

PERAMALAN PERMINTAAN MENGGUNAKAN *XGBOOST* SERTA IMPLEMENTASI PENGENDALIAN *SAFETY STOCK* DAN *REORDER POINT* DI PT XYZ

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ABSTRAK

Ketersediaan kemasan merupakan faktor penting dalam menjaga kelancaran proses produksi di PT XYZ. Ketidakakuratan peramalan permintaan dapat menyebabkan terjadinya *overstock* maupun *stockout* yang berdampak pada peningkatan biaya persediaan dan terganggunya proses produksi. Penelitian ini bertujuan menentukan skenario pembagian data terbaik, memperoleh konfigurasi *hyperparameter XGBoost* yang optimal, serta mengimplementasikan hasil peramalan dalam perhitungan *safety stock* dan *reorder point*. Data yang digunakan berupa data historis permintaan mingguan kemasan KMK 031 periode Juli 2021 hingga Agustus 2025 dengan variabel pendukung berupa hari libur dan promosi. Tahapan penelitian meliputi *pre-processing*, *feature engineering*, transformasi data, pembagian data dengan skenario 70:30, 80:20, dan 90:10, pelatihan model *XGBoost* menggunakan *hyperparameter default*, *Grid Search*, *Random Search*, dan *Bayesian Optimization*, kemudian dievaluasi menggunakan RMSE, MAPE, SMAPE, dan R^2 . Hasil penelitian menunjukkan bahwa model terbaik diperoleh menggunakan *Random Search* dengan pembagian data 80:20 yang menghasilkan Test RMSE sebesar 649,7184, Test MAPE sebesar 10,3817%, Test SMAPE sebesar 11,8297%, dan Test R^2 sebesar 0,7733. Hasil peramalan selanjutnya digunakan sebagai dasar penentuan *safety stock* dan *reorder point* untuk mendukung pengendalian persediaan kemasan di PT XYZ.

Kata kunci: *XGBoost*, Peramalan Permintaan, *Hyperparameter Tuning*, *Safety Stock*, *Reorder Point*.

DEMAND FORECASTING USING XGBOOST AND THE IMPLEMENTATION OF SAFETY STOCK AND REORDER POINT CONTROL AT PT XYZ

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ABSTRACT

Packaging availability is an essential factor in maintaining the continuity of production activities at PT XYZ. Inaccurate demand forecasting may lead to overstock or stockout conditions, resulting in increased inventory costs and production disruptions. This study aims to determine the optimal data splitting scenario, identify the best XGBoost hyperparameter configuration, and implement the forecasting results in safety stock and reorder point calculations. The study used weekly historical demand data for KMK 031 packaging from July 2021 to August 2025, complemented by holiday and promotion variables. The research stages included data preprocessing, feature engineering, data transformation, data splitting using 70:30, 80:20, and 90:10 scenarios, XGBoost model development with default hyperparameters, Grid Search, Random Search, and Bayesian Optimization, followed by evaluation using RMSE, MAPE, SMAPE, and R^2 . The results indicate that the best model was achieved using Random Search with an 80:20 data split, yielding a Test RMSE of 649.7184, Test MAPE of 10.3817%, Test SMAPE of 11.8297%, and Test R^2 of 0.7733. The forecasting results were subsequently applied to determine safety stock and reorder point values, providing support for inventory control of packaging materials at PT XYZ.

Keywords: *XGBoost, Demand Forecasting, Hyperparameter Tuning, Safety Stock, Reorder Point.*