

Optimization of Lubricant Distribution with Alternative Coordinates and Number of Warehouses Considering Truck Capacity and Time Windows

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Abstract

The contribution of the transportation and warehousing sector in Indonesia in 2020 decreased to rank eight at 3.81% compared to 2019 data at rank seven at 4.41%, according to data from the Central Bureau of Statistics Indonesia (BPS). The decline in the transportation and warehousing business sector to the GDP contribution has resulted in oil and gas companies implementing a strategic advantage with cost leadership to achieve a strategic fit for efficient supply chain lubricants. The existence of service time limits in the warehouse for shipping and receiving lubricant products is essential in determining an efficient route. The addition of depot points as a solution to meet the demand for lubricants to the service level. The proposed depot point is obtained through K-Means Clustering and optimal route with limited truck capacity and service time in the warehouse using the CVRPTW (Capacitated Vehicle Routing Problem with Time Windows) method. The data is used to realize shipments of lubricant products in 2019-2021 in state-owned oil and gas companies in Indonesia. The realization data for 2019 describes the demand for pre-covid 19 lubricants. The realization data for 2020 is the demand for lubricants during covid 19, and the realization data for 2021 describes the demand for lubricants post-covid-19. The results obtained two proposed hub points at coordinates -6.59395726,107.47077792 and -7.388939,111.76971405. Furthermore, the increase in truck utility is 72%, and the total cost after adding a depot is 10% lower than the existing condition.

Keywords

CVRPTW, Efficient Route, K-Means Clustering, Transportation and Lubricants.

Biographies

Taufik Rizkiandi is a Master's degree student in Industrial Engineering, Faculty of Engineering, University of Indonesia and a worker with a Business Development position at PT Patra Logistik (a subsidiary of PT Pertamina Patra Niaga). He obtained his S.Si from the ITB School of Life Science and Technology. With five years of working experience in a logistics company and being certified as a Certified Supply Chain Manager (CSCM) with credential ID number 2203251004 and earning a silver predicate in the Pertamina company-level Continuous Improvement Program (CIP) competition, his research interest is optimizing the planning time for domestic goods delivery and export Import.

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