

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 thesis

on the topic

Extending Mixed-Integer Programming for Dynamic Shelf Assortment Optimization

Selecting the optimal assortment of products in retail environments is a challenging task, as retailers must choose the right combination of items from a vast product portfolio while considering limited shelf space, customer preferences, and sales dynamics.

This thesis aims to extend an existing Mixed-Integer Linear Programming (MILP) model for shelf assortment optimization. Building on a provided model framework, the student will generate meaningful synthetic instances to test and validate the model, incorporate shelf attractiveness and sales dynamics (e.g., sales decay curves) into the optimization, and develop a hybrid approach that combines MILP optimization with a Multi-Armed Bandit algorithm for dynamic assortment decisions.

Key project tasks:

- Conduct a literature review on MILP-based assortment planning, shelf attractiveness modeling and dynamic assortment optimization
- Develop and define key performance indicators (KPIs) for shelf attractiveness
- Generate and analyze synthetic datasets, performing parameter sensitivity analyses
- Extend the existing MILP model by implementing
 - ☐ Sales decay curves
 - ☐ Integration with a Multi-Armed Bandit framework
- Evaluate the performance of the extended model on the created test instances

Requirements:

The thesis is suitable for Master in Management and Technology students with a focus on operations and supply chain management. The ability to work independently, as well as analytical skills, are required. Knowledge of Python (numpy, pandas) is required.

Earliest begin: November 2025

Supervisor: Till Krieger

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