

**Title:** Optimising a demand forecasting model for Pirelli using machine learning

**Relevance:** Demand forecasting is a critical area for the value chain of a company, since it is the basis of corporate decision-making, especially in the field of production planning and pricing. Utilizing different models is detrimental to increasing the reliability of demand forecasting. We propose data-driven quantitative methods for the application at Pirelli, as they allow for easier aggregation of data over multiple time periods and increased comparability.

This thesis also investigates the applicability of machine learning (ML) methods to the forecasting task at hand. We expect that, by building an adaptive and reliable forecasting model, especially due to ML enrichment, will allow for relevant insights into future demand, which in turn enables Pirelli to optimize their consecutive decision-making regarding pricing strategies and product management decisions.

**Research Question:** How can Pirelli implement a usable demand forecasting model using a multi-method approach?

**Methodology:** The study will employ a mixed-methods approach focussing on quantitative data analysis. A baseline of available information combined with business knowledge is established first to serve as a qualitative basis for further analyses. The thesis will apply a multi-method approach to forecast the demand on a product level for multiple larger customers. Applicable measures of accuracy are, among others, mean percentage error, mean absolute deviation, and forecast bias. Especially the impact of ML-based forecasting approaches is evaluated.

**Aims and scope of the thesis:**

This thesis aims to provide a mathematical tool to aid in corporate decision making by providing reliable demand forecast on the individual product level. To implement the tool, the following tasks are necessary for a successful project:

- In-depth data analysis
- Interviews to get professional opinions on current demand planning and product management decisions, i.e., to gather relevant business knowledge
- Development of mixed methods forecasting for demand predictions
- Evaluation of advantages and disadvantages of the proposed model

## **Bibliography**

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