

CHRISTIAN WECKENBORG
Assistant Professor
Institute of Automotive Management and Industrial Production
Braunschweig University of Technology, Germany

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I. EDUCATION:

Braunschweig University of Technology, Germany Major: Operations Management Minor: Supply Chain Management	Dr. rer. pol.	2020
Braunschweig University of Technology, Germany Concentration in Operations Management	M. Sc.	2016
Braunschweig University of Technology, Germany Concentration in Operations Management	B. Sc.	2014

II. ACADEMIC EMPLOYMENT:

Braunschweig University of Technology, Germany <i>Classes taught:</i> Operations Management in the Automotive Industry (M. Sc.) Sustainability in Production and Logistics (M. Sc.)	Assistant Professor	2021–Current
Sabancı University, Turkey	Visiting Researcher	2023
Braunschweig University of Technology, Germany Automotive Production Discrete-event Simulation Flexibility in Production Management Design of Assembly Lines Digitization in Production and Logistics	Research Assistant	2016–2020

III. PUBLISHED ARTICLES:

Weckenborg, C.; Vorwerk, B.; Spengler, T. S. (2024): A proactive transshipment model for prototype parts logistics in the automotive industry, in: *Journal of Business Economics*, in press. DOI: tbd.

Weckenborg, C.; Graupner, Y.; Spengler, T. S. (2024): Prospective assessment of transformation pathways toward low-carbon steelmaking: Evaluating economic and climate impacts in Germany, in: *Resources, Conservation & Recycling*, 203, 107434. DOI: 10.1016/j.resconrec.2024.107434.

- Weckenborg, C.**; Oetjegerdes, P.; Spengler, T. S. (2024): Energy-oriented crane scheduling in a steel coil storage, in: *Flexible Services and Manufacturing Journal*, in press. DOI: 10.1007/s10696-024-09534-0.
- Weckenborg, C.**; Schumacher, P.; Thies, C.; Spengler, T. S. (2024): Flexibility in manufacturing system design: A review of recent approaches from Operations Research, in: *European Journal of Operational Research*, 315 (2), pp. 413–441. DOI: 10.1016/j.ejor.2023.08.050.
- Sikora, C. G. S.; **Weckenborg, C.** (2023): Balancing of assembly lines with collaborative robots: Benders decomposition-based solution procedures, in: *International Journal of Production Research*, 61 (15), pp. 5117–5133. DOI: 10.1080/00207543.2022.2093684.
- Wieczorrek, S.; Thies, C.; **Weckenborg, C.**; Grunewald, M.; Spengler, T. S. (2023): Volkswagen Group Logistics Applies Operations Research to Optimize the Allocation of Measures for Supplier Development, in: *INFORMS Journal on Applied Analytics*, 54 (2), pp. 147–161. DOI: <https://doi.org/10.1287/inte.2022.0026>.
- Kinast, A.; Braune, R.; Dörner, K. F.; Rinderle-Ma, S.; **Weckenborg, C.** (2022): A hybrid metaheuristic solution approach for the cobot assignment and job shop scheduling problem, in: *Journal of Industrial Information Integration*, 28, 100350. DOI: 10.1016/j.jii.2022.100350.
- Weckenborg, C.**; Thies, C.; Spengler, T. S. (2022): Harmonizing ergonomics and economics of assembly lines using collaborative robots and exoskeletons, in: *Journal of Manufacturing Systems*, 62, pp. 681–702. DOI: 10.1016/j.jmsy.2022.02.005.
- Barke, A.; Bley, T.; Thies, C.; **Weckenborg, C.**; Spengler, T. S. (2022): Are sustainable aviation fuels a viable option for decarbonizing air transport in Europe? An environmental and economic sustainability assessment, in: *Applied Sciences*, 12 (2), 597. DOI: 10.3390/app12020597.
- Weckenborg, C.**; Graupner, Y.; Thies, C.; Meyer, C.; Molzberger, M.; Vogeler, U.; Oppermann, J.; Spengler, T. S. (2022): Ökonomisch und ökologisch effiziente Transformation von Produktionsnetzwerken in der Stahlindustrie – Ein aktivitätsanalytischer Modellierungsansatz, in: *Controlling – Zeitschrift für erfolgsorientierte Unternehmenssteuerung*, 34 (2), pp. 18–26. DOI: 10.15358/0935-0381-2022-2-18.
- Weckenborg, C.**; Kieckhäfer, K.; Spengler, T. S.; Bernstein, P. (2020): The Volkswagen Pre-Production Center Applies Operations Research to Optimize Capacity Scheduling, in: *INFORMS Journal on Applied Analytics*, 50 (2), pp. 119–136. DOI: 10.1287/inte.2020.1029.
- Weckenborg, C.**; Kieckhäfer, K.; Müller, C.; Grunewald, M.; Spengler, T. S. (2020): Balancing of assembly lines with collaborative robots, in: *Business Research*, 13, pp. 93–132. DOI: 10.1007/s40685-019-0101-y.

IV. BOOKS:

Weckenborg, C. (2021): *Modellbasierte Gestaltung von Fließproduktionssystemen im Spannungsfeld von Ergonomie und Ökonomie*, Springer Gabler. DOI: 10.1007/978-3-658-32888-7.

V. BOOK CHAPTERS:

Karig, M.; Weckenborg, C.; Spengler, T. S. (2023): Transformation von Flotten für eine klimafreundliche Mobilität – Ein Planungsansatz zur Unterstützung von Akteuren des ÖPNV, in: Proff, H. (eds.): *Towards the New Normal in Mobility*, Springer Gabler Wiesbaden, pp. 675–692. DOI: 10.1007/978-3-658-39438-7_38.

Weckenborg, C.; Schumacher, P.; Oetjegerdes, P.; Spengler, T. S. (2022): Ganzheitliche Bewertung der Implementierung von Industrie 4.0-Technologien, in: Roth, S.; Corsten, H. (eds.): *Handbuch Digitalisierung*, Vahlen München, pp. 439–462. ISBN: 978 3 8006 6562 4.

Spengler, T. S.; Schumacher, P.; Weckenborg, C. (2021): Methoden und Werkzeuge für die synergetische Konzeption und Bewertung von Industrie 4.0-Lösungen, in: Fritzsche, R. et al. (eds.): *Logistik in Wissenschaft und Praxis: Von der Datenanalyse zur Gestaltung komplexer Logistikprozesse*, Springer Fachmedien Wiesbaden, pp. 191–210. DOI: 10.1007/978-3-658-33480-2_8.

VI. CONFERENCE PROCEEDINGS:

Graupner, Y.; Rausch, F.; Weckenborg, C.; Spengler, T. S. (2024): Decarbonizing primary steelmaking: Strategic capacity modification and reduction planning, in: *Operations Research Proceedings 2023. Lecture Notes in Operations Research*, Springer, Cham, accepted for publication. DOI: tbd.

Oetjegerdes, P.; Schwier, P.; Weckenborg, C.; Spengler, T. S. (2023): Energy-oriented crane scheduling in steel coil storages: Evaluation of heuristic approaches, in: *IFAC-PapersOnLine*, 56 (2), pp. 5370–5375. DOI: 10.1016/j.ifacol.2023.10.183.

Oetjegerdes, P.; Weckenborg, C.; Spengler, T. S.; Vogeler, U.; Molzberger, M. (2023): Iterative optimierungsbasierte Simulation in der Praxis – Simulation der Oberflächenveredelung der Salzgitter Flachstahl GmbH, in: Bergmann, S.; Feldkamp, N.; Souren, R.; Straßburger, S. (ed.): *20. ASIM-Fachtagung Simulation in Produktion und Logistik 2023*, Universitätsverlag Ilmenau, Ilmenau, pp. 413–422. DOI: 10.22032/dbt.57804.

Bätge, T.; Weckenborg, C.; Spengler, T. S. (2023): A New Flow-Based Location and Capacity Model for Profit-Oriented Refueling Station Network Transformation, in: Grothe, O.; Nickel, S.; Rebennack, S.; Stein, O. (ed.): *Operations Research Proceedings 2022. Lecture Notes in Operations Research*, Springer, Cham, pp. 487–493. DOI: 10.1007/978-3-031-24907-5_58.

- Vorwerk, B.; **Weckenborg, C.**; Spengler, T. S. (2023): Benefits of Proactive Transshipments for an Automotive Manufacturer Under Emission Constraints, in: Grothe, O.; Nickel, S.; Rebennack, S.; Stein, O. (ed.): *Operations Research Proceedings 2022. Lecture Notes in Operations Research*, Springer, Cham, pp. 427–434. DOI: 10.1007/978-3-031-24907-5_51.
- Graupner, Y.; **Weckenborg, C.**; Spengler, T. S. (2023): Low-carbon primary steelmaking using direct reduction and electric arc furnaces: Prospective environmental impact assessment, in: *Procedia CIRP*, 116, pp. 696–701. DOI: 10.1016/j.procir.2023.02.117.
- Weckenborg, C.** (2022): Disassembly Line Balancing with Collaborative Robots, in: Trautmann, N.; Gnägi, M. (ed.): *Operations Research Proceedings 2021. Lecture Notes in Operations Research*, Springer, Cham, pp. 389–394. DOI: 10.1007/978-3-031-08623-6_57.
- Schumacher, P.; **Weckenborg, C.**; Spengler, T. S. (2022): The impact of operation, equipment, and material handling flexibility on the design of matrix-structured manufacturing systems, in: *IFAC-PapersOnLine*, 55 (2), pp. 481–486. DOI: 10.1016/j.ifacol.2022.04.240.
- Graupner, Y.; **Weckenborg, C.**; Spengler, T. S. (2022): Designing the technological transformation process in steel production: A conceptual framework for decision-making support, in: *Procedia CIRP*, 105, pp. 706–711. DOI: 10.1016/j.procir.2022.02.118.
- Schumacher, P.; **Weckenborg, C.**; Spengler, T. S. (2021): Economic Design of Matrix-Structured Manufacturing Systems, in: Dolgui, A. et al. (eds.): *Advances in Production Management Systems. Artificial Intelligence for Sustainable and Resilient Production Systems: IFIP WG 5.7 International Conference, APMS 2021, Nantes, France, September 5–9, 2021, Proceedings, Part II*, Springer International Publishing, pp. 516–524. DOI: 10.1007/978-3-030-85902-2_55.
- Schneider, D.; Huth, T.; Vietor, T.; Schumacher, P.; **Weckenborg, C.**; Spengler, T. S. (2020): Development of a Potential Model to support the Assessment and Introduction of Industry 4.0 Technologies, in: *Proceedings of the Design Society: DESIGN Conference*, pp. 707–716. DOI: 10.1017/dsd.2020.85.
- Weckenborg, C.**; Spengler, T. S. (2019): Assembly Line Balancing with Collaborative Robots under consideration of Ergonomics: a cost-oriented approach, in: *IFAC-PapersOnLine*, 52 (13), pp. 1860–1865. DOI: 10.1016/j.ifacol.2019.11.473.
- Müller, C.; **Weckenborg, C.**; Grunewald, M.; Spengler, T. S. (2016): Consideration of redundancies in the configuration of automated flow lines, in: Mattfeld, D. C. et al. (eds.): *Logistics Management: Contributions of the Section Logistics of the German Academic Association for Business Research, 2015, Braunschweig, Germany*, Springer International Publishing, pp. 173–185. DOI: 10.1007/978-3-319-20863-3_13.

VII. PhD STUDENTS:

Tjard Bätge:	Design of refueling infrastructure – Modelling and solution, ongoing.
Yannik Graupner:	Assessment of pathways toward low-carbon steelmaking, ongoing.
Patrick Oetjegerdes:	Energy-oriented crane scheduling in steel coil storages, ongoing.
Patrick Schumacher:	Design of matrix-structured manufacturing systems, ongoing.
Bastian Vorwerk:	Prototype parts logistics in the automotive industry, ongoing.

VIII. FUNDING ACQUISITION:

2023	Travel grant for a research stay at Sabancı University, Istanbul, Turkey (<i>Fritz Thyssen Foundation</i>)
2021–2024	"THEWA - Thermal Management of Hydrogen Fueling Systems" (<i>Lower Saxony Ministry of Science and Culture, Volkswagen Foundation</i>)
2021–2023	"HyWiS - Economic Evaluation of Hydrogen Use in Steel Production" (<i>Salzgitter Flachstahl GmbH</i>)
2020–2023	"LogOS - Logistics Simulation of Surface Finishing at Salzgitter Flachstahl GmbH" (<i>Salzgitter Flachstahl GmbH</i>)
2023	"Accompanying Studies on Energetic Factory Transformation" (<i>Stellantis - Opel Automobile GmbH</i>)
2021	"Evaluation of Savings Potential in the Configuration of Long-Running Vehicles" (<i>Volkswagen AG</i>)
2017–2020	"Digitalization in the Pre-Production Center" (<i>Volkswagen AG</i>)
2020	"Evaluation of Alternative Assembly Principles in Prototype Construction" (<i>Volkswagen AG</i>)
2020	"Potential for Mathematical Optimization in Prototype Management" (<i>Volkswagen AG</i>)
2019	"Identification of Planning Potentials" (<i>Volkswagen AG</i>)

IX. AWARDS:

2023	Horst Wildemann Award for Innovative Management Concepts , awarded by the <i>German Academic Association for Business Research</i>
2023	Best Paper Award Practice 2022 , awarded by the journal <i>Controlling</i>
2022	Best Practice Paper Award , awarded by the <i>German Academic Association for Business Research</i>
2021	Award for Application-Oriented Scientific Achievements , awarded by the <i>Initiative Science and Automotive Industry</i>
2019	Commended Paper Award , awarded by the <i>International Federation of Automatic Control</i>
2019	Finalist of the EURO Excellence in Practice Award , of the <i>Association of European Operational Research Societies</i>

X. EDITORIAL:

Reviewer for Journals: *European Journal of Operational Research, International Journal of Production Research, Journal of Business Economics, Flexible Services and Manufacturing Journal, Computers and Operations Research, Logistics Research*

Reviewer for Conferences: *Winter Simulation Conference, Procedia CIRP, Logistics Management*

XI. PROFESSIONAL EXPERIENCE:

<i>Salzgitter Flachstahl GmbH</i> , Germany, Research Project	2020–current
<i>Volkswagen Pre-Production Centre</i> , Germany, Research Project	2017–2020
<i>Volkswagen Group Logistics</i> , Germany, Research Project	2016–2017
<i>SimPlan AG</i> , Germany, Internship	2015
<i>Bosch Rexroth Teknik AB</i> , Sweden, Internship	2013
<i>Bosch Thermoteknik AB</i> , Sweden, Internship	2013
<i>Robert Bosch AG</i> , Austria, Internship	2012
<i>Robert Bosch Elektronik GmbH</i> , Germany, Internship	2011
<i>Faurecia Autositze GmbH</i> , Germany, Internship	2010

XII. HIGHER EDUCATION CERTIFICATE:

Completed a comprehensive 23-day program covering various aspects of higher education didactics, including teaching methods, pedagogical concepts, assessment design, and strategies for promoting effective learning.

XIII. REFERENCES:

Provided on request.

XIV. PERSONAL:

Loving husband, lead saxophonist in a jazz band, and actively involved in combating food waste.