Foreword

In the European Union, statutory regulations restricting truck drivers' working and driving hours have been existing for several decades. Although these regulations have ever since been strictly prescribed by law and although their negligence in transportation planning and fulfillment was to be fined, they have only been of minor importance in the vehicle routing and scheduling literature so far. First and foremost, the techniques used for the documentation of the actual driving times and the methods for controlling the abidance by the law have changed the situation drastically. Since April 2007, the usage of digital tachographs has become mandatory in the European Union. At the same time, the new Regulation (EC) No 561/2006 on driving times of truck drivers has become effective. Due to the digital documentation, the surveillance of the driving times has become easier and can be performed efficiently by the control authorities. That is why the planning of breaks and rest periods has become a very important issue in vehicle routing and scheduling by now.

The PhD thesis of Christoph Manuel Meyer is one of the very early comprehensive monographs considering driving and working hours within vehicle routing and scheduling. Its main focus is on the distributed decision making perspective in the combined problem of vehicle routing and break scheduling. In his thesis, Christoph Manuel Meyer first presents a complete mathematical optimization model for the vehicle routing and scheduling problem with time windows which complies with the European legal rules on driving and working times. This model of the so called VRPTW-EU is used for computational experiments which generate some very interesting insights concerning the impact of including break scheduling in vehicle routing. Especially the relations among different goals of vehicle routing, such as travel distance minimization, minimization of the number of used vehicles and the minimization of travel and operating times are analyzed. Based on the introduced comprehensive and full model for the compound problem of combined vehicle and break scheduling and on useful separations of the entire model, the general framework of distributed decision making is applied to the decision problem under consideration. This leads to innovative distributions of optimization tasks between dispatchers and drivers which indeed are to a

high degree relevant for operational transportation planning processes in practice. Solving and analyzing both, the decision problem of the dispatcher and that of the drivers, and combining both problems requires the definition and application of adequate anticipation functions. Several experiments with different anticipation functions are conducted and reported in this thesis, showing the advantages and disadvantages of perfect explicit, approximate explicit and implicit anticipation. Apart from a mathematical model this thesis presents a restricted dynamic programming heuristic which solves the VRPTW-EU efficiently. By means of this heuristic, valuable experimental results could be derived which are useful for the application of the decentralized planning approach to vehicle routing.

This book presents and investigates the important extension of vehicle routing and scheduling by the aspects of break scheduling according to the regulations of the European Union. It proposes approaches for solving the expanded problem and analyzes the effects of including these regulations in transportation planning. Therefore, it is an essential and helpful reading for researchers and students of logistics, particularly for those with an engineering background. In addition, the contents of this book might be very interesting for executives and software engineers in the area of transportation planning.

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