

Comparison of forecasting methods for the efficient food waste reduction in bakeries and hotels

¹Dominik Leverenz, ²Cinthy Lara and ²Gerold Hafner

¹*Institute for Sanitary Engineering, Water Quality and Solid Waste Management, University of Stuttgart, BÜsnau 70569, Stuttgart, Germany*

²*Institute for Sanitary Engineering, Water Quality and Solid Waste Management, University of Stuttgart, BÜsnau 70569, Stuttgart, Germany*

Abstract

The European Union is committed to the United Nations target of halving food waste at the retail and consumer level by 2030. According to European legislation, member states are obliged to monitor national food waste levels and report progress to the European Commission at annual intervals between 2022 and 2030. To achieve the reduction targets, suitable measures need be developed and implemented for each sector of the food supply chain. The objective of our research was to investigate the food waste reduction potential in bakeries and hotels through different forecasting methods. Within our research, we used a dataset from three bakery chains in Germany based on stock management software. In addition, we implemented food waste tracking systems in a hotel chain to generate data for the forecasting models. In order to investigate the food waste reduction potential, we compared the predictive quality of three forecasting models. We evaluated two machine learning models, namely random forest and support vector machine, and one time series model, namely ARIMA. The accuracy of the models was described by error indicators regarding the expected food waste reduction. In the oral presentation, we will give a brief insight into the findings of our research and highlight various aspects related to the potential for reducing food waste using different forecasting methods. The best fit model for bakeries was ARIMA, reaching significantly better demand forecasts that could reduce food waste by 75,8% ($\pm 10,3$). In hotels, food waste was already halved after implementing the food waste tracking systems, but showed significant additional reduction potentials through demand forecasting.

Keywords: Forecasting; Food waste prevention; food waste tracking