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

**Master thesis**

on the topic

**Inventory Routing with Minimum Vehicle Utilization**

The Inventory Routing Problem (IRP) is a challenging extension of the vehicle routing problem, in which inventory control and routing decisions are considered simultaneously. It usually involves one supplier and several customers, each with an inventory capacity and the demand per period for each customer. If demands are not met, penalty costs apply. Every period, decisions must be made about which customers to serve and which routes to take, aiming to minimize total travel and inventory costs. The IRP directly affects the efficiency and cost-effectiveness of supply chain operations. Finding good solution approaches lead to significant savings in transportation and inventory holding costs, ensuring timely delivery of goods and maintaining customer satisfaction.

In real-world scenarios, route planners usually aim for high resource utilization, only allowing routes that use at least a minimum level of the vehicle’s capacity. This thesis aims to incorporate these minimum utilization constraints into an IRP framework and study their impact on system performance. The goal is to formulate the arising model, develop a solution heuristic, and test the implementation on realistic rolling-horizon simulations.

**Key project tasks:**

- Literature review on relevant fields of study
- Formulation and implementation of the model
- Development of an appropriate solution method
- Testing of the model and the solution method in rolling horizon simulations
- Analysis of results and implications

**Requirements:**

The thesis is suitable for Master in Management and Technology students with a major in 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) is required. Knowledge of mathematical programming and optimization is preferred.

**Earliest begin:** as soon as possible

**Supervisor:** Nicolas Kuttruff

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