

An Application of the Vehicle Routing Problem Model to a Local Company in Kuwait

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Abstract

A popular furniture manufacturing company (AB) in Kuwait has been experiencing significant delays and increasing expenses, in their delivery service. For the furniture industry, home delivery is critically important service to achieve higher customer satisfaction levels. AB owns over 100 trucks of different capacities and cover the all areas of Kuwait. AB uses a computerized approach to manage their trucks considering the different truck capacities, the different product categories and sizes, the installation requirements at customer's premises, in addition to customer preferences. The current approach merged all trucks to serve all areas, and often combine several orders in one truck to utilize the truck size. Customers, however, started to complain because of late deliveries. The current system is rigid as expressed by the logistics department.

In this work, the problem is studied with the purpose of developing a simpler, efficient, and more user-friendly application to handle the truck routing issues. The objectives set for the project were:

- Evaluating the current situation to identify the potential source of the customer complaints
- Addressing the truck routing task at AB with the Vehicle Routing Problem (VRP) model
- Developing a spreadsheet implementation of the VRP model, applied to AB's settings, to allow more flexibility in rescheduling

The analysis of the current work method, pointed out that using large-sized trucks to combine several orders contributed to the difficulty of handling the missed deliveries. Drivers head to the delivery addresses but find no receiving customers and no responses when calls. This occurs more than expected. They proceed to next deliveries, and later get contacted to return to the earlier deliveries. If feasible to do in the same day, it causes significant waste of time and higher fuel and truck consumption. The problem is complicated with the usual traffic jams on the roads. In the analysis, it was proposed to use smaller trucks and limit the number of orders per truck. Thus, categorizing the use of the trucks was recommended. We modeled AB's system as a capacitated VRP and included our recommendations in developing a user-friendly spreadsheet application, to test the proposed operational settings. The spreadsheet application was built with MS Visual Basic for Application in Excel and it offered simple users' interface for data entry and results output. The Clarke and Wright' Saving algorithm was utilized as the solution approach.

Management evaluated the prototype of the application, and it was estimated that no less than 25% of the time and cost would be saved, if the proposed approached was used.

Keywords

Home delivery, Truck Routing, Vehicle Routing Problem, Spreadsheet Modeling.

Biographies

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