

## ABSTRAK

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**Judul** : OPTIMASI CVRPTW MENGGUNAKAN ALGORITMA *ARTIFICIAL BEE COLONY* DAN *ADAPTIVE LARGE NEIGHBORHOOD SEARCH*

Aktivitas distribusi barang memerlukan perencanaan rute kendaraan yang optimal untuk meminimalkan total jarak tempuh dengan tetap mempertimbangkan berbagai kendala dalam proses distribusi. Salah satu permasalahan yang dapat digunakan untuk menggambarkan kondisi tersebut adalah *Capacitated Vehicle Routing Problem with Time Windows* (CVRPTW), yaitu permasalahan penentuan rute kendaraan dengan memperhatikan kapasitas kendaraan dan waktu pelayanan pelanggan. Tujuan utama dari *Capacitated Vehicle Routing Problem with Time Windows* (CVRPTW) adalah menentukan rute distribusi dengan total jarak tempuh minimum tanpa melanggar kendala kapasitas kendaraan maupun waktu pelayanan pelanggan. Penelitian ini menggunakan algoritma *Artificial Bee Colony* (ABC) dikombinasikan dengan metode *Adaptive Large Neighborhood Search* (ALNS) untuk menyelesaikan permasalahan *Capacitated Vehicle Routing Problem with Time Windows* (CVRPTW). Algoritma *Artificial Bee Colony* (ABC) digunakan sebagai metode utama dalam proses pencarian solusi, sedangkan *Adaptive Large Neighborhood Search* (ALNS) digunakan untuk meningkatkan kualitas solusi melalui proses *destroy* dan *repair*. Penelitian ini bertujuan menganalisis kinerja algoritma *Artificial Bee Colony* (ABC) dasar dan algoritma *Artificial Bee Colony* (ABC) yang dimodifikasi menggunakan *Adaptive Large Neighborhood Search* (ALNS) dalam menyelesaikan *Capacitated Vehicle Routing Problem with Time Windows* (CVRPTW). Diharapkan modifikasi tersebut mampu menghasilkan solusi dengan total jarak tempuh yang lebih minimum serta memenuhi seluruh kendala kapasitas kendaraan dan waktu pelayanan pelanggan.

**Kata kunci:** *Artificial Bee Colony*, *Adaptive Large Neighborhood Search*, *Capacitated Vehicle Routing Problem with Time Windows*, optimasi.

# ABSTRACT

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**Judul** : *OPTIMIZATION OF THE CAPACITATED VEHICLE ROUTING PROBLEM WITH CVRPTW USING THE ARTIFICIAL BEE COLONY ALGORITHM AND ADAPTIVE LARGE NEIGHBORHOOD SEARCH*

Goods distribution activities require optimal vehicle route planning to minimize the total travel distance while considering various constraints in the distribution process. One of the optimization problems that can be used to model these conditions is the *Capacitated Vehicle Routing Problem with Time Windows* (CVRPTW), which involves determining vehicle routes by considering vehicle capacity and customer service time windows. The main objective of the *Capacitated Vehicle Routing Problem with Time Windows* (CVRPTW) is to determine distribution routes with minimum total travel distance without violating vehicle capacity constraints or customer service time windows. This study employs the *Artificial Bee Colony* (ABC) algorithm combined with the *Adaptive Large Neighborhood Search* (ALNS) method to solve the *Capacitated Vehicle Routing Problem with Time Windows* (CVRPTW). The *Artificial Bee Colony* (ABC) algorithm is used as the main method in the solution search process, while *Adaptive Large Neighborhood Search* (ALNS) is used to improve solution quality through the *destroy* and *repair* processes. This study aims to analyze the performance of the basic ABC algorithm and the ABC algorithm modified using *Adaptive Large Neighborhood Search* (ALNS) in solving the *Capacitated Vehicle Routing Problem with Time Windows* (CVRPTW). The proposed modification is expected to produce solutions with a lower total travel distance while satisfying all vehicle capacity constraints and customer service time windows.

**Keywords:** *Artificial Bee Colony, Adaptive Large Neighborhood Search, Capacitated Vehicle Routing Problem with Time Windows, optimization.*