World Academy of Science, Engineering and Technology
International Journal of Industrial and Systems Engineering
Vol:12, No:05, 2018

A Hybrid Algorithm for Collaborative Transportation Planning among Carriers

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Abstract : In this paper, there is concentration on collaborative transportation planning (CTP) among multiple carriers with pickup and delivery requests and time windows. This problem is a vehicle routing problem with constraints from standard vehicle routing problems and new constraints from a real-world application. In the problem, each carrier has a finite number of vehicles, and each request is a pickup and delivery request with time window. Moreover, each carrier has reserved requests, which must be served by itself, whereas its exchangeable requests can be outsourced to and served by other carriers. This collaboration among carriers can help them to reduce total transportation costs. A mixed integer programming model is proposed to the problem. To solve the model, a hybrid algorithm that combines Genetic Algorithm and Simulated Annealing (GASA) is proposed. This algorithm takes advantages of GASA at the same time. After tuning the parameters of the algorithm with the Taguchi method, the experiments are conducted and experimental results are provided for the hybrid algorithm. The results are compared with those obtained by a commercial solver. The comparison indicates that the GASA significantly outperforms the commercial solver.

Keywords : centralized collaborative transportation, collaborative transportation with pickup and delivery, collaborative transportation with time windows, hybrid algorithm of GA and SA
Conference Title : ICLSCM 2018 : International Conference on Logistics and Supply Chain Management
Conference Location : Amsterdam, Netherlands
Conference Dates : May 10-11, 2018