

ABSTRACT

PT XYZ's West Port conducts inter-terminal transportation (ITT) activities that involve shipping containers back and forth between container terminals and warehouses using trucks. While critical to port operations, data shows a high rate of delayed shipments (47.30% in January 2024), resulting in significant delay costs of RM 11,044 for one month. The main cause of the delay was the high frequency of empty truck trips (76.05%) caused by non-optimal truck assignment arrangements. This situation indicates the need to optimize truck scheduling at PT XYZ West Port to reduce empty trips, minimize delays, and lower operational costs. Simulated Annealing with Normalized Exploration rate (SANE) method is implemented to solve this optimization problem. The model was developed by considering various port operational constraints and container movement characteristics. After the application of the SANE optimization model, the optimization results show a decrease in empty truck trips by 80.89%. The total delay cost also decreased significantly by 83.96%, to RM1,772 during January 2024. This research proves the effectiveness of the SANE method in optimizing truck scheduling in a complex port environment. The implementation of this model has the potential to improve operational efficiency and reduce costs substantially.

Keywords - Truck scheduling optimization, Simulated Annealing, SANE, empty truck trips, delay costs, port operations