ABSTRACT

Tourism route planning is an important aspect of tourism development to improve travel efficiency and destination quality. This study aims to determine priority tourist destinations and to compare the performance of tourism route optimization methods in Semarang. Priority destinations are identified using the *Multi-Attribute Utility Theory* (MAUT) with criteria weights determined by the *Rank Order Centroid* (ROC). Tourism destinations with the highest utility values are selected as priority destinations and modeled as *Traveling Salesman Problem* (TSP). Tourism route optimization is carried out by comparing three optimization problem-solving method, namely exact method, heuristic method, and metaheuristic method. The exact method employs the *Branch and Bound* (B&B) algorithm as a benchmark to obtain the optimal solution. The heuristic method uses the *Nearest Neighbor* (NN) algorithm and metaheuristic method uses the *Ant Colony Optimization* (ACO) algorithm. Algorithm performance is evaluated based on total travel distance, computation time, and *Relative Error* (RE) to the optimal solution. The result show that the NN algorithm yields a *Relative Error* of 8,66%, while the ACO algorithm achieves a lower *Relative Error* of 2,2%. This indicates that ACO algorithm produces routes that are closer to the optimal solution.

Keywords: *Muti-Attribute Utility Theory, Traveling Salesman Problem, Tourism Route Optimization, Branch and Bound, Nearest Neighbor, Ant Colony Optimization*