

INTEGRASI METODE PERAMALAN DAN *MIN-MAX STOCK* DALAM PERENCANAAN PERSEDIAAN PRODUK *HOME* *CARE* DI PT XYZ

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ABSTRAK

Industri *Fast Moving Consumer Goods* (FMCG) memiliki pola permintaan yang dinamis dan fluktuatif sehingga memerlukan sistem peramalan dan perencanaan persediaan yang akurat guna mendukung efisiensi operasional. PT XYZ sebagai perusahaan manufaktur FMCG pada kategori produk *home care* masih menghadapi ketidaksesuaian antara tingkat persediaan dan permintaan pasar, yang berpotensi menimbulkan *overstock* dan risiko *dead stock*. Penelitian ini bertujuan untuk mengintegrasikan metode peramalan penjualan berbasis *machine learning* dengan metode *Min-Max Stock* dalam perencanaan persediaan produk *home care* di PT XYZ. Metode peramalan yang digunakan meliputi *Random Forest Regression* (RFR), *Support Vector Regression* (SVR), dan *Extreme Gradient Boosting* (XGBoost) dengan data historis penjualan *multivariat* periode Februari hingga Juli 2025. Setiap model dilakukan *hyperparameter tuning* dan dievaluasi menggunakan metrik evaluasi MAE, RMSE, dan R^2 . Hasil pengujian menunjukkan bahwa model SVR memberikan kinerja terbaik dengan nilai MAE 5,5926, RMSE 7,2635, dan R^2 0,6200. Hasil peramalan tersebut digunakan sebagai dasar penentuan *safety stock*, *reorder point*, serta batas minimum dan maksimum persediaan menggunakan metode *Min-Max Stock*, sehingga mampu memberikan rekomendasi perbaikan perencanaan persediaan yang lebih optimal dan mengurangi risiko kelebihan maupun kekurangan stok.

Kata Kunci: Peramalan Penjualan, *Support Vector Regression*, *Machine Learning*, *Min-Max Stock*, Produk *Home Care*

INTEGRATION OF FORECASTING METHODS AND MIN-MAX STOCK IN HOME CARE PRODUCT INVENTORY PLANNING AT PT XYZ

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ABSTRACT

The Fast Moving Consumer Goods (FMCG) industry is characterized by dynamic and fluctuating demand patterns, requiring accurate forecasting and inventory planning systems to support operational efficiency. PT XYZ, an FMCG manufacturing company in the home care product category, continues to experience mismatches between inventory levels and market demand, which may lead to overstock conditions and the risk of dead stock. This study aims to integrate machine learning-based sales forecasting methods with the Min–Max Stock approach for inventory planning of home care products at PT XYZ. The forecasting methods employed include Random Forest Regression (RFR), Support Vector Regression (SVR), and Extreme Gradient Boosting (XGBoost), utilizing multivariate historical sales data from February to July 2025. Each model underwent hyperparameter tuning and was evaluated using MAE, RMSE, and R^2 performance metrics. The results indicate that the SVR model achieved the best performance, with an MAE of 5.5926, an RMSE of 7.2635, and an R^2 value of 0.6200. The forecasts generated by the best-performing model were subsequently used to determine safety stock, reorder point, and minimum–maximum inventory levels using the Min–Max Stock method, thereby providing more optimal inventory planning recommendations and reducing the risks of both excess and insufficient stock.

Keywords: Sales Forecasting, Support Vector Regression, Machine learning, Min-Max Stock, Home Care Products