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Inland port performance: a statistical analysis of Dutch inland ports

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Abstract

Most scientific attention in freight transportation port studies centers on the characteristics of deep-sea ports, in particular container ports. In our paper, in contrast, we focus our attention on the performance of inland ports in a European context, which is up to now an overlooked part in the scientific literature on port development. Based on a large-scale quantitative dataset of Dutch inland ports we perform various statistical analyses to arrive at a more detailed understanding of the performance of inland ports. We try to explain the performance of inland ports in terms of transshipment level and growth in transshipment by several transport and economic factors. We test for differences in size and in volume growth and control for differences in diversity of transshipped goods and in availability of a container terminal in the inland port. Our findings contribute to the understanding of the performance of inland ports, as explained by general port characteristics. A better understanding of the characteristics and growth patterns of inland ports might also be beneficial to European practitioners and policy-makers in dealing with inland ports' development strategies in their daily practice.

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Keywords: inland port, port system development, transshipment, performance indicator, port governance

1. Introduction

Most scientific attention in freight transportation port studies centers on deep-sea ports and more in particular container ports. Especially the efficiency of maritime ports and terminals has received much attention, but also the

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analysis of the role of deep-sea ports in transport and supply chains and the analysis of the management and organization of ports and terminals forms part of the body of scientific literature (e.g. Van Klink & Van den Berg, 1998; Hesse & Rodrigue, 2004; Notteboom & Rodrigue, 2005; Notteboom, 2010). In the hinterland of deep-sea ports (i.e. in inland ports) most scientific attention also goes to container terminals in combination with the logistics role of inland ports versus the hinterland of the larger maritime ports (see for instance the recent Inside-Out, Outside-In discussion in Wilmsmeier et al., 2011 and Monios & Wilmsmeier, 2012). However, inland ports are becoming more important in global supply chains and up to now the scientific attention to these processes is lagging behind for the inland ports, especially in the European context. Furthermore, governmental bodies such as inland port authorities, municipalities and regions try to optimize their production factors in terms of people, planet and profits in and around inland ports and might therefore also be benefitted by a more detailed insight in the performance of inland ports in Europe. This leads us to the following research question: "How can the performance conditions of inland ports explain their change in size and growth?"

In our paper, we focus our attention on the inland ports in general (i.e. as compared to focusing solely on container terminals in inland ports). By doing so, we aim to address the undervalued position of European inland ports in the academic literature. In Section 2, we present a literature review of port studies. Due to the limited availability of scientific literature purely focusing on inland ports, the review mainly focuses its attention on issues identified in the context of maritime ports and the implications of these respective issues for the context of European inland ports. In Section 3, we explain the development of a large-scale dataset of 135 municipalities in the Netherlands with information about the transport characteristics of their inland navigation activities, combined with economic characteristics of the inland port, the municipality and the region. In Section 4, based on this large-scale quantitative dataset, we perform various statistical analyses (single-measure performance measurement and multivariate regression analyses) in order to arrive at a detailed understanding of the performance of inland ports. We try to explain the performance of inland ports by several transport and economic factors. We test for differences in size and in volume growth and control for differences in diversity of transshipped goods and in availability of a container terminal in the inland port. Section 5 contains the conclusions of our paper and the implications of our findings for port governance strategies in the daily practice of European inland ports.

2. Inland waterway transport and inland ports

2.1. Characteristics of inland waterway transport and inland ports

Inland waterway transport including the use of inland ports has been important for several centuries for both the transport of freight and passengers. In the past, horses were used to pull the barges towards their destinations. Later on, industrialization led to the introduction of steam engines in inland waterway transport but it also led to the introduction of rail transportation for both passengers and freight. This resulted in a shift from passengers away from barges to trains and, nowadays, inland waterways are usually only used for tourism purposes and no longer for regular passenger transportation services. Inland waterway transport stayed important though for freight transportation. Rail freight transport developed into a serious competitor for inland waterway freight transport, especially for large bulk freight flows to and from industrial production facilities. But also inland waterway freight transport was able to keep their market share and develop new markets for freight transport. Recently, dry bulk and liquid bulk together account for approximately 80% of all transported volume (in Europe). A new market developed by inland waterway freight transport is the hinterland transportation of containers to and from large deep-sea ports but also between inland ports.

Over the centuries, due to these developments, the institutional role of inland waterway transport has changed. It started off as being one of the most important transport modes, accompanied by a large institutional interest in inland waterway transport. New canals and locks were built and the inland waterway network grew in importance and size. After the introduction of rail freight transport and lorry transport, the institutional role of inland waterway transport changed. In land-bounded transportation, inland waterway transport has developed into the third transport mode after road and rail transport. The main institutional focus is now on the maintenance of the network (links and locks) and on solving capacity constraints.