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Locations of Logistics Service Providers in Germany - The basis for a new freight transport generation model

Kevin Rolko [a], Hanno Friedrich [b] *

Kevin Rolko, Technische Universität Darmstadt, Darmstadt (Germany)
Hanno Friedrich, The Kühne Logistics University, Hamburg (Germany)

Abstract

Integrating the decisions and the behavior of Logistics Service Providers (LSPs) into freight transport models is essential to be capable of accurately describing future developments in freight transport systems. Knowledge on the spatial distribution patterns of LSP locations, e.g. to represent network routing of shipments more accurately, is of paramount importance. Moreover, attributes characterizing the LSP locations are helpful to relate them to traffic generation. Therefore, the objective of this paper is to present intermediate results of an empirical study on LSP locations in Germany. Drawing on these findings, the freight generated by German less than truckload networks is estimated on an aggregate level. These findings shed some light on the spatial and structural patterns of the locations allocable to the German logistics sector and the freight transport it generates. These insights are highly relevant for freight transport and land use planning policies.

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Keywords: Freight generation rates, freight transport modelling, logistics service providers, locations, groupage, freight trip generation rates

1. Introduction

In Germany, the freight volume and freight traffic performance have risen significantly over the last decades. In the wake of this development, the logistics industry has steadily gained importance both in terms of sector employment and contribution to economic welfare due to trends like logistics outsourcing or the structural change in the types of goods transported. Specifically appealing to logistics service providers (LSPs) for settlement in

* Corresponding author. Tel.: +049 6151-1676135; fax: +49 6151-164625.
E-mail address: rolko@verkehr.tu-darmstadt.de

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commercial real estate areas has thus become an increasingly popular subject of location marketing and land use planning activities conducted by German local and regional authorities. The principal aim of these activities is to stimulate the creation of new employment and hence increase the local tax income (Wagner 2010).

Besides these economic benefits, locations of the logistics industry commonly entail more truck traffic in comparison to other types of land use and hence produce a higher level of negative externalities like noise or air pollution. Several concepts to mitigate these negative impacts such as city logistics or the establishment of freight villages have been promoted during the last years (e.g. Winkler and Seebacher 2011, Crainic et al. 2009). When appraising these concepts in regard to their effectiveness and efficiency, modelling is an essential tool to gain deeper insights into structural, spatial and temporal patterns of the freight transport demand by LSPs.

Yet German local and regional public authorities commonly do not operate a special, dedicated freight transport demand model, unlike for instance their Dutch or Belgian complements (e.g. Ben-Akiva and Jong 2013, Grebe et al. 2016). Therefore, a quick and convenient way to assess future traffic impacts of locations to be developed, is applying generation rates for both freight and passenger transport. Despite a widespread acceptance of this modeling method in practice, there are only a few empirical publications on logistics locations and their corresponding generation rates with emphasis on Germany. Therefore, it is of high importance - not only for spatial and transport planners but also for freight transport modelers - to gain a wider comprehension of the locations of LSPs and their structural patterns as a first step towards expanding the empirical basis on generation rates in Germany.

The paper addresses this knowledge gap by presenting statistical findings originating from a data sample on German LSP locations. The emphasis of this study is on the spatial and structural patterns of these locations on a national level. Moreover, freight generation rates are applied on a national level for the logistics market segment of less than truckload freight (LTL) to test the informational value of the data sample.

Therefore, the paper is organized as follows: the relevant literature on generation rate-based freight transport modelling and German logistics facilities is briefly reviewed in section 2. In section 3 the empirical approach and the representativeness of the obtained data sample are discussed. Thereupon the data sample is analyzed and structural as well as spatial patterns of German LSP locations are presented in section 4. In section 5, freight generation rates are applied to a subsample, the locations LTL transport service providers, on a national level. Finally, concluding remarks on the obtained insights and future directions of research are presented in section 6.

2. Literature review

In order to attain a consistent understanding for the remainder of this paper, the term *location* needs to be defined first. So for the purpose of this study, the term *location* refers to a single establishment of an LSP. This establishment commonly consists of a parcel of land on which buildings and/or other structures are located. These buildings and structures are primarily used to realize logistics services. Additionally, supplementary functions essential to operate a logistics company like administrative tasks are also carried out there. Explicitly not included in this definition are pure administrative locations like company headquarters or offices belonging to non-asset operating forwarders. Thus the distinctive characteristic is whether a location is, above the ordinary, a destination and/or origin for truck trips.

As to the existing literature on LSP locations, the focus of this paper is directed on the identification of studies that are directly related to freight transport demand modelling in general and generation rates of German LSP locations in particular. Yet a multitude of literature from related scientific perspectives concerning the LSP locations can be found, which mostly prove to be of additional informational value (e.g. McKinnon 2009, Dablanc and Rakotonarivo 2010, Cidell 2010, Rivera et al. 2014, or Sakai et al. 2015).