

At the Chair of Logistics and Supply Chain Management of TUM School of Management, we are looking for an interested and qualified student to conduct his/her

Master's Thesis

on the topic

Know your composites: Decomposing the Stochastic Economic Lot Scheduling Problem

The Stochastic Economic Lot Scheduling Problem (SELSP) is a single-machine multi-product production planning problem that considers the trade-off between large lots to save setups and frequent switching to react to uncertain demand. The problem is highly relevant to make-to-stock industries where setups remain significant, such as chemicals. The problem is difficult as it involves scheduling, lot sizing and safety stock planning in an integrated way. The deterministic problem has been proven to be NP-hard, and the stochastic version can be considered even more difficult.

A popular way to solve the SELSP is to decompose the problem into several smaller subproblems which can be solved independently and merge the solutions. However, it is not clear how to best decompose the problem in a general way. This thesis aims at exploring methods with differing levels of sophistication to create subproblems of the SELSP and investigate the impact on the cost performance.

Key project tasks:

- Conceptualize different ways to form subproblems in the SELSP
- Implement different decomposition schemes in Python
- Compare the performance of the decomposition to the optimal solution in small instances and to heuristics on large instances
- Analyze and interpret the results

Requirements:

This thesis is suitable for master's students in Management and Technology. The ability to work independently, as well as analytical skills, are required. Profound programming skills in Python (e.g. from the course Computational Logistics) are required. Knowledge of inventory management is beneficial but not required.

Earliest begin: March 2026

Supervisor: Patrick Helm

Application: Email with curriculum vitae and transcript of records to logtheses.log@mgt.tum.de