

# Optimasi Distribusi Pelumas Dengan Alternatif Koordinat dan Jumlah Gudang Mempertimbangkan Kapasitas Truk dan Time Windows = Optimization of Lubricant Distribution with Alternative Coordinates and Number of Warehouses Considering Truck Capacity and Windows Time

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## Abstrak

Kontribusi sektor transportasi dan pergudangan di Indonesia berdasarkan data Badan Pusat Statistik (BPS) pada tahun 2020 turun ke peringkat 8 sebesar 3,81% dibandingkan data tahun 2019 di peringkat 7 sebesar 4,41%. Penurunan sektor usaha transportasi dan pergudangan terhadap PDB mengakibatkan perusahaan minyak dan gas harus menerapkan strategi keunggulan biaya untuk mencapai kesesuaian strategi dengan rantai pasok pelumas yang efisien. Adanya batasan waktu pelayanan di gudang untuk pengiriman dan penerimaan produk pelumas sangat penting dalam penentuan rute. Penambahan titik hub sebagai solusi pemenuhan kebutuhan pelumas sesuai service level. Titik hub yang diusulkan diperoleh melalui K-Means Clustering dan rute optimal dengan kendala kapasitas truk dan waktu pelayanan di gudang digunakan metode CVRPTW (Capacitated Vehicle Routing Problem with Time Windows). Penelitian ini digunakan data realisasi pengiriman produk pelumas tahun 2019-2021 pada perusahaan BUMN minyak dan gas di Indonesia. Data realisasi tahun 2019 digambarkan permintaan pelumas pada masa pra COVID-19. Data realisasi tahun 2020 digambarkan permintaan pelumas pada masa COVID-19, dan data realisasi tahun 2021 digambarkan permintaan pelumas pasca COVID-19. Hasil penelitian diperoleh dua titik hub yang diusulkan pada koordinat -6.59395726,107.47077792 dan -7.388939,111.76971405. Selanjutnya diperoleh kenaikan utilitas truk sebesar 76,91% dan biaya distribusi setelah penambahan depot 21,62% lebih rendah dibandingkan dengan kondisi semula.

.....The contribution of the transportation and warehousing sector in Indonesia based on data from the Central Statistics Agency (BPS) in 2020 fell to rank 8 at 3.81% compared to 2019 data at rank 7 at 4.41%. The decline in the transportation and warehousing business sector to GDP has resulted in oil and gas companies having to implement a cost leadership strategy to achieve strategic alignment with an efficient lubricant supply chain. The existence of a service time limit in the warehouse for shipping and receiving lubricant products is very important in determining the route. Addition of hub points as a solution to meet the needs of lubricants according to service level. The proposed hub point is obtained through K-Means Clustering and the optimal route with constraints of truck capacity and service time at the warehouse is the CVRPTW (Capacitated Vehicle Routing Problem with Time Windows) method. This study uses data on the realization of lubricant product shipments in 2019-2021 at state-owned oil and gas companies in Indonesia. The realization data in 2019 depicts the demand for lubricants during the pre-covid 19 period. The realization data in 2020 describes the demand for lubricants during the covid 19 period, and the realization data in 2021 describes the demand for lubricants after the covid 19. The results of the study obtained two proposed hub points at coordinates -6.59395726, 107.47077792 and -7.388939,111.76971405. Furthermore, the increase in truck utility was 76.91% and the distribution cost after the addition of the depot was 21.62% lower than the original condition