Assessing the Potential for Rationalising Road Freight Operations

Funding: National (United Kingdom)
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Status: Complete with results

Background & policy context:
A key element of the UK government’s Sustainable Distribution strategy has been the Transport KPI initiative. This initiative has been designed to help companies benchmark the efficiency of their road transport operations against a standard set of key performance indicators (KPIs). Several ‘synchronised audits’ of fleet activity have been undertaken since 1997, including three in the food supply chain. The main objective of this project was to develop software tools that can be applied to the large transport KPI databases to assess opportunities for rationalising road freight operations.

Two forms of rationalisation were investigated: more efficient routing of vehicles on multiple-drop rounds and a reduction in the empty running of lorries through improved back loading. The tools were tested on the results of the 2002 transport KPI survey conducted in the food supply chain, which covered 53 vehicle fleets, comprising roughly 3500 vehicles which travelled 1.4 million km over the 48-hour survey period. The project also surveyed users and suppliers of commercial vehicle telematics systems (VTS) to examine the extent to which these systems were being used to collect and analyse KPI data.

Objectives:
1. To define and specify the requirements for a software tool-kit;
2. To develop a software tool-kit for use on the transport KPI database;
3. To apply the tool-kit in an analysis of the transport KPI data to assess the potential for reducing the economic and environmental costs of road freight transport;
4. To consider how the tool-kit might have to be adapted to distribution operations in other sectors;
5. To examine the collection of KPI data by commercial road freight information systems;
6. To investigate ways of combining the software tool-kit with real-time road freight information systems to identify backloading and load consolidation opportunities on a short-term basis.

Methodology:
Software toolkits have been developed to interface the transport KPI database with the Optrak vehicle routing package (for the route efficiency analysis) and with GIS modules in the SAS package (for the analysis of backloading opportunities) (objectives 1 and 2). The tools were tested in analyses of sample data drawn from the 2002 transport KPI survey in the food supply chain (objective 3). Although the tools are customised to the food transport KPI database, they could, with modest revision, be adapted to KPI surveys in other sectors employing similar methodology (objective 4). Telephone interviews were held with 33 providers and 32 users of truck telematics services were undertaken which examined the potential for these services to collect operational data required for the calculation of transport KPIs and the nature, formatting, storage and analysis of data currently collected (objective 5). Discussions with operators of vehicle telematics systems and online freight exchanges indicated that the tool-kit lacks the necessary functionality for real-time load matching in a commercial environment. Software for the real-time monitoring and trading of backhaul capacity has now been developed and commercialised by other organisations (objective 6).

Parent Programmes:
DfT LINK - Department for Transport - Transport LINK (various projects)
Key Results:

The main deliverable from this project has been the new set of software tools for retrospective analysis of the operational efficiency of truck fleets using data compiled in transport KPI-type surveys. Use of these tools permits the assessment of potential efficiency gains against theoretical optima, in contrast to the earlier benchmark analysis which judged this potential against prevailing industry best practice. It is anticipated that the main use of the tools will be to estimate potential cost, energy and emissions savings at an aggregate level, though they could be applied to a single company’s transport operation where it supplies sufficient fleet data. Other deliverables include:

1. the results of the routing and backloading analyses on which the new software tools were tested and
2. the results of the surveys of companies supplying and using road telematics systems.

The latter results provide a useful insight into the current state of the telematics sector in the UK and the possibility of applying a similar set of software tools to commercial vehicle tracking databases.

Policy implications

The software tools developed in this project essentially add value to the government’s transport KPI initiative. They permit much more detailed spatial analysis of the trip data collected in the transport KPI surveys. This analysis can be conducted both at an aggregate level for the sample of fleets surveyed or for individual companies participating in the surveys. In both cases, the main output is an estimate of the potential reductions in vehicle kilometres, transport costs and emissions from improved routing and scheduling and greater backloading. The analysis can also help to identify where the main opportunities exist for efficiency gains.

The Cold Storage and Distribution Federation (one of the research partners) is exploring the possibility of securing longer-term commitment from companies in the food sector to participate in transport KPI surveys on a regular basis. This would create new opportunities for the application of the software tools. Indeed, they could become an integral part of the transport KPI initiative.

The surveys of companies supplying and using road telematics systems provided a useful insight into the current state of the telematics sector in the UK and the possibility of applying a similar set of software tools to commercial vehicle telematics databases. It is possible that, with further development, the software tools developed in this project could be adapted for use with the large commercial databases being accumulated by vehicle telematics systems. Opportunities are being explored for providing advice, on a commercial basis, to road freight operators on the purchase and implementation of VTS. The survey of VTS users revealed that many of them have failed to obtain the expected benefits from these systems, particularly in the way that they use the telematics data to measure and benchmark fleet performance.
STRIA Roadmaps: Network and traffic management systems
Transport mode: Road transport
Transport sectors: Freight transport
Geo-spatial type: Other