



Legal aspects in road transport optimization in Europe

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ABSTRACT

Road freight transportation is subject to several legal requirements having direct impact on the practical applicability of routes and schedules. The vast majority of vehicle routing literature, so far, has largely focused on physical constraints such as capacity limits, or customer requirements such as time windows for pickups and deliveries. This paper studies legal requirements for long-distance haulage in the European Union, identifies some major gaps in the current state-of-the-art in vehicle routing, presents approaches for overcoming this gap, and analyzes the impact of the legal requirements studied.

1. Introduction

In the European Union, as in other parts of the world, road freight carriers must comply with several legal requirements. Some of these legal requirements, e.g., speed limits and access restrictions for certain types of vehicles and roads, can be easily considered in approaches for road transport optimization, because these approaches are usually based on distance matrices which can be pre-computed taking into account the various requirements of the individual roads. Other legal requirements, in particular, those arising from social legislation are more complex and difficult to deal with in approaches for road transport optimization and have so far seen little coverage in the scientific literature on vehicle routing.

This paper contributes to research on transport optimization in several ways. First of all, it reviews social legislation for road freight transport in the European Union and identifies major gaps in the state-of-the-art in vehicle routing. These gaps can lead to practically infeasible solutions and solutions having unnecessarily high costs. Secondly, an approach is presented which can be used by transport companies, drivers, and enforcement agencies to validate compliance of planned or executed schedules. Furthermore, an approach for generating feasible schedules is presented and it is shown how compensation schemes compliant with social legislation can be considered when optimizing routes and schedules. Lastly, the impact of social legislation on feasibility, route length, costs, and road safety is experimentally analyzed. This impact analysis should be of particular interest to policy makers and other stakeholders, in particular, as relevant regulations are currently under review and may be revised in the near future (European Commission, 2017b).

2. Social legislation

In the European Union, several legal frameworks exist aiming at improving road safety and working conditions of drivers as well as ensuring fair competition between road transport operators throughout the European single market. Among these is Regulation (EC) No 561/2006 (European Union, 2006) which entered into force in 2007. With the introduction of this regulation, transport companies can be made liable for infringements committed by the drivers and, thus, they are legally responsible if plans and schedules are generated in such a way that drivers do not have enough time for compulsory break and rest periods.

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According to Regulation (EC) No 561/2006, a driver must not drive for more than $4\frac{1}{2}$ h without taking a break of at least 45 min duration, during which the driver may not carry out any work. The break can also be taken in two parts, whereas the first part must have a duration of at least 15 min and the second part must have a duration of at least 30 min. After a total of 9 h of driving, a driver must take a rest period of 11 h duration, during which the driver may freely dispose of her or his time. Similar to break periods, rest periods can also be taken in two parts, whereas the first part must have a duration of at least three hours and the second part must have a duration of at least nine hours. Thus, if a rest period is taken in two parts, a total rest of 12 h is required before the driver may continue to drive again. Three times a week, the regular duration of a rest period may be reduced to at least 9 h, and twice a week, the total driving time between rests may be extended to 10 h. In any case, the required amount of rest must have been taken within 24 h after the end of the previous rest period. The accumulated amount of driving and the accumulated amount of working within a week are restricted to at most 56 and 60 h and a weekly rest period of at least 45 h must be taken after at most 144 h after the end of the previous weekly rest period. Alternatively, a reduced weekly rest period of 24 h may be taken if the reduction is compensated by an equivalent period of rest taken in a subsequent week. The regulation constrains the total accumulated driving time during any two consecutive calendar weeks to at most 90 h and in any period of four months, the average working time during a calendar week must not exceed 48 h.

In order not to incentivize drivers to violate above mentioned rules on driving hours, Regulation (EC) No 561/2006 demands that transport companies do not give drivers any payment related to distances traveled, not even in the form of a bonus or wage supplement.

Besides Regulation (EC) No 561/2006, which is directly applicable in all member states of the European Union, transport companies must also comply with national implementations of Directive 2002/15/EC (European Union, 2002). The directive is also called “Road Transport Working Time Directive” and outlines additional provisions for working time, breaks, and night work. The directive is not directly applicable, however, the member states of the European Union have adopted additional national regulations imposing comparable constraints, with some variation in the working time limits and the definition of night time (see Goudswaard et al., 2006). These regulations require that a truck driver does not work for more than six hours without a break of at least 30 min. If the total amount of work between two rest periods exceeds 9 h, the amount of break time required is increased to at least 45 min. The required break time can be taken in several periods of at least 15 min each. Furthermore, the directive restricts the total amount of work within any period of 24 h if night work is performed. Night work in this context means any work performed during night time which is defined by national law. As shown in Table 1, the definition of night time and the daily working time limit varies across the European Union.

It must be noted, that in some countries, additional regulations exist prohibiting road freight transport during night. In Austria, there is a general night time driving ban for heavy goods vehicles between 22.00 h and 5.00 h (International Road Transport Union, 2016a). In Germany, night driving restrictions exist for specific roads (International Road Transport Union, 2016b), and in the United Kingdom there is a night time driving ban in the Greater London area from 21.00 h to 7.00 h (International Road Transport Union, 2017a).

Table 1
Night time definitions and daily working time limits (Goudswaard et al., 2006).

Country	Abbreviation	Definition of night time	Daily working time limit
Austria	AT	00.00–04.00	10
Belgium	BE	20.00–06.00	8
Cyprus	CY	00.00–07.00	10
Czech Republic	CZ	22.00–06.00	8
Denmark	DK	01.00–05.00	10
Estonia	EE	00.00–07.00	10
Finland	FI	23.00–06.00	n/a
France	FR	22.00–05.00	n/a
Germany	DE	23.00–06.00	8
Greece	GR	22.00–06.00	10
Hungary	HU	00.00–04.00	10
Italy	IT	n/a	n/a
Ireland	IE	00.00–04.00	10
Latvia	LV	00.00–07.00	10
Lithuania	LT	22.00–06.00	10
Luxembourg	LU	00.00–05.00	10
Malta	MT	00.00–07.00	10
Netherlands	NL	00.00–05.00	10
Poland	PL	21.00–07.00	10
Portugal	PT	00.00–05.00	10
Slovakia	SK	22.00–06.00	10
Slovenia	SI	23.00–06.00	10
Spain	ES	00.00–07.00	8
Sweden	SE	00.00–07.00	10
United Kingdom	GB	00.00–04.00	10

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