freight vehicles was very limited, mainly because it was organized as voluntary collaboration without any need by regulation or economic pressure (Wagner 2002).

**Keywords:** Action theory, Decision model, Urban freight, Urban logistics, Theoretical framework

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# Logistics capabilities of countries as an influencing factor for foreign direct investment

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**Abstract.** Globalization of markets and dismantling of investment barriers have led to an intensifying internationalization of production. Companies all over the world are increasingly fragmenting production processes and localizing different production stages in specialized plants in different countries. This development poses great challenges, particularly in the field of logistics. It generally causes more transport and a greater need for coordination along the entire supply chain. Therefore, the logistics capabilities of countries (LCC) is of particular importance as it can, for example, facilitate the transport of goods, ensure their safety and speed and reduce trade costs between countries. The focus of this paper is on macroeconomic logistics factors, which are determined by the government and which exert an influence on the business activities of foreign companies. These country-specific factors must be adequately equipped so that companies can derive a competitive advantage from their international activities. Accordingly, the assumption of the paper is that the LCC is a factor influencing the location decisions of multinational companies.

The aim of this paper is to first identify the influencing factors of LCC and then examine the influence of LCC on the location decision of multinational enterprises. This decision to operate in another country is thereby expressed by foreign direct investments (FDI).

**Keywords:** Foreign direct investment, Logistics capabilities

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## Systematization of Humanitarian NGOs from a Logistical Viewpoint

### An Exploratory Study in Germany

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**Abstract.** Logistics is an important factor in humanitarian aid operations, whether after the outbreak of a natural disaster or during man-made crises. The speed and effectiveness of the various actors

depend, among other things, on the appropriate design of the operations, which is why the scientific interest in this field has increased considerably in recent years. Unfortunately, there is a gap between science and practice (Kunz 2017). One reason for the lack of applicability in humanitarian logistics research can be seen in the diversity of humanitarian actors. As there is no systematic characterization of humanitarian NGOs regarding aspects relevant from a logistical perspective, this paper aims at providing a suitable overview. A classification scheme is developed that includes the four dimensions of the mandate and sector, as well as the internal network structure and the various forms of on-site cooperation. The results can help to better align scientific research in humanitarian logistics and to foster practical exchange between the pertinent humanitarian organizations.

**Keywords:** Humanitarian logistics, Disaster management, NGO, Classification, Exploratory study

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## Supply Chain Risk Handling: The Human Factor

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**Abstract.** As supply chains become more complex and thus more vulnerable, even smaller malfunctions can result in serious problems. In 2016 for example, 81 % of the companies were confronted with disruptions from direct suppliers and 41 % from lower-tier suppliers, of which every third caused a loss of at least 1 million Euro (riskmethods GmbH and Bundesverband Materialwirtschaft, Einkauf und Logistik e.V. 2017).

The severity and likelihood of such losses could be lessened by appropriate supply chain risk management decisions. However, since risks are associated with uncertainty and/or novelty and are hard to assess prior to their occurrence, risk management decisions are usually not accurate (Tazelaar and Snijders 2013). According to the behavioral decision-making literature, this is also due to the fact, that individual's decisions are not only dependent on context-related factors that "can cause a reversal in preference for the decision maker" (Mantel et al. 2006) but also on their task-related and personal characteristics (human factors). Openness to share information (Jüttner 2005) and resources (Ali and Shukran 2016), the number of alternatives considered (Mantel et al. 2006) and perceived time pressure (Mantel et al. 2006) have been already identified as key human factors influencing business decisions. Further examples are the individual's temporal focus (Manuj and Mentzer 2008), personal involvement (Williams and Narendran 1999), and the perceived importance of the decision (Mantel et al. 2006).

**Keywords:** Supply chain risk handling, Decision-making

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# Risk Assessment of Data Transfer Between Partners in the Automotive Supply Chain

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**Abstract.** Supply chains in the automotive industry are characterized by a high level of complexity and large amounts of data transferred between partners, particularly between suppliers and manufacturers. Automated data transfer from the manufacturer to the supplier and vice versa within given supply chain processes does not only create benefits for both partners but also comprises high risks that cannot be prevented neither by terms of contract nor highly sophisticated technical measures like blockchain based systems. A risk assessment of data is needed that helps to quantify the damage of potential data misuse beyond the defined supply chain partnership.

A model for assessing risks of data transfer and data sharing is introduced and applied to a use case in the automotive supply chain. The assessment process comprises four steps, starting with the identification of the objects at risk and ends with recommendations for risk management. The theoretical and methodological background of risk assessment is outlined. The developed assessment model is explained in detail. The model has been applied to different use cases coming from the procurement department of a large automobile manufacturer. The data of the use cases show different levels of multidimensional risks and different monetary effects of “value at risk”. The experimental results of the model are presented and discussed.

**Keywords:** Risk management, Supply chain data, Value at risk

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# Dynamic Responsive Pricing as a Mitigation Strategy against Supply Chain Disruptions: An Agent-based Model

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**Abstract.** Supply Chain disruptions can result in immense financial losses for affected enterprises. Quantitative models which analyze the impact of supply chain disruptions and, in particular, the possible application of mitigation strategies can support the decision making process of practitioners to better cope with disruptions. Since existing approaches have mainly investigated the effects of backup supply and information exchange, further mitigation strategies need to be implemented. Therefore, we

present an agent-based model in which the supply chain entities set their prices autonomously and dynamically based on their experienced total costs. We analyze whether dynamic responsive pricing is an appropriate strategy in the event of a disruption in case of price-sensitive customers. Our results illustrate that, in many cases, a dynamic price choice delivers better results than a fixed price choice. The value of optimal price elasticity increases the lower the price sensitivity becomes, but the speed of growth decelerates. However, if the price elasticity is too high, strong costs can occur and fixed prices become advantageous.

**Keywords:** Supply chain risk management, Agent-based modelling, Responsive pricing

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## Retention Tactics based on a Taxonomy of Truck Drivers

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**Abstract.** Driver shortage is a widespread phenomenon in Germany and in many other developed economies. This paper strives (1) to obtain an empirical-based classification of truck drivers and (2) to suggest standardized retention tactics for each class of drivers. To achieve these objectives, a sample of 928 professional truck drivers is used to develop a six-group driver taxonomy based on three main factors: drivers' occupational satisfaction (JOB), occupational commitment (OCC) and organizational commitment (OGC). For each cluster we propose standardized retention tactics such as tactic of appreciation, tactic of advancement, tactic of encouragement, tactic of job rotation, tactic of wait and see and tactic of rapid improvement. Companies can thus set priorities and select operational activities tailored to distinct tactics.

**Keywords:** Truck driver shortage, Retention, Human resources

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# Organizational Commitment of Truck Driver in Times of driver shortages - Impact of HR-activities on the Organizational Commitment of truck drivers

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**Abstract.** Trucks are standing still and products in the warehouses can't be delivered. A lot of haulages and transport companies are aware of this scenario. One reason for this unfortunate situation can be the current lack of truck driver in German.

The German Freight Forwarding and Logistics Association (DSLVL) pointed out that 45.000 of truck drivers are missing in 2017 and in July 2018 the German Government also confirmed that the lack of truck drivers affect the economic growth. But in the end of 2018 the profession of a truck driver was finally seen as a shortage occupation. One solution to cope with the shortage of truck drivers in long-term, it is necessary to increase the organizational commitment of the truck drivers. Because when there's no long-term commitment of the truck drivers in the company the spiral of recruitment and fluctuation continues to turn as it was before.

**Keywords:** Truck driver, Organizational commitment, HR-activities, Quantitativ research

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# Knowledge configurations for logistics service provider-initiated innovation – a qualitative study

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**Abstract.** In today's economy, companies face intense competition in global supply chains, and increasing levels of dynamism and uncertainty, especially through new technologies, new business models and new market players. As a result, adaptations and improvements to the supply chain are necessary to stay competitive.

As logistics-related activities are outsourced to a large extent, such adaptations require the involvement of the suppliers – the logistics service providers (LSPs). In this context especially LSP-initiated (i.e., proactive) cost and service improvements are valuable for the outsourcing companies. However, despite

notable re-search in the last 15 years, LSP-initiated improvements are still not at the level desired by the LSPs' clients.

Against this background our study focusses on knowledge as facilitator of improvements, particularly relationship-specific knowledge. To do so, a three step-approach was applied.

**Keywords:** LSP-initiated innovation, Relationship-specific knowledge, Logistics outsourcing, Logistics service provider, Dyadic research, Case study research, Knowledge-based view

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## Should I participate or should I not? Logistics outsourcing in the light of behavioral theory

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**Abstract.** This paper focuses on a neglected issue of outsourcing: the individual behavior of managers who may be affected by the discontinuation of internal production and the buying of logistics services from an outside supplier. These actors, such as purchasers, logistics managers or supply chain managers, behave in different ways and with different degrees of intensity. Sometimes purchasers, logistics managers or supply chain managers do not take part at all. Since we assume that intention acts as a predictor of behavior, the intention to participate in this process was the core variable of the model. Based on a sample of 201 managers, factors derived from the Reasoned Action Approach were used to explain the magnitude of managers' intention to participate in the outsourcing process, particularly their intention to join an outsourcing project group at the very beginning. Empirical data provides evidence that social norms, attitudes and perceived capacity exert significant influence on managers' intention to participate.

**Keywords:** Logistics, Outsourcing, Human resources, Behavior

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# Influence of Organizational Culture Dimensions on Improvement Behavior in Logistics Outsourcing Relationships

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**Abstract.** Changes in legislation, deregulation, as well as trends such as digitalization of supply chains and decarbonization of the transport industry require companies to continuously adapt and improve their logistics, with Logistics Service Providers (LSPs) often having a central role in the supply chains, because of high levels of logistics outsourcing.

Yet, the observed level of innovation in logistics outsourcing relationships is relatively low. Especially the level of proactive improvements by LSPs is low, resulting in improvements often being driven by the LSP's customers. Research investigated this phenomenon in the past from different perspectives and identified several barriers that hamper improvements in logistics services (i.e. lack of skills and knowledge, insufficient knowledge transfer, insufficient R&D processes). However, the deficits are still not fully explained.

**Keywords:** Logistics service provider, Logistics outsourcing relationship, Organizational culture, Proactive improvement, Relationship-specific innovation, Case study research

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## Integration of sustainability aspects in the supplier selection process: the case study of a German electronic firm

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**Abstract.** The supplier selection process represents a critical dilemma faced by many firms. The appropriate supplier selection decision is a fundamental strategic process and plays an important role in supply chain management. In the last decade, academic research on sustainability has evolved rapidly in the supply chain literature. However, there has been scant opportunity for the research community to complete a global assessment of sustainable supplier selection activities to date. This paper seeks

to address this need by exploring sustainability in supply chain management, developing a sustainable supplier selection framework with a tool for its operationalization to help managers evaluate supplier selection decisions. This research work follows the best-in-class approach to comply with all applicable environmental regulations and laws in the supplier selection process.

**Keywords:** Supplier selection, Sustainability, Supply chain management, Case study

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## Current Trends in B2C E-Commerce Logistics – A Content Analysis

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**Abstract.** In the B2C e-commerce market, logistics plays a crucial role, not only as a cost factor, but also as a major success factor for the firms. It is therefore important for e-tailers to know which trends in B2C e-commerce logistics are considered to be the way forward. This also has implications for the directions of future research.

We present a systematic content analysis of 87 non-scientific, practice-oriented articles published on the internet. This results in a comprehensive overview of the trends currently being discussed in B2C e-commerce logistics. An additional correlation/association analysis reveals important relationships between the trends.

A total of 36 trends were identified. Overall, the trend towards faster deliveries was most frequently mentioned in the articles. Followed by more transparency across the processes (track-and-trace), logistics cooperation/outsourcing and more (smaller) urban warehouses.

To the best of our knowledge, this is the first scientific paper that systematically examines current trends in B2C e-commerce logistics practice. The results of this article can serve as an impetus for a variety of research questions, some of which we will touch upon in the course of this article.

**Keywords:** E-commerce logistics, Future, Trend, Content analysis

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# Exploring Dynamic Capabilities in Omnichannel Retailing: An Analysis of the Literature

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**Abstract.** Omnichannel retailing refers to the management of manifold channels of distribution, touch-points which optimizes the customer experience and the channel performance. Touchpoints are those elements of omnichannel retailing that allow contact as well as communication between end-users and retailers and thus guaranteeing the combination between the advantages of physical stores with the improved information level and quality of online shopping. The concept of omnichannel retailing represents a shopping world where customers can switch seamlessly in between physical touch-points as well as online channels. In this setting, many retailers aim to set up an over-all channel solution for a smoothly customer journey. Amongst others this includes inventory, warehouse and delivery management as well as their organization- and IT-systems. Some retailers are able to do this better than others that leads to the question which capabilities are necessary to manage omnichannel retailing? Especially considering the permanently changing omnichannel landscape, retailers with the capabilities to adapt their company will more likely acquire a sustainable competitive edge. The purpose of this paper is to identify these capabilities.

**Keywords:** Omnichannel retailing, Dynamic capability view, Dynamic capabilities, Literature review

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# Customers' Order Type Decisions in Online Retailing: Influence of External and Internal Factors

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**Abstract.** When customers decide to order the item online, they have two options: they can either decide online for one item, which they think fits best, and order it, or alternatively they can look online for several similar items that they think might fulfill their need and order all of them with the intent to find the best one at home by comparing them and return the others (Einmahl 2017).

These order types have different influences on the forward as well as the returns process of the online retailer. Since the latter order type contains more than one item, the parcel will be larger and heavier. The picking strategies for these order types are different (Li et al. 2017). The items for the latter order type may involve multi-stage picking or the items may even need to be picked from different fulfillment centers (Acimovic and Graves 2015). Because the first order type includes only one item instead of several items, the customer, however, has to place a second order if the ordered item does not fit. This may result in a higher number of parcels that have to be processed at the retailer, which also could be a challenge for the retailer and its logistics (Lim and Shiode 2011).

**Keywords:** Online order types, Discrete choice experiment, Perceived risk theory

## 4.6 Stream Operations Management

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### The role of cargo availability for planning in maritime transport chains

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**Abstract.** With today's possibilities in regard to real-time tracking of vehicles, various approaches to enable dynamic planning strategies using the "estimated time of arrival" (ETA) are currently being applied and further developed. In maritime transport chains, complex transshipment processes limit the informative value of ETA-information since it does not indicate when cargo is available for onward transportation. However, the role of cargo availability as a novel planning parameter has rarely been discussed in the existing literature so far.

**Keywords:** Maritime transport chains, Interorganizational planning, Coordination

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### Ship Traffic Management and Infrastructure Extension for the Kiel Canal

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**Abstract.** The Kiel Canal is one of the busiest artificial waterways in the world. Up to 30000 ships traverse it every year to go from the North Sea to the Baltic Sea or vice versa. Using this canal instead of going around the Jutland Peninsula (Denmark) saves ships several hundred kilometers of travel distance. Unfortunately, the canal has several narrow segments where ships cannot pass each other. In order to resolve such conflicts, some ships have to wait in wider segments in order to have opposing traffic pass by.

We investigate in this talk the corresponding traffic management problem for the Kiel canal, which aims at minimizing the total transit time for a given set of ships. We present a MIP model for the fundamental

decision on which ships have to wait for which other ships. We also present various extensions of the model to cover relevant aspects of the practical application. These extensions comprise variable ship speeds, hard restriction of waiting times, and limited capacities of the wider siding segments.

**Keywords:** Kiel canal, Traffic management, Ship scheduling

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## Integrated Scheduling of Production and Distribution Operations with Site Selection

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**Abstract.** Customers' desire for ever shorter delivery times forces companies to produce and deliver customer orders in the shortest possible time. To achieve this goal, companies can follow the distributed manufacturing paradigm and try to move their production sites close to their customers, which automatically leads to a location problem that has to be solved. Another approach is to coordinate production and distribution scheduling in such a way that punctual delivery can take place at the lowest possible cost, whereby stock keeping is largely avoided. The article shows for the first time that the traditionally successively planned problems of location planning and joint production and distribution planning can be combined in an integrated approach. A multi-period MIP model is set up to coordinate both subproblems, so that the overall costs incurred can be minimized. The simultaneous planning approach is illustrated using a numerical example and then evaluated critically.

**Keywords:** Production and distribution scheduling, Distributed manufacturing, Optimization

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## An IP formulation for a machine-sequencing problem to minimize job deviations and set-ups

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**Abstract.** The maximum deviation machine-sequencing problem with set-ups is a short-term decision problem in which a sequence of plastic outer-shell car parts are to be determined for launching in a

paint shop. The decision is made under two objectives. On the one hand, the deviation between the original job number in the called off sequence by the customer and the position on which the job is painted should be minimized. On the other hand, the number of set-ups that occur when changing the colour in the paint shop should also be minimized. The situation is taken from a real-world situation of a supplier in the German automotive industry. Due to the large number of authentic influences, the problem is described in detail and classified according to existing characterizations of scheduling problems. An IP formulation is presented that is solved by the  $\epsilon$ -constraint method. Finally, an example is explained and computational results discussed.

**Keywords:** Machine-sequencing problem, Paint shop,  $\epsilon$ -constraint method

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## Booking Limit Based Revenue Management Approaches for Customer-Value Oriented Make-to-Order Production

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**Abstract.** In make-to-order (MTO) production, decisions are to be made about the jobs which are to be accepted and the sequence in which they are to be carried out. While in practice often rather simple rules like first-come-first-served (FCFS) are used, also strategies from the field of revenue management can be applied to achieve better results. In MTO not only the maximization of short-term profit should be focused on, but also the long-term perspective of performing good service in particular to valuable and returning customers is important. Therefore, in this work a booking-limit approach is combined with an order acceptance and scheduling model for a single machine environment to derive new strategies which take this aspect into account by defining different service levels to be strived at for the different customer segments. These strategies are tested on data settings with three customer segments. It turns out that a newly developed re-verses nested booking limit approach (RNBL) leads to the best results regarding the conflicting aims of short-term profit maximization and customer satisfaction, whereas the classical partitioned booking limit (PBL) strategy is not recommend-able.

**Keywords:** Revenue management, Make-to-order production, Booking limits, Order acceptance and scheduling, Nesting strategies

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# Luftfrachtumschlag und das Ramp Management System der DHL Hub Leipzig GmbH

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**Abstract.** Pro Nacht werden am DHL Hub Leipzig rund 6.000 Container von 50 auf dem Vorfeld agierenden Ladegruppen be- und entladen. Die Container werden von rund 145 FahrerInnen auf rund 1.700 Anhängern zwischen den Flugzeugen und einem der Terminals bewegt. Das Kontrollzentrum disponierte in der Vergangenheit diese Akteure im operativen Betrieb auf dem Flug-Vorfeld manuell. Damit Kommunikationsflüsse verschlankt, Standzeiten von Fahrern verkürzt und letztendlich Abflüge pünktlich sind, begegnet die DHL Hub Leipzig GmbH den Risiken einer manuellen Disposition seit 2015 mit dem automatisierten Ramp Management System.

Das System entscheidet automatisch über die Auftragsvergabe an verschiedene Akteure auf dem Flug-Vorfeld. Durch die systemische Übernahme von Dispositionsaufgaben wird das Kontrollzentrum entlastet. Durch den Einsatz von Computer-Tablets auf denen für die jeweilige Rolle und den Arbeitsauftrag relevante Informationen vom System kommuniziert werden, kann das Kontrollzentrum seine Grundaufgaben besser wahrnehmen, Probleme schneller antizipieren und frühzeitig pro-aktiv lösen.

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## Zone picking and vehicle routing operations with restricted intermediate storage

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**Abstract.** Retailers typically fulfill the demand of stores via distribution centers where they handle high product volumes. The orders from stores can be submitted until late on the day before the actual delivery. Retailers therefore need to align their operations and process orders efficiently to allow a smooth supply of stores. The processing of orders affects different subsystems at the DC. High-volume demands from stores are usually processed in zone picking operations, conflated in an intermediate storage and thus provided to be loaded for the actual delivery.

The different process steps are thereby highly interrelated. An order must be completely conflated before it can be loaded and all orders of a delivery tour must be completely loaded before the vehicle can start. Conversely, order picking operations should be performed such that favourable delivery tours are enabled.

**Keywords:** Retail, Picking and routing, Variable neighborhood search, Restricted intermediate storage, Zone picking

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## Bewertung von Transportprozessen aufgrund der Kriterien Auslastung und Leerkilometer

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**Abstract.** Es gibt viele unterschiedliche Bewertungskriterien, die als Zielkriterien für Tourenplanungsprobleme herangezogen werden; z.B. die Minimierung der Gesamtlänge eines Tourenplans. Hier ist zu unterscheiden, ob die Länge des Tourenplans aufgrund der zurückgelegten Entfernung, der reinen Fahrzeit oder der gesamten Fahrtdauer einschließlich der Pausen- und Wartezeiten gemessen wird. Ein weiteres oft verwendetes Minimierungskriterium ist die Minimierung der Anzahl der einzusetzenden Fahrzeuge, wobei dieses Kriterium oft in Kombination mit anderen Kriterien verwendet wird. In diesem Beitrag wird die Maximierung der Auslastung und die Minimierung der Leerkilometer kritisch betrachtet. Der Vollständigkeit halber seine noch weitere Optimierungskriterien genannt, nämlich die Minimierung der Transportleistung, der entstehenden Kosten, die resultierende Umweltbelastung, etc. Oder aber es wird ein Maximierungsproblem statt eines Minimierungsproblems betrachtet; in diesem Fall könnte beispielsweise der Gewinn oder der Wirkungsgrad der geplanten Transportoperationen maximiert werden. Alle hier aufgeführte Zielkriterien sind nur geeignet, wenn die Menge der Transportaufträge fix vorgegeben ist, und alle Aufträge ausgeführt werden müssen.

**Keywords:** Tourenplanung, Auslastung, Leerkilometer, Effizienz

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## Train formation planning without departure tracks

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**Abstract.** In shunting yards wagons of incoming trains are decoupled and shunted to form new freight trains. In a hump yard wagons are pushed over a hump and roll into a system of classification track to

build new trains. Typically, wagons are moved from the classification tracks to departure tracks where the new train is finally composed by connecting a locomotive. As there are sometimes more trains to assemble than classification and departure tracks are available, a train formation problem arises. A possibility to face this kind of problem is to introduce pullbacks. Wagons which cannot be assigned to a classification track to form a new train are stored on a mixing track. The wagons waiting at the mixing track are pulled back over the hump again. This is typically done in fixed time intervals. In the modernized shunting yard in Halle (Saale), no departure tracks are available such that completed trains have to wait on the classification tracks until departure. Therefore, the train formation problem becomes more difficult to solve as the total number of trains to build is more restricted compared to traditional shunting yards. To cope with the increasing complexity, variable pullbacks can be introduced by deciding on the times for pullbacks when generating the shunting schedules. The corresponding train formation problem dedicated to the specific layout of the shunting yard in Halle (Saale) and using variable pullbacks is presented in this talk.

**Keywords:** train formation problem, variable pullbacks, shunting yard Halle

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## An improved LP-based heuristic for solving a real-world locomotive assignment problem

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**Abstract.** The locomotive assignment (or scheduling) problem is a highly relevant problem in rail freight transport. For a preplanned train schedule, minimum-cost locomotive schedules have to be created so that each train is pulled by the required number of locomotives (locomotives are assigned to trains). Determining locomotive schedules goes hand in hand with determining the number of required locomotives and this has a significant impact on capital commitment costs. Therefore, this paper proposes an improved heuristic for scheduling locomotives at a European rail freight operator. We show that a transformation of an iterative process to simplify the underlying network into a one-step procedure can significantly reduce computing times of a heuristic. Computational tests are carried out on the real-world instance as well as on smaller instances. The results show that the proposed heuristic outperforms an existing heuristic from literature in terms of both solution quality and computation times and, in contrast to approaches from literature, enables a solution of a practical instance in Europe.

**Keywords:** Locomotive assignment, Linear programming, Heuristic

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# Decomposition strategies for multi-network crew scheduling with attendance rates for conductors

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**Abstract.** Railway crew scheduling is the problem of generating feasible duties for the crews on a train to cover all trips at minimal cost. In Germany, regional passenger transportation consists of many distinct but interlinked networks, each with own crews. For efficiency reasons, we investigate the cost saving potential of scheduling crews collectively across multiple networks operated by the same company. To derive valid estimates, we develop a solution approach for the large-scale multi-network crew scheduling problem considering the network-specific constraints of attendance rates for conductors. Several studies have shown that partitioning large-scale problems improves computational times. We discuss guidelines for a problem-specific decomposition and derive three methods: a graph partitioning algorithm with adjusted edge weights and two variants of a network-based greedy decomposition heuristic. We assess their performance with a 2-phase optimization method using a hybrid column generation genetic algorithm and benchmark the results against a test run without decomposition. The tests show that maintaining the network structure while considering the connectivity between networks achieves the best results.

**Keywords:** Railway transportation, Crew scheduling, Large-scale optimization, Decomposition heuristics

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# An integrated multi-criteria approach for the regional facility location and development planning problem

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**Abstract.** Urbanization trends confront companies with major challenges in their location management. Facility location planning is a complex task, as it usually involves multiple conflicting objectives. In addition, particularly at a regional decision-making level, companies are confronted with relevant dynamics that cause main changes of location requirements and characteristics over time. In order to ensure optimal long-term location decisions, planning approaches have to consider company-driven and

municipal location developments over an extended planning horizon. To date, the variety of dynamic multi-criteria facility location planning approaches is generally scarce and possibilities for location developments are not given. Therefore, an appropriate model formulation for regional facility location planning considering relevant dynamics in location development is missing. In this contribution, the Regional Facility Location and Development Planning Problem (RFLDP) is introduced. For this purpose, an appropriate model is developed that provides an integrated decision-aid for a company's location selection and development. In doing so, a strategic measure plan is determined through an allocation of company-driven measures under consideration of municipal location developments. The model is evaluated based on an illustrative example.

**Keywords:** Facility location planning, Measure Allocation, Municipal developments

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## Design of a Robust Blood Supply Chain Network with Facility Disruption

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**Abstract.** The blood supply of hospitals in disasters is a crucial issue in supply chain management. In this paper, a dynamic robust location-allocation model is presented for designing a blood supply chain network under facility disruption risks and uncertainty in a disaster situation. A scenario-based robust approach is adapted to the model tackle with the inherent uncertainty of the problem, such as a great deal of periodic variation in demands and facilities disruptions. It is considered that the effect of disruption in facilities depends on the initial investment level for opening them, which are affected by the allocated budget. The usage of the model is implemented by a small real-world case example that addresses demand and disruption probability as uncertain parameters.

**Keywords:** Blood supply chain network, Location-allocation, Disruption risks, Disaster, Robust optimization, Uncertainty

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# Multi-objective optimization with respect to variable domination structures

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**Abstract.** In many multi-objective optimization problems, variable domination structures are involved and very useful to derive optimal solutions. These problems have many practical applications. In this paper, we consider Multi-criteria decision-making problems with respect to a variable domination structure. This variable domination structure is described based on the importance of criteria (weights) in the given problems. In order to solve such problems, we use inverse variational inequality. We also apply our results to select a proper location to install the Solar panels.

**Keywords:** Multi-objective optimization, Variable domination structure, Weights of criteria, Solar