An Exact Method To Solve The Multi-Vehicle Static Demand Responsive Transport Problem Based on Service Quality with Hard Time Windows: the case of One-to-One

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Résumé

With development the technologies in the transportation systems, the distributed applications are more and more used. Because these systems needs to have Service Quality (SQ) expectations (delay, not comfortable transportation , etc.),a set of SQ oriented system aimed at aiding passengers to be more satisfied in their daily transport. Traditionally, SQ is measured by its inverse that is to say in terms of inconvenience, today it's became more and more important mainly in transportation system.

If we look now at the DRT we found that it can have a middle SQ compared with other mode of transportation according to Raje et al (2003), when they defined the DRT as " services provide transport 'on demand' from passengers using fleets of vehicles scheduled to pick up and drop off people in accordance with their needs. DRT is an intermediate form of transport, somewhere between bus and taxi which covers a wide range of transport services ranging from less formal community transport through to area-wide service networks ". Selecting the best routing with the best cost according to the application requirements and DRT contexts is a challenge if we want to provide enough SQ to the customer. For that we have the idea to make a new mathematical modeling for the Static DRTP totally based on SQ.

Our modeling is different from those existing in literature in the way of integration of SQ as a penalty function in the objective function. If the customer reached late to his destination there is a penalty percentage will be added to the cost which must be minimized. So we have here a new variant of the SDRTP based on SQ with hard time windows called SDRTP-SQHTW. Second we are tried to solve this new variant of SDRTP with multi-vehicle in the case of One- to-One transportation type uses an exact method the Branch and Bound. The Multi-Vehicle Demand Responsive Transport Problem Based on Service Quality in the case of One-to-One (MVSDRTPBSQHTW1-t-1) under study presented this characteristic: each customer have his own origin and own destination.

The aim of this paper is to find the best routing scheduled of all receipt requests with the respecting of hard Time Windows of each customer. The novelty of our paper is presented in

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the new manner of B&B algorithm application. However, we will trying to take the general architecture of Branch & Bound algorithm and using valuation rules in a different way which can adapted for such problem to find an optimal solution. The main idea is to applicants B&B in each vehicle such as we have a mono-vehicle problem but we are already testing all existing possible case to affect nodes to vehicles. It is very difficult to found an optimal solution to this problem since it is a NP hard mostly with using an exact methods ,but finally, we are succeed to adapt B&B algorithm and found very interesting results.

Mots-Clés: Keywords- Demand Responsive Transport Problem, Exact Method, one, to, one transportation, Branch and Bound algorithm