Acta logistica - International Scientific Journal about Logistics
Volume: 6 2019 Issue: 4 Pages: 165-170 ISSN 1339-5629

doi:10.22306/al.v6i4.144
Received: 01 Dec. 2019
Accepted: 25 Dec. 2019

SUSTAINABLE MULTIMODAL AND COMBINED TRANSPORT IN THE EUROPEAN UNION

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Keywords: logistics, transportation, multimodal, railway, EU
Abstract: The manuscript deals with the problematic of multimodal and combined transport in the European Union. Multimodal transport is an intermodal transport where most of the road in Europe is carried out by rail, inland waterway or maritime transport and each start and end of the road that is made by road is as short as possible. Road traffic is used only on short routes, e.g. for the carriage of goods to rail or sea or to pick up the goods at the place of unloading. The aim of this manuscript is to point out of the European Commission priority, that is to reducing CO_2 emissions, congestion and air pollution to improve the quality of life of European citizens. Our research is focused on state of the art of multimodal and combined transport with which it can be reduces CO_2 emissions and energy consumption per cost unit and future directions of multimodality.

1 Introduction

Intermodal transport or combined transport means the transport of goods where a lorry, trailer, semi-trailer with or without a tractor, a swap body or a transport container uses the road for the initial or final transport section and the rail, inland waterway, sea or air transport for the remaining section, where this part of the carriage exceeds 100 km as the crow flies and the start or end of the carriage is performed by road [1]:

- between the place where the goods were loaded and the nearest appropriate terminal of loading at the initial transport stage or between the nearest suitable terminal of transhipment and the place at which the goods were unloaded at the final transport stage,
- or within a radius not exceeding 150 km as the crow flies from the terminal of a national river or seaport of loading or unloading [1,2].

The European Union has created an appropriate legal framework for the transport sector to facilitate the free movement of people and goods within the Union.

Under the Agreement of Functioning of the EU, measures taken under this legal framework include:

- common rules applicable to international transport to or from a Member State or crossing the territory of one or more Member States,
- the conditions under which a carrier not established in the territory of a Member State may carry out transport operations in that Member State,
- measures to improve transport safety as well as other relevant provisions [1,3].

The common transport policy focuses not only on promoting trans-European transport networks (TEN-T) across the EU, but also on establishing a sustainable transport network that takes environmental aspects into account. The trans-European transport networks include road, inland waterways and maritime transport as well as the European high-speed rail network [4]. Cohesion policy supports the EU's transport policy by building infrastructure and funding projects in areas such as urban transport, multimodal transport and intelligent transport systems.

2 Multimodal and Combined Transportation in the European Union

In the countries of the European Union, combined transport has received significant support, particularly from an environmental point of view, as reflected in the agreements aimed at setting up international networks. Of particular importance is the European Agreement on Major International Combined Transport Routes and Related Objects, prepared by the United Nations Economic Commission for Europe in 1991, known as the AGTC – "European Agreement on Important International Combined Transport Lines and Related Installations" [2,5]. Combined transport in the rail-road system has attracted great interest, both in terms of transport economics and transport policy [3,6]. The reasons for this concern are both environmental benefits and advantages of combined transport as an integral part of the rail freight transport strategy. In the Figure 1 is presented corridors of combined transportation across the Europe.

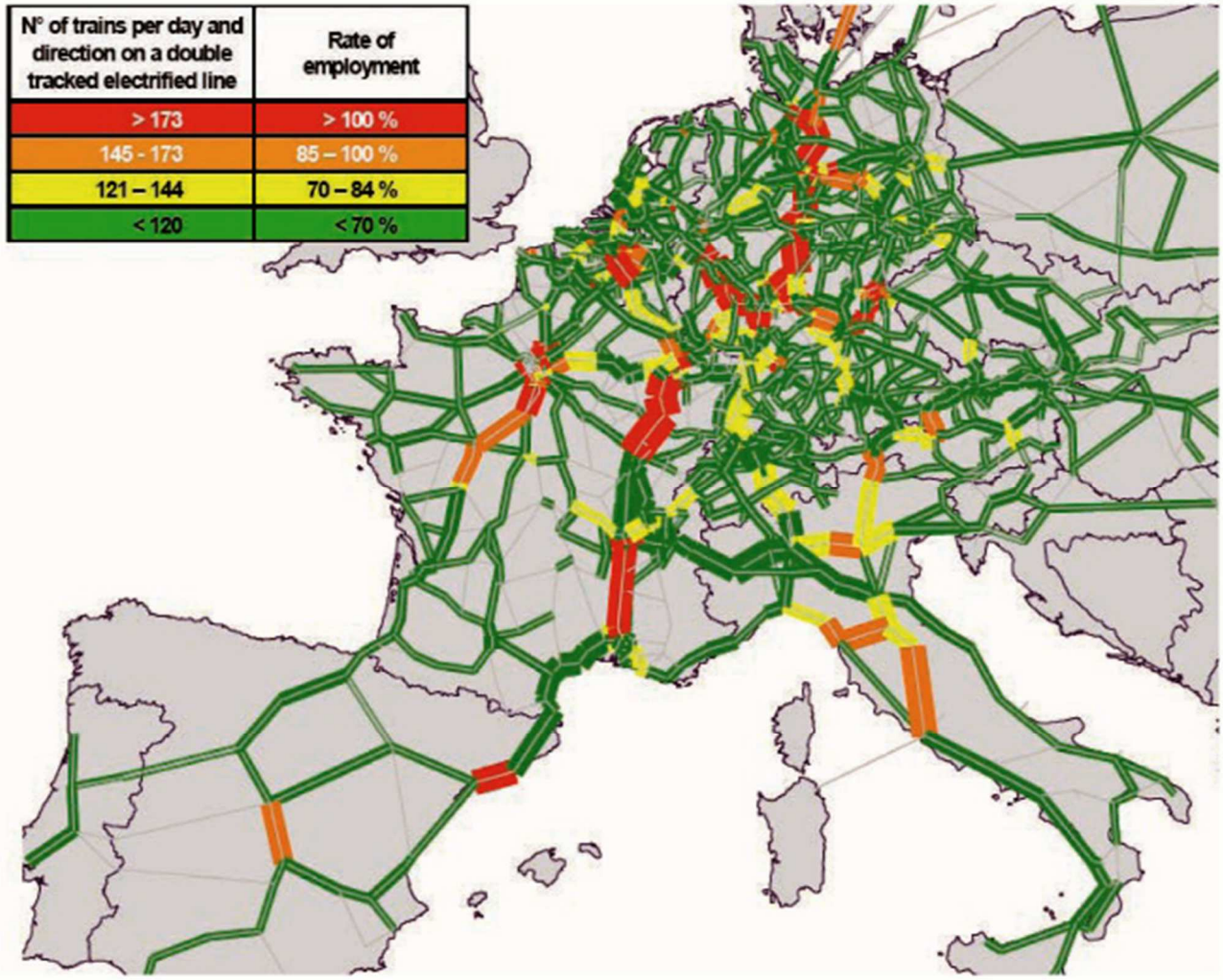

Figure 1 Corridors of combined transportation [7]

Combined transport in Europe is organized under the umbrella of the International Union of Combined Transport Society (UIRR), based in Brussels. It coordinates the co-operation of national rail and road transport operators and combined transport operators in national combined transport organizations. They are also national representatives for combined transport in the same country [7].

New economic conditions make it possible to create and operate combined transport on the principles of logistics transport chains [8]. Separate activities to date must be interconnected and complemented by various complementary activities and services (warehousing of goods, warehousing, loading and unloading, dividing and assembling of consignments, sampling, accompanying of consignments, consulting and the like) [8]. The whole intermodal transport system must be based on the needs of transporters and must fully meet their requirements. New services provided at the level of logistics chains are suitable for transporters. However, the prerequisite is the development of an overall logistics system concept, including an information system [6,9].

The evolution of logistics forms in developed European countries shows that the focus was initially on the supply of raw materials to limit and minimize stocks, on relocation from production to intermediate stores and on the supply of finished products to business partners or consumers.

3 Evaluation of multimodal and combined transportation in the European Union

The state transport system, which consists of individual types of conventional and unconventional transports, is unthinkable today without combined transport (as opposed to a combination of transports where we do not use one freight unit from the sender to the recipient when transporting by different types of means of transport) [5]. Combined transport is a transport-handling system ensuring the transport of goods in one and the same cargo unit from the consignor to the consignee as an uninterrupted chain [10]. The function of the combined transport system consists in concentrating the freight units

by road to the respective terminal, where by means of efficient loading mechanisms the freight units are transferred to railway wagons or ships, followed by transport to the destination transhipment from which the transport to the recipient is ensured [6].

In principle, it is not an autonomous mode of transport, but is an efficient use of those interconnected conventional modes of transport (rail, road and waterway), which, for their comparative and systemic merits, can reliably meet the transport requirements of economic centres nationally and internationally [7]. Applying a logistic approach to transport in recent years means a gradual transition from solving individual problems (elements) of the transport process to solving the whole, i.e. of the whole transport process with the aim of its optimal solution in terms of its participants [11]. Transport is by its high share in the logistics functions of enterprises an integrating element of logistics systems, i. management of material circulation, storage, packaging, transhipment, distribution and transport. In order to manage these tasks, it seems advantageous to cumulate them in a certain area into a single place where the interrelationships between transport and other sub-systems can be managed more efficiently and faster than if they were decentralized [12]. Suitable places for such services are the points of concentration of goods flows, resp. places of important crossings of transport routes, where there is a change in the direction of goods streams, which clearly include the reloading points of the railways [10,12].

The following benefits of intermodal transport result from cooperation between the different modes of transport:

- eliminating the disadvantages of direct road transport,
- waiting at the border, since the combined transport trains are already equipped with customs at the combined transport terminals, which are recognized as border customs offices,
- driving bans on public holidays, public holidays and at night do not apply to road vehicles carrying collection and distribution from combined transport terminals,
- road tax relief for vehicles used for collection and distribution from combined transport terminals
- no need for transport permits for international road transport,
- independence from road and weather conditions [12,13].

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3.1 Improving the quality of rail freight service

Multimodal and combined transport relies heavily on rail freight service, where quality is defined as a mixture of reliability, sustained average speed, uniformity of loading gauges along with maximum train length and axle loads, as well as clear and consistent traffic management rules determining priority in driving [10]. Achieving these objectives requires different types of measures for rail infrastructure managers acting as a natural monopoly and traction rail service operated under competitive conditions (open market).

- **Much more clarity** is needed to better understand the true quality of performance, consistent reporting on train departure and arrival accuracy, protocols of planned and actual average train speeds for combined transport, etc. [14]. Systematic quality monitoring should be possible for rail freight customers, such as combined transport operators and their representative organization such as the UIRR, provided that the European Commission (through the European Railway Agency) intends to intensify its rail freight quality monitoring activities [1,2,16].
- **The elimination of privileged relations** among railway undertakings and railway infrastructure managers is necessary to strengthen competition in the railway transport service. Also, the functions, responsibilities and procedures of rail infrastructure managers need to be unified throughout Europe in order to create a genuine Single European Transport Area, which can be made easier for cross-border operators to limit such opportunities by having to deal with infrastructure managers at present. The rapid and consistent implementation of the Regulation of the European rail network for competitive freight (913/2010 / EC) should further contribute to this objective [16]. A further step would be needed to achieve the necessary alignment on the established corridors (uniform invoicing, joint transport management, uniform general contract terms) [2,17].
- **Strong enforcement of existing European legislation** - such as the mutual recognition of road and rail driving licenses - as an essential element for improving the quality of rail freight service. In many cases, the incorporation of European rules into national legislation is not enough in itself to transform decades of national practice.
- **Categories of European train paths and their hierarchy**-should be established to provide the basis for well-managed train traffic on mixed lines. This priority procedure could be ensured on a fair, non-discriminatory basis, ensuring the quality of the lines for profitable rail freight [7,14].

- **Targeted complementary resources should be added at European level** to help enforce European rules and control their enforcement in their real sense in day-to-day operations. The Single European Railway Area requires a comprehensive set of common rules that are consistently applied. The amount of human resources burdened by this mandate at European level does not allow this objective to be achieved [2,5,15].

3.2 Future direction of multimodal and combined transportation

At the same time, the EU has urged, and supported by the international community (Figure 2), to significantly reduce global greenhouse gas emissions in order to keep the temperature rise caused by climate change below 2 °C. The Commission's analysis shows that, while significant reductions can be made in other sectors of the economy, the transport sector, which is an important and growing source of greenhouse gases, requires a reduction of at least 60% of greenhouse gas and CO_2 emissions by 2050 compared to 1990 [1,2,18].

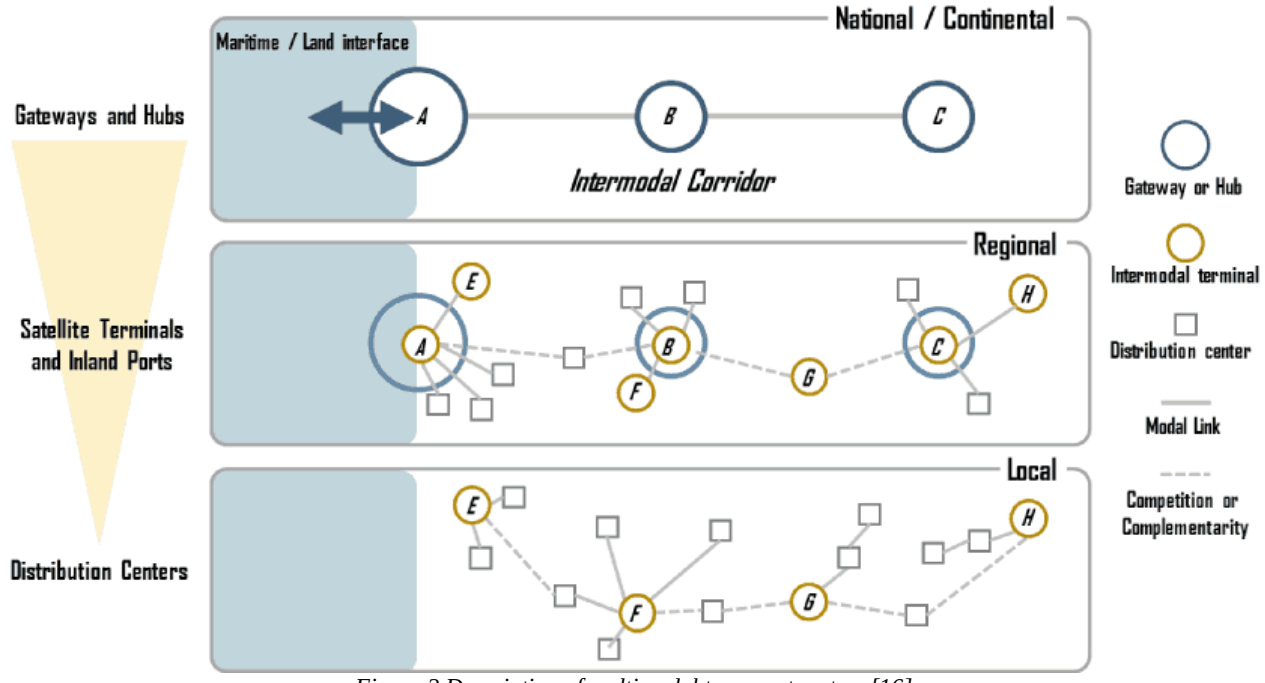

Figure 2 Description of multimodal transport system [16]

Legend:
A, *B*, *C* - gateways and hubs,
E, *F*, *G* - intermodal terminals,
H - satellite.

Generally, the multimodal and combined transport system integrates different geographical scales from the global to the local. With the development of new modal and intermodal infrastructure, countries and regions have a growing accessibility to the global market. Some modal segments can be competing or be complementary. However, the transport system is still not sustainable. From the perspective of the next 40 years, it is clear, that transport cannot develop in the same way as it has been until now. Taking the existing approach, transport dependence on oil would still be close to 90% and renewable energy sources would only at least exceed the 10% target set by 2020 [1,18].

Congestion costs will increase by about 50% by 2050 [17]. The difference in accessibility between central and peripheral areas will increase. The social costs of accidents and noise would continue to increase.

4 Conclusion

Infrastructure creates mobility. Without the support of an adequate network and greater intelligence in its use, it will not be possible to achieve major transport changes. Overall, investment in transport infrastructure has a positive impact on economic growth, generating welfare and jobs, and enhancing trade, geographical accessibility and mobility of people.

They must be designed to maximize their positive impact on economic growth and minimize their negative impact on the environment.

- more clarity, less paper reporting,

- putting into effect the competition rules in the operation of the railway infrastructure in eliminating "privileged relations",
- increased enforcement of European rules and efficient additional resources at European level,
- elimination of historical bilateral traction agreements between officials (cross-border relations),
- definition of European categories of railway lines and their hierarchy (to improve traffic management on mixed lines).

Nowadays, multimodal and combined transport are inseparable part of the transport system of developed European countries, it is not a new mode of transport, but very efficient use and interconnection of common modes of transport. It is therefore a combination the positive effects of several modes of transport, e.g. the railway transports large quantities efficiently and regularly goods over longer distances, while being greener than road transport, costly road transport is characterized by great flexibility in terms of transport time and its advantage is accessibility almost everywhere.

According to European statistics, the relationship of rail transport (including multimodal and combined transport) to the environment can be characterized in it in the sense that this is an environmentally and energy-friendly mode of transport.

Acknowledgement
This paper is part of a project that has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No.723274.

http://www.lessthanwagonload.eu

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Review process
Single-blind peer review process.