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The enablers and inhibitors of intermodal rail freight between Asia and Europe

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ABSTRACT

Contemporary modes in intercontinental transportation are sea and air freight. The geographical connection of Eurasia additionally enables rail freight via the Eurasian landbridge. This transport concept reduces lead time compared to sea freight at lower cost than air or sea-air freight and hence fits into a strategic niche between established modes. These characteristics facilitate developments in supply chain management like increasing transport distances and continuous cost reduction together with relatively new trends (smaller, but more frequent shipments, flexibility and sustainability) that are only partly satisfied by contemporary modes. At this moment, the Eurasian landbridge is at an immature state, used by few shippers. This paper intends to identify factors that enable, respectively, inhibit Eurasian rail freight and understand how inhibitors can be overcome. The research based on case studies reviewing literature and conducting interviews to investigate individual landbridge routes. Besides providing secondary data, literature identified stakeholders and thus served as input for 24 semi-structured interviews to gather primary data. Both data streams were then combined to reveal the current attractiveness of Eurasian rail freight. A future outlook in the closing section aims at stimulating further research and thinking in order to create a viable alternative for global supply chain management.

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1. Introduction

Today's markets more than ever present a merciless challenge to almost any corporation in terms of consumer satisfaction, costs and competition. Developments like the enhanced customisation, servitisation and variety of products as well as the continuous urge for technical innovations have replaced former order winners such as *costs* and *quality* and downgraded them to order qualifiers. To cope with such developments, supply chain management has become key to a company's success (Christopher, 2011).

Trends as introduced above have considerably changed various prevailing characteristics of supply chain management in relatively short time. The satisfaction of consumer demand has become extremely volatile and hard to please. This has put immense pressure on lead times and caused orders to become smaller, but more frequent. In addition, the constant pursuit for innovation has drastically shortened product life cycles and immensely reduced the time-to-market available to manufacturers in industries such as fashion, consumer electronics and automotive. Such changes present an enormous need for enhanced flexibility in these industries that is generally related to increased costs. However, these developments have come along with the ongoing endeavour to take costs out of supply chains (Christopher, 2011). A reason for this dilemma is the increasing pressure from global competition that forces companies to simultaneously improve service and lower prices. Price reductions are principally pursued by the supply chain function *procurement* that continuously searches for a lower combination of cost for raw materials, production (including labour) and transport (Rushton et al., 2010). As this is often achieved through global sourcing, the distance goods travel through supply chains from source to consumption has been lengthened enormously in recent decades. Garments for example are not produced and sold close to the cotton growing area anymore. Instead, cotton is grown in Central America, shipped to Asia to produce garments that are later dyed in Northern Africa to be sold in Europe. At the same time however, the peak oil scenario as well as the issue of sustainability gain more and more attention by consumers, economists and politicians. The scarcity of (cheap) oil immensely increases transport cost which in the outer case might trigger the reorganisation of entire supply networks, especially those including very long transport distances. Possible network reorganisations

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include the shift of production sites closer to the place of consumption and the introduction of (super) slow steaming of shipping lines in order to reduce cost of emission and fuel. Sustainability has become an increasingly important indicator against which the performance of any supply chain is measured. It also imposes new legal requirements to be obeyed by corporations in order to conduct business (refer to Section 6.6).

To ensure customer satisfaction through the provision of sophisticated service at minimal costs and environmental impact under such turbulent macroeconomic conditions requires supply chains to adapt. Intercontinental transport which is a central component of contemporary supply chain management plays a crucial role in this (Rushton et al., 2010). Currently, 99% of intercontinental transport volume is carried by sea freight and the remainder by air, respectively, sea-air freight. Intercontinental rail and road freight take in a negligible share (Davydenko et al., 2012). The characteristics of the available transport modes force shippers to choose between the two extremes of long lead time and low transport cost (sea freight) and short lead time and high transport cost (air freight) as shown in Fig. 1. While these extreme characteristics turn out to be ideal for certain product groups, other cargo types are rather suitable for intermediate solutions. The geographical preconditions of most intercontinental routes however require the unique ability of sea and air freight in bridging oceans and thus do not facilitate the deployment of alternative modes. Such lack of alternatives forces shipments into either of the extremes and consequently requires other adaptation strategies for supply chains (e.g. form-postponement, demand sensing). Considering the geographical connection between Asia and Europe allows the investigation of alternatives to contemporary intercontinental transportation in terms of rail (and road) freight. The concept of running trains between Asia and Europe via the Eurasian landbridge is not new as the first connection, the Trans-Siberian route, was built in 1916 (Shirres, 2011) and used by international freight trains since 1936. During the world wars, the Trans-Siberian route was predominantly used to supply troops of the Allies and under the rule of the Soviet Union the connection initially served domestic, agricultural transportation and shipments to neighbouring communist countries. The emergence of containerised cargo in the late 1960s triggered the Russian government to again offer international transportation (in the form of block train services) via the Eurasian landbridge which attracted volumes of up to 100,000 TEU per year. After the collapse of the Soviet Union, the future of the Eurasian landbridge was uncertain (Liliopoulou et al., 2005). Considering contemporary macroeconomic developments and related trends in global supply chain management (outlined in Section 6), Eurasian rail freight (together with road freight) possesses characteristics that present a promising alternative to fill a strategic niche between the extremes of sea and air freight in terms of transport cost and lead time.

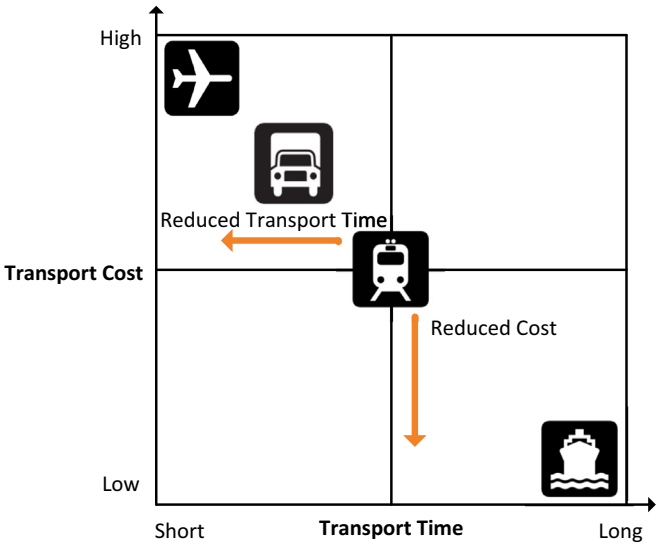

Fig. 1. Competitive position of rail freight, *Source:* Author.

Based on a research study at Cranfield University, England, this article intends to provide an overview of factors that enable and inhibit Eurasian rail freight with special attention on intermodal transport. After outlining the followed methodology, the article introduces the different routes and their characteristics, compares the available transport modes and presents stakeholders of intercontinental rail freight. Furthermore, it elaborates on enablers and inhibitors of Eurasian rail freight, provides a critical assessment of the current landbridge state and suggests strategies to turn Eurasian rail freight into a valid alternative for global supply chain management.

2. Materials and methodology

The research aim was defined as determining the enablers and inhibitors of (intermodal) rail freight landbridges between Asia and Europe that facilitate a transport alternative for global supply chain management. This aim was broken down into three main objectives:

- The identification of landbridge stakeholders.
- The identification of enablers and inhibitors of Eurasian landbridges.
- The identification of strategies to mitigate inhibiting factors.

To accomplish aim and objectives, an exploratory study was set up. Key to this approach was the triangulation of data from different sources that was achieved through a mix of literature and survey research.

Literature research provided secondary data and was primarily based on the study of academic articles and research publications. However, to consider contemporary trends and market developments, further sources such as magazine articles, promotional material, press releases and websites were used to access a wide range of information and to bypass the time gap related to the publishing process of academic papers. The study of literature provided a technical overview of the different landbridge routes across Eurasia (Section 3) as well as a comparison of available modes (Section 4) and gave insight into the enabling (Section 6) and inhibiting (Section 7) factors of Eurasian rail freight as well as options to mitigate inhibitors (Section 8). Furthermore, literature contributed to the identification of stakeholder groups (Section 5) and hence served as input for survey research in the pursuit of generating primary data.

Surveys were conducted using 24 semi-structured interviews supported by a questionnaire. Interviewees were chosen with the aim of generating a balanced mix of interview partners with at least one representative of each stakeholder group as identified in literature research. Potential partners were approached at practitioner events or via the authors' (indirect) contact network and contacted by email that contained a draft outline of the research and expressed the intention of arranging interviews. The idea of using semi-structured interviews aimed at providing a basis for comparing answers of different interviewees on the one hand while leaving space to discover aspects not considered previously on the other hand. Interviewees were asked to name enabling and inhibiting factors of Eurasian rail freight and subsequently rank them according to perceived importance respectively rate

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