Abstrak

Distribusi pupuk NPK di Kabupaten Deliserdang memiliki tantangan dalam pemilihan rute yang efisien untuk menekan biaya, waktu, dan memastikan ketepatan pengiriman. Penelitian ini membandingkan efektivitas algoritma Dijkstra dan Nearest Neighbor dalam mengoptimalkan rute distribusi. Data jarak antar titik distribusi diperoleh melalui Google Maps, sedangkan data permintaan pupuk dikumpulkan dari distributor dan instansi terkait. Algoritma Dijkstra digunakan untuk menentukan jalur terpendek secara global, sedangkan Nearest Neighbor memilih rute berdasarkan jarak terdekat secara bertahap (lokal optimum). Hasil menunjukkan bahwa algoritma Dijkstra mampu mengurangi jarak tempuh dari 246,80 km menjadi 156,42 km (penghematan 90,38 km atau 36,62%), sedangkan Nearest Neighbor hanya menguranginya menjadi 226,62 km (penghematan 20,18 km atau 8,17%). Kesimpulannya, Dijkstra lebih efektif dalam meminimalkan jarak dan meningkatkan efisiensi waktu distribusi dibandingkan Nearest Neighbor.

Kata kunci: distribusi, pupuk NPK, algoritma Dijkstra, Nearest Neighbor, optimasi rute.

Abstract

The distribution of NPK fertilizer in Deliserdang Regency faces challenges in selecting efficient routes to reduce costs, save time, and ensure timely delivery. This study compares the effectiveness of the Dijkstra algorithm and the Nearest Neighbor algorithm in optimizing distribution routes. Distance data between distribution points were obtained from Google Maps, while fertilizer demand data were collected from distributors and relevant agencies. The Dijkstra algorithm was applied to determine the globally shortest path, whereas the Nearest Neighbor algorithm selected routes based on the nearest location in each step (local optimum). The results show that the Dijkstra algorithm reduced travel distance from 246.80 km to 156.42 km (a saving of 90.38 km or 36.62%), while the Nearest Neighbor algorithm only reduced it to 226.62 km (a saving of 20.18 km or 8.17%). In conclusion, Dijkstra proved more effective in minimizing travel distance and improving delivery time efficiency compared to Nearest Neighbor.

Keywords: distribution, NPK fertilizer, Dijkstra algorithm, Nearest Neighbor, route optimization.