

Vehicle Routing and the Green Agenda

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The main objective of logistics systems has been to co-ordinate plan operations in a way that meets customer requirements at minimum cost. In the past this cost has been defined in purely monetary terms. As concern for the environment rises, organisations wish to take more account of the external costs of logistics associated mainly with climate change, air pollution, noise, vibration and accidents.

As part of a research programme in the U.K. on green logistics in general (www.greenlogistics.org), we are studying what contribution might be made to environmental objectives through vehicle routing models that do not solely focus on economic objectives.

Current vehicle routing and scheduling software is designed to produce schedules for freight vehicles to minimise the relevant economic costs to the logistics service provider. Typically these are based on numbers of vehicles and drivers required and the distance travelled. Although the software may allow different speeds for vehicles on different types of roads, this is a rough approximation that does not take into account the different speeds on different roads at different times of day and different days of the week. This results in schedules where freight vehicles spend time in congested traffic, contributing to the congestion and associated environmental costs. There are also economic and social costs due to missed delivery time windows and overtime costs when routes take longer than planned.

Transit time variations on different routes that are due to congestion and features such as long-term road works can be predicted from past experience. Data in the form of a Road TimetableTM database are now available through companies such as ITIS Holdings plc to provide the information that shows how long it will take to travel along different roads at different times of day and different days of the week.

Using data from ITIS Holdings plc, we are developing a prototype vehicle routing and scheduling system to take this information into account and to plan schedules for different types of distribution operations that minimise the time-based costs.

The paper describes some of the technical issues involved in developing the software to meet this requirement.

Results are presented using data from a case study involving distribution of goods by an electrical wholesaler in the south west of England that indicate potential benefits from this approach.