

ABSTRACT

In the era of Industry 4.0, technological advancements in supply chain management significantly impact various business aspects, including transportation management, which is crucial for maintaining company efficiency and responsiveness. PD Vina Jaya Snack, a snack distribution company based in Bekasi, faces challenges in managing its product deliveries due to inefficient delivery routes and fluctuating demand. With only one operational vehicle, the company often struggles to meet delivery demands, resulting in high fuel consumption and transportation costs. This study aims to design a more efficient delivery route to reduce fuel costs below the target of Rp1,500,000, using the Ant Colony Optimization (ACO) method. The study consists of three main stages: input, process, and output. The input stage involves collecting data on the location of the distribution center, retail points, product demand, operational hours, and vehicle capacity. This data is processed into a distance and travel time matrix, which serves as input for implementing the ACO method to find the optimal delivery route. The results show that the designed route successfully reduces the total travel distance by 50.07% and lowers fuel costs by Rp1,315,063, bringing the fuel cost for April down to Rp1,311,189, staying within the budget limit of Rp1,500,000.

Keywords: Ant Colony Optimization (ACO), Transportation Management, Delivery Route, Cost Efficiency, Supply Chain Management.