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FREIGHT TRANSPORT MODELING: REVIEW AND FUTURE CHALLENGES

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ABSTRACT: This paper reviews the models proposed in the past two decades to forecast freight transport demand resulting from changes in infrastructures, services and regulation. A classification is proposed based on different scales of analysis (e.g. long-distance *vs.* short-distance freight transport), and on modeling approaches (e.g. aggregate *vs.* disaggregate). The first part of the paper focuses on the long-distance scale (i.e. national and international). In this context aggregate modeling efforts, using time series data, have either concentrated on the growth pattern for specific commodities or on the traditional "four-step" model, typically applied to passenger demand. These models address large-scale problems, but are unable to deal explicitly with the micro-mechanisms underlying demand, where a more disaggregate approach is needed. The second part of the paper deals with short-distance models and with the distribution of final products from wholesalers and re-stocking centers to retailers and end consumers. These models can be cast into two classes: those simulating level and spatial distribution of commodities traded within the study area (Origin-Destination matrices) and those simulating the delivery process with the ultimate goal of estimating commercial vehicle flows on the road network. In particular, the aggregate class of models can be further split based on reference unit (i.e. vehicle, quantity and delivery). Finally, the paper discusses the pros and cons of both types of models (i.e. long and short distance), and describes the research challenges in this area for the near future.

KEYWORDS: freight transport, large-scale demand modeling, agent-based models, urban freight demand modeling, city logistics.

1. INTRODUCTION

TRANSPORT plays an important role in the economic system at the national, regional and urban scale. An efficient transport system can contribute considerably to increase trade and productivity of a country by reducing freight transport-related costs (Southwork, 2003). Moreover, it fosters the

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