

PERENCANAAN PERSEDIAAN *PALLET* KOSONG MELALUI PERBANDINGAN METODE PERAMALAN DAN *MIN-MAX* *STOCK* DI PT XYZ

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ABSTRAK

PT XYZ merupakan perusahaan FMCG yang memproduksi kosmetik halal di Indonesia. Permasalahan utama adalah ketidakpastian kebutuhan *pallet* kosong akibat *bottleneck* produksi serta belum diterapkannya pendekatan kuantitatif dalam pengelolaan persediaan, sehingga terjadi kekurangan (*stockout*) persediaan. Penelitian ini bertujuan untuk menentukan metode peramalan yang tepat guna memprediksi permintaan *pallet* kosong pada bagian Produksi, serta menghitung kebutuhan manajemen persediaan seperti *safety stock*, *reorder point*, batas minimum dan maksimum, hingga jumlah penarikan *pallet* yang ideal. Tiga metode peramalan digunakan yaitu *Single Exponential Smoothing* (SES), *Autoregressive Integrated Moving Average* (ARIMA), dan *Long Short-Term Memory* (LSTM) untuk memprediksi kebutuhan *pallet* dengan hasil menunjukkan bahwa LSTM memberikan akurasi terbaik (MAPE 7,97%). Berdasarkan hasil tersebut, perencanaan persediaan dilakukan menggunakan metode *Min-Max Stock* dengan tiga skenario *Service Level* (SL): 95%, 90%, dan 85%. Setiap skenario menghasilkan *Safety Stock* sebanyak 88, 68, dan 55 *pallet*; *Reorder Point* sebanyak 1888, 1868, dan 1855 *pallet*; serta maksimum persediaan sebanyak 3688, 3668, dan 3655 *pallet*. Kuantitas pemesanan ditetapkan sebesar 1800 *pallet* per siklus. Implementasi ini memberikan fleksibilitas pengambilan keputusan berdasarkan tingkat toleransi risiko, serta membantu pengelolaan persediaan dalam kegiatan operasional.

Kata Kunci: Peramalan, *LSTM*, *Min-Max Stock*, Persediaan *Pallet* Kosong

PLANNING OF EMPTY PALLET INVENTORY THROUGH COMPARISON OF FORECASTING METHODS AND MIN-MAX STOCK AT PT XYZ

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ABSTRACT

PT XYZ is an FMCG company that produces halal cosmetics in Indonesia. The main problem lies in the uncertainty of empty pallet demand caused by production bottlenecks and the absence of a quantitative approach in inventory management, leading to stockouts. This study aims to determine the appropriate forecasting method to predict the demand for empty pallets in the Production department and to calculate inventory management needs such as safety stock, reorder point, minimum and maximum stock levels, and the ideal pallet replenishment quantity. Three forecasting methods were used: Single Exponential Smoothing (SES), Autoregressive Integrated Moving Average (ARIMA), and Long Short-Term Memory (LSTM), with results showing that LSTM provided the best accuracy (MAPE 7.97%). Based on the forecasting results, inventory planning was carried out using the Min-Max Stock method under three Service Level (SL) scenarios: 95%, 90%, and 85%. Each scenario resulted in Safety Stock levels of 88, 68, and 55 pallets; Reorder Points of 1888, 1868, and 1855 pallets; and Maximum Stock levels of 3688, 3668, and 3655 pallets. The replenishment quantity was set at 1800 pallets per cycle. This implementation offers flexibility in decision-making based on risk tolerance and supports more efficient inventory management in operational activities.

Keywords: Forecasting, LSTM, Min-Max Stock, Empty Pallet Inventory