

A MEMETIC ALGORITHM FOR THE VEHICLE ROUTING PROBLEM WITH MOVING SHIPMENTS AT THE CROSS-DOCKING WAREHOUSE

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Cross-docking (CD), a relatively new technique, is considered an efficient technique to control the inventory flow in logistics. CD can reduce delivery lead times, inventory holding, and transportation costs. This research extends the study on vehicle routing problem with moving shipments at the cross-docking center (VRPCD&MS). The objectives of this study are to obtain near-optimal solutions to the large-scale instances of the VRPCD&MS model using a meta-heuristic algorithm known as the Memetic Algorithm (MA) and compare the performance of MA with the Genetic Algorithm (GA). In this study, MA is hybridised with GA, with an *insertion local search* method. The *elitism method* to choose the best members from the previous population to the next is also considered to structure the proposed MA approach. The tournament selection, order crossover and swap mutation are applied as the operators of the GA. The data for the numerical experiments are extracted from a benchmark problem in the literature. At the preliminary analysis, some parameters of MA, such as population size, number of iterations, termination count, crossover rate, and mutation rate, are tuned by the *Taguchi* method, and the appropriate parameter values are 50, 100, 100, 0.7, and 0.3, respectively. The computational results show that better solutions are found for VRPCD&MS by the MA approach than GA. In all the instances, even the average solutions found by MA are better than the best solutions found by the GA approach. Also, it was observed from the convergence analysis that the MA approach can reach the solution in fewer iterations than the GA approach. Therefore, it can be concluded that MA is capable of providing more accurate solutions than GA, whose average percentage improvement is nearly 6%. Moreover, it can be concluded that the MA approach converges to a better near-optimal solution faster than the GA approach.

Keywords: Cross-docking, Memetic algorithm, Moving Shipments, Vehicle routing