

Integrating Transport Logistics Hubs in Freight Transport Demand Modelling

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Abstract

Changes in transport logistics result in changes in freight transport. Therefore, logistics is seen as being of major importance and a driver for the development of freight transport itself. In freight transport demand modelling the mapping of logistics-caused influences on freight transport emerged as an important topic in this context, too. Logistics aspects found more and more consideration in modelling in last decades. Nevertheless, there are some essential aspects that are covered insufficiently by models, especially for the German context. One of these aspects is the consideration of transport logistics hubs – hubs that do not have storage function (although there may be a certain buffer capacity due to the transshipment process). Transport logistics hubs are of great importance in transport logistics today because transport is increasingly managed and handled at these hubs. Thus, they have a significant influence on generation of freight transport. They play a crucial role for transport processes because commodity flows are bundled and concentrated at these points. Nonetheless, transport logistics hubs (e.g. locations of forwarding companies, combined transport terminals) are hardly integrated in freight transport demand modelling and rarely covered empirically, as well. Due to the fact that all demand models need proper input to integrate transport logistics hubs adequately, the lack of data represents a major challenge here.

In order to close this gap a project, funded by the German Research Foundation (DFG), was launched. First of all, a typological order of hubs was developed by reviewing hub specific literature. In this manner, different attributes and characteristic values were identified. They served as a basis for an empirical survey. Additionally, a comprehensive literature review examined national and international freight transport demand models due to their integration of transport logistics hubs. Data requirements as well as transferability of modelling approaches were reviewed in this context. In a second step, a huge secondary data pool was compiled by investigating all hub locations in Germany and their specific data. These data mainly concentrate on transport statistics and company data. The following data acquisition (survey) focussed on the identified hubs and companies from the previous secondary data analysis. Thirdly, statistical analysis (e.g. non-linear regression analysis) helped to determine correlations between key parameters of the surveyed hubs. Using the discovered correlations, secondary and primary data were linked in order to provide input parameter for the modelling process. In the last step we developed an approach to integrate transport logistics hub into freight transport demand modelling.

The aim of the article is to present the major findings and results of the project. We will present an integrated approach to consider transport logistics hubs, its typological derivation of statistical values according to their transport generation as well as the modelling approach that considers transport logistics hubs. The literature review mainly showed that only some of them consider transport logistics hubs in an adequate way. Logistics hubs are mostly considered as distribution logistics hubs, whereas transport logistics hubs, if considered, are commonly integrated as simple sources/sinks or so called special generators. This procedure is, however, not suitable for all types of hubs. In order to integrate transport logistics hubs for the area of Germany in an adequate way, there is a need to survey hub specific data. The carried out typological classification of transport hubs will present all types of hubs, which were identified and considered in the further analysis steps (e.g. ports for international and inland waterways, terminals of combined freight transport, airports, freight transport centres, locations of KEP-service provider and freight forwarders). The compiled data pool of logistics hubs and companies includes nearly 2.400 contacts and focusses especially on the 14 freight forwarding networks in Germany dealing with general cargo. All returned answers of the survey – almost 400 – provide detailed hub specific information

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regarding its characteristics (e.g. handling area, transport volume and trips, used vehicles, clients' business sectors, etc.). Findings of the non-linear regression analysis show that there are significant correlations between key parameters and hub characteristics. This will be exemplified in the article for hubs corresponding to freight forwarders and other facilities of goods transportation in the road transport sector. Using these correlations we will present possibilities to integrate the gathered knowledge of transport logistic hubs into freight transport demand modelling as well as a concept to reproduce the hub specific freight transport demand – explicitly for the case of freight forwarding companies. Furthermore, an outlook to the further use of the gathered information (e.g. development of a logistics module) will close the paper.

Keywords: freight transport demand modelling, transport logistics hubs