OPTIMALISASI *CAPACITATED VEHICLE ROUTING PROBLEM* UNTUK PENENTUAN RUTE DISTRIBUSI MAKANAN RINGAN MENGGUNAKAN ALGORITMA *SAVING MATRIX, NEAREST NEIGHBOUR*, DAN *SEQUENTIAL INSERTION* DI PT. XYZ

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ABSTRAK

Penelitian ini bertujuan untuk meningkatkan efisiensi operasional distribusi di PT. XYZ melalui optimalisasi kapasitas armada dan rute pengiriman. Peramalan permintaan menggunakan metode Exponential Smoothing menghasilkan tingkat akurasi tinggi dengan nilai Mean Absolute Percentage Error (MAPE) sebesar 0,83345% yang digunakan untuk memperkirakan kebutuhan kapasitas armada. Optimalisasi rute distribusi dilakukan menggunakan pendekatan Capacitated Vehicle Routing Problem (CVRP) dengan penerapan algoritma Saving Matrix, Nearest Neighbour, dan Sequential Insertion. Hasil penelitian menunjukkan bahwa rata-rata utilisasi kapasitas armada meningkat dari 34% menjadi 81–83%. Selain itu, metode Sequential Insertion memberikan hasil terbaik dengan total jarak tempuh 653,23 km, waktu tempuh 28 jam 18 menit, dan biaya distribusi Rp 6.079.934, atau 40,85% lebih efisien dibandingkan kondisi sebelumnya. Kombinasi forecasting dan optimasi rute ini secara signifikan meningkatkan efisiensi distribusi dan pencapaian Service Level Agreement (SLA). Penelitian ini merekomendasikan penggunaan metode Sequential Insertion sebagai strategi distribusi yang optimal di PT. XYZ.

Kata kunci: *Optimalisasi Distribusi, Peramalan Permintaan, Capacitated Vehicle Routing Problem, Sequential Insertion, Efisiensi Operasional*

OPTIMIZATION OF THE CAPACITATED VEHICLE ROUTING PROBLEM FOR DETERMINING SNACK DISTRIBUTION ROUTES USING THE SAVING MATRIX, NEAREST NEIGHBOUR, AND SEQUENTIAL INSERTION ALGORITHMS AT PT. XYZ

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ABSTRACT

This study aims to enhance the operational efficiency of distribution at PT. XYZ through the optimization of fleet capacity and delivery routes. Demand forecasting using the Exponential Smoothing method achieved high accuracy with a Mean Absolute Percentage Error (MAPE) of 0.83345%, serving as a basis for estimating fleet capacity needs. Route optimization was carried out based on the Capacitated Vehicle Routing Problem (CVRP) approach, applying Saving Matrix, Nearest Neighbour, and Sequential Insertion algorithms. The results showed an increase in average fleet capacity utilization from 34% to 81–83%. Furthermore, the Sequential Insertion method produced the best outcomes, achieving a total travel distance of 653.23 km, a travel time of 28 hours 18 minutes, and a distribution cost of IDR 6,079,934, making it 40.85% more efficient than the existing route. The combination of forecasting and route optimization significantly improved distribution efficiency and Service Level Agreement (SLA) achievement. This study recommends the Sequential Insertion method as the optimal strategy for distribution planning at PT. XYZ.

Keywords: *Distribution Optimization, Demand Forecasting, Capacitated Vehicle Routing Problem, Sequential Insertion, Operational Efficiency*