Optimasi penentuan distribution center, dengan mempertimbangkan rute, time windows, permintaan stochastic dan kemacetan jalan = Optimization of distribution center determination by considering routes, time windows, stochastic demand and traffic congestion

Fabianus Dhanang Pradanta, author

Abstrak

ABSTRAK
Tingkat kemacetan jalan di kota besar cenderung meningkat dari tahun ke tahun. Kemacetan jalan tersebut menyebabkan model distribusi barang dengan satu Distribution Center (DC) untuk melayani semua titik pengiriman dalam satu kota besar belum tentu menjamin ketersediaan barang. Fluktuasi permintaan dan batasan waktu penerimaan di titik pengiriman menjadi hal yang harus diperhitungkan dalam menentukan kombinasi rute yang paling efisien. Penambahan sub-DC untuk melayani beberapa titik pengiriman bisa merupakan satu solusi agar tidak terjadi stock out. Hanya saja penambahan sub-DC cenderung akan menambah total biaya operasional, baik biaya pengiriman maupun biaya penyimpanan barang. Untuk itu perlu optimasi penentuan tambahan sub-DC yang mempunyai biaya paling efisien, termasuk meneliti sejauh mana perkembangan kondisi kemacetan akan membuat pilihan tambahan sub-DC tepat atau tidak. Model CVRPTW (Capacitated Vehicle Routing Problem with Time Window) dijalankan menggunakan VRP Speadsheet Solver. Kasus nyata pengiriman barang di Jakarta digunakan sebagai benchmark dan mengetes validitas model yang dibuat. Dari hasil eksperimen, selain didapat rute optimal hasil perhitungan, penambahan sub-DC tetap menambah biaya operasional total, namun bisa dipilih lokasi sub-DC yang memberikan tambahan paling kecil dibanding lokasi yang lain. Namun dalam jangka panjang, dengan kondisi kemacetan ekstrim, penambahan sub-DC ternyata memberikan biaya total yang lebih efisien dibandingkan bila hanya ada satu DC untuk melayani semua titik pengiriman barang.
<hr>
ABSTRACT
The level of traffic congestion in big cities tends to increase from year to year. Traffic congestion causes the distribution of goods model with one Distribution Center (DC) to serve all delivery points in one big city not necessarily guarantee the availability of goods. The demand fluctuations and acceptance time limits at the point of delivery are the things that must be taken into account in determining the most efficient route combinations. The addition of sub-DC to serve multiple points of delivery can be one solution to avoid stock out. It is just that the addition of sub-DC tends to increase the total operations cost, both shipping and storage costs. Therefore, it is necessary to optimize the determination of sub-DC additions which have the most efficient cost, including to examine the extent to which the development of congestion conditions will

make the sub-DC sub-appraisal correct or not. The CVRPTW (Capacitated Vehicle Routing Problem with Time Window) model is run using VRP Spreadsheet Solver. The real case of delivery of goods in Jakarta is used as a benchmark and test the validity of the model created. From the experimental results, in addition to the optimal route of calculation results, the addition of sub-DC still adds the total operational cost but can be selected sub-DC location which gives the smallest addition compared to other locations. However, in the long term, with extreme traffic congestion conditions, sub-DC additions turn out to provide a more efficient total cost than if there was only one DC to serve all points of delivery.