

***Prophet Modeling Optimization for Demand Forecasting of Fast-Moving
Consumer Goods (Case Study: UD Aan Jaya Toko)***
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ABSTRACT

Demand for Fast-Moving Consumer Goods (FMCG) at UD Aan Jaya Toko exhibits complex patterns, including upward trends, seasonality, demand spikes during religious holidays, and fluctuations driven by store operations and stock availability. This complexity necessitates accurate demand forecasting to support inventory optimization. This study aims to optimize the performance of the Prophet model in forecasting demand for five FMCG products (cooking oil, sugar, eggs, flour, and Sedaap Goreng instant noodles) by comparing four modeling configurations: standard model, logarithmic transformation, external regressors, and a combination of logarithmic transformation and external regressors. Modeling was optimized through hyperparameter tuning using grid search across three data split ratios (50:50, 67:33, and 83:17). The results indicate that the 83:17 data split ratio consistently yields the best performance. The external regressor configuration proved optimal for cooking oil (MAPE 7,40%), sugar (MAPE 7,88%), eggs (MAPE 7,72%), and flour (MAPE 9,00%), while the combined logarithmic transformation and external regressor model was optimal for Sedaap Goreng (MAPE 8,21%). All optimal configurations achieved MAPE values below 10% (highly accurate category). These optimal models were subsequently implemented into a web-based system using the Streamlit framework, achieving a black box testing success rate of 93,75% and a User Acceptance Testing (UAT) score of 89%.

Keywords: Demand Forecasting, Fast-Moving Consumer Goods, Prophet, Logarithmic Transformation, External Regressor, Hyperparameter Tuning, Streamlit.