



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

## **Bachelor thesis**

on the topic

### **Effect of Satellite Capacity on Routing Performance in 2E-VRP**

The Two-Echelon Vehicle Routing Problem (2E-VRP) is a logistics optimization problem where goods are transported from a central depot to customers through intermediate depots known as satellites (Sluijk et al., 2023). A crucial operational constraint in these systems is the limited capacity of satellites, which restricts how much demand they can handle per delivery cycle. This capacity directly influences how customer demand is assigned and fulfilled, and how efficient the routes from satellites to customers can be.

This thesis explores the impact of satellite capacity constraints on the quality and feasibility of routing solutions in a two-echelon distribution network. It investigates how tightening or relaxing satellite capacity influences delivery costs, route efficiency, and vehicle utilization.

#### **Key project tasks**

- Literature review on relevant fields of study
- Formulation and implementation of a basic 2E-VRP model including satellite capacity constraints
- Testing and comparison of different satellite capacity levels using clustering-based heuristics (Crainic et al., 2008)
- Analysis of results to derive operational insights for real-world logistics planning

#### **Requirements**

The thesis is suitable for Bachelor 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 one general-purpose programming language (e.g., Python, Julia, C++) is a plus. Knowledge of mathematical programming and optimization is preferred.

**Earliest begin:** January 2026

**Supervisor:** Nicolas Kutttruff

**Application:** Email with curriculum vitae and transcript of records to [logtheses.log@mgt.tum.de](mailto:logtheses.log@mgt.tum.de).

## References

- Crainic, T.G., Mancini, S., Perboli, G., Tadei, R., et al., 2008. Clustering-based heuristics for the two-echelon vehicle routing problem. volume 46. CIRRELT Montréal.
- Sluijk, N., Florio, A.M., Kinable, J., Dellaert, N., van Woensel, T., 2023. Two-echelon vehicle routing problems: A literature review. *European Journal of Operational Research* 304, 865–886. doi:10.1016/j.ejor.2022.02.022.