Horizontal co-operation in a clustered distribution context

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Abstract

By dividing the distribution area in zones, the complexity of the large-scale distribution problem faced by courier companies can be reduced. As a result, the underlying optimisation problem can be modelled and solved as a clustered vehicle routing problem. In this research, the concepts of horizontal co-operation are applied to a group of courier companies. By allowing the exchange of zones between different collaborating partners, the global efficiency of executing the transportation requests might increase, resulting in a lower total logistics cost for the coalition (coalition efficiency). However, it should be ensured that all individual partners feel comfortable with the proposed solution and that the workload, cost,... is allocated back to the partners in a fair way.

We propose a two-level view on the collaborative clustered vehicle routing problem. A master problem, taking care of the coalition efficiency, is in charge of suggesting profitable interactions between the partners (cluster exchange). For each partner involved in this interaction, a slave problem is solved with the aim of evaluating the suggested move by defining an acceptance condition (cost price). Only if both partners agree, the move is executed.

As a result, an integrated solution approach that ensures both coalition efficiency and individual partner efficiency is obtained. Furthermore, a cost allocation method is included implicitly in the optimisation procedure.

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