Lecture Series of the Research Institute for Supply Chain Management

Friday, April 21, 2023, 12:30 pm

Room TC.3.21, Welthandelsplatz 1, 1020 Vienna

CHRISTIAN ALMEDER:

"ACCELERATING PRODUCTION PLANNING - RAPID CONSTRUCTION HEURISTICS FOR THE CAPACITATED LOT SIZING PROBLEMS"

The capacitated lot sizing problem (CLSP) is a core model in production planning that is known to be an NP-hard optimization problem. In practice, simple period-by-period heuristics have been widely used due to their low computational cost and suitability for rolling planning horizons. Nonetheless, researchers have primarily focused on more advanced solution methods in the last 30 years, which provide better results but at the cost of significantly (100x and more) longer computational times. However, in an online setting, where immediate responses to changes or customer orders are needed, or in stochastic environments where multiple scenarios must be evaluated, computational times become increasingly important.
In the first part of this talk, we propose a novel approach that uses genetic programming (GP) to automatically generate specialized heuristics. After a computationally intensive training phase, these heuristics outperform existing methods while maintaining the same low computational effort.
In the second part of the talk, we present a general two-step construction heuristic (2-SCH) that sorts customer orders and iteratively adds them to a preliminary production plan. Our computational experiments demonstrate that the 2-SCH outperforms existing construction heuristics for the CLSP without setup times, as well as the only available heuristic for the CLSP with setup times. Furthermore, we illustrate the versatility of the 2-SCH by applying it to the CLSP with backorders and the multi-level CLSP, as well as the single-level CLSP in an online environment.

Prof. Christian Almeder is a dedicated academic who has spent many years researching and developing solutions in the field of short- and medium-term production and logistics planning. He received his PhD in Mathematics from the Vienna University of Technology, followed by a habilitation in Business Administration from the University of Vienna, and currently he serves as a Professor for Supply Chain Management at the European University Viadrina Frankfurt(Oder). His research focuses on creating advanced planning models and solution algorithms using various operations research techniques.

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