Determining Waste Transportation Route by Considering Operational Schedule of Collecting Points and Depot (Case Study: Nabuang Sarok Program in PT Semen Padang)

FINAL PROJECT

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As a requirement to fulfil bachelor degree in Industrial Engineering Department Engineering Faculty Universitas Andalas

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ABSTRAK

*PT Semen Padang mengusulkan program "Nabuang Sarok" sebagai implikasi keberlangsungan lingkungan guna mengoptimalkan pemanfaatan sampah untuk bahan bakar alternatif batu bara. Sistem program saat ini adalah sampah dikumpulkan oleh warga sendiri ke titik pengumpulan di PT Semen Padang. Sistem ini tidak efisien karena pengiriman sampah secara langsung oleh masing-masing individu berdampak tinggi pada biaya dan rendahnya kapasitas sampah yang dibawa. Oleh karena itu, PT Semen Padang mengkoordinasikan projek awal untuk menyebarkan titik pengumpulan di 15 sekolah dasar dan 7 kantor kelurahan di Kecamatan Lubuk Kilangan. Rute transportasi baru ini diharapkan dapat memberikan rute yang optimal dengan biaya transportasi terendah dan jarak total terkecil. Penelitian ini dilakukan untuk mengetahui rute optimal pengangkutan sampah Program Nabuang Sarok di Kecamatan Lubuk Kilangan. Metode untuk melengkapi penelitian ini adalah model Capacitated Vehicle Routing Problem with Time Windows (CVRPTW). Perhitungan akan dilakukan dengan pendekatan eksak (*Software LINGO 19.0) *dan Metaheuristik (*Nearest Neighbor *dan* Tabu Search). *Total rute yang diperoleh melalui penyelesaian eksak yaitu 18 rute dengan total Rp76.799,00 dan mampu menghemat 37%. Penyelesaian dengan solusi metaheuristic memberikan perbedaan hasil 22% lebih tinggi dibandingkan pendekatan eksak.*

Kata kunci: CVRPTW, rute pengangkutan sampah, nearest neighbor, tabu search vehicle routing problem

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ABSTRACT

PT Semen Padang proposed a program called “Nabuang Sarok” for environmental sustainability to optimize the use of waste as an alternative fuel. Current system of this program is the waste are deposited by individual partners themselves to collecting point at PT Semen Padang. This system is inefficient because of direct transportation by each individual impact high in cost and low in capacity. Therefore, PT Semen Padang coordinates a pilot project to spread the collecting points at 15 elementary schools and 7 village offices of Lubuk Kilangan district. it is anticipated that the new transportation route will provide the optimal route with the lowest transportation cost and total distance. This research is conducted to determine the optimal route of waste transportation for Nabuang Sarok Program in Lubuk Kilangan District Calculations will be carried out with an exact approach (Software LINGO 19.0) and Metaheuristics (Nearest Neighbor and Tabu Search). The total route obtained through the exact solution is 18 routes with a total of Rp61,799.00 and is able to save 37%. Completion with a metaheuristic solution provides a 22% higher difference in results compared to the exact approach.

Keywords: CVRPTW, vehicle routing problem, nearest neighbor, tabu search, waste pick-up transportation

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