ABSTRACT

PT. XYZ is a Fast-Moving Consumer Goods (FMCG) company operating in the food and beverage sector with a growing international market presence. In the FMCG industry, the rapid and accurate availability of products is important to business operations. However, achieving this goal has not been fully realized due to suboptimal warehousing processes, particularly in the picking process.

To enhance picking performance within the warehouse, the FSN classification method is employed, categorizing products into three groups: Fast-Moving, Slow-Moving, and Not-Moving based on their Consumption Rate and Average Stay. The results of the FSN classification are then integrated with the Slotting Zone, Aisle, Bay, Level, Slot (ZABLS) process, which dictates product placement by considering the total time required for retrieval, from the shortest to the longest. To further support optimal Delivery Order (DO) fulfillment, the outcomes of the classification and slotting processes are integrated into the Vehicle Routing Problem (VRP) utilizing a hybrid algorithm combining Ant Colony Optimization and Tabu Search (ACO-TS).

The novelty in this research lies in the sequential modeling of FSN Classification and ZABLS slotting as a strategic decision and VRP with hybridization of ACO and TS algorithms as a operational decision. The hybridization of these two algorithms yielded an average of 626.34 seconds or 10.43 minutes in the condition before classification and slotting, while in the condition after classification and slotting, the average was 557.64 seconds or 9.29 minutes. In the existing condition, the average was 757.14 seconds or 12.62 minutes. The minimization obtained in the condition before classification and slotting was 17.74%, while in the condition after classification and slotting, it was 25.75%.

Keyword: ACO, FMCG, FSN, TS, VRP, ZABLS