

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

**July 2024**

**I. EDUCATION:**

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

**II. ACADEMIC EMPLOYMENT:**

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

**III. PUBLISHED ARTICLES:**

- Graupner, Y.; **Weckenborg, C.**; Spengler, T. S. (2024): Effects of European emissions trading on the transformation of primary steelmaking: Assessment of economic and climate impacts in a case study from Germany, in: *Journal of Industrial Ecology*, in press. DOI: 10.1111/jiec.13544.
- 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: 10.1007/s11573-024-01194-8.
- 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.

## VIII. FUNDING ACQUISITION:

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

## IX. AWARDS:

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

## **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.