

# Master Thesis

## Forecast methods in the citrus fruits industry

### Aim/Content of the thesis

The Mediterranean area is home to a lot of citrus orchards because of its warm climate. Citrus fruits are not only used as fruits, but as animal food or for extracting fruit acid, too. These fruits are often diseased by bacteria or fungi before being picked. After harvesting them, they are sensitive to temperature, so the transport and storage of these fruits are very difficult. Seasonal climatic conditions also influence the crop and consequently the number of needed fruit-pickers. This causes additional uncertainty in the citrus industry.

The aim of this thesis is an extensive overview over forecasting methods for the production and sales of citrus fruits and its side products. It should include recent approaches from practice as well as relevant literature. Furthermore, we want you to investigate how aspects of the circular economy can be included into and how they affect these forecasting models. If there is not enough literature concerning citrus fruits, we will extend the literature review to fruit forecasting in general and its applicability to the citrus industry. Moreover, we expect you to implement several forecasting methods.

This master thesis originates from a third-party project called „ImPUISe - Innovation in the supply chain of citrus fruits and its side products in the Mediterranean area“. This project is funded by the EU/BMBF through DLR.

### Requirements

- Student in business administration or similar study course with clear quantitative focus
- Ability to independently do a literature research by revising original resources with quantitative models
- Good knowledge in operations research/management science and statistics
- Basic programming and modelling skills (e. g. Matlab, C, or Python)
- English thesis very welcome (German possible)

### Introductory Literature

Acosta, I. C. G., et al. (2018): Design of an inventory management system in an agricultural supply chain considering the deterioration of the product: The case of small citrus producers in a developing country. *Journal of Applied Engineering Science* 16, 523-537.

Wulfsohn, D., et al. (2012): Multilevel systematic sampling to estimate total fruit number for yield forecasts. *Precision Agriculture* 13, 256–275.

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