

Implementasi *Algoritma Ant Colony Optimization* Dalam Penentuan Rute Pendistribusian LPG (Studi Kasus PT Sumberbina Usahamandiri)

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ABSTRAK

PT Sumberbina Usahamandiri merupakan salah satu penyedia jasa pengisian dan pendistribusian LPG di daerah Jombang Jawa Timur. Pendistribusian yang dilakukan oleh PT Sumberbina Usaha mandiri tidak memiliki perencanaan penyelesaian masalah pengiriman dengan mempertimbangkan bongkar muat dan jam buka tutup konsumen yang akan dikirimkan secara optimal. Pada proses pengiriman atau pendistribusian LPG, PT Sumberbina Usahamandiri 5 truk melakukan pengiriman ke 118 node tujuan yang dilakukan secara random/acak. Penelitian ini bertujuan untuk menentukan rute terbaik dengan pertimbangan bongkar muat, jam buka tutup toko dan demand konsumen dengan pendekatan *Vehicle Routing Problem With Pick-up Delivery and Time Windows* (VRP PDTW) menggunakan metode Ant Colony Optimization (ACO). Sesuai dengan permasalahan tersebut, perlu melakukan penentuan rute yang lebih optimal. Sehingga dapat memperoleh rute terbaik yang meminimumkan waktu pengiriman. Berdasarkan hasil pengolahan data menggunakan algoritma ACO didapatkan total waktu tempuh selama 1 hari sebesar 363,69 menit. Hasil tersebut mampu meminimalkan waktu pengiriman 1.240,62 menit dari total waktu tempuh kondisi eksisting. Hasil tersebut mampu meminimalkan biaya pengiriman Rp 630.000 dari total biaya kondisi eksisting. Kesimpulan dari penelitian ini didapatkan bahwa dengan menggunakan algoritma ACO didapatkan rute terbaik yang mampu meminimasi waktu pengiriman sebesar 82 % dibandingkan rute eksisting.

Kata Kunci : ACO, Distribusi, VRPPDTW.

Implementation of the Ant Colony Optimization Algorithm in Determining LPG Distribution Routes (Case Study of PT Sumberbina Usahamandiri)

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ABSTRACT

PT Sumberbina Usahamandiri is a provider of LPG filling and distribution services in the Jombang area of East Java. The distribution carried out by PT Sumberbina Usaha Mandiri does not have a plan for solving shipping problems by considering loading and unloading and opening and closing hours for consumers to be delivered optimally. In the process of sending or distributing LPG, PT Sumberbina Usahamandiri's five trucks make deliveries to 118 destination nodes, which are carried out randomly. This study aims to determine the best route by considering loading and unloading, shop opening hours, and consumer demand using the Vehicle Routing Problem With Pick-up Delivery and Time Windows (VRP PDTW) approach using the Ant Colony Optimization (ACO) method. In accordance with these problems, it is necessary to determine a more optimal route. So that it can get the best route that minimizes delivery time. Based on the results of data processing using the ACO algorithm, the total travel time for one day is 363.69 minutes. These results were able to minimize the delivery time of 1,240.62 minutes from the total travel time of the existing condition. These results were able to minimize shipping costs of Rp 630,000 from the total cost of existing conditions. The conclusion from this study was that by using the ACO algorithm, the best route was obtained, which was able to minimize delivery time by 82% compared to the existing route.

Keywords: ACO, Distribution, VRP PDTW.