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

**Ordering Decision Automation in C-Parts Warehouse**

Keller & Kalmbach, a leading German fastener, fastening technology, and C-parts management company established in 1878, is a leading provider in its field. Keller & Kalmbach targets automotive, machinery, construction, and electronics industries with fasteners and fastening solutions. Over 100,000 SKUs of screws, bolts, nuts, washers, and other fastening elements are available. Procuring large amounts of items is difficult. Decision support systems help planners choose order timing and quantities. These systems are effective, but human oversight is often needed to validate and refine their recommendations. Planners must review the system's suggestions, which is time-consuming and repetitive. Over 142,000 manual order lines were reviewed and placed in 2023. Using historical procurement data, machine learning algorithms can learn order proposal validation patterns and criteria. The automation reduces data entry and interface searches. The saved time can be used for value-added tasks such as strategic sourcing and supplier negotiations. Employees can spend more time on innovation and company growth with streamlined procurement workflows. Automation maximizes resource utilization, driving the companies' operational efficiency and competitiveness. In this context, feature extraction and selection can improve automated ordering decision-making by identifying and selecting the most relevant features when training suitable machine learning models. The algorithms learn more about procurement by extracting item descriptions, quantities, prices, supplier performance metrics, and purchase order history. This improves order validation predictions and decisions, driving decision support system efficiency and effectiveness.

**Key project tasks:**

- Conducting a literature review on Machine Learning Applications for Task Automation
- Data preparation and cleansing
- Developing a model to meet Keller&Kalmbach’s operational requirements.
- Performance Assessment and Cross-validation
- Deriving managerial insights and decision support to select appropriate products for order automation

**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 Python programming, good understanding of inventory management and machine learning is required. Knowledge of mathematical programming and optimization is preferred. The thesis should be written in English.

**Earliest begin:** as soon as possible

**Supervisor:** Mahsa Nakhost

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