

# RAIL TRANSPORT IN LOGISTICS

## POSTAVENÍ ŽELEZNIČNÍ DOPRAVY V LOGISTICE

Ing. Blanka Kalupová<sup>1</sup>

Department of Bachelor Studies  
College of Logistics  
e-mail: blanka.kalupova@vslg.cz

### Abstract

Transport is an important element of the logistics system. All types of conventional transport are used in logistics, namely road, rail, water and air transport. Each mode of transport has its specific application in the logistics chain due to its characteristics. Rail transport has an irreplaceable place in the logistics chain, particularly for the transport of larger quantities of goods over longer distances. The article focuses on the issue of the use of rail transport in logistics. The paper is aimed at the issue of the use of rail transport in logistics

### Abstrakt

Doprava je důležitý prvek logistického systému. V logistice se uplatňují všechny čtyři druhy konvenční dopravy – silniční, železniční, vodní a letecká. Každý druh dopravy má vzhledem ke své charakteristice specifické uplatnění v logistickém řetězci. Železniční doprava má v logistickém řetězci nezastupitelné místo zejména pro přepravu většího množství zboží na delší vzdálenosti. Článek je zaměřen na problematiku uplatnění železniční dopravy v logistice.

### Key words

rail transport, wagon delivery, individual delivery, complete train, container train

### Klíčová slova

železniční doprava, vozová zásilka, jednotlivá zásilka, ucelený vlak, kontejnerový vlak

## INTRODUCTION

Individual transfer, animal or freight transport play an essential role in our society. Transport is so called cross-section activity within logistics. All conventional and non-conventional modes of transport participate in freight transport. Rail transport belongs together with road transport among the basic transport systems in Central Europe. Rail transport plays an essential role in logistics.

## 1 TRANSPORT AS AN IMPORTANT ELEMENT OF THE LOGISTICS SYSTEM

Transport represents a set of activities ensuring the move of transport means on transport routes. **From the logistics point of view, transport is the most important element of the logistics system. Logistics transport is a part of logistics chain.** Comparing the economic concept of transport, logistics transport is integrated onto the logistics system characterised by the synergy effect.

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<sup>1</sup> External PhD student of Faculty of Security Engineering, University of Žilina

**The basic function is to realize transport.** It is the act of moving tangible objects (goods or animals) from the place or origin to the place of destination with related activities, loading, unloading and control operations. It is necessary to have suitable transport network, high-quality transport routes and secure operations. [1]

The transport system is functional if the following factors are balanced:

- logistics transport booking service,
- technology capacity of transport,
- quality of transport. [1]

To move the product means double benefit in transport - benefit of place and benefit of time. Both mean added value but do not increase the use value of the product.

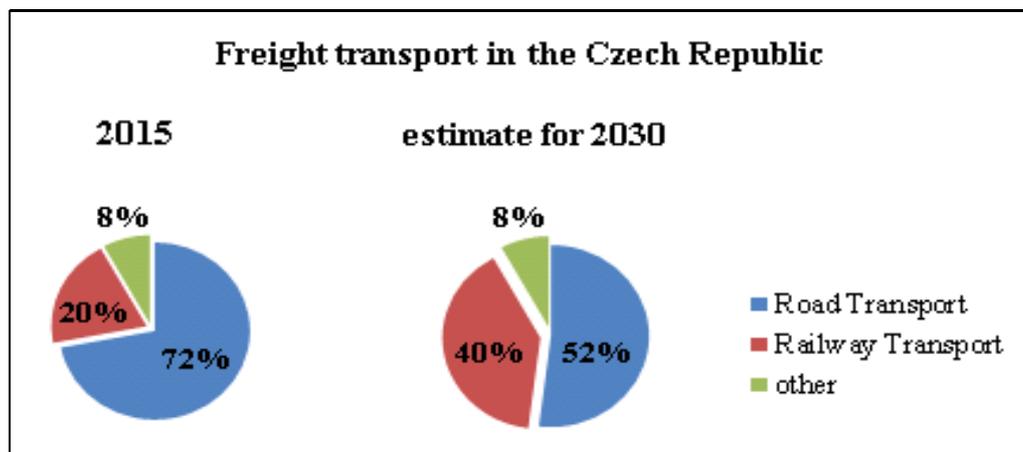
Logistics activities connected to transport give a share in 38 % of logistics costs. Sometimes transport is perceived as rather cheap with compared to the storage costs or inner supply. The transport requirements are very high together with the modest use of transport means. This causes many empty drives, low backward workload and Just in Time requirements. [2, 3]

## 2 RAIL TRANSPORT

Rail transport is a conventional transport system participating at global transport. It is the transport on railway. It has got its specific and essential place in the national economy and in logistics.

Rail freight transport is a set of activities ensuring transport of goods and animals by rolling stocks, or transport of railway vehicles on railway. It is suitable to transport large volumes of goods for long distances. [4]

Currently the rail transport does not have such high share in the transport market as it used to have in the past. However, the share in division of transport labour should raise in the future. The aim of the European Transport Policy is to convert 30 % of current road transport above 300 km to railway, eventually to water transport. Figure 1 presents estimations of the division of transport labour between particular transport sectors in the Czech Republic in 2030, compared to 2015.



**Fig. 1** The share of the transport sector in freight transport in the Czech Republic in 2015 and estimated for 2030

Source: <https://www.mdcz.cz> [2]

The advantages of rail transport are to transport large volumes of different freight, lower costs for long distances, high-security of transport, low energy performance, low dependency on environmental conditions, independence on traffic flow intensity on roads, environmental performance etc. Disadvantages are impossibility of door-to-door delivery (except of railway sidings), limited flexibility, complicated technology of transport, etc. There are also opportunities in rail transport, such as cooperation with other modes of transport, or to use intermodal intra-continental and inter-continental transport.

### 3 RAIL FREIGHT TRANSPORT

Rail transport enables to move different types of goods including dangerous goods or non-standard consignments, that means heavy or oversized goods.

Generally, it is possible to transport:

- wagon delivery,
- single-piece delivery,
- express delivery.

Rail transport providers currently offer and realise transport of wagonloads.

**Wagonload** is a consignments that needs at least one single wagon for its transport. It has to contain a waybill. Wagonload means also an empty or bulk container or a swap body transported on the rolling stocks, or a rolling stocks in empty or bulk state, that are not owned by the carrier and are sent by consignor with a waybill. [3]

Wagonloads can be transported as:

- individual deliveries,
- complete trains.

**Individual deliveries** enable to move smaller volume of goods. Transport of wagon deliveries utilizes one wagon or a group of railway wagons (maximum of five). ČD Cargo is the only transport provider to offer this type of transport in the Czech Republic and in the whole network of SZDC, and also on the railways of other private companies. To deliver abroad it cooperates with foreign partners, also in a great part of European railway network.

The wagons are transported from the consignor to the recipient using a common train-formation route. The indicated plan specifies the route and particular trains carrying the consignment. Individual deliveries respond to the market and are convenient for transport of smaller volumes into more destinations (see Figure 2 and 3). [6]



**Fig. 2** Example of wagonload in one wagon - individual delivery

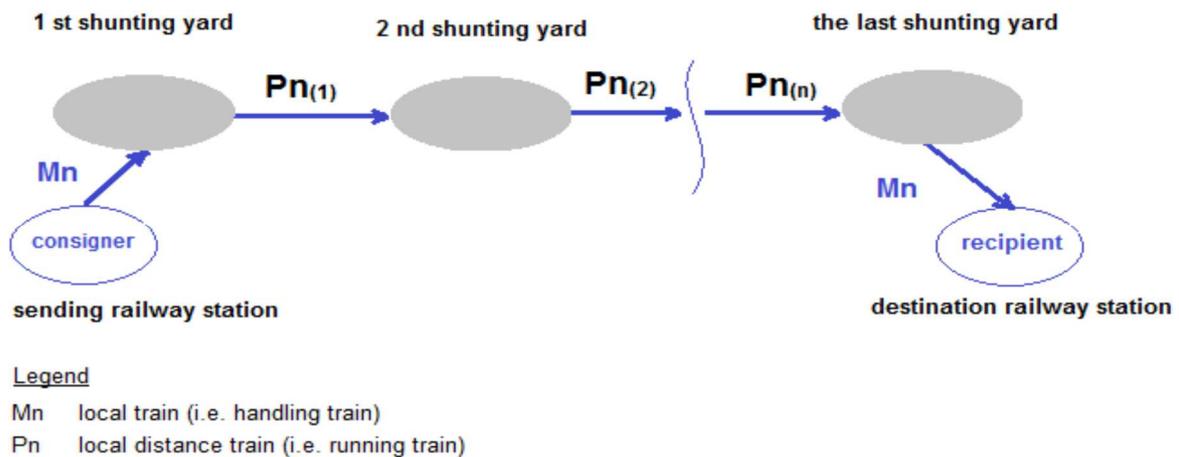
Source: <https://www.cdcargo.cz/katalog-nakladnich-vozu>



**Fig. 3** Freight train with individual wagon delivery

Source: <http://www.fotodoprava.com> foto Bedřich Zenáhlík

Single wagons are collected from the dispatcher by a local (i.e. handling) train to the nearest shunting yard. They are further dispatched by long distance train (i.e. running, potentially freight express) into the closest shunting station to the recipient, and then delivered by local train. Figure 4 shows the described scheme.



**Fig. 4** Scheme of the transport of single wagonloads

Source: own

**Complete trains** are shunted from the wagons transporting only one delivery, and they are transported directly from the consignor to the recipient without any shunting works. The delivery travel period is significantly reduced, and due to simplified handling, the transport by complete trains is significantly more beneficial in price. The complete trains represent the most suitable method of transport for large volume deliveries. Figures 5, 6 and 7 show the examples of transport in complete trains.

The following types of complete trains are offered by rail transport:

- direct complete train,
- grouped complete train,
- diffused complete train.



**Fig. 5** Complete train with coal

Source: <http://www.fotodoprava.com> foto Bedřich Zenáhlík



**Fig. 6** Complete train with cars from Mladá Boleslav

Source: <http://www.fotodoprava.com> foto Bedřich Zenáhlík



**Fig. 7** Complete tank train of the Unipetrol Transport Company

Source: <http://www.fotodoprava.com> foto Bedřich Zenáhlík

The trend in rail freight transport is to use complete trains. It is the most economic option of freight transport. New railway providers in railway freight transport, such as Unipetrol Transport, Advanced World Transport, METRANS Rail etc., started to operate complete trains. ČD Cargo, as the biggest rail transport provider, is also able to organize transport of the complete train in Europe. The most common commodities transported in complete trains are coal, cement or different substances in tanks. [7, 8, 9 ]

#### 4 RAIL TRANSPORT SYSTEM IN COMBINED TRANSPORT

At the beginning of the 21st century, rail transport can undoubtedly find its place in the system of combined transport.

**Combined transport** is a system of transport in one transport unit (container, swap body, etc.) or in road vehicle using also rail or water transport. It means that goods are placed in one unit, while the unit is transported by several modes of transport. Only the transport unit is reloaded, not the goods itself.

Combined transport uses advantages of all modes of transport. Rail and water transport belong to cheaper possibility for long distances transport, while road transport is suitable for short distances.

Rail transport has its place in the system of combined transport to transport:

- containers within container transport system,
- swap bodies,
- semi-trailers,
- trucks on wagons in the system Ro-La (Rollende Landstrasse – especially in the Alpine region),
- roller container – system ACTS (Abroll-Container-Transport-System), etc.

Transport within container transport system creates a significant share in the system of combined transport (Figure 8). It is related to the development of container sea transport using unified transport units ISO 1 (especially 40' containers ISO 1 A and 20' containers ISO 1 C). Vertical method of manipulation is used by reloading - grabbing the container through its upper corner components.



**Fig. 8** Complete container train of the METRANS Rail Company

Source: <http://www.fotodoprava.com> foto Bedřich Zenáhlík

Rail transport providers and operators of combined transport (e.g. ČD Cargo, METRANS Rail, Advanced World Transport) offer transport of big containers into important sea ports and in return. Trains carrying containers run either regularly or ad hoc. [10, 11, 12]

Recently the connection of Europe and Asia by railway experiences a big boom. Especially containers are transported here. Rail inter-continental transport is faster and more time reliable compared to the sea transport. It is slower compared to air transport, which is however more expensive.

## CONCLUSION

The European Union and its member states pay particular attention to transport and logistics of freight transport. The strategic and conceptional documents emphasise the share in division of transport labour in order to develop advantages of particular modes of transport and to provide efficient logistics services. This should help to fulfil the strategic goals as reducing of energy performance and impact on the environment.

Rail transport has its significant place not only in the national transport system, but also in logistics processes. To develop rail transport and its application in logistics chain, it is important to modernise rail transport system and to apply modern systems of combined transport.

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