Intermodal Inland Waterway Transport: Modelling Conditions Influencing Its Cost Competitiveness

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Abstract

In this paper a model is developed to analyse and compare the transport costs of intermodal inland waterway transport and road-only-transport. The influence of the economies of scale in inland waterway transport and terminal operations are taken into account in the analysis. In the model the transport costs are defined and related to different transport operations and conditions (e.g. share of empty kilometres, capacity usage of terminals, etc.) in order to analyse the sensitivity of the cost performance of intermodal inland waterway transport. By doing this it is possible to analyse to what extent intermodal freight transport is competitive with road-only transport in terms of transport costs and specific operations and conditions (both in shipping and terminal). The conclusions prove that roundtrips, drop & pick operations in pre- and end-haulage and smaller containers (20ft instead of 40ft) considerably improve the competitiveness of intermodal inland waterway transport, while the relative high cost operations in small terminals reduce the competitiveness of intermodal inland waterway transport.

Key Words : Inland Waterway Transport, Intermodal, Cost Competitiveness, Economies of Scale, Europe

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I. Introduction

In the last decades, European freight transport has increased enormously and this growth has been predominantly absorbed by road transport. While road transport counted for 65% of total transport (in tonne-km) in the European Union (EU-9) in 1980, its share in the EU-27 recorded 76% in 2010, leaving a share of rail and barge of 17% and 7% respectively (Eurostat, 2013). However, besides its many advantages road freight transport also causes congestion, accidents, air pollution and noise nuisance. Evidently, these conditions ask for an improvement of the performance of road freight transport, but they also call upon a greater role of other modes. Intermodal transport can be an alternative mode that can overcome the above-mentioned problems. A precondition to achieve this shift from road to intermodal transport is, however, that the performance of intermodal transport is competitive with road-only transport. In general, the cost of transport services remains one of the most important criteria in modal choice and this is also confirmed by scientific research (e.g. Bergantino et al., 2013; Danielis and Marcucci, 2007). Economies of scale are easier to achieve and can also be greater in inland waterway transport than in rail transport and hence intermodal inland waterway transport (IWT) can offer a more competitive cost performance to road transport. The cost performance of IWT is therefore often mentioned as the major trigger to shift from road transport to IWT. However, to what extent is IWT really cost competitive with road-only transport? Several studies have been conducted on cost-break even distances (see e.g. Niérat (1997), Platz (2009), Frémont and Franc (2010), Macharis et al. (2010) or Kim and Van Wee (2011)). However, the precise relationship between costs and operations in the transport chain is often not elaborated in detail, leading to unclear results or average cost estimates. That is to say, instead of including detailed costs that reflect the specific case that is being studied, the costs are often assumed to be an average of all operations in the intermodal transport sector. As a consequence, crucial data is usually not presented or described which makes it impossible to trace the results of cost comparisons between IWT and road-only transport. This paper models these intermodal transport problems and analyses the relation between costs and operations in the transport chain. In the analysis the