

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:

### **Managerial Insights for Competition in Supply Chains**

In reality, a firm's supply chain cannot be evaluated independently without considering the actions of competing firms. As firms compete with each other economically, it is valuable to devise strategies which anticipate the actions of a firm's competitors, and also maximizes the firm's profits based on demand estimates. We propose the study of supply chain competition [1] [2]. The student is expected perform data analysis and forecasting on relevant data, and subsequently prescribe managerial strategies to help a firm compete in a competitive landscape, for example using the framework of a Bertrand, Cournot or Stackelberg economic game.

The objective of this research is to perform data analysis on data relevant to supply chain competition. The thesis student is encouraged to find examples of economic supply chain competition, where such examples can include, dynamic pricing [4], or dual-channel supplier sourcing [3], and discover relevant data which can describe this supply chain competition. One suggestion is to use Wharton WRDS to query for such data.

Subsequently, we are interested in creating robust prediction strategies to forecast the demand performance of the market and/or the anticipated actions of the competitors (for example via ARIMA or Neural Networks may be applied). We then validate the predictive model accuracy via simulation and/or robust metrics. And most importantly, managerial insights and an actionable strategy should be provided based on data analysis and predictive modelling.

As a thesis student, there will be opportunities to share your work in upcoming workshops hosted by both our Chair and the Munich Data Science Institute. Furthermore, strong support will be provided alongside you as PhD students will work in parallel on similar topics and approaches.

#### **Selected research tasks:**

- Identify relevant realistic examples where supply chain competition exists, and find data which corresponds to such economic competition.
- Perform predictive modelling to analyze the behaviour of the market and a firm's competitors.
- Build prototypes and evaluate the proposed algorithms via simulation or using real data.
- Provide managerial insights and actionable strategy based on the analysis of the data and output of the model.

**Requirements:**

The thesis is for Bachelor students of the students at TUM from the field of Management. Experience with Python, and scientific computing is a plus. The thesis should be written in English.

**Begin:** as soon as possible

**Advisor:** Larkin Liu

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

**References:**

- [1] Cachon, Gerard P., and Serguei Netessine. "Game theory in supply chain analysis." *Models, methods, and applications for innovative decision making* (2006): 200-233.
- [2] Cesa-Bianchi, Nicolò, et al. "Online Learning in Supply-Chain Games." *arXiv preprint arXiv:2207.04054* (2022).
- [3] Chen, Jing, Hui Zhang, and Ying Sun. "Implementing coordination contracts in a manufacturer Stackelberg dual-channel supply chain." *Omega* 40.5 (2012): 571-583.
- [4] Liu, Larkin. "Approximate Nash Equilibrium Learning for n-Player Markov Games in Dynamic Pricing." *arXiv preprint arXiv:2207.06492* (2022).