

LSP COLLABORATION ON MULTIMODAL TRANSPORT IN CHEMICAL LOGISTICS

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Abstract

One of the most prominent targets of the EU Transport Whitepaper is the ambition to shift 30% of road freight, transported more than 300 kilometers, to multimodal by 2030 and 50% by 2050. Transport and logistics industries are working on achieving this goal with a strong commitment and contribution from chemical companies. The critical factors for success are the interconnectivity and interoperability of European transport systems in terms of infrastructure, processes and law, as well as logistics collaboration between supply chain partners. The purpose of this article is to introduce the concept of multimodal transport in chemical logistics with its key challenges, and to show the role supply chain collaboration plays on logistics when shifting road transport to multimodal ones. Vertical and horizontal collaboration with logistics service providers (LSPs), in order to develop quality multimodal service delivered at a good price, will be investigated. The research problem is analyzed using a survey conducted among chemical companies operating in Poland, as well as logistics companies serving them. The research is part of the “Promotion of Multimodal Transport in Chemical Logistics” project within INTERREG Central Europe Programme.

Keywords: Sustainability, multimodality, intermodality, horizontal and vertical collaboration, chemical logistics

1. INTRODUCTION

Freight transport is critical to successful operations of any supply chain, including chemical ones, as it ensures efficient movement and timely availability of raw materials, processed goods and finished products. The growing demand for freight transport is related to globalization, and on one hand, the dispersion of sources of supply and places of consumption, on the other hand, the concentration of production in fewer sites in order to secure reductions in scale. These economic practices result in the growth of the distance as well as the volume of freight transport, and cause problems when it comes to accommodating product flow in an efficient and sustainable way.

In most countries, one of the biggest challenges is a very high share of road transport within inland flows. According to Eurostat, in European Union countries in 2014 (EU-28) almost 75% of total inland freight transport was done via road, i.e. four times more than via rail (18.3%). [1] The European Commission (EC) warns that this imbalanced modal split with road haulage domination has its negative effects, which cost the EU more than 250 billion EUR annually, of which almost half relates to congestion and longer delivery times. Additional causes of this problem are environmental deterioration (by CO₂ and NO_x emissions) and the inefficient use of energy, as well as social costs of road accidents and noise. [2]

Thus, when deciding about the EU transport policy for the 21st century, the Commission focused on the need to integrate transport in sustainable development, i.e. development that meets the needs of the present, without compromising the ability of future generations to meet their own needs. Among others, the policy includes: controlling road transport development, revitalizing rail transport, improving short-sea and inland waterways, and promoting multimodal transport. [3]

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industries are working on achieving this goal with a strong commitment and contribution from chemical companies.

The purpose of this article is to introduce the concept of multimodal transport in chemical logistics with its key challenges, and to show the role supply chain collaboration plays on logistics when shifting road transport to multimodal ones. The research problem is analyzed based on literature and documents reviewing the topic, and a survey conducted among chemical companies operating in Poland as well as logistics companies serving them. The research is part of the “Promotion of Multimodal Transport in Chemical Logistics” project within INTERREG Central Europe Programme.

2. THE CONCEPT OF MULTIMODALITY IN EUROPEAN FREIGHT TRANSPORT

In order to facilitate the use of multimodal transport in European freight transport in general, and chemical logistics in particular, it is essential to explain the complexity of such a shift. That is why firstly - the concept of multimodal transport is introduced, secondly- the process and actors are described, and finally - the challenges are presented.

2.1. Definition and scope

Many terms are used to describe the phenomenon of transport using more than one mode. The most popular ones are: multimodal, intermodal, and combined transport. Very often they are used interchangeably, but according to European Conference of Ministers of Transport (ECMT) and United Nations (UN) Convention on International Multimodal Transport of Goods they differ and they should be understood as follows. [5]

Multimodal transport is the broadest term, which is defined as the carriage of goods by at least two different modes of transport. It is done on the basis of a multimodal transport contract from a place where the multimodal transport operator takes the goods in charge to a place designated for delivery. If these places are in different countries, we deal with international multimodal transport.

Intermodal transport is a type of multimodal transport organized in one and the same loading unit or vehicle by successive modes of transport without handling of the goods themselves when changing modes.

Combined transport is intermodal transport where the major part of the European journey is by rail, inland waterways or sea, and any initial and / or final leg that is carried out by road is as short as possible. According to UN recommendation, combined transport is a combination of means of transport where one (passive) transport means is carried by another (active) means, which provides traction and consumes energy.

Besides the terms defined above, concepts of co-modal and synchro-modal transport have been introduced into multimodality recently. Their focus is on efficiency.

2.2. Process and actors

A multimodal transport system may be described by its core activities such as pre- and post-haulage (generally completed by road), transshipment, rail haulage, coordination activities, and where applicable, sea transport. In some cases rail haulage could be changed for inland waterborne transport. In addition, infrastructure and supporting activities such as lease of equipment, inspection, cleaning, mending and empty stacking of intermodal loading units are needed for the system to work.

Although multimodal transport by definition involves at least two traffic modes, the focus is on the core part of the process that embraces rail haulage and transshipments. [6] The actors who participate in the core part of multimodal transport on the demand side are: shippers, forwarders and shipping agencies. The role of **shippers** is largely determined by the size of their shipment. Shippers sending full intermodal loading units, take interest in the system, while customers sending general cargo typically do not know or care how their consignments are forwarded. The role of **forwarders**, more and more often referred to as **LSPs**, is to act as

an intermediary in the transition of transport services between shippers and operators supplying physical transport and transshipment services. Traditionally forwarders perform activities such as the physical and administrative consolidation of small consignments, documentation, warehousing, and supplying intermodal loading units. Their ties to carriers have a history of close connections to road hauliers and use multimodal transport as some regular services, as reserve capacity or on customers' request. Large forwarders such as DB Schenker, DHL, Kuhne and Nagel attempt to offer all types of transport between all geographical areas. Mergers and acquisitions in order to form players with large geographical and service scope have created a new landscape of the transportation market. [7] Besides, the other actors participating in multimodal transport are **shipping agencies**, which have shown particular interest in extending their control to port operations and hinterland transport.

The supply side of the multimodal market is traditionally divided between companies based upon rail and road transport respectively. The classic role of the **rail operators** has been to sell rail haulage between intermodal terminals. They also operate terminals and supply rail wagons, and nowadays they have become interested in all other categories. The new **intermodal operators** are found in the large market for the hinterland transport of maritime containers related to the ports of Hamburg, Bremerhaven, Rotterdam and Antwerp.

2.3. Barriers to modal shift

On the list of the chief obstacles to efficient multimodal freight transport in Europe is interconnectivity between modes, and interoperability within the modes. [8] In terms of interconnectivity, a lack of multimodal terminals with loading and unloading technology, as well as an absence of railway connections or their insufficient frequency or capacity, are the barriers most cited. The problem concerns mainly connections between Central Europe and France, Spain, Balkan countries and Turkey. Regarding interoperability, the most challenging is European rail, which was designed hundreds years ago, partly for national defense purposes, and has been incompatible between countries. [9] The other reasons for unsatisfactory development of multimodal transport is its time and cost handicap, low flexibility and responsiveness to demand changes, which is partly because of rigidity of government-owned railways, as well as high complexity related to extended planning and organizing of multimodal operations. The latter also relates to difficulties in changing the mentality and habits of transport planners who are used to road transport.

3. SUPPLY CHAIN COLLABORATION ON MULTIMODAL TRANSPORT

To overcome barriers to multimodal transport, on the base of game theory, resource based view (RBV) and social exchange theory, the thesis that supply chain actors' collaboration on logistics can help to address the challenges related to modal shift, was formulated.

3.1. Towards supply chain collaboration - literature review

In the paper the concept of collaboration is understood, according to Soosay and Hyland [2015], as: "two or more companies working together to create a competitive advantage and higher profits than can be achieved by operating alone". [10] It is widely accepted today that supply chain collaboration enables superior performance in firms due to the capitalization on resources, capabilities, processes and routines residing in their partners' firms. [11] Thanks to it, supply chain partners could increase customer satisfaction, shorten lead times, improve information visibility and enable a clearer division of responsibilities among partners. [12]

The competences of LSPs make them an attractive partner for logistics collaboration. Collaboration with LSPs has a positive effect on the efficiency of logistics performance, which translates into the increased competitiveness of the supply chain. The supply chain collaboration of LSPs and their partners may have two directions, i.e. vertical and horizontal. The **vertical collaboration** refers to collaboration between adjoining businesses i.e. LSP vs. customers and shippers on the demand side, as well as vs. suppliers, rail and port

operators on the supply side. The **horizontal collaboration** refers to partners with a similar business profile, which operate at the same tier of supply chain. According to Barrat [2004], they could be competitors or non-competitors. [13] This form of relationship is often called coopetition (cooperation plus competition). Wallenburg and Schaffler [2016] emphasize that horizontal collaboration is a common practice among LSPs who form partnerships to increase the productivity of their assets or extend their geographical coverage by combining network of LSPs. [14]

3.2. Intensity of collaboration

It should be emphasized that not all activities performed together by companies could be considered collaboration. Świtała [2015] admits that inter-firm relationships can take various forms from cooperation (basic level of supply chain integration), through coordination (with a higher level of integration), to collaboration (when companies treat each other as an “extension” of their organization). [15]

Lambert et al. [1999] identified three types of cooperation depending on the level of integration of partners (**Figure 1**). **Type I** consists of mutually recognized partners that cooperate to a limited degree within short time horizon. **Type II** - participants that do not merely coordinate, but also integrate part of their business planning. The horizon is longer, and multiple divisions or functions of the companies are involved. **Type III** is when participants have integrated their operations to a significant level and each company regards the other(s) as an extension of itself. This business relation is based on mutual trust, openness, shared risk and shared rewards. Typically, there is no fixed end date for such a collaboration. This spectrum is completed on the left side by arm’s length (transactional) relationship and on the right side by full integration. [16]

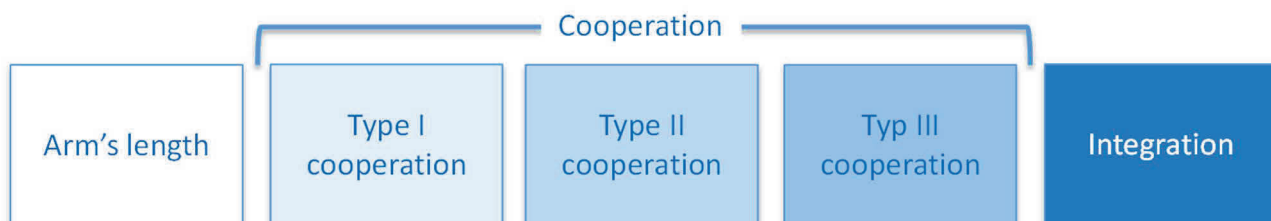


Figure 1 Cooperation and the level of integration [17]

4. COLLABORATION ON MULTIMODAL TRANSPORT WITHIN EU CHEMMULTIMODAL PROJECT

Collaboration on freight transport in chemical logistics could be vertical and horizontal as well. It can also be diversified by its intensity. To analyze it, the survey within ChemMultimodal project was prepared and conducted.

4.1. ChemMultimodal Project

The general objective of the ChemMultimodal project is to promote a shift to multimodal freight transport in chemical logistics by the coordination and facilitation of cooperation between chemical companies, specialized LSPs, terminal operators and public authorities in chemical regions in Central Europe (CE). The consortium of 14 partners from seven CE countries is responsible for delivering it. [18]

The goal for the first stage of the project was to analyze multimodal transport of chemical goods in the countries and regions of project partners, while focusing on identifying main routes, barriers and opportunities to improve the usage of multimodal transport in chemical logistics. Collaboration between chemical companies, specialized LSPs, terminal and port operators was investigated.

4.2. Research method and the structure of sample companies

At the first stage of the project a questionnaire-based survey was conducted among chemical and logistics companies in seven CE countries. Forty-nine questionnaires were sent out to companies across Poland and 21 answers were collected: 12 from chemical companies (producers and distributors as well) and nine from logistics companies (LSPs, carriers, rail and port operators). Most questionnaires were followed by interviews. Both groups of respondents are rather diversified, 58% of chemical companies are big players with more than 250 employees, 25% are medium sized players, and 17% is considered as small chemical companies. The split of logistics companies is as follows: 45% - big, 22% - medium, and 33% - small players.

4.3. Logistics collaboration on multimodal transport in chemical industry - survey results

The results of the survey regarding collaboration on freight transport were analyzed from two perspectives: a vertical and horizontal one.

Regarding **vertical collaboration**, all respondents from logistics companies admitted that they cooperate with their customers, however the intensity of the cooperation between companies differ. Big logistics players have a few significant customers with whom they integrate selected processes, work on new routes, new packaging or extra services tailored to their needs. This cooperation has elements of collaboration. However, it is the minority. The logistics market is very fragmented and the majority of logistics companies are small players with very limited market power. That is why they generally cooperate with their customers at arm's length with very limited trust. In the case of arm's length cooperation, partners are not ready to allocate risk related to shift from road to multimodal transport.

Regarding chemical companies, two out of 12 respondents decided to outsource their freight operations to LSPs, three out of 12 prefer to organize the freight transport on their own, three work in cooperation with LSPs, and the last four apply the mixed model with few routes managed by chemical companies' transport departments on their own, and the others are managed by LSPs. The share of operations managed on their own against these managed by LSPs differs from company to company.

On the other side, the LSPs' **horizontal collaboration** is very limited in Poland. Respondents from logistics companies admitted that their cooperation with competitors and non-competitors operating at the same tier of supply chain is extremely difficult. The biggest challenge is openness and trust, and fair gain and risk sharing. Shortages in these aspects make transport services organized by several providers not transparent to customers. This type of cooperation needs improvement, as LSPs are aware of the advantages of horizontal collaborations. LSPs understand that, individually, it could be difficult for them to shift transport from road to rail but when consolidating shipments from different LSPs it could be possible to fill the train. Horizontal collaboration could also be a good solution for extending geographical coverage by combining the network of other LSPs.

5. CONCLUSIONS

In order to be able to increase modal shift from road to multimodal freight transport, more international harmonization at a technical, legal and organizational level is needed, in terms of the interconnectivity and interoperability of the European transport system. It is critical to invest public money in developing better multimodal infrastructure, creating equal market conditions for every transport mode, and preventing distortion of competition. These are prerequisites for augmenting the collaboration between chemical companies, specialized LSPs, rail, and terminal operators on an efficient quality multimodal freight service. The role of chemical companies in this process should be noticed. They are important players in evaluating transport solutions and they should be more active in demanding the most sustainable and efficient transport solutions.

ChemMultimodal is a platform which aims to promote multimodal transport by coordination and facilitation of the collaboration of different stakeholders engaged in chemical logistics in Central Europe. The objective of the project is to improve sustainability of chemical logistics, increase multimodal transport of chemical goods and facilitate collaboration of multimodal stakeholders.

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