

## ABSTRAK

Penelitian ini dilatarbelakangi oleh ketidaktercapaian target produksi pupuk Interflor di PT. Kusuma Dipa Nugraha akibat sistem pengendalian persediaan bahan baku yang masih berbasis perkiraan. Kondisi tersebut menyebabkan ketidakefisienan biaya dan berpotensi menghambat keberlanjutan proses produksi. Penelitian ini bertujuan menentukan kuantitas dan interval pemesanan yang optimal serta meminimalkan total biaya persediaan dengan mempertimbangkan kendala kapasitas gudang dan biaya kekurangan persediaan (shortage cost). Metode yang digunakan adalah Economic Order Quantity (EOQ) multi-item berbasis algoritma genetika. Penelitian dilakukan melalui pendekatan kuantitatif dengan peramalan kebutuhan menggunakan metode time series, pengujian akurasi menggunakan Mean Absolute Percentage Error (MAPE), dan optimasi model EOQ multi-item yang diimplementasikan pada Google Colab. Hasil optimasi menunjukkan kuantitas pemesanan optimal untuk Kalsium, Clay, dan Urea masing-masing sebesar 8.000 kg, Fosfat 12.000 kg, Kalium Klorida (KCL) 4.000 kg, serta Dolomit 39.999,78 kg dengan total kuantitas pemesanan 79.999,78 kg. Interval pemesanan optimal yang diperoleh adalah 1,3461 bulan atau setara 41 hari. Total biaya persediaan minimum sebesar Rp1.225.274.484,66 yang terdiri atas biaya pembelian Rp1.158.902.500,00, biaya pemesanan Rp57.944.900,00, biaya penyimpanan Rp3.737.618,39, dan biaya kekurangan persediaan Rp9.378.932,55. Solusi optimal diperoleh pada generasi ke-26 dengan seluruh kendala terpenuhi. Hasil penelitian ini mendukung pencapaian SDG 9 melalui penerapan inovasi dalam pengelolaan persediaan dan SDG 12 melalui peningkatan efisiensi penggunaan sumber daya serta pengurangan pemborosan dalam proses produksi.

**Kata Kunci:** Persediaan, Bahan Baku, EOQ, *Multi-Item*, Algoritma Genetika, Optimal, Pemesanan.

## ABSTRACT

*This research was motivated by the failure to achieve the Interflor fertilizer production target at PT. Kusuma Dipa Nugraha due to a raw material inventory control system that was still based on estimation. This condition led to cost inefficiencies and had the potential to hinder production sustainability. The objective of this study was to determine the optimal order quantity and ordering interval while minimizing total inventory costs by considering warehouse capacity constraints and shortage costs. The method employed was a multi-item Economic Order Quantity (EOQ) model integrated with a Genetic Algorithm. The study adopted a quantitative approach involving demand forecasting using time series methods, accuracy testing using Mean Absolute Percentage Error (MAPE), and optimization of the multi-item EOQ model implemented in Google Colab. The optimization results indicated the optimal order quantities of 8,000 kg each for Calcium, Clay, and Urea, 12,000 kg for Phosphate, 4,000 kg for Potassium Chloride (KCl), and 39,999.78 kg for Dolomite, resulting in a total order quantity of 79,999.78 kg. The optimal ordering interval obtained was 1.3461 months or approximately 41 days. The minimum total inventory cost was IDR 1,225,274,484.66, consisting of purchasing costs of IDR 1,158,902,500.00, ordering costs of IDR 57,944,900.00, holding costs of IDR 3,737,618.39, and shortage costs of IDR 9,378,932.55. The optimal solution was achieved in the 26th generation with all constraints satisfied. The findings support the achievement of SDG 9 through the application of innovation in inventory management and SDG 12 through improved resource efficiency and reduced waste in the production process.*

**Keywords:** *Inventory, Raw Materials, EOQ, Multi-Item, Genetic Algorithm, Optimization, Ordering.*