MARKET ANALYSIS

to develop existing and build up new market ready train concepts (for conventional wagon load and/or intermodal services) between Scandinavia (defined as Sweden, Norway, Denmark and Finland) and Hungary via the Port of Rostock

D.T2.3.1 Transport analysis **July 2020**

Port of Rostock

THE PROJECT IS CO-FINANCED BY THE EUROPEAN UNION.

Prepared by the consortium of:

EX ANTE Consulting Ltd.

MLSZKSZ

LUB Consulting GmbH

Contracting entity:

ROSTOCK PORT GmbH

Port Strategy / Business Development

Thomas Biebig

Ost-West-Strasse 32

18147 Rostock, Germany

Date: 20.07.2020

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

ROSTOCK PORT, owner and operator of the port infrastructure, is among the construction and maintenance even responsible for the port's general development. In that sense, the company co-operates with different international institutions in the Interreg project "CorCap" (Interreg Central Europe Programme). The main focus of this project is the further logistics development of the TEN-T transport corridor "Orient-East Med" to make it ready for growing transport volumes.

ROSTOCK PORT GmbH[1]

The Federal State of Mecklenburg-Western Pomerania and the Hanseatic City of Rostock are the owner of the port of Rostock. Their interests are protected by the company ROSTOCK PORT GmbH. The company's mission is to develop this state´s largest port in such a way that it is able to meet the constantly increasing requirements of the shipping and tourism industries.

The work of ROSTOCK PORT is focused on the foresighted development of the port infrastructure as well as its maintenance. As the owner of the property, the quays and the water areas, it works closely together with the shipping industry and the companies located at the port to ensure that Rostock has all it needs at its disposal in order to continuously improve its competitive position.

ROSTOCK PORT is the single operator of the ferry and cruise ship port. Additionally, it is co-owner of the operating company of the terminal for combined freight transport.

A further task of the company is to provide services oriented towards the improvement of the competitive situation of the company or of the location. In this capacity, it can be found, acquire or have a share in companies or use the services of other companies, establish, acquire or lease auxiliary companies and open branch offices. Neither the company itself nor a company in which it has a majority share is allowed to engage in cargo handling or activities involved in the storage and handling of goods.

The stated objective of ROSTOCK PORT is, to continually develop the port in order to be able to meet new and changing demands.

With the winning of large production companies such as Liebherr, EEW Special Pipe Construction, Bio Petrol, Power Oil as well as the preparations for the establishment of additional handling, distribution and industrial companies, this location is sure to distinguish itself further in the second half of this decade.

[1] https://www.rostock-port.de/en/rostock-port/rostock-port-gmbh

2 METHODOLOGY OF THE TRANSPORT CONCEPT

In order to perform the requested analysis, which includes the analysation of the potential for either pure intermodal or mixed (convention-al/intermodal) trains between Hungary and Scandinavia via the Port of Rostock in due consideration of feeder trains or concepts to/from neighbouring countries like Slovenia, Romania and Bulgaria, we covered the following tasks.

A Transport analysis was carried out to examine the relevant statistics and literature for the affected area. It was followed by the Market analysis focussed on the train concept development. In order to get an even more accurate picture of the transport volumes and connections to Scandinavia, a market analysis was also be carried out by involving a number of freight forwarder companies.

The development of the train concept was built on the results of previous sections. After creation of a draft train concept the market penetration activity starts. With the help of this advertising activity, we will be able to communicate the possibility of the new train service to potential stakeholders. The product sheet will contain the results gained in the previous work packages which we also want to display with the help of an info graphic.

3 WORK PACKAGE 1 "TRANSPORT ANALYSIS"

In this work package, we want to examine the relevant statistics and literature for the affected area.

This will make visible the goods that are currently traded and transported between the regions relevant to the whole contract. The Hungarian present and future freight transport market will thus be supported by exact data and figures.

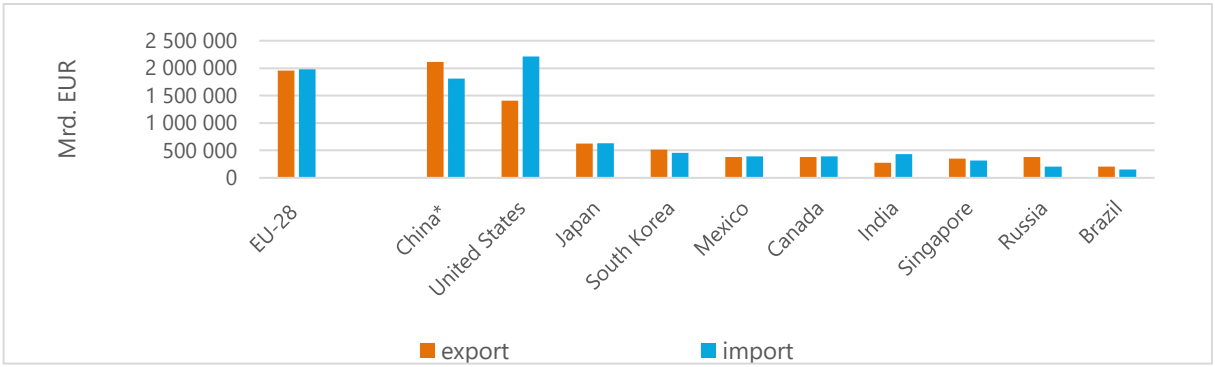
After that, we use different diagrams to show what trends can be observed in the relevant freight section. This will be the basic market potential forecast.

3.1 Characterisation of main spatial structures

3.1.1 World trade

Until the early 2000s, foreign trade between the US, Japan and the EU was decisive, replaced by the main flow direction from and to China, which was also strengthened by trade from other Asian countries. In 2017, China, the US and Germany became the world's leading exporters and importers. China is increasing the export of processed products and the domestic value-added content of its export products.

In recent years, the growth in world trade has been driven mainly by growing import demand from Asia. The growth of European foreign trade turnover has been around 2-3%. The economies of developing countries are dynamising exports, while developed countries still account for more than half of world trade.



* Hong Kong is not included

1. Figure. Major operators in international trade in goods.

Source: Eurostat, 2018

In addition to spatial restructuring, the composition of goods has also changed significantly, with 70% now representing trade in processed products, in the production of which multinational companies and global value chains play a key role.

3.1.2 Hungary's foreign trade

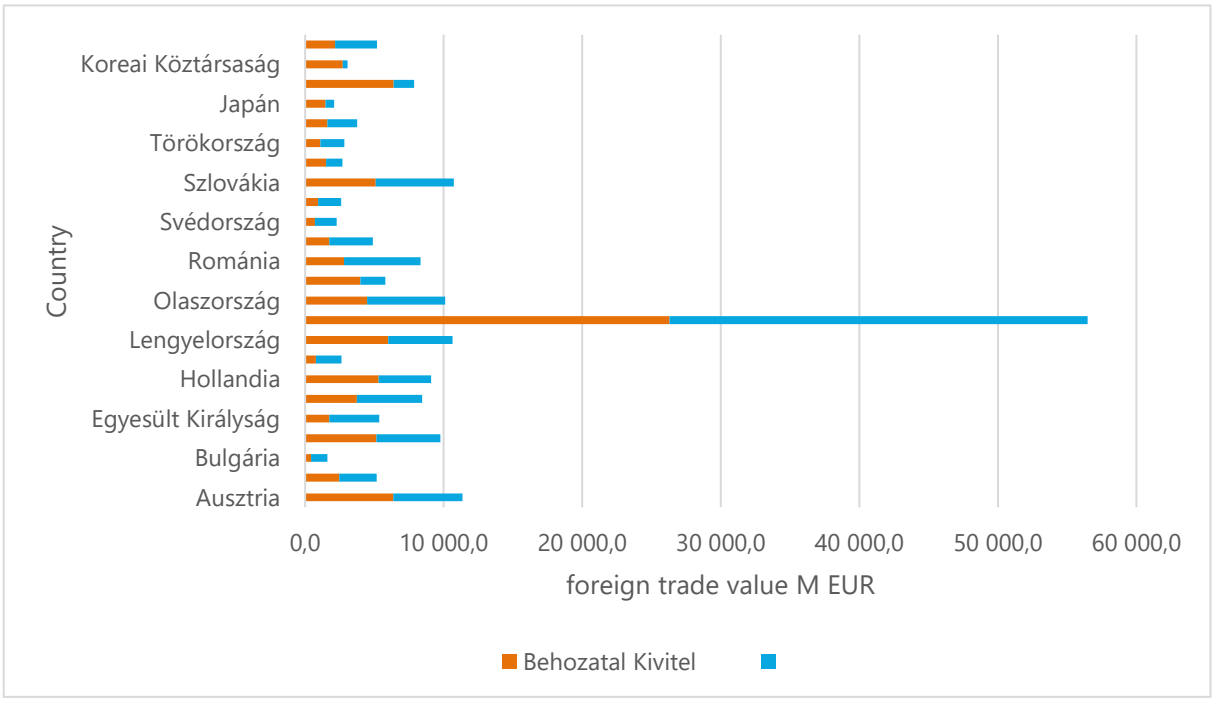
Hungary, as a small, open country, is particularly exposed to world economic processes. Its export orientation and import dependence are both among the highest in Europe. More than half of the country's foreign trade is provided by large companies, and more than 80% of exports are by foreign-owned companies. Almost 80% of Hungarian exports and imports are with the EU.

In terms of the **composition of goods**, the most significant (56%) and increasing export item is the turnover of machinery and transport equipment. The engine of growth is provided by the vibrant trade of the automotive industry and its related suppliers. The most important destination for cars is Germany. The export of chemical goods, including pharmaceuticals and pharmaceutical products, is also significant.

3.1.3 Characterisation of trade relations by country group

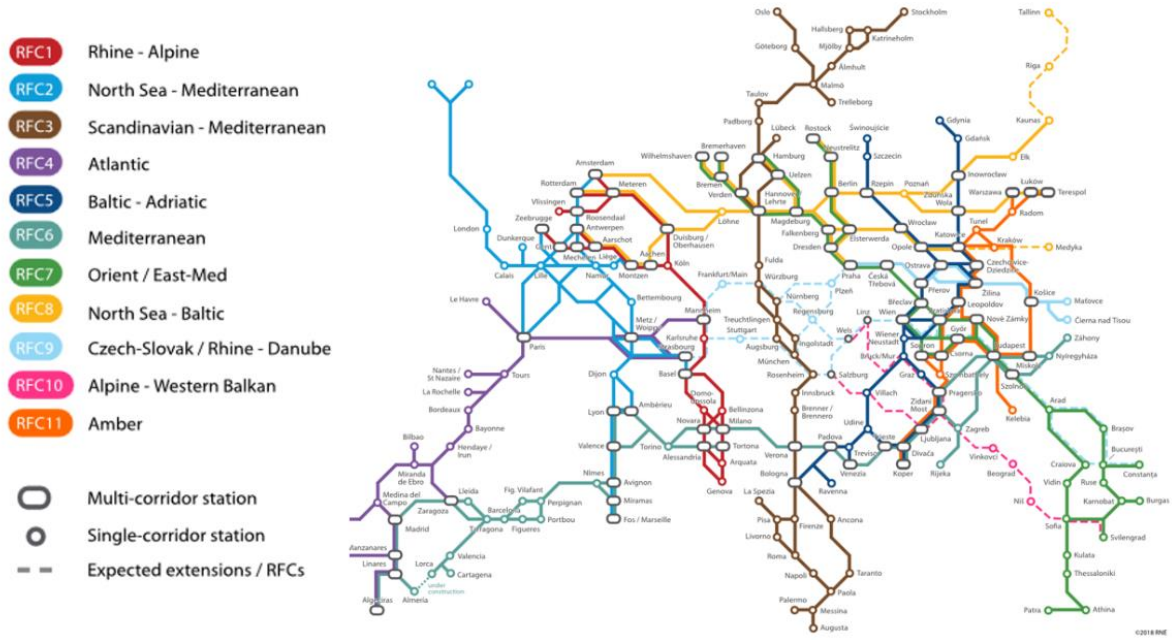
In terms of value of trade in goods, 50% of both exports and imports are to **Western Europe**. Our foreign trade to Western Europe takes place mainly on the RFC7 Orient/East-Med corridor in the direction of Győr-Hegyeshalom/Sopron-Vienna, and to a lesser extent on the RFC6 Mediterranean corridor in the direction of Békéscsaba - Hódos - Trieste.

The second most important group of countries in terms of foreign trade is the **countries that joined the EU after 2000**, of which our outstanding partners are Slovakia, the Czech Republic, Poland and Romania. The main routes are the RFC7 Orient/East-Med corridor, Slovakia, Czech Republic. The newly created RFC11 Amber Corridor provides trade to Slovakia and Poland.



2. Figure. Value of foreign trade imports and exports (M EUR)

Source: by country 2019, HCSO



3. Figure. Rail Freight Corridor (RFC) corridors in the EU

Source: http://rne.eu/

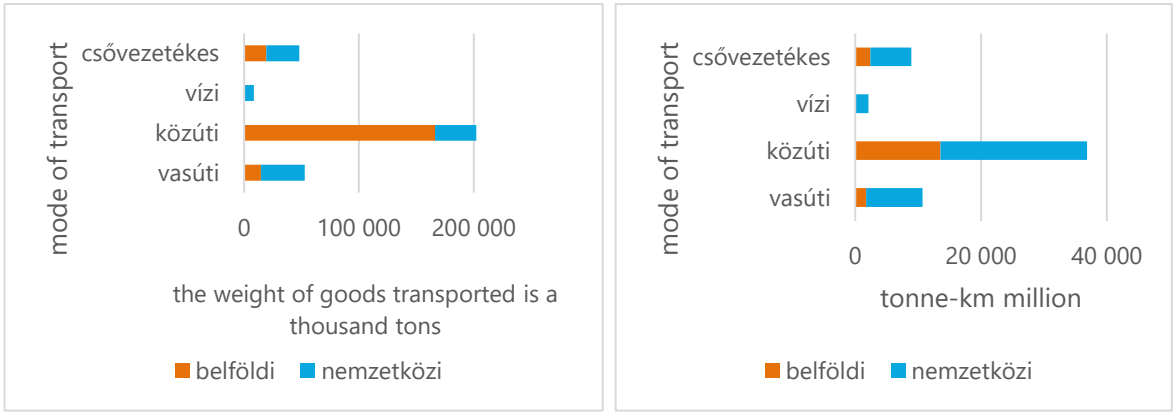
Of the **non-EU European countries**, only Russia and Ukraine are significant, with energy imports in particular standing out, most of which come by pipeline.

The **Far Eastern countries** (China, South Korea and Japan) are characterised by the most dynamic growth, which is also dominated by imports. The dominant form of freight transport is maritime container traffic, combined with some form of land transport. Our traffic in the Far East is handled through the Adriatic, Mediterranean and North Sea ports. (RFC7 Orient/East.Med, RFC6 Mediterranean, RFC11 Amber.). The development of the Chinese-majority port of Piraeus (Athens) and the rise of container traffic in particular is a strategic entry point for Chinese goods for Hungary and the countries of the wider region.

Of the **American countries**, only our foreign trade with the US is significant, most of which is exports. Most of our foreign trade with the US takes place through North Sea ports. (Direction RFC7 Orient/East-Med.)

3.2 The demand side of the Hungarian territory

The volume of goods transported increased dramatically in Hungary at the beginning of the decade, more than doubling. This radical increase has occurred on the roads, as the **capacity of the railway has been around 50,000 tonnes** on a permanent basis, while the road has reached an annual volume of 250,000 tonnes in 2009, with a **current volume of 200,000 tonnes**. As a result of the crisis, there has been a significant decline, but since 2011 the volume of road freight traffic has been growing again by an average of 4% a year, while rail freight traffic has continued to stagnate. Of the modes of transport, transportation on water also achieved a similar increase, albeit at a very low base, but produced a 2.5-fold increase. In the case of rail freight transport, the international direction is dominant in terms of both the weight of the goods transported and the freight tonne-kilometres.

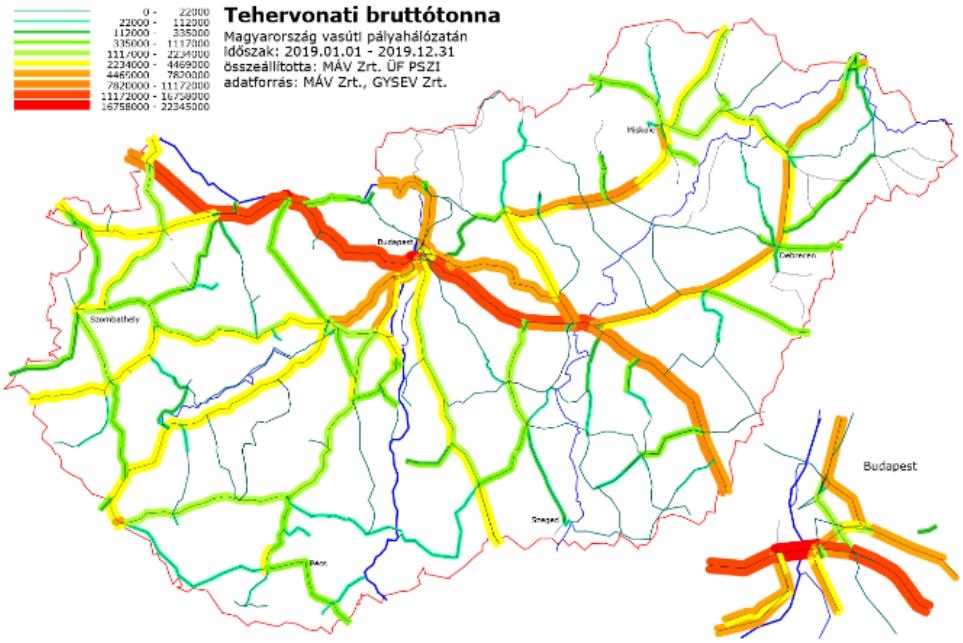


4. Figure. Modal distribution of domestic and international freight transport in Hungary (thousand tonnes, million freight tonne-km) 2019

Source: HCSO

3.2.1 Rail freight transport

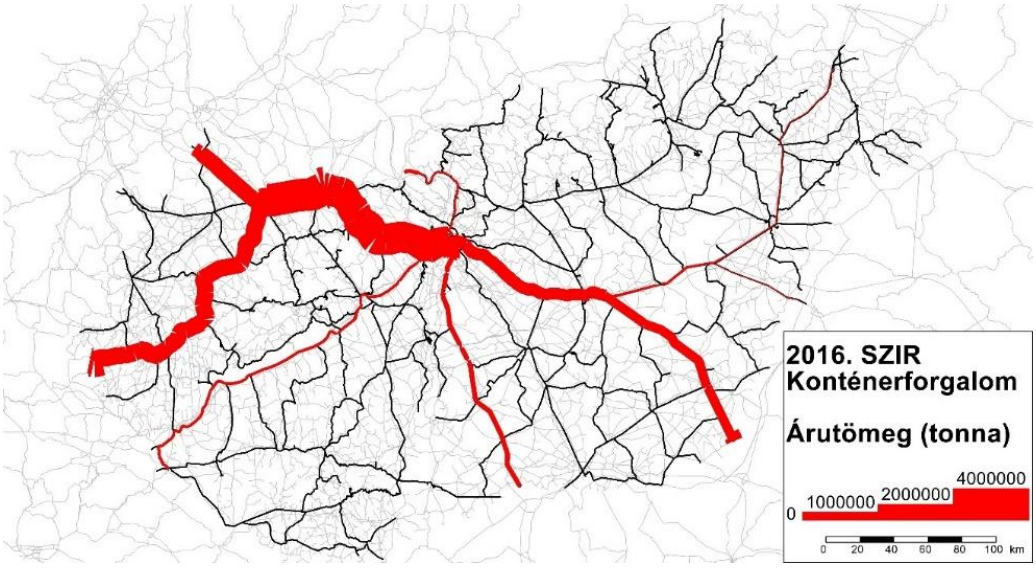
The largest volume of railway transport takes place on the TEN-T corridors, especially the performance of **RFC7, the Orient/East-Med** freight transport corridor on the entire Hungarian section from Hegyeshalom to Lökösháza, but with the largest traffic between Győr and Szolnok. This corridor also includes line 70 to Szob, which, also with heavy traffic, which is also part of **RFC11**. Also, lines with significant traffic are line 30a belonging to the **RFC6 Mediterranean** corridor to Székesfehérvár, line 80 to Miskolc, line 100 to Záhony and line 120a between Budapest and Szolnok.



5. Figure. Gross tonnage of freight trains in Hungary (2019)

Source: MÁV

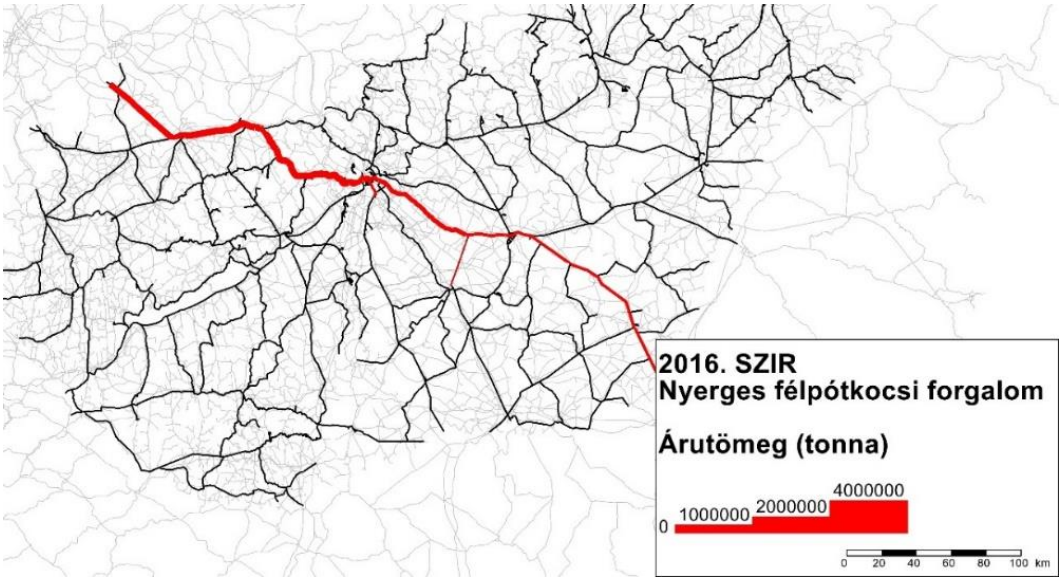
Based on the Transport Management System operated by MÁV Zrt., Hungary's rail freight traffic (loaded container and semi-trailer traffic) is concentrated in Budapest, and the largest traffic is realised in Austria. n addition, there is significant traffic to Romania, Serbia, Ukraine and Slovakia. The most important transit direction is the Hegyeshalom-Budapest-Lőkösháza route.



6. Figure. SZIR modelled loaded container traffic (2016)

Source: MÁV

The 2016 figure shows well that Budapest is the centre of domestic container traffic. In terms of border relations, there is significant traffic from Austria and Romania, partly through transit. The volume of the Croatian and Serbian directions is significantly smaller, and the traffic on the Záhony-Debrecen axis can also be observed.



7. Figure. SZIR modelled semi-trailer traffic (2016)

Source: MÁV

The turnover of semi-trailers in 2016 was significantly lower. In Hungary, in addition to the predominance of Budapest, traffic with measurable strength was generated in Kecskemét.

The figures clearly show that Hungary's rail freight traffic is concentrated in Budapest, and the largest traffic is realised in Austria. n addition, there is significant traffic to Romania, Serbia, Ukraine and Slovakia. The most important transit direction is the Hegyeshalom-Budapest-Lőkösháza route.

Among the **goods transported by rail**, small value-added products, such as raw materials and mined products, still stand out. The quantity of goods to be shipped as solid bulk goods dominates. The current total volume of product groups that can be partially containerised is about 20,000 tonnes.

Type of goods	Transported quantity (thousand tons)	Possible type of transport
Agricultural Products	5737	SZÖ, K
Coal, lignite, crude oil, gas	7080	SZÖ, FÖ
Mined products	10473	SZÖ
Food, drink, tobacco	486	K
Textile Goods	13	K
Wood- and wood products	1932	SZÖ, K
Coke and refined petroleum products	2803	SZÖ, FÖ
Chemical product	4047	SZÖ, FÖ, K
Other non - metallic minerals	922	SZÖ
Other metals and metal products, except machinery and equipment	3965	K

Machines, tools	688	K
Means of transport	1878	DÁ
Furniture and other manufactured products	10	K
Secondary raw material, waste	684	SZÖ
Equipment and materials used for the transport of goods	89	K, DÁ
Other	4279	either

1. Table Volume of goods transported by rail (thousand tonnes) by commodity 2018

Source: Eurostat, TRENECON processing

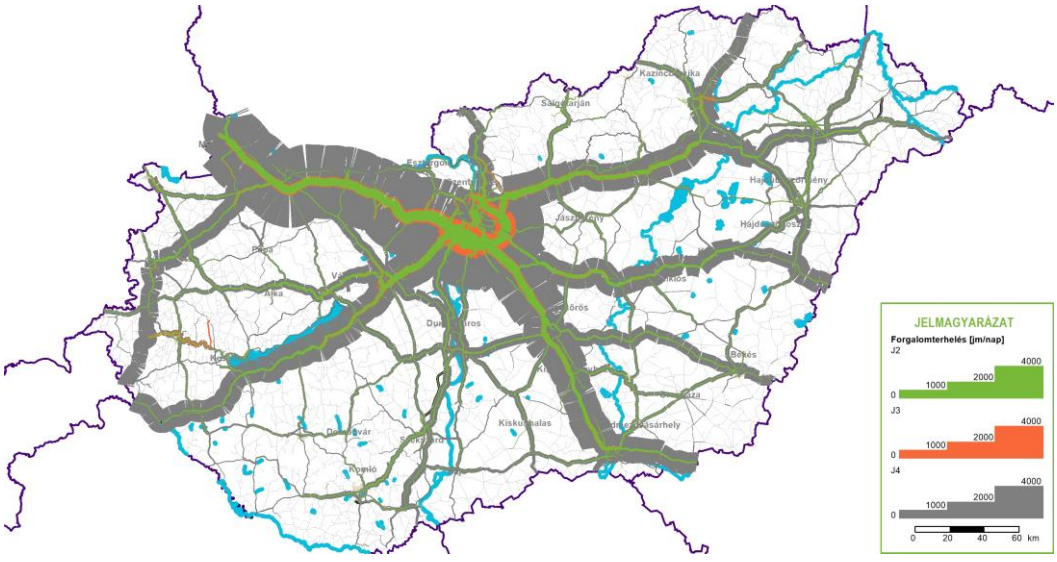
Symbols:

SZÖ: dry bulk; FÖ: liquid in bulk; K: can be containerised; DÁ: piece goods

3.2.2 Road freight transport

Analysing the 2019 traffic data received from NÚSZ (Nemzeti Útdíjfizetési Szolgáltató Zrt.), in road traffic, the Austria-Romania transit axis is the strongest direction. The Romanian-Slovak traffic, which is close to 250,000 J4 category trucks, is going in this direction, the Romanian-Austrian traffic is 150,000 trucks per year, and the Slovak-Slovenian traffic is also 150,000 trucks. In comparison, the annual turnover of 50,000 trucks in Serbia-Slovakia and nearly 70,000 trucks in Romania-Slovenia is low. This significant traffic burdens Budapest on the M0 ring road, which is already operating at the limit of its capacity - despite the recent development of capacity in the busiest southern part.

If we look at the development dynamics of these traffic over the last 4 years, there are directions in which traffic has increased by 100,000 trucks during this period. The average traffic growth in 4 years is 50,000-70,000 trucks. This very strong development dynamics creates opportunities for the development of combined transport. Within combined transport, in addition to the container branch, the transport of non-crane road semi-trailers by rail will play a major role. This is at least as big an option as a container, as 97% of trailers on the road are non-crane.



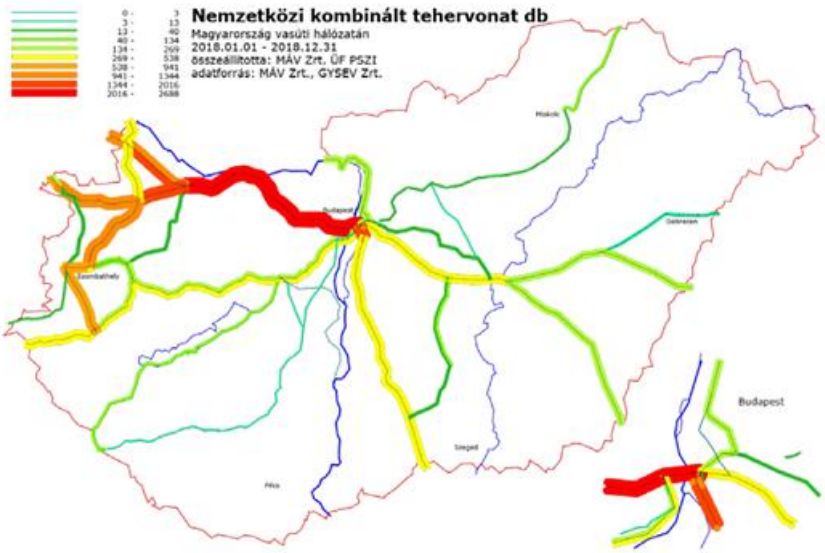
8. Figure. Traffic load J2 (green), J3 (orange) and J4 (grey)

Source: TRENECON Kft.

3.2.3 Combined transport

3.2.3.1 Statistical data, trends

The most dynamically developing sector of rail freight traffic is combined freight transport, due to the easy loading of universally usable means of transport. In terms of freight traffic, it is based on the growth of transcontinental freight traffic, which projects an increase in the share of long-distance transport. In Europe, the volume of combined traffic has increased by 50% since 2005, while general rail freight traffic has stagnated.



9. Figure. International combined freight train, number (for 2018)

Source: MÁV

The maximum traffic of a combined freight train in terms of number of units is on railway line 1, followed by the railway lines 16, 8, 17 and 25 in the Győr-Sopron-Szombathely area according to traffic. There are fewer combined freight trains on the railway lines of the eastern part of the country, there is considerable traffic on the entire section of railway line 150 and on railway line 100 up to Szolnok.

European combined transport produced robust growth in 2017:

- The total number of shipments carried by UIRR (Union for Road-Rail Combined Transport) members increased by + 5.48%, while the total tonne-kilometre increased by + 8.7%;
- International traffic increased by + 8.83%, while domestic traffic increased by + 7.93%;
- Cross-border - transcontinental services of the EU grew by 38%, while intra-European trade grew by a healthy + 5%.

	International			Domestic		
	2016	2017	2017/ 2016	2016	2017	2017/ 2016
Number of shipments (pcs)	2 075 709	2 153 563	3,75%	949 151	1 037 008	9,26%
Containers	*1 559 213*	*1 651 506*	*5,92%*	*860 373*	*954 711*	*10,96%*
Craneable semitrailers	*391 389*	*372 826*	*-4,74%*	*79 146*	*73 453*	*-7,19%*
Full truck (ro-la)	*125 107*	*129 231*	*3,30%*	*9 632*	*8 844*	*-8,18%*
Average distance (km)	1 067	1 120	4,97%	491	492	0,20%
Billion tkm	50,26	54,70	8,83%	8,70	9,39	7,93%
"Freight units" number (pcs)	4 151 418	4 307 126	3,75%	1 898 301	2 074 015	9,26%

2. Table. Changes in combined transport performance in the EU

Source: UIRR

Combined transport has also grown dynamically in Hungary; in terms of the quantity of the container, swap body is the most common technology. The previously present RO-LA service was completely discontinued after the end of the subsidy, while the semi-trailer remained modest despite significant growth. The performance of container and swap body freight transport in terms of freight tonne-kilometres has doubled in Hungary since 2009.

3.2.3.2 Data obtained from EKÁER

Traffic data were obtained from EKÁER (Electronic Public Road Trade Control System) for this Study, thus, on the basis of the data of the EKÁER data obligors, we analysed the annual import, export and domestic goods turnover of the most important domestic combined terminals (GYSEV CT-Sopron, METRANS, MCC, BILK) for EKÁER obligatory goods.

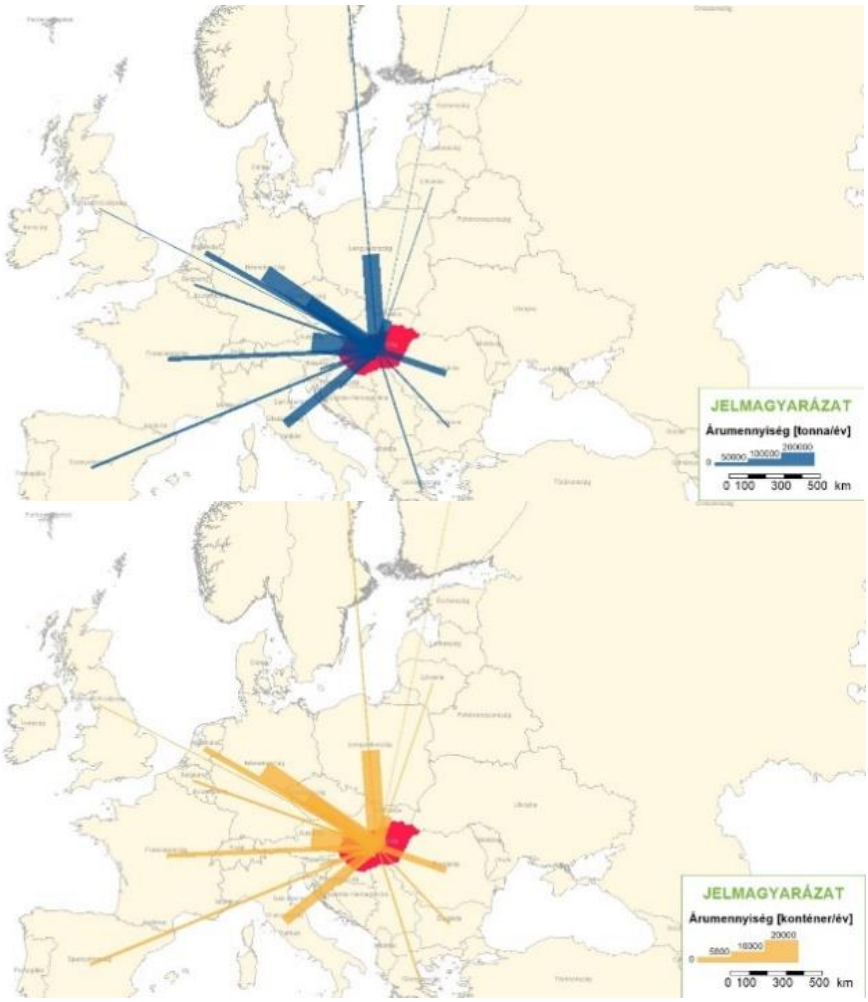
Export

The three Budapest terminals have an export turnover of more than 325,000 tonnes/year, while the Sopron terminal has an annual export turnover of 165,000 tonnes/year. The largest export turnover is directed to Austria, with an annual volume of more than 106,000 tonnes, which corresponds to nearly 7,000 containers. Exports to Germany (76,000 tonnes/year, 5,000 containers), Poland (64,000 tonnes/year, 4,000 containers) and Slovakia (53,000 tonnes/year, 3,000 containers) are also significant.

Import

The import turnover for the terminals in Budapest is 1.15 million tonnes (72,000 containers) annually, and for the terminal in Sopron 210,000 tonnes (13,000 containers). The largest quantities of goods arrive for the examined Hungarian combined terminals from Austria (200,000 tonnes/year, 13,000 containers), Poland (193,000 tonnes/year, 12,000 containers) and Germany (176,000 tonnes/year, 11,000 containers).

In terms of imports, the largest turnover is to Austria, with imports between the two countries and annual volumes in excess of 200,000 tonnes, equivalent to more than 12,000 containers. In addition, there is a significant annual turnover of more than 100,000 tonnes to Poland, Germany, the Czech Republic and Italy.



10. Figure. Annual import and export turnover of the three combined terminals in Budapest and the Sopron combined terminal (tonnes/year and container/year)

Source: EKÁER

3.3 The supply side of the Hungarian territory

3.3.1 Railway

3.3.1.1 Infrastructure

An important parameter for rail freight is the **permissible axle load of the track**. This has a direct effect on the weight of the load that can be carried on the wagons. On the lines affected by combined transport, an axle load of at least 20 t is permitted, of which 22.5 t is possible on several sections.

In Europe, freight trains with a maximum length of 750 m are currently allowed. Such long freight trains are Hegyeshalom-Budapest, Budapest-Szolnok-Békéscsaba, Szolnok-Záhony, Budapest-Miskolc-Hidasnémeti, Cegléd-Kecskemét-Kiskunhalas, Budapest-Dunaújváros and Budapest-

Székesfehérvár. On the other railway lines examined, the **maximum** permitted **freight train length** is 650 m, 600 m. On the Sárbogárd-Bátaszék railway line, on the other hand, only 350 m long freight trains are allowed, so it is more favourable to reach the port of Baja from Kiskunhalas on the 154 railway line.

We have a **railway line with the right speed** to Austria, Slovakia, Ukraine and Romania. Towards Serbia, the current 80 km/h of railway line 150 and the few slower sections towards Nagykanizsa-Croatia have sufficient but potential for development. Paks and its port can be reached at low speeds, the permitted speed on the railway line is 60 km/h.

Electrification of the railway line is also an important feature. An increasing proportion of freight trains run on modern electric locomotives, as they have a very favourable power/consumption ratio, they have low operating costs and good driving characteristics. They require a proper current type and overhead line system to operate. Among the examined railway lines, the Püspökladány-Biharkeresztes, Dombóvár-Bátaszék, Bátaszék-Kiskunhalas, Sárbogárd-Bátaszék, Dunaújváros-Paks railway lines were not electrified.

3.3.1.2 Commercial railway companies

In Hungary, rail transit related to combined transport is handled by several (nine in the first half of the year) contracted railway companies, thus covering rail freight transport, which is the backbone of combined transport. The largest are the following: MÁV-START, Rail Cargo Hungary, Floyd, MMV, CER, Train Hungary etc. Railway companies own locomotives, multiple units and railway carriages. Railway companies' vehicles move people and goods on the country's rail network. A freight railway company undertakes to transport the consigned goods. It provides wagons to transport the goods, a suitable locomotive to tow the wagons. The railway company has a licence to operate trains in Hungary, provided that all material and personal resources specified in the legislation are available to it. It is the responsibility of the railway undertaking to purchase train paths and other accesses for its trains from the infrastructure manager. There may be other accesses, such as assigning shunting staff to the train, using train scales, taking fuel, and so on.

3.3.2 Road

3.3.2.1 Infrastructure

It has an advanced motorway network in Hungary, which forms a coherent network. Most highways reach the border, such as: M7 (Slovenia, Croatia), M1 (Austria, Slovakia), M5 (Serbia), M43 (Romania), M0 (Budapest ring road. Ongoing motorway developments to reach the border in the near future, such as: M35 (Romania), M2, M30 (Slovakia), M85 (Austria). As a result of the developments of recent years, the expressway and main road network has been renewed in many places, and further significant renovations and expansions are expected in the next 3-4 years. At the end of the development programme, all cities with county status will be accessible by expressway, and all highways will reach the national border - for which this has not yet been achieved.

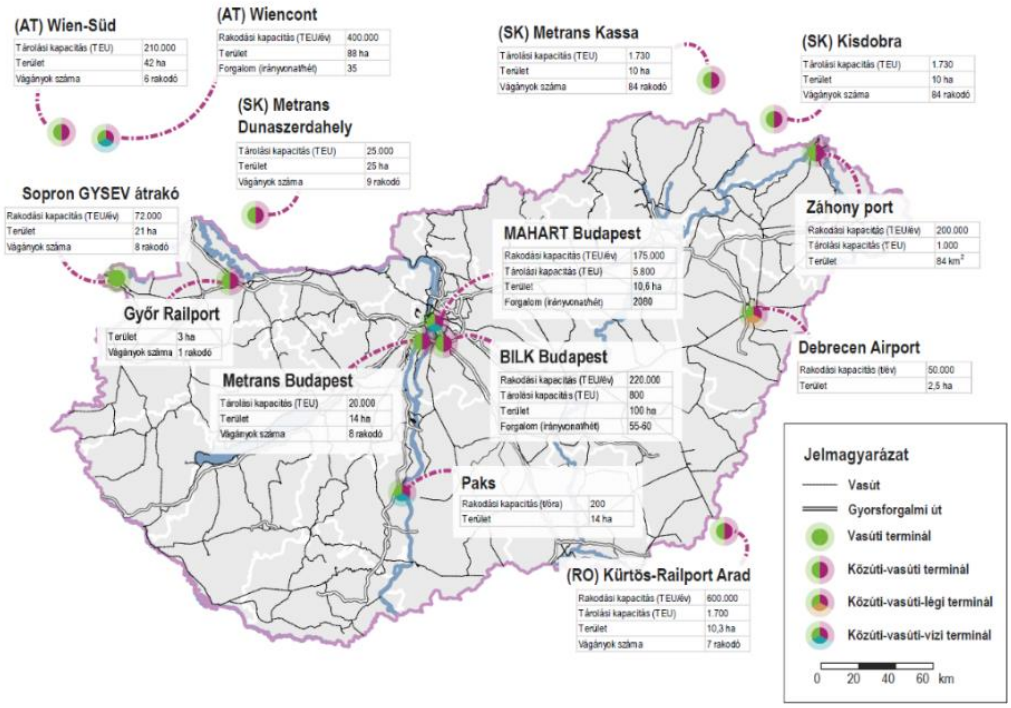
3.3.3 Combined freight transport operators

3.3.3.1 Infrastructure and service

The majority (more than 90%) of intermodal consignments arriving and departing in the country are handled in Budapest. This is especially the case since METRANS handed over its new terminal in Csepel, and now, together with the BILK and MCC terminals, there are 3 high-capacity transhipment terminals with almost the same capacity in the capital.

The other terminals operating in Hungary operate with significantly smaller capacity. The main activity of Záhony-Port is the management of railway track change from Ukraine, Russia, the Commonwealth of Independent States and beyond, through the Ukrainian-Hungarian railway border crossings. (wide: 1520 mm – ordinary: 1435 mm).

Among the border terminals, Kürtös Railport-Arad, Vienna Wien-Süd, Wiencont and Dunaszerdahely should be highlighted when examining their capacity performance.



11. Figure. Combined freight transport operators

Source: Trenecon

3.3.3.2 Comparison of road and combined freight transport services

In the Annex, we present in detail a calculation based on a specific example to compare road and combined transport charges. Based on the specific example, it appears that the combined long-distance freight rate advantage in the freight market (in the specific example it is 7%, but this may vary depending on distances and other factors) does not massively motivate shippers / principals to use this mode of transport.

Obstacles:

- simplicity and speed of organising road transport, door-to-door transport, continuous supervision by the driver;
- slowness of rail freight bidding, need for more complex organisation, unpredictability, road hauliers must also be used for pre / post transport;
- there is a shortage of railway staff with specialist knowledge of rail transport at shippers/principals (some exceptions are, of course);
- one of the biggest obstacles to the railway transport of Hungarian road trailers is the organisation of the follow-up from the foreign combined terminal (organisation, legal liability, insurance) - most Hungarian companies do not have such business relations/knowledge.

The list of obstacles above can, of course, be expanded. One way to overcome this is to provide shippers/principals financially motivated through a complex combined transport incentive scheme.

In order to divert part of road transport to rail, the following must be taken into account:

- 97% of European road semi-trailers are non-crane;
- there are few swap bodies and the special media required for this;
- the number of special railway carriages (RoLa, LOHR, NIKRASA, etc.) required for the transport of road vehicles by rail is small, their acquisition is essential to increase traffic;
- the necessary involvement of the railway operator in the organisation of the processes;
- designation of a good relation, at a distance of at least 1000 km, where there is a lot of road activity on the transport axis (e.g. Kiskundorozsma - Munich);
- declared multi-level advanced rail mixture transportation;
- the importance of incentive support for combined transport.

3.3.3.3 Effects. of combined transport

The solution of the centrality of Budapest and the diversion of road traffic to rail can only be solved if combined terminals are built in industrial centres with higher traffic potential in the countryside, with state support. The role of the state helps to speed up longer market processes and stimulate regional development effects.

At the same time, it can be stated that Hungary can only meet the EU climate targets in the years of intensive development of combined transport, as road transport is one of the largest emitting sectors. Thus, a significant reduction in emissions can be achieved by shift of modes of transport.

The intensive development of combined transport requires the development of a comprehensive incentive scheme for combined transport, which has a significant impact on the operators' shift of modes in the transport market.

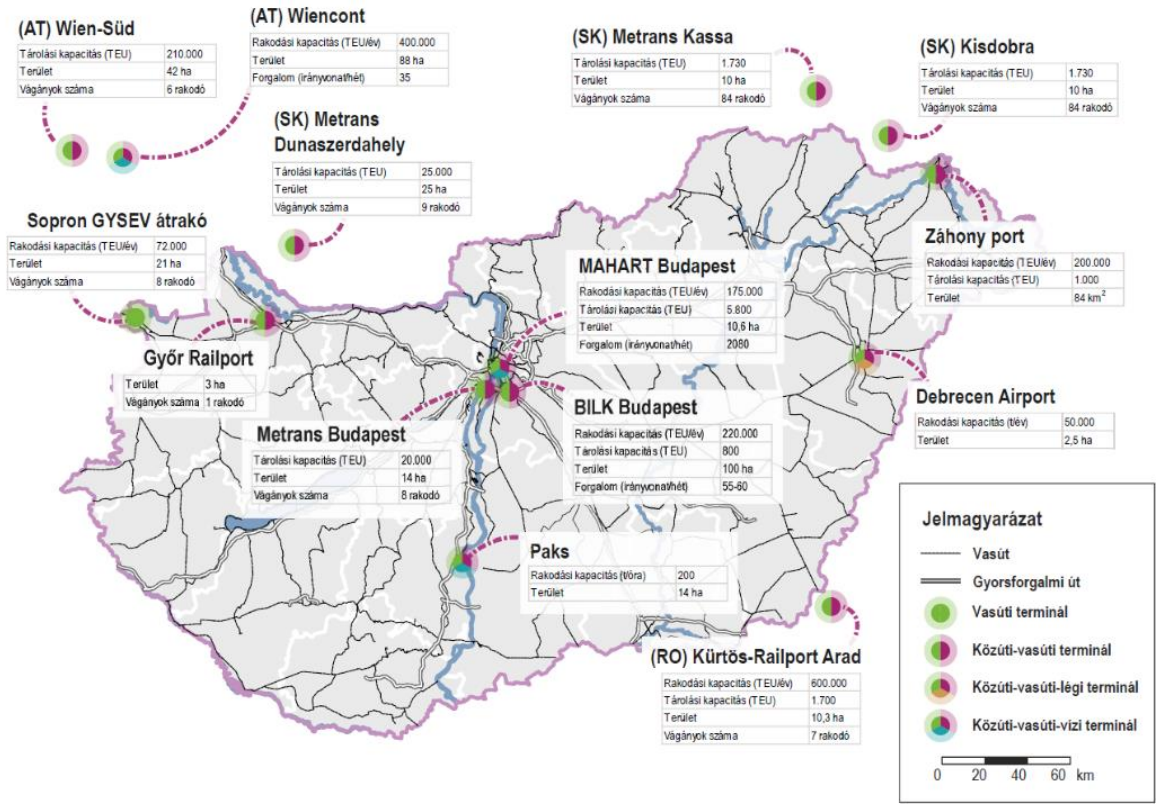
3.3.4 Identification of problems and deficiencies

	Problems and deficiencies
Freight transport	
Road	• High sensitivity to disturbance - weather, epidemics, border crossings; • Many small operators - inability to cooperate; • Low IT equipment of small hauliers, lack of business models.
Rail	• Its regulatory system is outdated; • Border crossings are slow and problematic - need to be modernised and accelerated; • Creating transport conditions for longer freight trains (700-750 m) • Lack of specialists.
Water	• There is no incentive scheme for waterway transport - the incentive scheme for combined transport can have a positive effect here as well; • Lack of specialists.
Combined transport	• Budapest-based, there is no incentive scheme for traffic diversion.
Infrastructure	
Road	• Service roads leading to residential areas; • Availability from the express network is only available in a few cases; • Some sections are overcrowded - M1, M0. • Danger of accidents.
Rail	• Most of the current regional container terminals are designed to transport small containers, are located in the central part of the cities, are served by roads through residential areas, and their infrastructure has deteriorated; • The need to develop border crossings occurs in several places (Lőkösháza-Curtici; Gyékésnyes-Croatia; Kelebia-Serbia) • Due to the proximity of Budapest, terminals with better infrastructure cannot operate in a suitable plant size; • Renovation programmes disadvantaged for freight transport - ill-considered track locks, etc.; • Downsizing of freight transport capacity on refurbished lines; • Electrification of railway lines and stations important for freight traffic (Debrecen-Balmazújváros-Füzesabony) • Semi-trailer and swap body loading is solved in few places; • Lack of Budapest railway ring road - V0.
Water	• The navigability of the Danube, with a diving depth of 2.5 m, cannot be ensured for 320 days a year = unpredictability.

Institutional	
	• Combined freight transport requires the involvement of many more operators than road freight transport, and requires more infrastructure and equipment. This reduces the flexibility of service delivery as well as increases prices; • At present, **there is no adequate incentive scheme** to divert road freight to rail; • The initial capital requirement for terminal investments is very high, mainly due to the development of railway infrastructure, which does not make the construction of terminals profitable on a purely market basis either, which is otherwise economically operational and socially rewarding.

3.4 Presentation of container terminals in and around Hungary

In this chapter, the intermodal logistics centres shown in the figure will be described with their short history, terminal services, and their connection to the domestic road and rail network.



12. Figure. Combined freight transport operators

Source: Trenecon

The data in the figure come from the websites of the terminals, other data collection portals or their operators. The figure shows that the Hungarian infrastructure is also strongly Budapest-centric in the field of intermodal terminals, more than two thirds of the loading capacities are concentrated in Budapest and in Pest County. Most rural terminals are located close to the national border, along

important industrial zones or freight transport corridors. It is important to note that foreign terminals located close to Hungary, e.g. Railport Arad, Wiencont, Wien Süd, also have significant loading capacities.

There is a very strong grouping of combined terminals in the vicinity of Győr and along the northern border in Slovakia and Austria, which handle significant traffic to Hungary. The southern neighbours of the country do not have a meaningful terminal network system, which is caused by the fact that industrially these areas are spectacularly lagging behind the northern regions. The terminal in Kürtös on the Romanian side serves the regions of Partium and Transylvania. When planning facilities with similar functions near the Hungarian border, this information should not be ignored.

3.4.1 Rail Caro Terminal – BILK Zrt. - Budapest

3.4.1.1 Basic data and equipment of the terminal

storage area	22,3 ha
loading track	7×720 m + 2×280 m + 90 m
rail-mounted gantry crane	2 pc (Kone 45 t)
loaded container loading machine	6 pc (Konecranes, Kalmar 45 t)
empty container loading machine	2 pc (Kalmar, 10 t)
terminal tractor	1 pc Kalmar
electric connection	refrigerated container
repair shop	
hazardous (ADR/RID) container goods storage area	
container customs inspection and transhipment place	
container handling (lifting):	• 250,000 units/year • storage: 6,900 TEU

13. Figure Combined Terminal operated by Rail Cargo – BILK Terminál Zrt.

Source: BILK

3.4.1.2 Service

Services in container traffic

- Loading of containers, swap-bodies and semi-trailers,
- Depot for empty containers,
- Handling of reefer containers,
- Handling of hazardous containers,
- Block trains in the relation of: Hamburg, Bremenhaven, ARA ports, Koper, Wien, Wels, Duisburg
- Sending waggon groups towards West European countries (e.g. Rotterdam, etc.)
- Sending waggon groups towards CIS and East European countries (e.g. Zahony/Csop, Arad/Curtici, etc.)

Additional services related to container traffic

- Road haulage of containers,
- Customs clearance,
- Container repairing,
- Container inspection,
- Container cleaning,
- ADR/RID Labelling,
- Photographed seal control,
- Flexi tank installation,
- Weighing

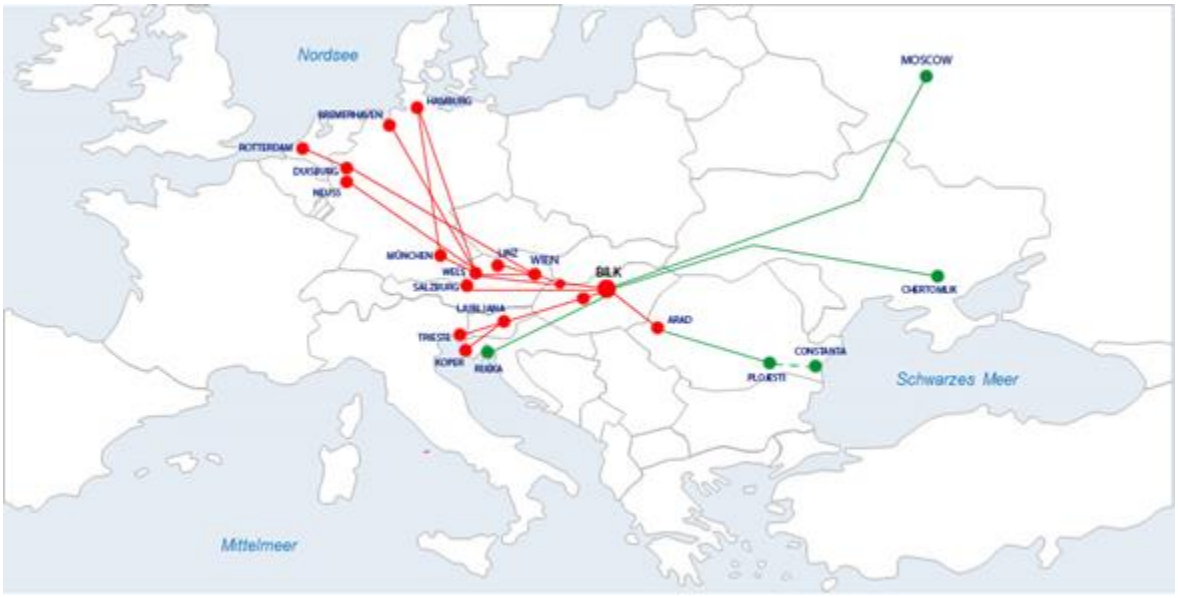
Other services

- Buffet,
- Secured truck parking,
- Informatics services

3.4.1.3 Turnover

With the new investment, Rail Cargo Terminal-BILK Zrt. is currently able to handle approximately 220,000 TEU containers annually.

The terminal currently serves 55-60 directional trains per week. In addition to scheduled container directional trains, the terminal also handles ad hoc trains and the service of wagonload combined transport rail consignments.



14. Figure. BILK directional train connection

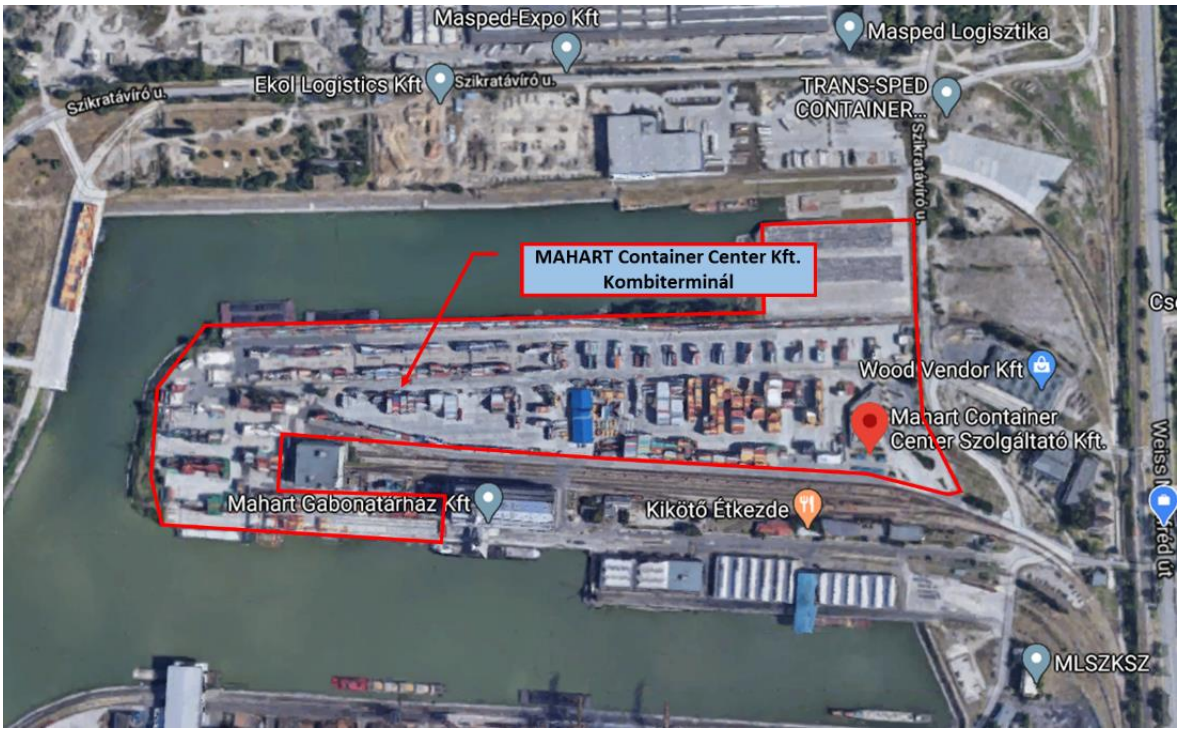
Source: https://railcargobilk.hu/; http://bilk.hu/

3.4.2 MAHART Container Centre - Budapest

3.4.2.1 Basic data and equipment of the terminal

storage area	10.4 ha (104,000 m2)
loading track	2×690 m + 3×300 m
loading embankment	220 m
rail-mounted gantry crane	1 pc (30 t)
loaded container loading machine	6 pcs (Kalmar, 45 t)
empty container loading machine	3 pcs (Kalmar, 10 t)
terminal tractor	2 pcs Kalmar
electric connection	74 pcs

repair shop	
hazardous (ADR/RID) container goods storage area	
container customs inspection and transhipment place	
container handling (lifting):	175,000 pcs/year storage: 5,800 TEU



15. Figure. Combined Terminal operated by MAHART Container Centre in the Freeport of Csepel

Source: MAHART Container Centre

3.4.2.2 Service

The terminal manages diversified train projects in Europe through railway operator companies it co-operates with. From the Mahart Container Centre, closed express directional trains run to Trieste, Koper, Rijeka, Hamburg, Bremerhaven, Herne, Cologne and Rotterdam on a regular basis and to Salzburg, Linz, Paskov and China on an ad hoc basis through the railway operators co-operating with the terminal. The current directional train projects are summarised in the figure below:

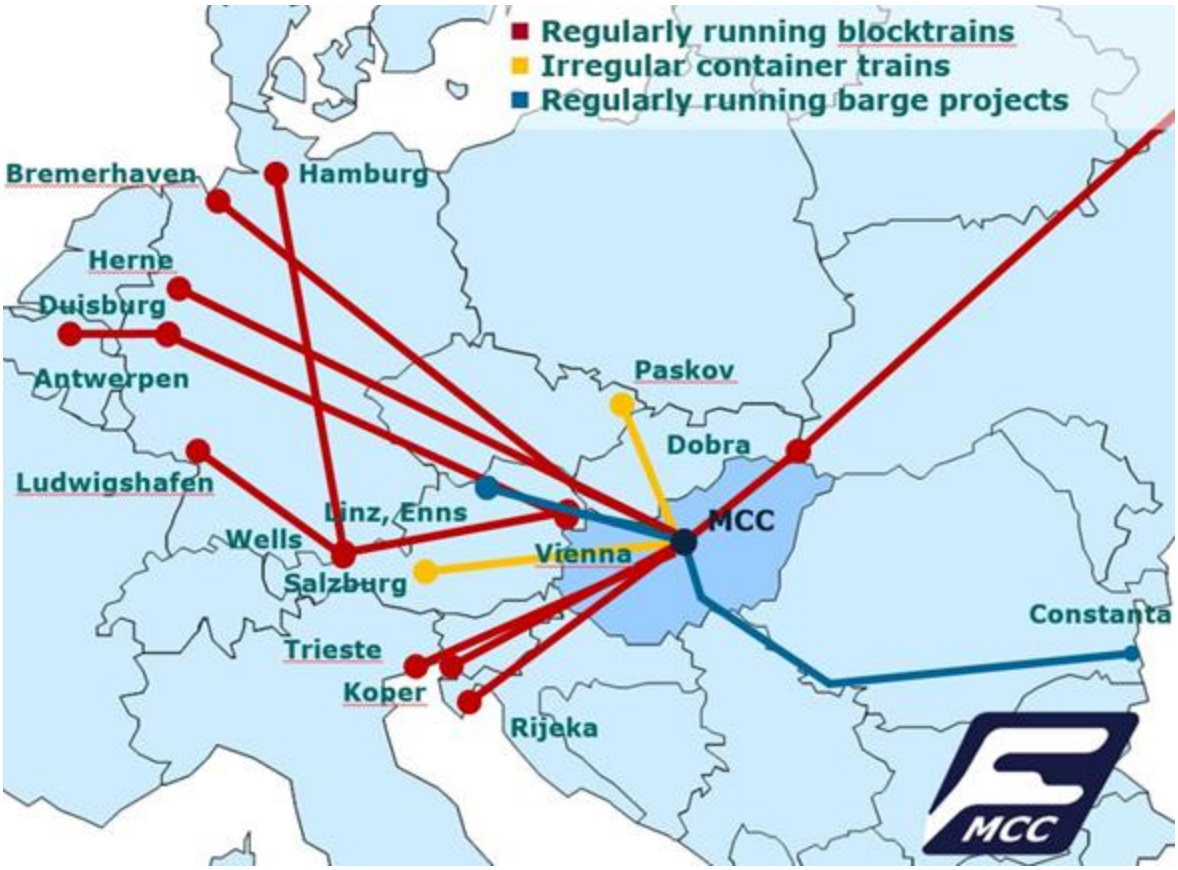
Terminal services:

- Trimodal (road-rail-river) handling of ITUs.
- Storage of ITUs on terminal.
- Depot activity for empty containers.

- Handling of blocktrains in the following relations: Bremenhaven, Koper, Trieste, Rijeka, Vienna (connecting possibility to Wels, Ludwigshafen, Duisburg, Rotterdam, Antwerpen and Hamburg), Cologne, Herne, China via Malaszewicze (PL), Dobra (SK)
- Handling of vessels, barges in the following relations: Constanta (Galac, Beograd), Bratislava (spot-based project), Linz (Wien, Enns, Linz - regularly running).
- Semi-trailer rail project handling

Other services:

- Road haulage of containers
- Testing, cleaning and electricity feeding of reefer containers
- Installing (GOH, Flexi-tank, inliner, insulated liner)
- Handling, storing of ADR containers (only ADR 2, 3, 6.1, 8, 9 classes)
- Container repairing
- Container inspection
- Steam cleaning of containers
- Cargo handling in case of customs checking per random sample or per article
- Cargo handling/transloading from container to truck
- Customs services
- Used, empty containers (20', 40', 40'HC) for sale



16. Figure MAHART Container Centre directional train connections

Source: https://containercenter.hu/index.php/hu/

3.4.3 METRANS Konténer Kft. - Budapest

3.4.3.1 Basic data and equipment of the terminal

storage area	14.0 ha
loading track	6×650 m + 2×500 m
rail-mounted gantry crane	3 pcs (45 t)
loaded container loading machine	4 pcs (45 t)
empty container loading machine	1 pc (10 t)
electric connection	refrigerated container
repair shop	
hazardous (ADR/RID) container goods storage area	
container customs inspection and transhipment place	
container handling (lifting):	• 250,000 units/year • storage: 20,000 TEU

17. Figure. Combined Terminal operated by METRANS Konténer Kft.

Source: METRANS

3.4.3.2 Service

- Logistics services
- Road transport organization
- Moving and storing containers
- full customs administration

3.4.4 GYSEV Cargo Zrt. – Sopron container transhipment facility

3.4.4.1 Basic data and equipment of the terminal

tracks with cranes	6
storage tracks	4
lifting machines	2 gantry cranes (40 t – 45' container, swap body, semi-trailer)
loaded container loading machine	1 (40 t – 45' container, swap body, semi-trailer)
storage facility	30,000 m2
electric connection	refrigerated container
repair shop	
container customs inspection and transhipment place	
container handling (lifting):	• 72,000 pcs/year • storage: 2,000 TEU

18. Figure Combined Terminal operated by GYSEV Cargo Zrt.

Source: GYSEV Cargo Zrt.

3.4.4.2 Service

Traction + rail freight transport

- Transport of intermodal and conventional block trains
- Single wagon load (on own infrastructure)
- Tracking & tracing
- Full commercial administrative services (waybill, re-expedition etc.)
- Customs clearance

Classification yard

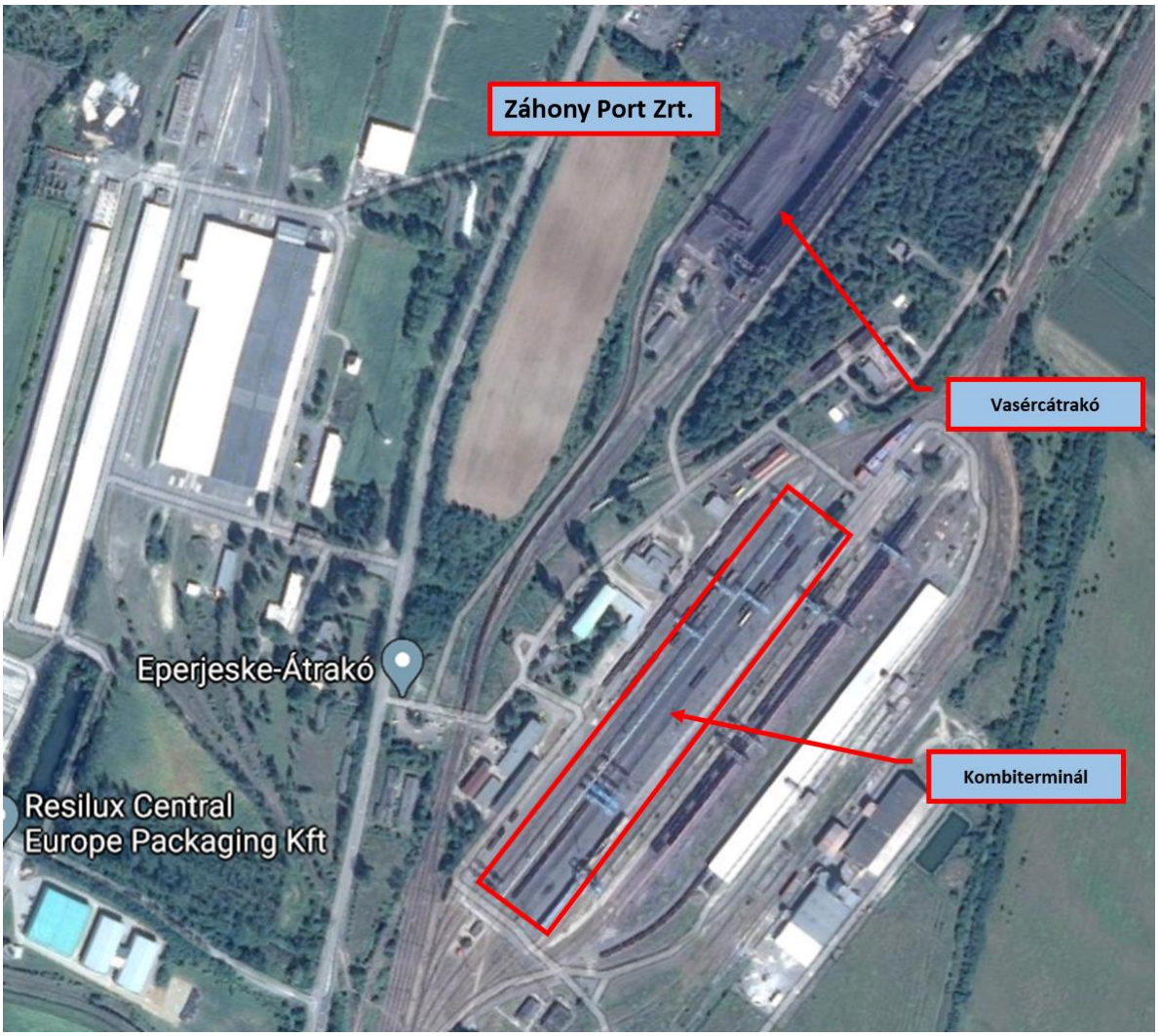
- Technical data
- 16 running tracks
- 1 loading track for commercial traffic
- Tracks with catenary, suitable for electric traction
- 1 track-scales
- Comprehensive electronical data processing

- Services
- Wagon collection/ block train composition
- Antenna-like distribution/collection of incoming block trains
- Re-expedition
- Handling of dangerous goods/RID
- Technical inspection of trains
- Technical wagon repair
- Weighing of wagons

3.4.5 Záhony-Záhony Port

3.4.5.1 Basic data and equipment of the terminal

storage area	4.0 ha
loading track	2×530 m normal + 2×530 m wide gauge railway track
gantry crane	17 pcs (30 t)
container loading machine with a telescope boom	1 pc (45 t)
electric connection	for refrigerated containers
repair shop	
hazardous (ADR/RID) container goods storage area	
container customs inspection and transhipment place	
container handling (lifting):	• 100,000 pcs/year • storage: 800 TEU
Capacity	• 7,000 tonnes/day, or 500 TEU/day



19. Figure. Combined Terminal operated by Záhony Port Zrt.

Source: Záhony Port Zrt.

3.4.5.2 Service

- Transloading loose bulk goods
- Transloading bulk grain
- Crane loading
- Tank-to-tank transloading
- Loading with small machinery
- Transloading log and wood products
- Storage services
- Customs assistance
- Railway company activities
- Metal industry services

3.4.6 Győr-Railport DB

3.4.6.1 Infrastructure

The Győr Railport terminal is located in the Győr Industrial Park, which is operated by DB Cargo Hungária Kft. In the 30,000 m2 loading area, it is possible to handle 3 wagons at a time with the help of forklift trucks. The terminal is served by DB Cargo's own diesel locomotives.

The terminal is located in a heavily built-in environment; expansion of its loading and storage area as well as its track network is minimal.

3.4.6.2 Service

Győr Railport Terminal offers our customers multifunctional logistics solutions near the Hungarian-Slovak-Austrian border

- complex logistics services
- transhipment and storage (under tarpaulin tent or in containers)
- to link rail and road freight transport

3.5 General presentation of rail, road freight transport and logistics

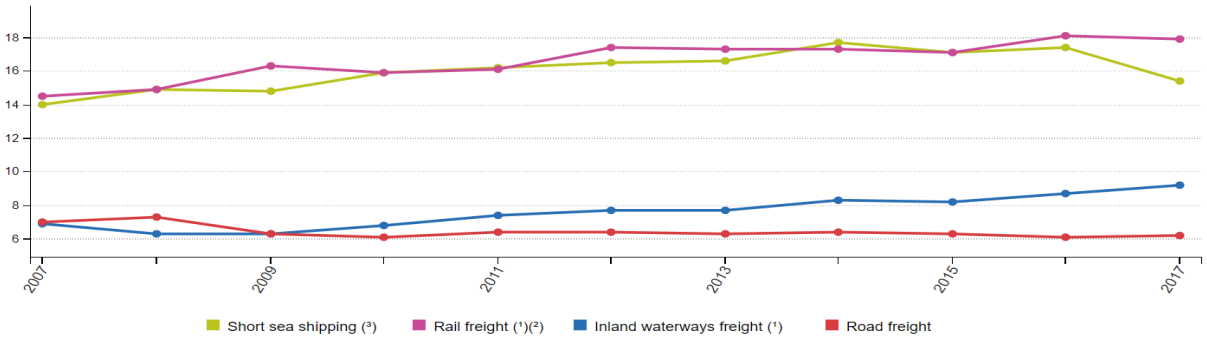
3.5.1 Great opportunities ahead for combined transport

In the European Union, the biggest challenge for road transport is finding a driver for trucks. At the same time, the growing heavy goods vehicle traffic significantly increases the environmental impact of roads and the need for road renovation and puts a heavy burden on the budgets of all countries. According to the MLSZKSZ (Association of Hungarian Logistics Service Centres), by raising road, rail and waterway transport cooperation to a higher level in Hungary, 50-100 thousand trucks a year could disappear from Hungarian roads, and rail and waterway transport could gain new business orders, and road hauliers could save costs, and the measures would also address the expected tightening of the European Union's Mobility Package. In addition, it is important that logistics operators maintain their business independence and organize their transport processes in a completely new way, more efficiently, with less environmental impact, and more economically.

3.5.1.1 Growing EU intermodal traffic - trends by mode of transport

The proportion of 'freight transport units' followed a similar trend in short maritime shipping and rail freight transport from 2007 to 2016. The rate for rail freight transport reached 14% in 2007; this value has not changed significantly since then. Only containers and swap bodies were considered in the examination of the latter and in comparison, with other modes of transport. In the case of short maritime shipping, the use of 'freight transport units' is initially growing relatively steadily, it rose from 14% in 2007 to 17.7% in 2014 but fell to 17.3% in 2016.

With regard to road and inland waterway freight transport, 'freight transport units' are present in a significantly lower proportion than in short maritime and rail freight transport. Inland waterway freight transport increased steadily between 2009 and 2014, but the rate of 'freight transport units' decreased by 0.1% from 2014 to 2015 and then reached a share of 8.7% in 2016, which represents an increase of 0.5% compared to 2015. Only four Member States in the EU (the Netherlands, Germany, France and Belgium) have significant inland container traffic, in the case of road freight transport, the share of 'freight transport units' was 6.9% in 2007, the same as inland waterway transport, and has typically remained below 6% since then. The proportion of 'freight transport units' for the EU from Member States' data provided to Eurostat is shown in the figure below.



20. Figure. EU container transport within total freight transport, by mode of transport, 2007-2016 (% of total tonne-kilometres)

Source: https://ec.europa.eu/eurostat/statistics-explained/index.php/Freight_transported_in_containers_-_statistics_on_unitisation

3.5.1.2 Options for shift of modes from road to rail

One of the main objectives of European transport policy is to reduce greenhouse gas (GHG) emissions by 60% from 1990 levels by 2050. The first step in the strategy to achieve this is to switch 30% of road transport to 300 km and below, with lower CO_2 emissions than road transport, including the transfer of containers and other 'freight transport units' from road to rail and inland waterway transport.

The 'shift of modes potential' indicator provides information on the proportion of container traffic transported over distances of 300 km or more. Diversion of road container transport to rail or inland waterway transport would help to reduce CO_2 emissions in the transport sector. The development of the volume of long-distance container road transport between 2014 and 2016 can be observed in the following table.

3. Table. Long-distance container transport on road (300 km or more), shift of modes potential 2014-2016

Source: HCSO

	Long-distance container transport (300 km or more) by road (thousand tonnes)			Share of long-distance transport (300 km or more) in total container transport by road (% of total tonnes)		
	2014	2015	2016	2014	2015	2016
EU-28	**:**	**:**	**:**	***41,7***	***40,8***	***41,0***
Belgium	1 227	1 379	1 082	35,4	38,0	30,6
Bulgaria	625	1 134	1 019	77,4	77,6	71,1
Czech Republic	2 041	2 081	1 299	65,1	59,9	46,5
Denmark	:	:	:	:	:	:
Germany	**15 406**	**15 598**	**15 616**	**39,9**	**39,6**	**39,3**
Estonia	97	214	264	39,4	74,8	74,8
Ireland	:	:	:	:	:	:
Greece	284	148	438	35,0	23,6	51,2
Spain	3 094	3 256	4 416	46,8	47,3	52,7
France	2 750	2 483	2 996	49,2	46,3	50,7
Croatia	:	:	:	:	:	:
Italy	:	:	:	:	:	:
Cyprus	10	13	16	11,6	14,6	14,0
Latvia	176	208	356	65,7	55,5	65,7
Lithuania	657	360	591	76,8	70,0	78,9
Luxembourg	581	387	319	58,5	54,9	49,5
Hungary	713	688	474	66,0	64,1	59,8
Malta	-	-	-	-	-	-
Netherlands	2 220	1 750	1 585	25,2	20,3	19,4
Austria	135	135	138	22,9	20,5	18,4
Poland	1 573	1 138	2 620	66,8	58,6	75,4
Portugal	2 661	2 650	2 822	42,2	38,4	42,1
Romania	1 551	1 424	301	80,3	79,6	74,7
Slovenia	414	612	685	69,1	78,6	73,5
Slovakia	645	659	698	66,6	66,4	65,4
Finland	577	272	702	42,1	18,6	44,0
Sweden	2 388	2 329	1 912	32,3	30,9	25,4
United Kingdom	1 975	2 302	1 908	25,4	31,1	26,0
Iceland	:	:	:	:	:	:
Liechtenstein	:	:	:	:	:	:
Norway	1 054	802	814	51,0	36,6	40,5
Switzerland	:	:	:	:	:	:

Symbols:
green*: long-distance road container transport decreased during the period under review*
black*: long-distance road container transport increased in absolute terms during the period under review*

The data show that the share of long-distance (300 km or more) containerised road freight transport in the EU fell by 0.7 percentage points, from 41.7% to 41%.

European combined transport produced robust growth in 2017 (figures are shown in the table below): the total number of shipments carried by UIRR (Union for Road-Rail Combined Transport) members increased by + 5.48%, while the total tonne-kilometre increased by + 8.7%. International traffic increased by + 8.83%, while domestic traffic increased by + 7.93%. Cross-border - transcontinental services of the EU grew by 38%, while intra-European trade grew by a healthy + 5%.

	International			Domestic		
	2016	2017	2017/ 2016	2016	2017	2017/ 2016
Number of shipments (pcs)	2 075 709	2 153 563	3,75%	949 151	1 037 008	9,26%
Containers	*1 559 213*	*1 651 506*	*5,92%*	*860 373*	*954 711*	*10,96%*
Craneable semitrailers	*391 389*	*372 826*	*-4,74%*	*79 146*	*73 453*	*-7,19%*
Full truck (ro-la)	*125 107*	*129 231*	*3,30%*	*9 632*	*8 844*	*-8,18%*
Average distance (km)	1 067	1 120	4,97%	491	492	0,20%
Billion tkm	50,26	54,70	8,83%	8,70	9,39	7,93%
"Freight units" number (pcs)	4 151 418	4 307 126	3,75%	1 898 301	2 074 015	9,26%

4. Table. Changes in combined transport performance in the EU

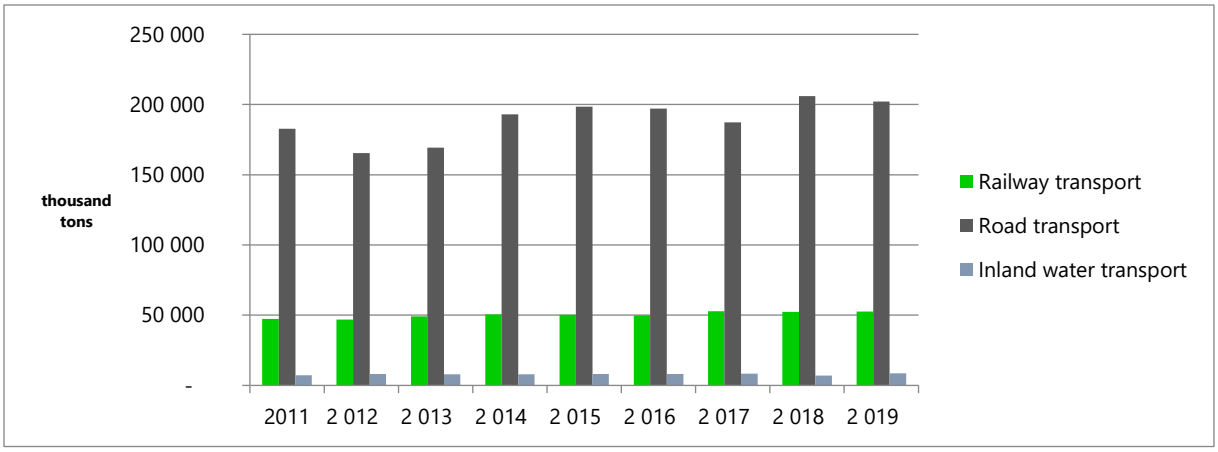
Source: UIRR

3.5.1.3 Analysis of the development of intermodal traffic in Hungary in 2019

The Association of Hungarian Logistics Service Centres (MLSZKSZ) analysed the current situation and tendencies of intermodal traffic in Hungary on the basis of the Hungarian Central Statistical Office (HCSO) and its own data collection in 2019. After analysing and evaluating the data, the Association identified points along which the efficiency and effectiveness of the intermodal transport system can be improved.

In 2019, in freight transport the volume of freight traffic (312 million tons[2]) increased by 2.1% and its performance (59 billion tonne-kilometres) by 1.5% compared to 2018. In domestic traffic, tonne-kilometre performance increased by 2.8% and internationally by 0.9%. Of the total freight transport performance, road transport accounted for 63%, rail transport for 18%, pipeline transport for 15% and inland waterway transport for 3.6%.

[2] https://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_odmv005.html



21. Figure Changes in freight transport performance in Hungary

Source: HCSO

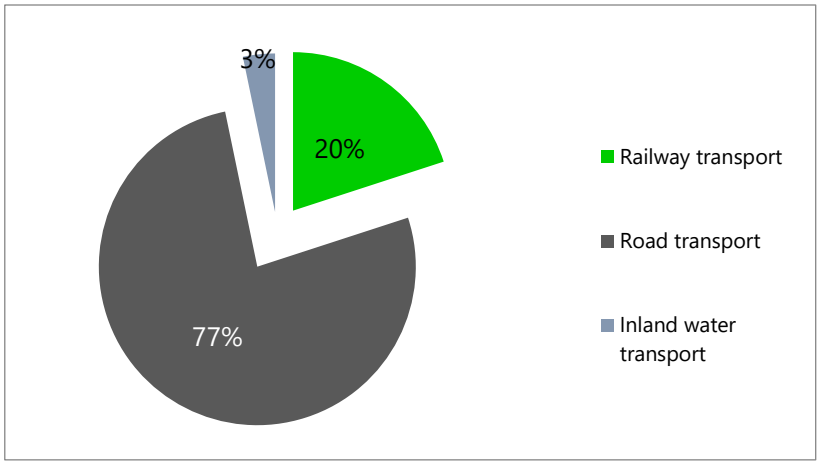
Development of road freight traffic - reorganisation or permanent loss of the market

According to the data published by the Hungarian Central Statistical Office (HCSO), after the stagnation of road freight traffic volumes in 2016 and 2017, it increased slightly in 2018, so that we can see another decline in 2019. After a decrease of 1.45% in 2015/2016 and a further decline of 6.41% in 2016/2017, after a 10% increase compared to 2017/2018, there was a 1.9% decline in relation to 2018/2019.

Road traffic, according to traffic directions:

- 7.5% less goods were transported in domestic traffic, with a 2.8% lower freight tonne-kilometre performance,
- in international traffic, volume decreased further by 1.3% and performance by 6.2%,

In the domestic part, the Hungarian economy has been on a growth trajectory in recent years, so the significant decline is interesting. It is likely that the amount of goods processed locally has increased and shipments have been made over shorter distances. The decrease in the international parts can be partly related to the stricter regulation of road freight transport in the European Union. The 2 million tonnes of extra goods that appeared in waterway transport were probably bulk goods that went on the road due to the drought of the previous year and have now returned to water.



22. Figure. Transport of goods in 2019, in a breakdown by sectors

Source: HCSO

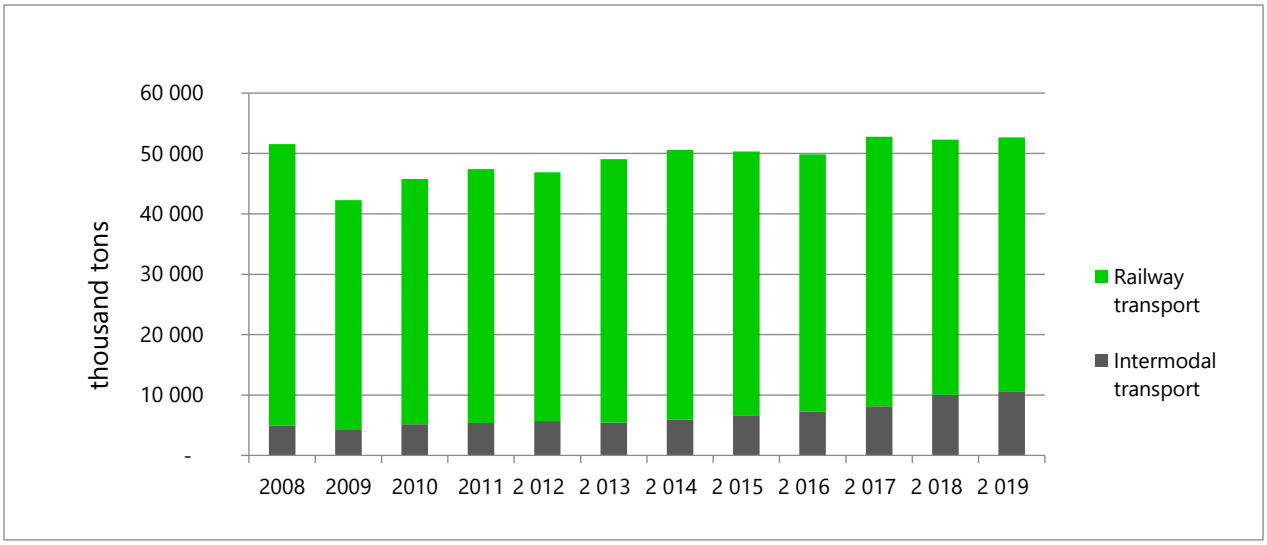
Based on the data of the HCSO in 2019, it appears that 77% of the goods delivered by haulier companies registered in Hungary were transported by road. This meant domestic road transport of about 166.2 million tonnes of goods, equivalent to the movement of more than 10.3 million trucks. This is 2% less than in 2018.

The volume of international road freight traffic was 35.9 million tonnes in 2019. In most cases, this traffic was handled by heavy goods vehicle combinations with a maximum gross weight of 40 tonnes, which means about 2.20 million trucks on the roads.

Development of rail freight traffic - further stagnation!

In 2019, the volume of freight traffic in rail freight transport (53 million tonnes) increased by 0.4% compared to 2018, while performance (11 billion tonne-kilometres) increased by 0.9%. In domestic traffic, tonne-kilometre performance decreased by 14%, while in international terms we measured an increase of 4.5% compared to the previous year.

Examining the data of the HCSO for the last 3 years, rail transport seems to have been able to stabilise its traffic, which means that between 2017-2019 there was no significant change in the volume of goods transported. The stagnation of rail traffic is clearly due to track closures due to major railway renovations, delays caused by detours, capacity constraints and an outdated regulatory system.



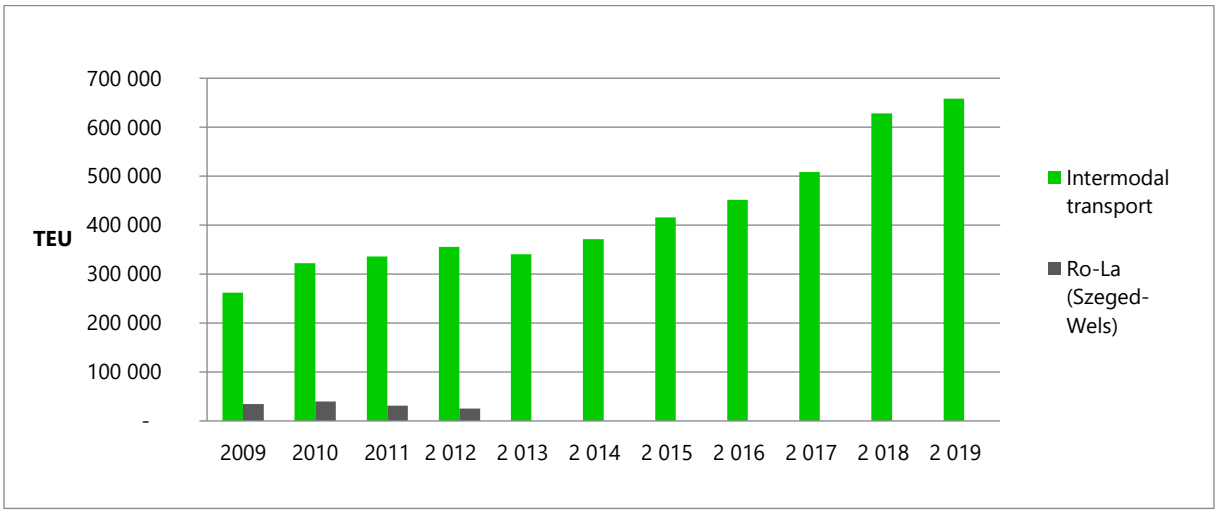
23. Figure. Rail transport of goods in Hungary, including combined transport

Source: HCSO *and MLSZKSZ*

According to the MLSZKSZ's own research data, the share of domestic intermodal traffic (including Ro-La until the end of 2012) within the railway transport sector increased by 4.8% in relation to 2018/2019, which is in sync with the rate of economic development. The share of domestic intermodal traffic within the rail freight transport sector will remain above 20% in 2019, which is a good proportion.

Development of intermodal freight traffic - in marked growth

Hungarian intermodal traffic has been growing steadily over the last 6 years: this increase was 4.8% in relation to 2018/2019.



24. Figure. Intermodal transport in Hungary (TEU)

Source: HCSO *and MLSZKSZ*

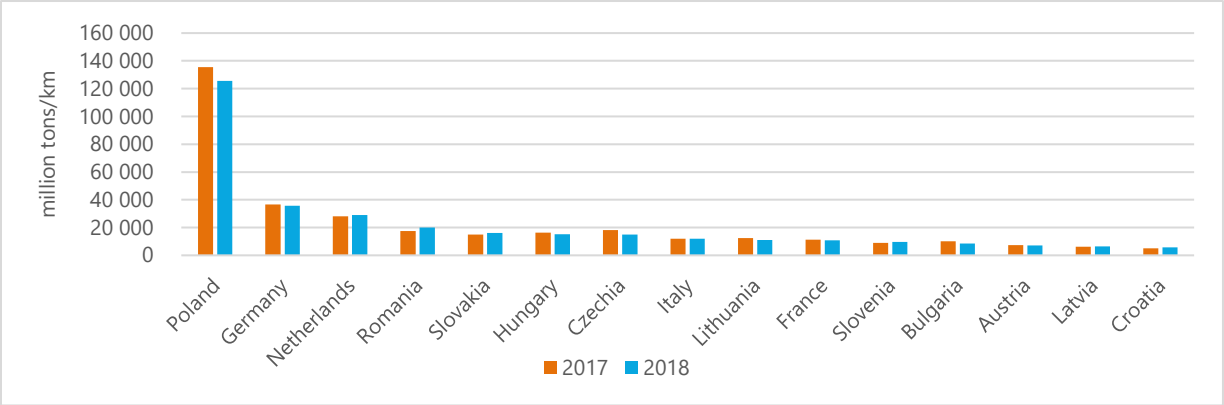
The growth is partly due to the recovery of economic production (GDP growth was 4.9 percent in 2019), partly due to the strengthening of containerisable goods traffic, and partly due to the increase in traffic at METRANS 'combined terminal in Csepel.

According to the data of the MLSZKSZ, substantial intermodal traffic in Hungary is handled only by combined terminals, which are part of the logistics service centres in Central Hungary. International directional trains arrive here and depart from here. 93.0% of the total domestic intermodal traffic arrived in the country in 2019 through three combined terminals in Central Hungary (BILK Combined Terminal, Mahart Container Centre, METRANS). The Törökbálint Combined Terminal closed in 2017, its traffic shifted to the Mahart Container Centre. In the case of rural terminals, the turnover of the Sopron terminal decreased by 4%, and the container traffic of Záhony increased by 40%. In the case of Záhony and Sopron, most of the traffic is transhipment traffic, with a small amount of forwarding on local roads.

Looking to the future, the share of intermodal traffic in transport will increase (this process has already started) for the following reasons: Up to 1,200 km in 24 hours (by rail, slightly longer on water), well-organised, competitive rail freight rates, low overall cost, significant reduction in environmental impact, less risk due to migration, less congestion due to traffic jams, direct cost reduction for the road fleet operator: 1 engine driver instead of 30 chauffeurs, which means fewer drivers and fewer tows, reduced tire wear, reduced need for repairs and maintenance, later replacement of trailers.

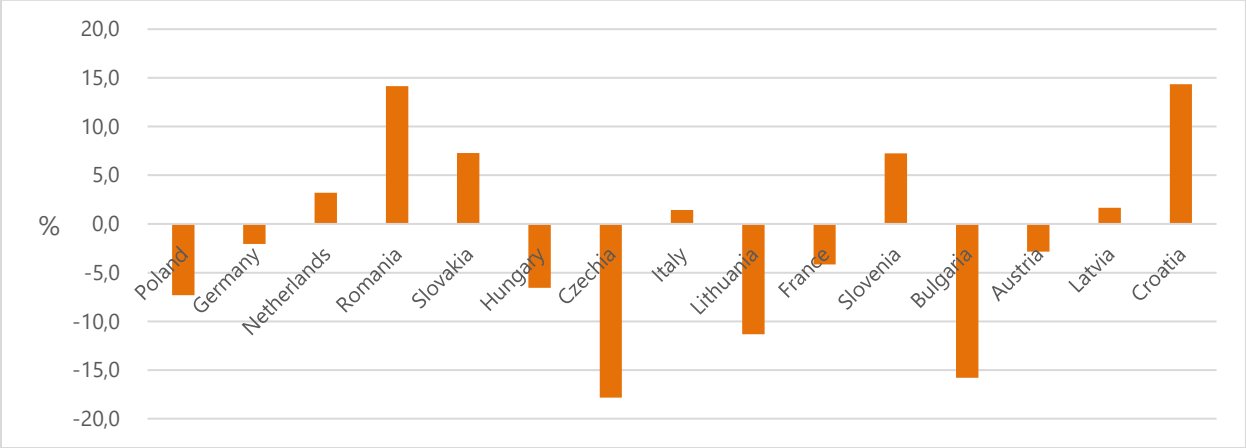
3.5.2 Freight transport performance by mode of transport

There are not enough truck drivers in Western European countries and they cannot seduce enough from Eastern European countries either, so they are thinking of new solutions. When designing new combined terminals, special attention will be paid to creating the possibility of towing road trailers (within this, they will focus more on non-crane trailers). One of the fastest-growing non-crane trailer rail solutions is the LOHR technology. It is characterised by centrally reversible railway carriages and a special terminal that does not require vertical loaders and heavy-duty bulkheads. Non-crane trailers are towed to/from trains by terminal tractors. The cost of building a horizontal loading terminal is only 40-50% of that of a vertical loading terminal. The cost of a reversible railway carriage is 160-170% of the cost of a normal pocket car. So on one side, the terminal investment costs less, but railway carriages are more expensive. Cost optimisation can be achieved with the size of the terminal, the good location, and the consequent traffic of the appropriate order - road/rail.



25. Figure. European countries' international road freight performance

Source: Eurostat http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do



26. Figure. Changes in the international road freight performance of European countries in relation to 2017/2018

Source: Eurostat

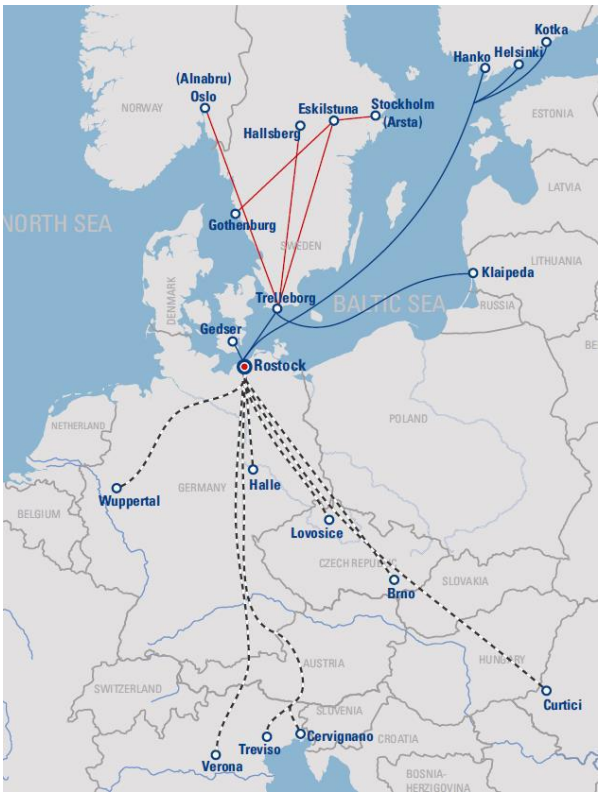
3.5.2.1 Characterisation of freight flows in Port of Rostock

In January 2014 the extension of the intermodal terminal in the Port of Rostock has been completed. Additional three full-train-length tracks and two gantry cranes have been constructed. The handling capacity doubled and a future-oriented handling system for trailer, container and swap bodies between rail, road and maritime transport was put into operation.

These new terminal handling facilities also allow a shift of intermodal units between trains in a more efficient way and the handling of different trains at the same time. In addition to the infrastructural extension, a new terminal information and control system is in service, supporting all maritime operators, handling and logistics companies in tracking and tracing of their intermodal units across the entire port area.

The benefits of using intermodal transport solutions via the Port of Rostock have been realised by the most important European transport operators like DB Schenker, DHL, DSV and LKW WALTER.

Rostock delivers goods to the cities pictured using intermodal freight transport. It is an intermodal hub for European rail-based solutions.



27. Figure Intermodal transport connections from Rostock

Source: Port of Rostock

New intermodal connections are prepared to the Adriatic Ports and South-East Europe. As hub in the Baltic-Adriatic-Corridor, the Port of Rostock offers the shortest and fastest intermodal transport connections between Central Europe, South East Europe and Scandinavia.

The table below shows the exact data about the handled units (wagon load/ intermodal) in Port of Rostock in the last three years to the above-mentioned cities.

Intermodal	2017	2018	2019
Hamburg (DE)	11.676	10.711	5.431
Wuppertal (DE)		6.344	10.879
Halle/Schkopau (DE)		1.049	1.390
Verona (IT)	33.751	35.450	37.268
Cervignano (IT)		2.314	7.079
Treviso (IT)	766	316	84
Lovosice (CZ)			7.583
Brno (CZ)	17.334	18.483	12.835
Curtici (RO)		514	3.523

Conventional			
Trelleborg (SE) to: Treviso (IT) Vienna (AT) DB single wagon traffic	14.718	15.605	18.388

3.5.2.2 Characterisation of freight flows between Hungary-Scandinavia

In this chapter, we present road and rail traffic between Hungarian and Scandinavian countries using various statistics portals (e.g. Eurostat, trafa[3]).

We searched for data for the following Central European countries that overlap territorially with the focus of the study:

- Czechia
- Germany
- Hungary
- Austria
- Slovakia

The following countries have been crushed as potential targets:

- Denmark
- Estonia
- Latvia
- Lithuania
- Finland
- Sweden

In the case of Germany, Eurostat statistics refer in all cases to the former territory of the FRG until 1990.

Road

We first show the extent of annual road freight transport by type of operation and type of transport for the countries concerned. For one table, we compare their performance per thousand tonnes, while for the other, we compare their performance per million tonne-kilometre (TKM). If a cell is left blank (or n/a is included), the reason is that no data is available for that year for that country.

[3] https://www.trafa.se/en/

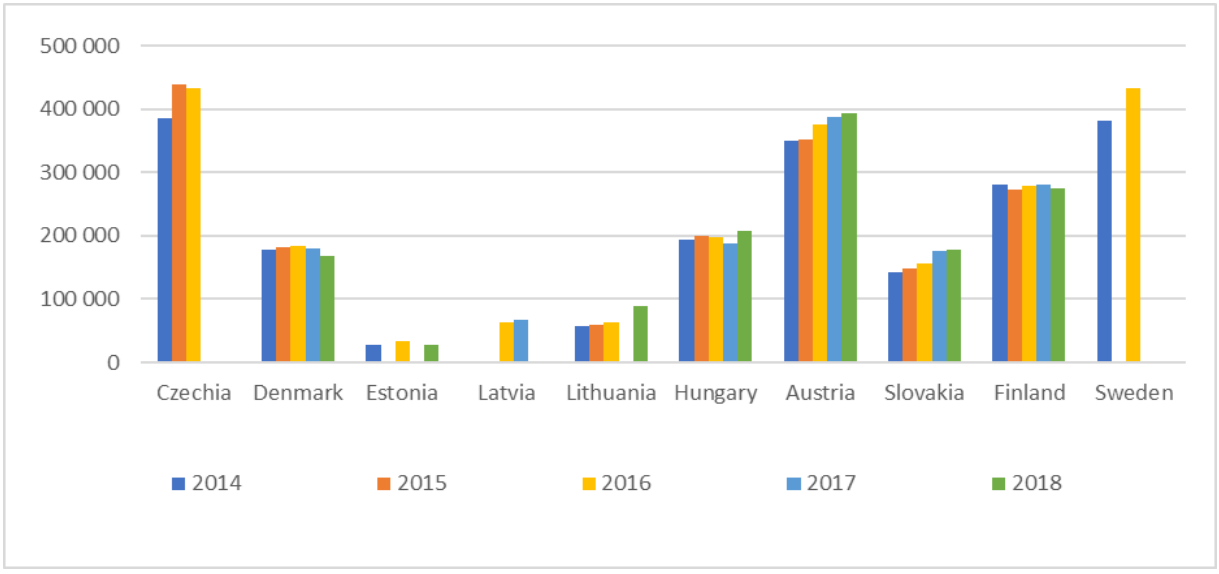
Data displayed in this table cover the carriage of goods by road by means of goods road transport vehicles registered in the reporting countries. The table below shows that Germany's dominance in terms of the analysed area is outstanding. The volume of goods transported on an annual basis is at least ten times that of the countries analysed.

Country/Year	2014	2015	2016	2017	2018
Czechia	386 243	438 907	431 889	n/a	n/a
Denmark	178 146	181 232	184 726	179 062	167 534
Germany	3 052 628	3 035 329	3 111 858	3 161 837	3 200 925
Estonia	27 358	n/a	34 581	n/a	28 494
Latvia	n/a	n/a	63 389	68 013	n/a
Lithuania	57 591	58 601	63 571	n/a	89 105
Hungary	193 112	198 744	197 759	188 250	206 669
Austria	349 544	351 068	376 399	386 858	393 313
Slovakia	142 608	147 225	156 179	176 750	177 131
Finland	280 131	271 912	278 957	280 744	274 346
Sweden	381 263	n/a	433 065	n/a	n/a

5. Table Annual road freight transport by type of operation and type of transport (1 000 t)

Source: Eurostat

The above tabular data are also plotted on a graph, which shows that outstanding values can be observed for Austria, Sweden and Czechia. However, it is important to note that no data are available for Sweden and Austria for the last two years. Slovakia and Lithuania show strong growth.



28. Figure Annual road freight transport by type of operation and type of transport without Germany (1 000 t)

Source: Eurostat

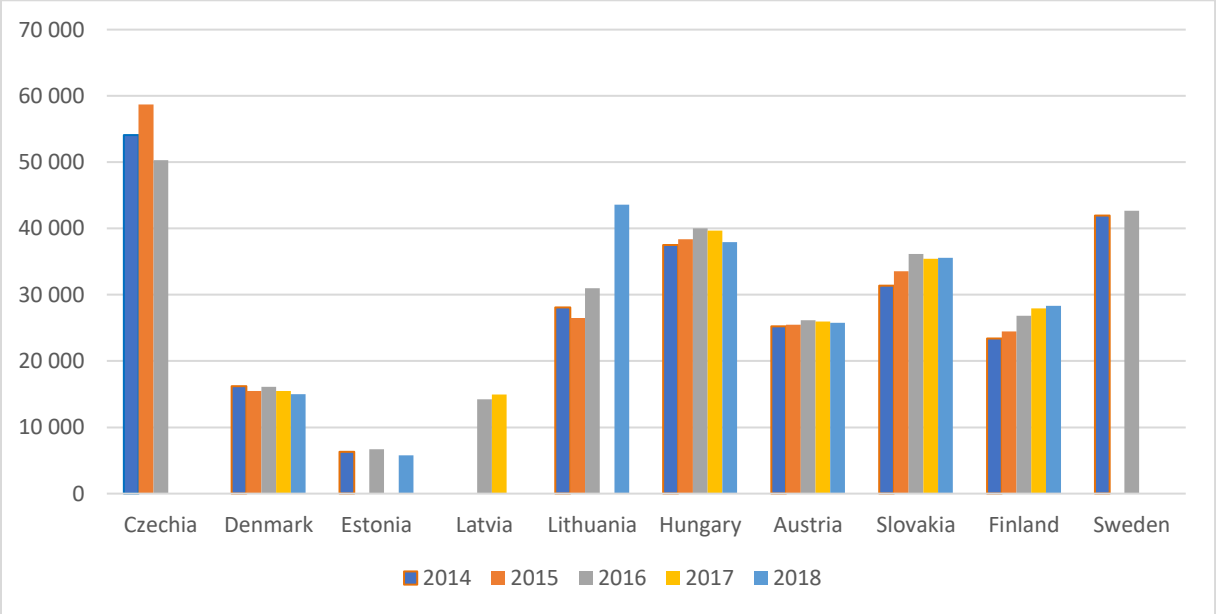
The same analysis looks as follows per Million tonne-kilometre (TKM). In this case, too, Germany's outstanding transport performance can be observed.

Country/Year	2014	2015	2016	2017	2018
Czechia	54 092	58 715	50 315	n/a	n/a
Denmark	16 184	15 500	16 094	15 502	14 998
Germany	310 142	314 816	315 774	313 149	316 772
Estonia	6 310	n/a	6 716	n/a	5 775
Latvia	n/a	n/a	14 227	14 972	n/a
Lithuania	28 067	26 485	30 974	n/a	43 590
Hungary	37 517	38 353	40 002	39 684	37 948
Austria	25 260	25 458	26 138	25 978	25 763
Slovakia	31 358	33 540	36 139	35 411	35 586
Finland	23 401	24 488	26 846	27 966	28 345
Sweden	41 964	n/a	42 673	n/a	n/a

6. Table Annual road freight transport by type of operation and type of transport (Mio Tkm)

Source: Eurostat

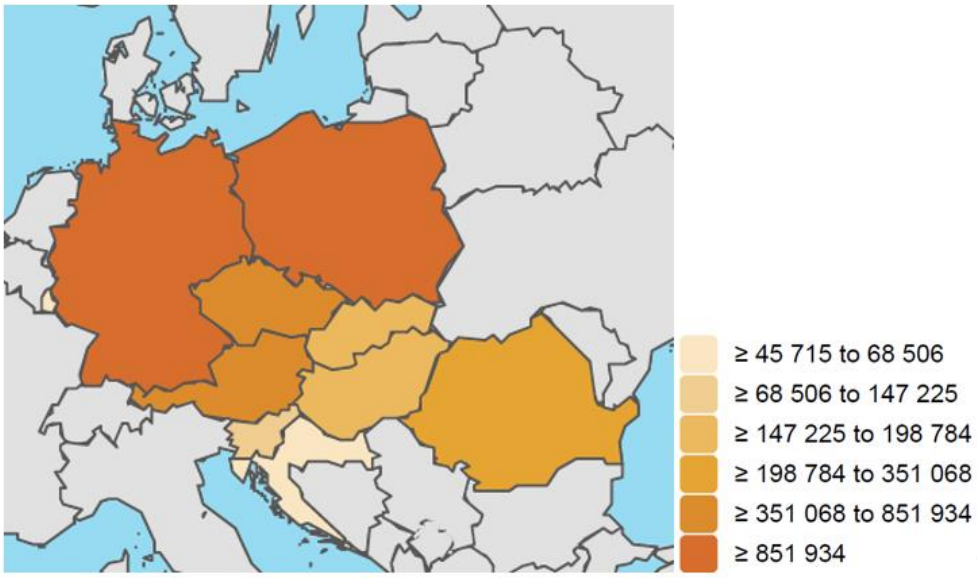
However, it can already be seen from the representation of the data that "competition" is much more balanced in this respect among other countries. The performance of Czechia is also outstanding, although it is important to highlight that we only have data until 2016.



29. Figure Annual road freight transport by type of operation and type of transport without Germany (Mio Tkm)

Source: Eurostat

Annually road freight values were also displayed using infographics, which are as follows in 2018:



30. Figure Goods transport by road in 2018 (thousand tonnes)

Source: Eurostat

In the next section, we present the change in the volume of annual road freight transport for each destination country over the past 3 years. We only show countries for each destination for which we have data for at least one year.

Denmark

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Czechia	200	203	80	213	198	74
Denmark	1 459	1 302	1 186	707	716	544
Germany	4 420	4 274	3 888	1 897	1 851	1 840
Estonia	76	68	76	78	50	63
Latvia	182	229	208	131	150	145
Lithuania	629	692	683	595	635	596
Hungary	124	87	107	143	111	136
Austria	43	26	30	47	25	33
Slovakia	448	294	241	471	226	185
Sweden	107	284	338	44	93	113

7. Table International annual road freight transport by country of loading and unloading by Denmark

Source: Eurostat

In addition to Germany and Lithuania, the volume of domestic transport per thousand tonnes is outstanding. In the case of Germany, however, a declining trend can be observed. Compared to the other Scandinavian countries, in addition to Sweden, this country is interested in the largest amount

of goods transported by road from the countries analysed. These trends are also observed per million tonne-kilometre.

Estonia

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Estonia	1 272	984	908	943	782	877
Latvia	872	1 063	1 148	347	340	462
Lithuania	586	455	563	417	356	406

8. Table International annual road freight transport by country of loading and unloading by Estonia

Source: Eurostat

In the case of Estonia, only road freight transport to the two neighbouring countries appears in addition to domestic transport. The countries concerned can transport to this country to a very negligible extent by road.

Latvia

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Estonia	424	353	397	172	127	163
Latvia	2 214	2 447	2 716	1 827	2 104	2 272
Lithuania	1 971	1 732	2 392	763	668	1 046

9. Table International annual road freight transport by country of loading and unloading by Latvia

Source: Eurostat

Lithuania

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Estonia	298	195	135	200	142	100
Latvia	1 112	1 333	1 111	598	478	353
Lithuania	4 122	4 998	4 591	4 615	5 215	4 239

10. Table International annual road freight transport by country of loading and unloading by Lithuania

Source: Eurostat

The situation is the same for Latvia and Lithuania as for Estonia. The modal shift would only slightly increase rail freight transport due to the small amount of road freight transport.

Finland

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Denmark	:	:	20	:	:	21
Germany	48	:	49	49	:	24
Estonia	497	512	501	222	294	270
Latvia	132	143	232	84	117	187
Lithuania	229	210	273	205	197	380

Finland	923	760	813	599	476	544

11. Table International annual road freight transport by country of loading and unloading by Finland

Source: Eurostat

In the case of Finland, we already have data for several origin countries, but the extent is still not outstanding. In the case of Estonia, its figures are the highest per thousand tonnes, but these amounts have stagnated in the recent years. However, in the case of million tonne-kilometre, Lithuania is the dominant one, the values of which have also increased significantly in the recent years.

Sweden

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Czechia	269	185	121	308	218	135
Denmark	1 289	1 279	1 248	561	610	695
Germany	759	566	640	528	381	404
Estonia	232	378	177	148	243	115
Latvia	398	462	438	309	377	330
Lithuania	591	802	754	700	866	772
Hungary	109	68	57	140	82	73
Austria	68	68	64	82	93	77
Slovakia	235	210	208	267	254	185
Finland	1 217	815	1 243	663	485	845
Sweden	883	965	1 115	793	713	721

12. Table International annual road freight transport by country of loading and unloading by Sweden

Source: Eurostat

In the case of Sweden, only Norway is the one from which we do not have data. It can be seen that both the volume of goods transported and the mass-distance ratio are dominated by neighbouring countries. Even Germany is trying to catch up with the performance of the Scandinavian countries.

Norway

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Denmark	523	:	485	400	:	402
Germany	284	:	163	240	:	118
Estonia	331	421	304	269	371	264
Latvia	416	786	544	235	502	296
Lithuania	334	382	551	359	350	568
Hungary	25	30	27	30	41	52
Austria	35	47	47	37	50	56
Slovakia	202	275	139	158	278	127
Finland	168	:	196	117	:	245
Sweden	2 560	2 378	:	982	935	:
Norway	1 705	1 820	1 785	977	1 084	1 094

13. Table International annual road freight transport by country of loading and unloading by Norway

Source: Eurostat

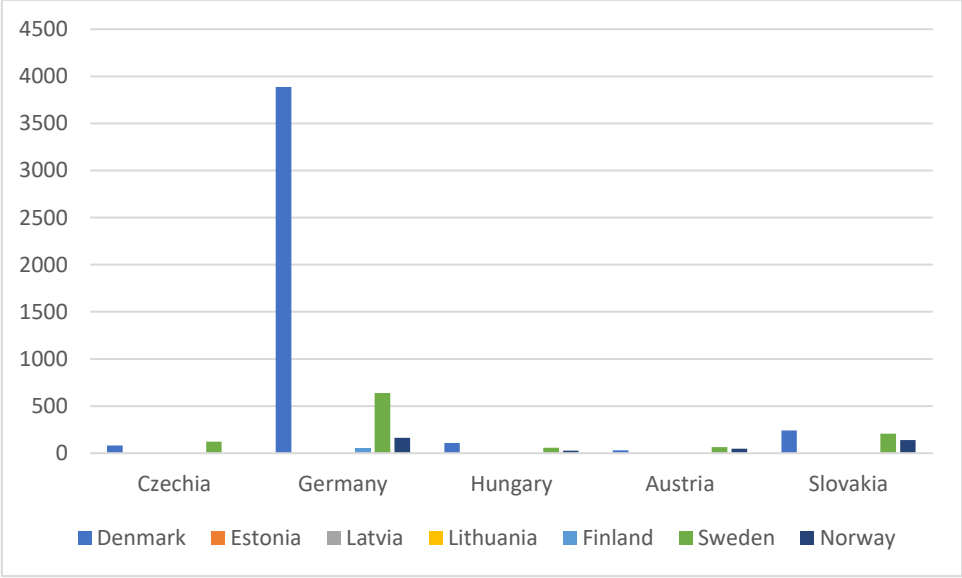
In the case of Norway, Czechia alone is the country for which no data are available, i.e. this value is presumably negligible. The difference between Central European countries and the Scandinavian countries is no longer as conspicuous here as in the case of Sweden, in both respects.

In order to illustrate the volume of goods transported from Central European countries to the Scandinavian countries, we further analysed the above data from both perspectives (thousand tonnes and TKM). Data from 2018 were used as a basis and displayed for each table.

	Denmark	Estonia	Latvia	Lithuania	Finland	Sweden	Norway
Czechia	80	:	:	:	:	121	:
Germany	3888	:	:	:	49	640	163
Hungary	107	:	:	:	:	57	27
Austria	30	:	:	:	:	64	47
Slovakia	241	:	:	:	:	208	139

14. Table The turnover of the examined Central European countries towards the Scandinavian countries (Thousand tonnes, 2018)

Source: Eurostat



31. Figure The turnover of the examined Central European countries towards the Scandinavian countries (Thousand tonnes, 2018)

Source: Eurostat

It can be seen that in the case of the Czech Republic as a starting country, only Denmark and Sweden come into question. In the case of Germany, we can already talk about four destinations, Denmark, Finland, Sweden and Norway. Of these, Denmark is number one, followed by Sweden.

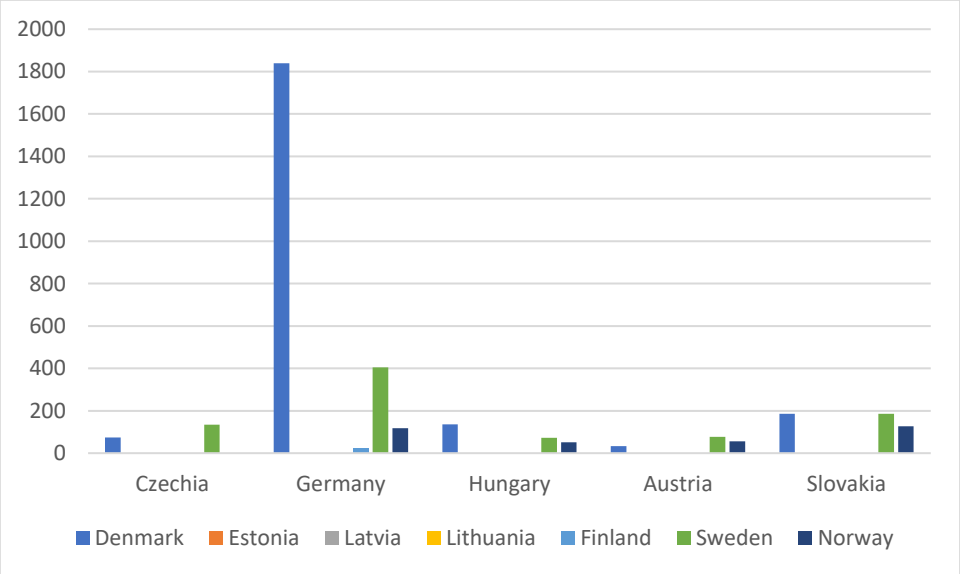
In the case of Hungary, we can already talk about a much smaller volume of goods transported. However, the main terminus in this case is also Denmark. The volume in Austria is almost half of the volume in Hungary, although the focus in their case is already Norway. In the case of Slovakia, we can already observe higher values, which also appear in the direction of three countries: Denmark, Sweden and Norway.

It is clear that Denmark is the number one destination for Central European countries, followed by Sweden in terms of the volume of goods transported. Now let us also examine these values in relation to the distances transported.

	Denmark	Estonia	Latvia	Lithuania	Finland	Sweden	Norway
Czechia	74	:	:	:	:	135	:
Germany	1840	:	:	:	24	404	118
Hungary	136	:	:	:	:	73	52
Austria	33	:	:	:	:	77	56
Slovakia	185	:	:	:	:	185	127

15. Table The turnover of the examined Central European countries towards the Scandinavian countries (Million tonnes-kilometre (TKM), 2018)

Source: Eurostat



32. Figure The turnover of the examined Central European countries towards the Scandinavian countries (Million tonnes-kilometre (TKM), 2018)

Source: Eurostat

In this case, we already get a slightly more nuanced picture, but Denmark still has a very large dominance. However, Sweden and Norway are already showing significant values. This is probably also due to the fact that certain points in these countries are very far from Central Europe due to their large expanses.

While in the case of Denmark, it also clearly contributes to the fact that a large number of goods may arrive by road from Central Europe and then, after reloading, it continues either by rail or road for example to Sweden.

This is also indicated by the outstanding value for previous statistics on the relationship between Sweden and Denmark. This may be due, for example, to the presence of the Öresund Bridge[4].

The Öresund Bridge is a combined railway and motorway bridge across the Öresund strait between Sweden and Denmark. The bridge runs nearly 8 kilometres (5 miles) from the Swedish coast to the artificial island Peberholm in the middle of the strait. It connects the road and rail networks of the Scandinavian Peninsula with those of Central and Western Europe.

33. Figure Öresund Bridge

Source: Wikipedia

In order to further analyse the connection between Denmark and Sweden and to map the traffic passing through this bridge, we will use the traffic statistics of trafa.se and of oresundsbron.com.

The number of trucks and vans from 6 metre that crossed the bridge in 2019 can be seen in the table below by month.

Month	Trucks and vans from 6 m
January	47 731
February	46 006
March	51 277
April	50 152
May	54 645
June	51 711

[4] https://www.oresundsbron.com/en/start

July	52 908
August	50 761
September	51 385
October	53 927
November	48 504
December	40 053

16. Table The number of trucks and vans from 6 metre that crossed the bridge in 2019

Source: www.oresundsbron.com

The number of these vehicles was 599 060 in 2019.

The statistics on road freight of trafa describe traffic and shipments involving Swedish-registered lorries both within Sweden and abroad. The survey on which the results are based covers Swedish-registered tractor/trailers with a maximum load weight of 3.5 tonnes or more.

The table below shows the international road goods transport with Swedish registered lorries according to import- and export countries in 2019.

2019		Number of haulages (Thousand times)	Kilometres driven (Thousand times-km)	Amount of goods transported (Thousand tonnes)	Million tonnes-kilometre (TKM)
From Sweden to abroad, with cargo					
	Denmark	14,91	4030,86	156,161	49,351
	Germany	14,67	11617,32	295,647	219,091
From abroad to Sweden, with cargo					
	Denmark	13,64	4840,72	252,479	88,179
	Germany	17,11	13074,80	279,75	196,4

17. Table International road goods transport with Swedish registered lorries according to import- and export countries. Number of haulages, kilometres driven, goods carried, and tonne-kilometres performed, 2019

Source: www.trafa.se/en

The total value of the two directions is what could potentially be diverted to the rail or waterway.

Rail

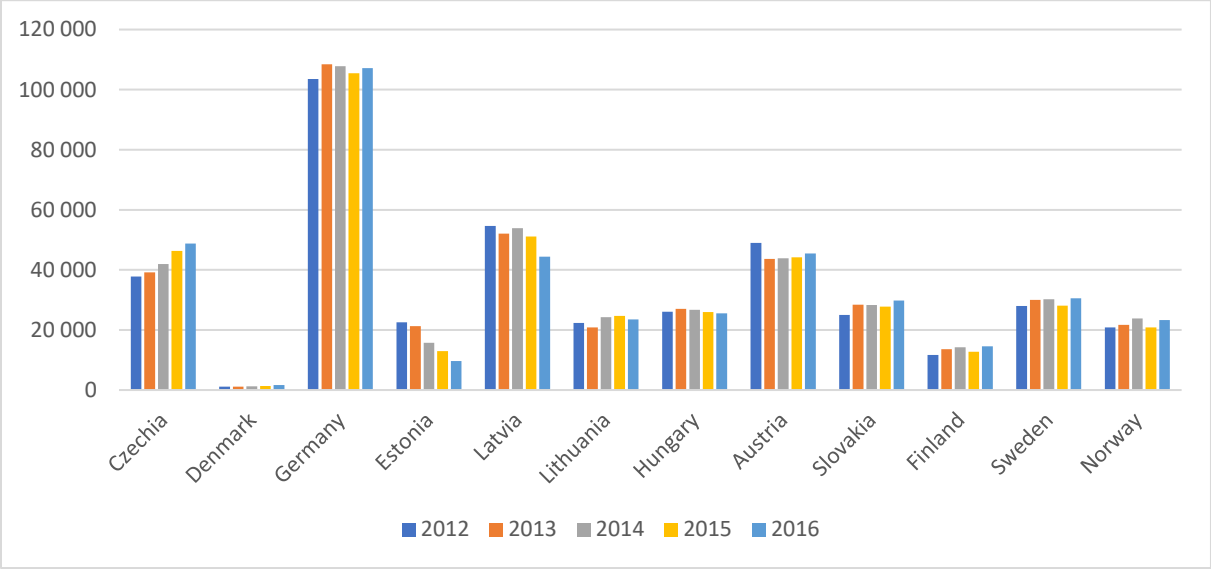
So far, we have examined the volume of goods transported by road from Central Europe to the Scandinavian countries. We now analyse the same from the perspective of the railway.

We first show what volumes occur in thousand tonnes and in million tonne-kilometres for the countries concerned.

Country/Year	2012	2013	2014	2015	2016
Czechia	37 797	39 129	41 970	46 325	48 788
Denmark	1 086	1 119	1 253	1 376	1 715
Germany	103 511	108 449	107 777	105 483	107 114
Estonia	22 578	21 231	15 766	12 907	9 647
Latvia	54 614	52 025	53 929	51 126	44 420
Lithuania	22 323	20 845	24 255	24 707	23 554
Hungary	26 029	27 016	26 671	25 921	25 555
Austria	48 937	43 638	43 900	44 224	45 463
Slovakia	24 987	28 421	28 257	27 753	29 789
Finland	11 691	13 642	14 266	12 700	14 552
Sweden	27 944	30 000	30 174	28 116	30 584
Norway	20 842	21 725	23 857	20 892	23 266

18. Table International goods transport (Thousand tonnes; 2012-2016)

Source: Eurostat



34. Figure International goods transport (Thousand tonnes; 2012-2016)

Source: Eurostat

Based on the figure and the table, it can be seen that the performance of Germany is outstanding both on the road and on the railway. The volume of goods shipped between 2012 and 2016 was

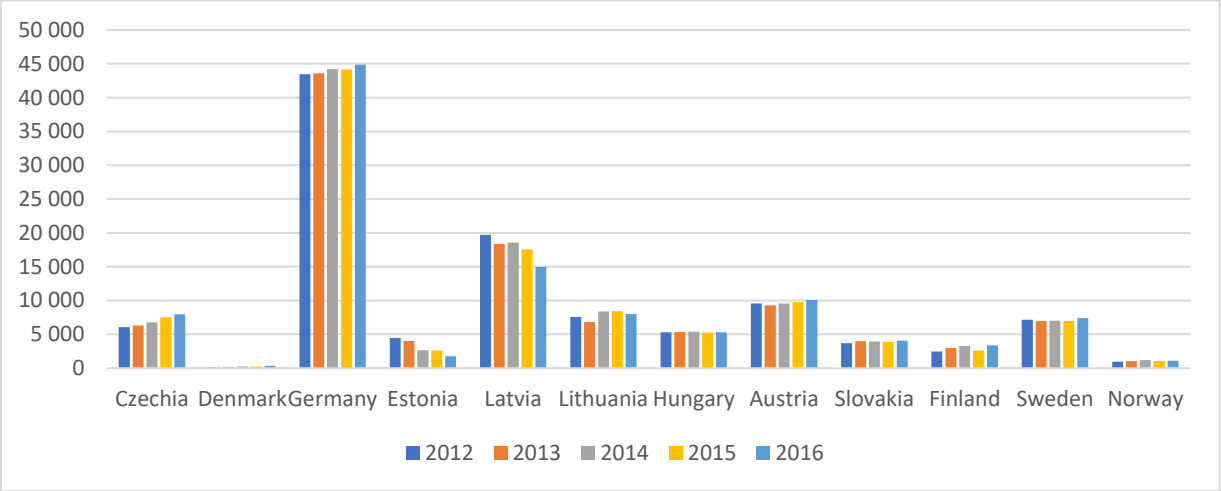
roughly stagnant at them. Latvia is in second place on the imaginary podium, but its performance is on a declining trend. While Czechia and Austria were on an increasing trajectory for the years analysed. The rail traffic of the Scandinavian countries lags behind these countries.

Per million tonne-kilometre (TKM), these trends are also observed. The same countries are at the top of the ranking, while Sweden's data has risen slightly (ore shipments may be the reason).

Country/Year	2012	2013	2014	2015	2016
Czechia	6 054	6 299	6 779	7 550	7 972
Denmark	168	191	227	242	325
Germany	43 470	43 573	44 223	44 154	44 853
Estonia	4 472	4 044	2 648	2 602	1 765
Latvia	19 713	18 375	18 571	17 588	14 942
Lithuania	7 600	6 838	8 369	8 423	7 995
Hungary	5 292	5 370	5 399	5 246	5 297
Austria	9 552	9 294	9 584	9 739	10 104
Slovakia	3 697	3 961	3 924	3 882	4 056
Finland	2 472	2 968	3 260	2 621	3 355
Sweden	7 138	6 982	7 002	6 945	7 412
Norway	958	1 036	1 166	1 040	1 076

*19. Table International goods transport (*Million tonne-kilometre (TKM)*; 2012-2016)*

Source: Eurostat



35. Figure International goods transport (Million tonne-kilometre (TKM); 2012-2016)

Source: Eurostat

Total international quantities are made up of imports and exports. Along these two directions, we further disaggregated the 2016 values, which are summarised in the following table.

	Thousand tonnes		Million tonne-kilometre (TKM)	
	Incoming	Outgoing	Incoming	Outgoing
Czechia	29 138	19 650	3 911	4 061
Denmark	1 223	492	231	94
Germany	57 888	49 226	22 885	21 968
Estonia	8 778	869	1 583	182
Latvia	42 036	2 384	14 255	687
Lithuania	19 714	3 840	7 018	976
Hungary	13 042	12 514	2 701	2 596
Austria	28 150	17 313	6 034	4 070
Slovakia	16 762	13 026	2 320	1 736
Finland	14 137	415	3 278	77
Sweden	5 445	25 140	1 714	5 698
Norway	20 556	2 710	930	146

20. Table International transport – incoming and outgoing (Thousand tonnes; TKM, 2016)

Source: Eurostat

Based on these, it can be seen that there are significant differences in the incoming and outgoing trade of goods in each country. With the exception of Sweden, the incoming volume is more dominant in all of them. In the case of Latvia, this difference is extremely large.

Top 3 importing countries: Germany, Czechia, Latvia, while the top 3 exporting countries: Germany, Sweden and Czechia.

The values presented above are further broken down by country pairs depending on where the goods went from.

We examine to which Scandinavian countries the goods arrived by rail from Central European countries and in what quantities (the goods were loaded in the designated country). If one of the Scandinavian countries is not included in the table, it means that we do not have data for that year for that country or the quantity of goods delivered is zero.

Czechia

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Denmark	6	7	:	1	1	:
Sweden	44	35	10	26	25	0

21. Table International transport of goods from Czechia

Source: Eurostat

Germany

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Denmark	521	495	:	95	94	:
Lithuania	2	5	10	0	1	1
Sweden	2 465	2 691	854	747	887	487
Norway	11	13	1	1	1	0

22. Table International transport of goods from Germany

Source: Eurostat

Hungary

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Denmark	1	1	:	0	0	:
Sweden	12	44	24	6	12	4

23. Table International transport of goods from Hungary

Source: Eurostat

Austria

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Denmark	14	12	:	2	2	:
Lithuania	0	1	0	0	0	0
Sweden	180	171	148	36	38	38
Norway	17	19	12	2	3	1

24. Table International transport of goods from Austria

Source: Eurostat

Slovakia

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2016	2017	2018	2016	2017	2018
Denmark	24	20	:	3	3	:
Latvia	1	1	:	0	0	:
Sweden	19	31	37	8	17	16
Norway	0	1	1	0	0	0

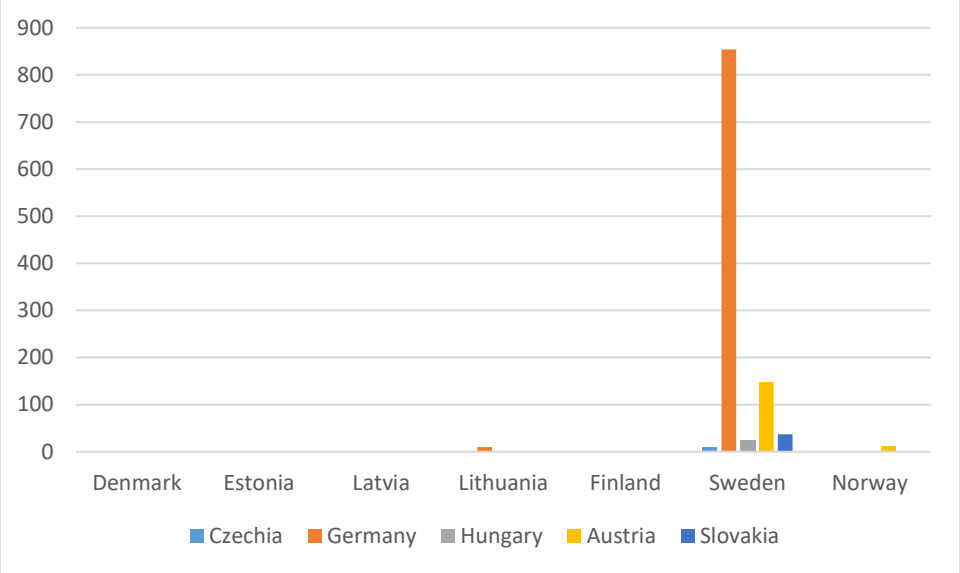
25. Table International transport of goods from Slovakia

Source: Eurostat

Based on the above values, it can be seen that the transported amount of goods from Central European countries to the north is negligible. In the case of Sweden, there is already a higher turn-over (mainly from Germany) than in some countries, but overall it is still not outstanding compared to other Western European countries.

The following figure shows the origin countries and destinations together and their volume of goods transported for the year 2018.

In the case of Denmark, the volume of goods transported is low/zero because they do not have data for 2018. However, in their case, Germany and Czechia are clearly the main origin countries.



36. Figure International transport of goods from Central European countries to the Scandinavian (2018, Thousand tonnes, reported by the loading country)

Source: Eurostat

For the same transport direction, we examine the traffic reported by the Scandinavian countries from Central European countries.

We examine from which Central European countries the goods arrived at the reporting Scandinavian countries by rail and in what quantities (the goods were unloaded in the indicated country). If one of the Central European countries is not included in the table, it means that there is no data for that country for that year or the quantity of goods transported is zero.

Denmark

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2017	2018	2019	2017	2018	2019
Czechia	68	63	77	18	17	21
Germany	670	622	:	338	310	:
Hungary	1	1	:	0	0	:
Austria	7	:	0	1	:	0
Slovakia	35	27	33	8	7	9

26. Table International transport of goods to Denmark

Source: Eurostat

Estonia

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2017	2018	2019	2017	2018	2019
Hungary	1	:	:	0	:	:

27. Table International transport of goods to Estonia

Source: Eurostat

Latvia

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2017	2018	2019	2017	2018	2019
Hungary	8	:	:	2	:	:
Slovakia	:	1	0	:	0	0

28. Table International transport of goods to Latvia

Source: Eurostat

Lithuania

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2017	2018	2019	2017	2018	2019
Czechia	1	:	0	0	:	0
Germany	10	10	:	4	5	:
Austria	0	1	0	0	0	0
Slovakia	1	:	:	0	:	:

29. Table International transport of goods to Lithuania

Source: Eurostat

Finland

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2017	2018	2019	2017	2018	2019
Hungary	12	14	:	3	4	:

30. Table International transport of goods to Finland

Source: Eurostat

Sweden

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2017	2018	2019	2017	2018	2019
Czechia	63	45	34	19	12	11
Germany	1 408	1 441	:	688	708	:
Hungary	31	34	:	7	8	:
Austria	102	68	72	21	15	17
Slovakia	24	29	21	2	3	7

31. Table International transport of goods to Sweden

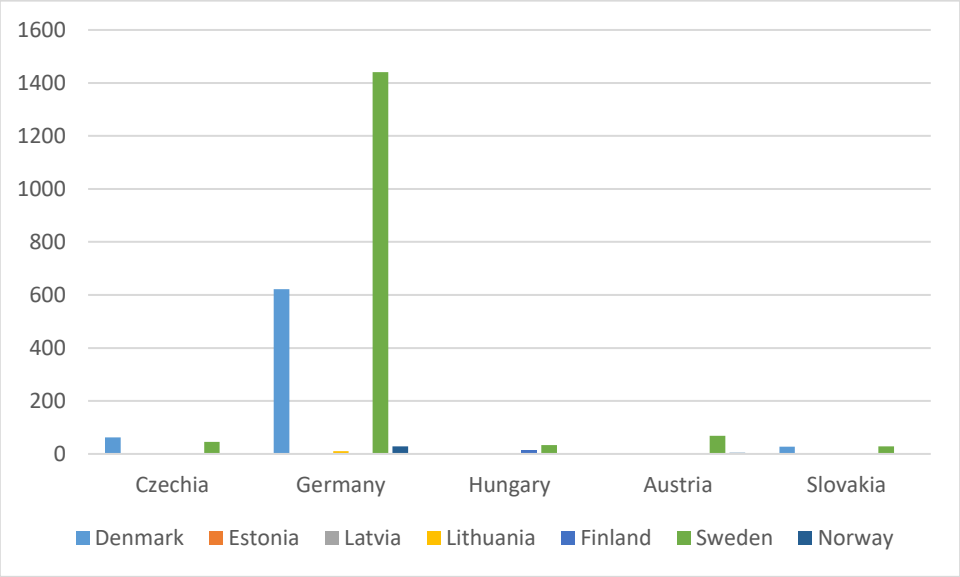
Source: Eurostat

Norway

	Thousand tonnes			Million tonne-kilometre (TKM)		
	2017	2018	2019	2017	2018	2019
Germany	29	29	:	11	11	:
Austria	1	4	0	0	0	0
Slovakia	0	1	1	0	0	0

32. Table International transport of goods to Norway

Source: Eurostat



37. Figure International transport of goods to the Scandinavian from Central European countries (2018, Thousand tonnes, reported by the unloading country)

Source: Eurostat

Although the figures differ slightly due to the different ways in which the processes are reported, they also show that Germany is the one with the most traffic to the north (towards Denmark and Sweden) compared to the other countries. In addition, Czechia and Austria show more turnover.

This low level of traffic to the Scandinavian countries can be explained, for example, by the following needs and challenges:

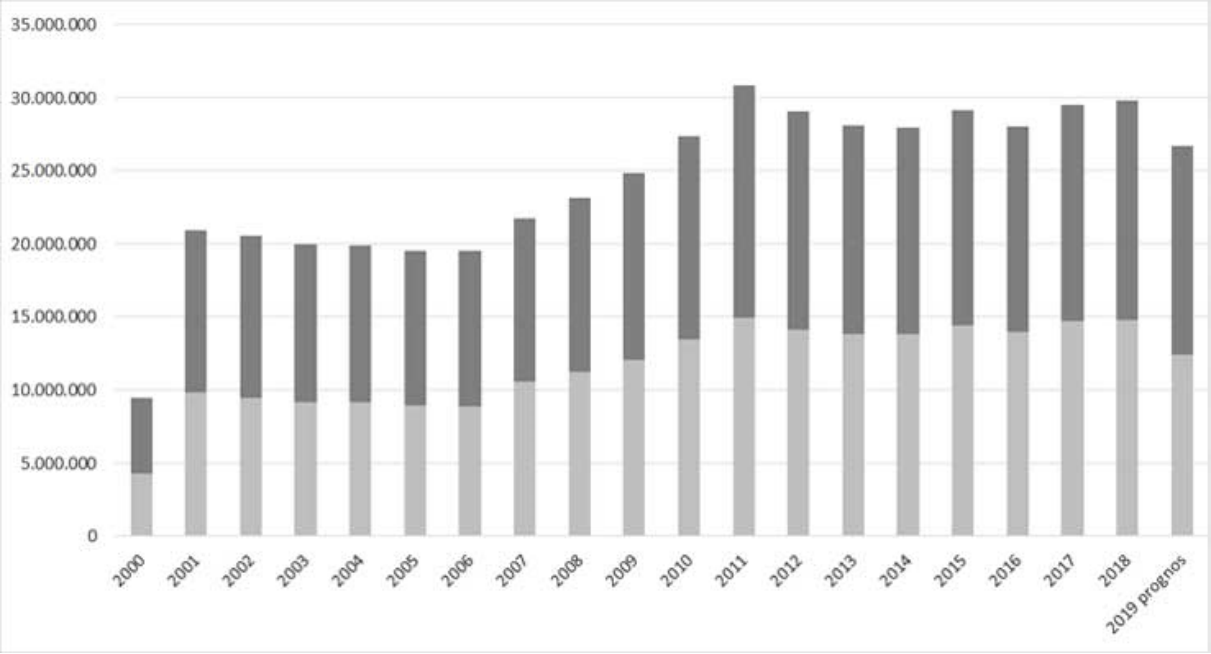
- Intermodal transport is much underdeveloped along the OEM corridor;
- Dominating road transport due to low cost basis and not equal competitive environment (no level-playing field).

However, it should be emphasised, that there is trade in goods to the Scandinavian countries, but not in a direct way. For example, it is transported from Central European countries all the way to Germany, where it is transhipped and then the goods move further to north.

We would also like to touch briefly on the railway connection between Sweden and Denmark, which we illustrate in a figure below.

It shows the volume of traffic by railway at the Öresund Bridge in terms of gross tonnage in recent years.

Dark = Sweden - Denmark and Light = Denmark – Sweden



38. Figure Train weight of all rail traffic in gross tonnage

Source: www.oresundsbron.com

The above data is tabulated in more detail below.

							All traffic including works trains							
				Passenger- and Freight trains			Denmark - Sweden			Sweden - Denmark			Total	
Year		Passengers		Passenger	Freight		Trains	Train weights		Trains	Train weights		Trains	Train weights
		(number)		*(number)*	*(number)*		*(number)*	*(gross gross tonnes)*		*(number)*	*(gross gross tonnes)*		*(number)*	*(gross gross tonnes)*
2010		10 564 079		54 425	8 800		33 395	13 408 233		33 561	13 936 327		66 956	27 344 560
2011		10 826 347		60 548	10 481		36 321	14 889 084		37 217	15 953 309		73 538	30 842 393
2012		11 384 810		57 007	8 619		33 955	14 076 059		34 442	15 003 118		68 397	29 079 177
2013		11 855 498		56 718	8 820		34 027	13 799 623		34 337	14 312 010		68 364	29 111 633
2014		11 817 303		55 080	8 332		33 242	13 842 097		33 587	14 080 334		66 829	27 922 431
2015		12 273 842		57 656	8 486		34 712	14 440 983		34 969	14 710 837		69 681	29 151 819
2016		11 490 122		50 266	8 952		30 778	13 940 598		31 115	14 085 331		61 893	28 025 929
2017		11 593 664		52 418	9 092		31 979	14 701 120		32 374	14 821 460		64 353	29 522 580
2018		11 970 328		55 538	8 745		33 131	14 779 638		33 687	15 040 610		66 818	29 820 248
2019*		12 216 448		51 109	8 381		31 353	12 409 025		32 265	14 285 673		63 617	26 694 698

33. Table Volume of traffic and transports by railway at the Öresund Bridge

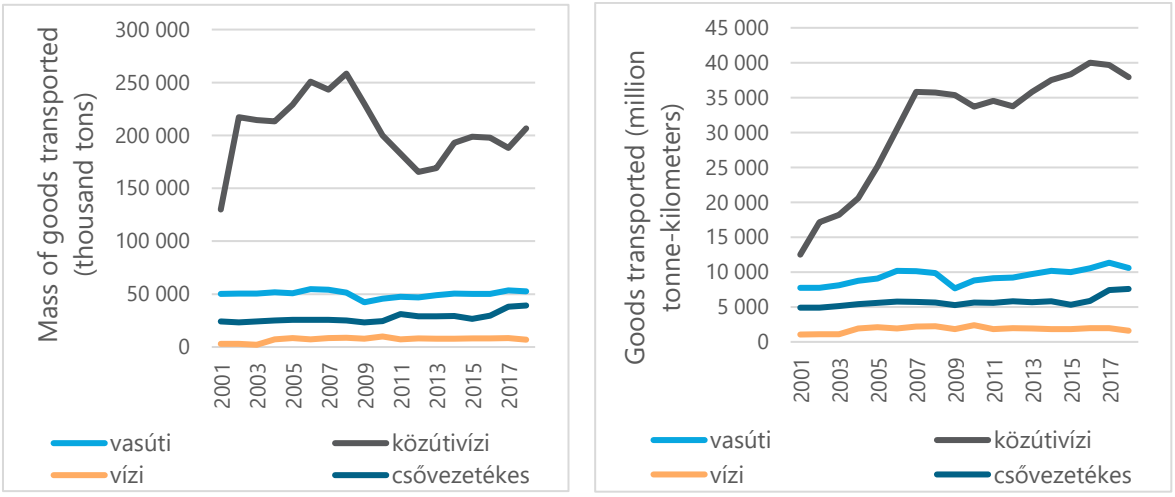
Source: www.oresundsbron.com

3.5.2.3 Characterisation of freight transport in Hungary by main directions (export, import, domestic, transit)

Volume of freight transport, distribution by mode

The volume of goods transported increased dramatically in Hungary at the beginning of the decade, more than doubling in less than a decade. All this radical increase has occurred on the roads, as the capacity of the railway has been around 50,000 tonnes on a permanent basis, while the road has reached an annual volume of 250,000 tonnes in 2009. As a result of the crisis, there has been a significant decline, but since 2011 the volume of road freight traffic has been growing again by an average of 4% a year, while rail freight traffic has continued to stagnate. Of the modes of transport, transportation on water also achieved a similar increase, albeit at a very low base, but produced a 2.5-fold increase.

If we also look at the length of transport (freight tonne-km), the increase is even more striking, it has more than tripled on the road compared to 2001. It is smaller for the other modes of transport, but they have also seen an increase of about 1.5 times over the last two decades. A comparison of these two data sets shows that the average distance between deliveries is on an increasing trend.



39. Figure. Volume of freight transport, 2001-2018 (thousand tonnes, million freight tonne-km)

Source: HCSO

The modal split between each mode of freight transport in 2018 is as follows: close to 70% by road and 17-18% by rail.

40. Figure. Modal distribution of freight transport (thousand tonnes, million freight tonne-km), 2018

Source: HCSO

Rail freight transport

Demand for freight transport on international corridors

In terms of volumes transported, stagnant rail freight transport achieved a more significant increase in domestic freight transport, while its performance decreased in outbound and transit transport. At the same time, the proportion of each direction showed significant variability from one year to the next, while overall performance did not change significantly.

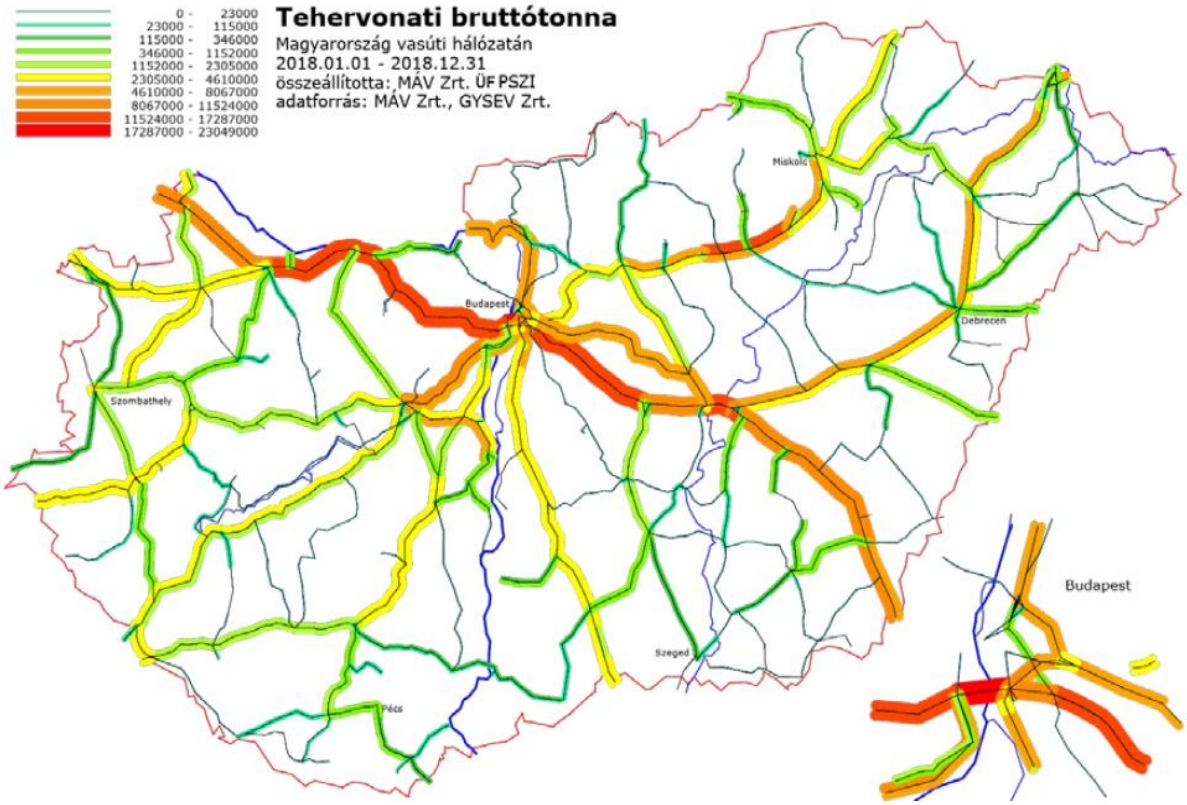
Taking into account the distances transported, it was able to achieve increasing performance with the exception of imports. The current ratios are shown in the following figures.

41. Figure. Orientation of rail freight transport (thousand tonnes, million freight tonne-km), 2018

Source: HCSO, https://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_odmv006.html

In terms of the weight of the quantity of goods transported, the domestic is the most significant orientation (30%), while in terms of the distance of transport, transit (31%).

The largest volume of railway transport takes place on the TEN-T corridors, especially the performance of **RFC7, the Orient/East-Med** freight transport corridor on the entire Hungarian section from Hegyeshalom to Lökösháza, but with the largest traffic between Győr and Szolnok. This corridor also includes line 70 to Szob, which, also with heavy traffic, which is also part of **RFC11**. Also, lines with significant traffic are line 30a belonging to the **RFC6 Mediterranean** corridor to Székesfehérvár, line 80 to Miskolc, line 100 to Záhony and line 120a between Budapest and Szolnok.



42. Figure. Freight train gross tonnage facility operated on the Hungarian railway network (2018)

Source: HCSO

Among the **goods transported by rail**, small value-added products, such as raw materials and mined products, still stand out. The quantity of goods to be shipped as solid bulk goods dominates. The current total volume of product groups that can be partially containerised is about 20,000 tonnes.

	export (HUF billion)	Major export partners	import (HUF billion)	Major import partners
Machinery and transport equipment				
road vehicles	5,3	Germany, China (30% increase in 2017), USA	3	
electrical machines, apparatus, instruments	3,9	Germany, China (30% increase in 2017), USA	4	Germany
energy generating machinery and equipment	2,8	Germany, Slovakia, Spain, Mexico, Netherlands, United Kingdom, Poland	1,5	
telecommunications, sound recording and reproducing apparatus	2,1	Germany, Slovakia, Spain, UK, Netherlands, Italy, France	1,6	
Processed products				
chemical goods within medicines and pharmaceutical products	3,6	Russia, Germany, Romania, France	1,2	Germany, France, Belgium
szakmai, tudományos ellenőrző műszerek	1	Germany		
rubber product	0,6			

	export (HUF billion)	Major export partners	import (HUF billion)	Major import partners
furniture, furniture elements	0,3			
iron and steel	0,4	Germany, Austria, Poland	1	
Food, beverages, tobacco				
cereals, cereal products	0,5	Austria, Italy		
vegetables, fruits	0,3	Germany, Austria, Poland	0,2	
animal feed	0,26			
dairy product and eggs	0,15		0,15	
meat, meat products	0,38		0,23	
Raw materials	0,7		0,63	

Symbols:

SZÖ: dry bulk; FÖ: liquid in bulk; K: can be containerised; DÁ: piece goods

34. Table. Volume of goods transported by rail (thousand tonnes) by commodity groups, 2018

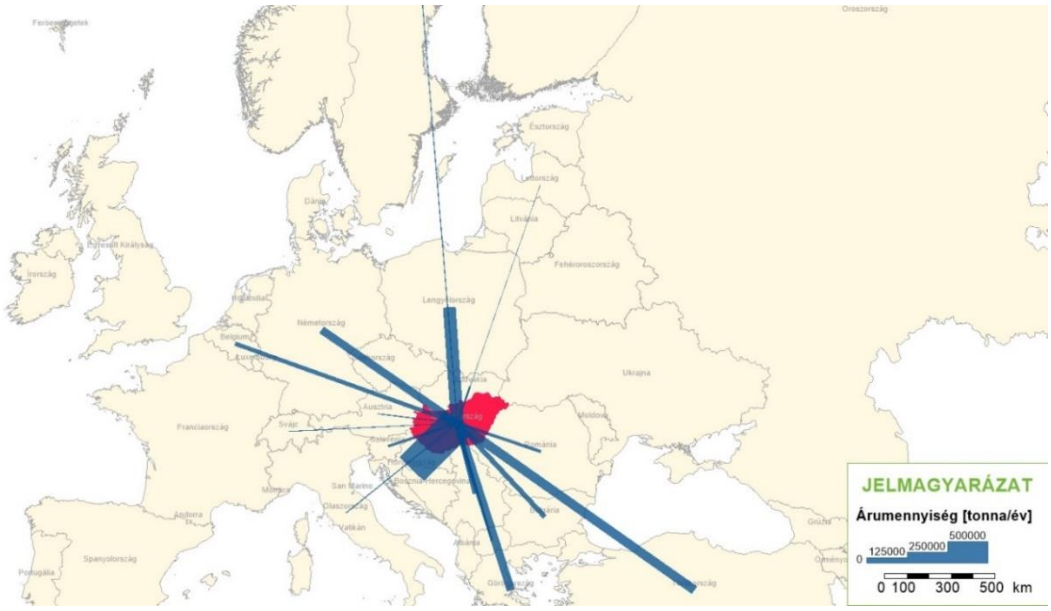
Source: Eurostat

Road freight transport

Demand for freight transport on international corridors

Based on the customs databases received from NAV (the Hungarian customs authority) for 2019, we were able to analyse the most important directions of transit (departures and arrivals) by modes of transport (road, rail). The database contains movements of goods subject to customs duties launched from or received in Hungary. In the obtained data sets, the places of dispatch and destination were available at the settlement level, which were aggregated by country in order to provide a clearer representation, and the quantities of goods were taken into account in net terms.

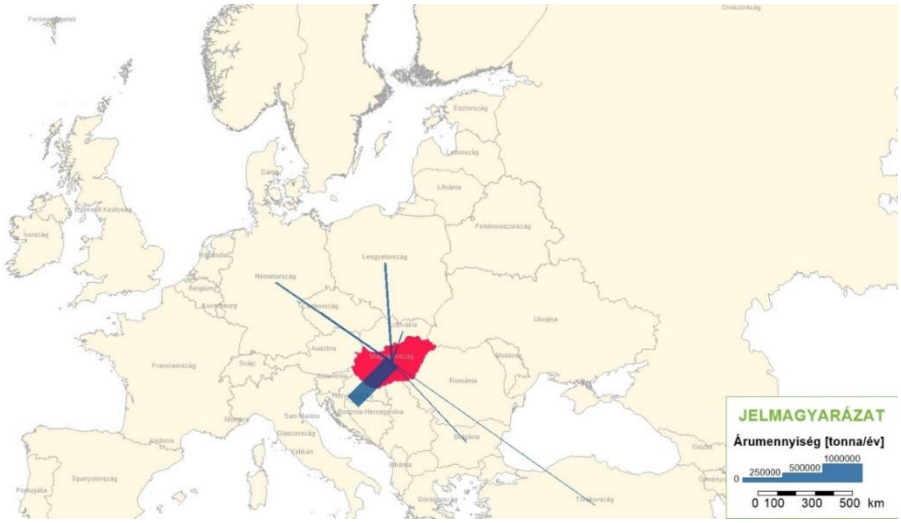
The largest freight traffic in road transport was directed to Croatia, where the launch of more than 522,000 tonnes of goods were registered from Hungary, and goods roughly half of that arrived in Hungary from Croatia in 2019. Significant movements of goods can also be seen in the direction of Poland, in this relation there were 135,000 tons of goods received and 160,000 tons of goods launched by road. In addition, more than 100,000 tonnes of goods were shipped and arrived by road to and from Turkey, Germany, Greece and Belgium on an annual basis.



43. Figure Main directions of departures and arrivals (road transport)

Source: NAV

In rail freight transport, the largest volume of goods (736,000 tons) also arrived from Croatia, while the volume of goods shipped to Croatia in Hungary also exceeded 110,000 tons in 2019. The volume of rail freight traffic between the other European countries and Hungary lags significantly behind it, only in the case of Germany and Poland the total volume of goods started and arrived exceeds 100,000 tonnes per year, the vast majority of which comes from arrivals for both countries.



44. Figure Main directions of departures and arrivals (rail transport)

Source: NAV

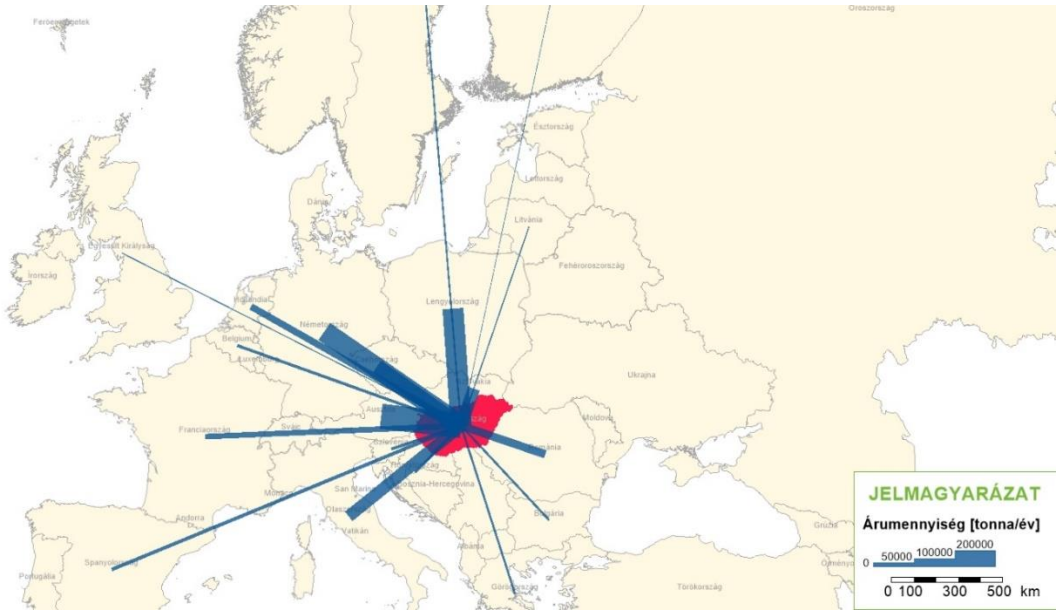
At data request we received and analysed the annual import, export and domestic goods turnover of the most important domestic combined terminals (GYSEV CT-Sopron, METRANS, MCC, BILK) for EKÁER obligatory goods. According to our assumption, the directions of freight traffic within the competence of EKÁER are mostly the same as the main directions of total container traffic, so we can also conclude the characteristics of container freight traffic based on the analysis of EKÁER data.

In the EKÁER data series, we treated import-export turnover and domestic goods turnover separately. In both cases, we examined only those goods movements, one of the endpoints of which was at the three combined terminals in Budapest or the Sopron combined terminal.

The import-export data series included the place of loading and unloading at the country level, and in domestic traffic we were able to identify the place of loading and unloading of goods on the basis of the first three digits of the postal codes. The data sets contained the name of the section of the given goods according to the EKÁER register, the number of goods and the weight of the goods. We examined only those types of goods that could be transported in containers and assumed that 90% of the quantities in the data set were transported in this way. The average weight of a container was considered to be 16 tonnes, so a fictitious number of containers was formed from the available cargo weight quantities.

The analyses of goods falling within the remit of EKÁER processed on the basis of the above assumptions are presented below.

The three Budapest terminals have an export turnover of more than 325,000 tonnes/year, while the Sopron terminal has an annual export turnover of 165,000 tonnes/year. The largest export turnover is directed to Austria, with an annual volume of more than 106,000 tonnes, which corresponds to nearly 7,000 containers. Exports to Germany (76,000 tonnes/year, 5,000 containers), Poland (64,000 tonnes/year, 4,000 containers) and Slovakia (53,000 tonnes/year, 3,000 containers) are also significant.

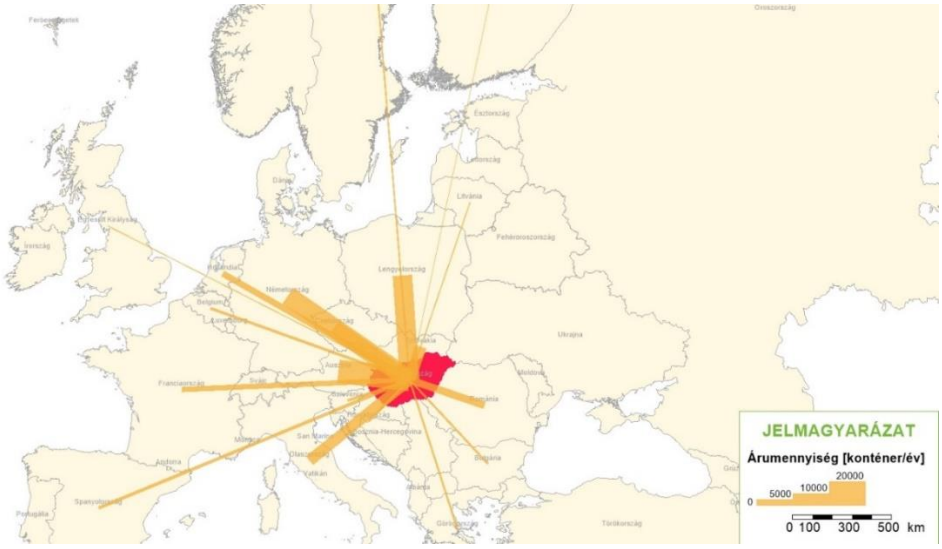


45. Figure. Annual import and export turnover of the three combined terminals in Budapest and the Sopron combined terminal (tonnes/year)

Source: NAV

The import turnover for the terminals in Budapest is 1.15 million tonnes (72,000 containers) annually, and for the terminal in Sopron 210,000 tonnes (13,000 containers). The largest quantities of goods arrive for the examined Hungarian combined terminals from Austria (200,000 tonnes/year, 13,000 containers), Poland (193,000 tonnes/year, 12,000 containers) and Germany (176,000 tonnes/year, 11,000 containers).

In terms of imports, the largest turnover is to Austria, with imports between the two countries and annual volumes in excess of 200,000 tonnes, equivalent to more than 12,000 containers. In addition, there is a significant annual turnover of more than 100,000 tonnes to Poland, Germany, the Czech Republic and Italy.



46. Figure Annual import and export turnover of the three combined terminals in Budapest and the Sopron combined terminal (container/year)

Source: NAV

Analysing the total road EKÁER data, it can be seen that Hungary has the largest import turnover to Slovakia (5.7 million tonnes/year) and Romania (4.6 million tonnes/year). About 615,000 tonnes of goods come from the Scandinavian region annually.

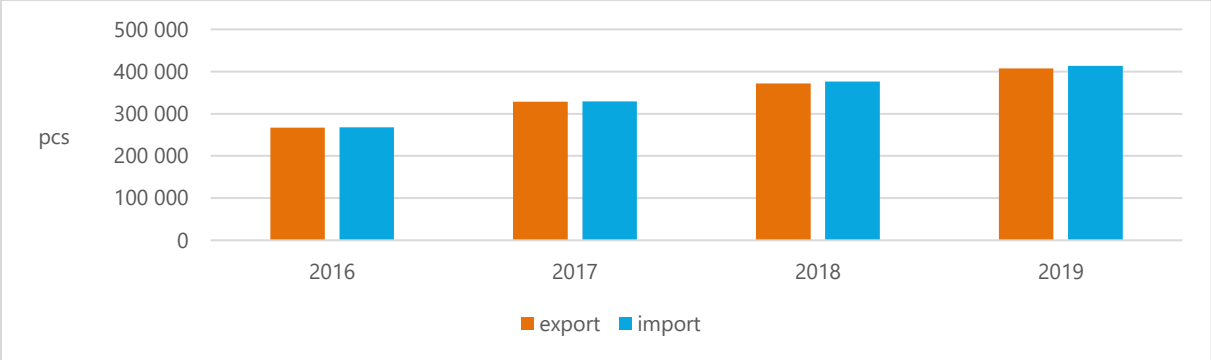
According to EKÁER data, Hungary has the largest export turnover to Austria (3.8 million tonnes), Slovakia (3.2 million tonnes) and Germany (3.1 million tonnes). Exports to Scandinavia amount to 585,000 tonnes per year.

47. Figure. Distribution of export-import turnover to the Scandinavian countries by country

Source: MLSZKSZ, NAV

Analysing the data of NUSZ J4 category heavy goods vehicle traffic in the direction of export-import, the Slovak route is interesting from the point of view of the task, as it is used by the Scandinavian traffic. Traffic on this route has grown steadily over the last 4 years, by the same amount. In 2019, 407,000 and 413,000 heavy goods vehicles travelled with Hungarian sending or arrival addresses in export and import directions, respectively. With a good combined traffic incentive

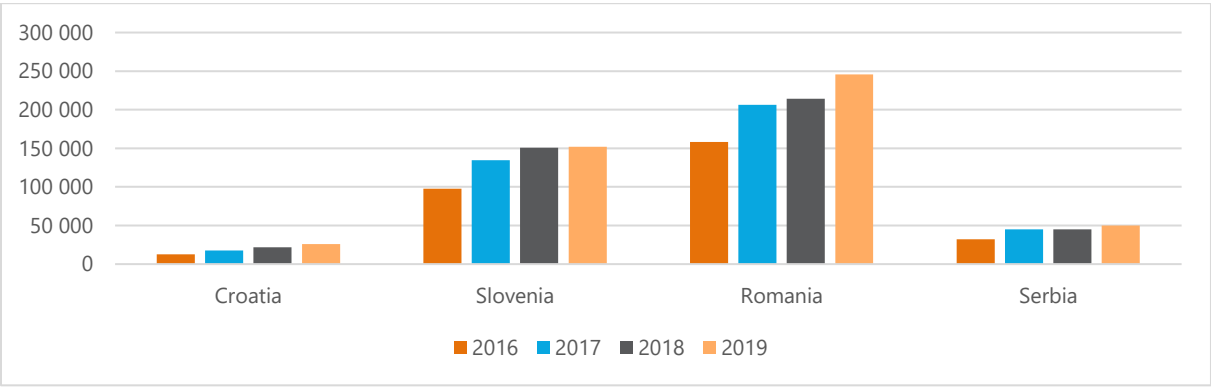
scheme, about 10% of this road traffic can be targeted as potential traffic that can be diverted to rail. This means that about 40,000-40,000 trucks can be placed on trains per direction, which means 22-22 directional trains per week (for 50 weeks and with 35 road trailers per train). The only problem with this traffic at the moment is that its exact destination is not known. In the framework of the present work, a survey is being prepared to find it out.



48. Figure. From Hungary to the north (towards Slovakia) - change in export-import truck traffic

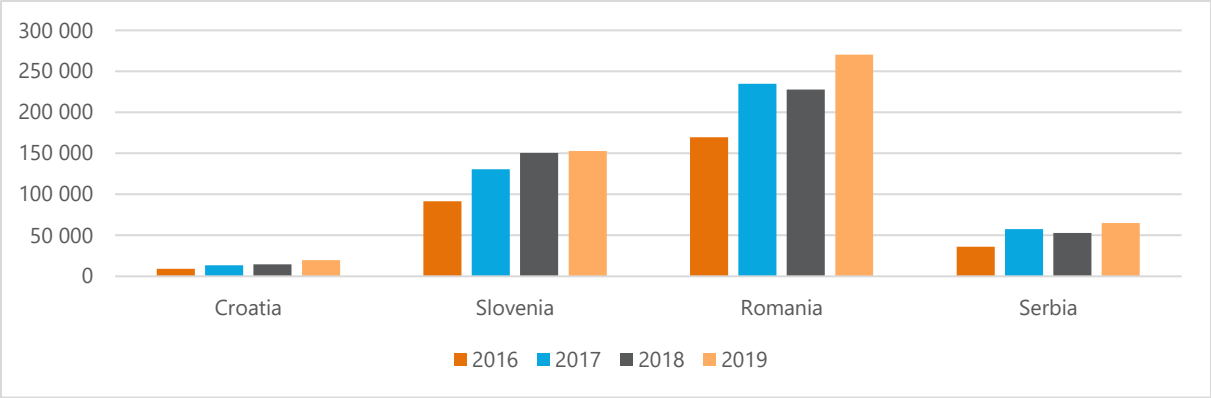
Source: NUSZ, MLSZLKSZ

In addition to the Hungarian export-import traffic to the north, we can see from the traffic data of NUSZ that the road traffic from Romania/Serbia and Croatia/Slovenia to the south-north, passing through Slovakia, is also very strong. Continuous development can also be seen in the case of these traffic. 474,000-508,000 J4 category vehicles travel in the above direction through Hungary. Some of them are also potential customers of a combined directional train service in the Budapest-Rostock direction.



49. Figure. Category J4 road transit traffic from Romania, Serbia, Croatia and Slovenia to Slovakia

Source: NUSZ, MLSZKSZ



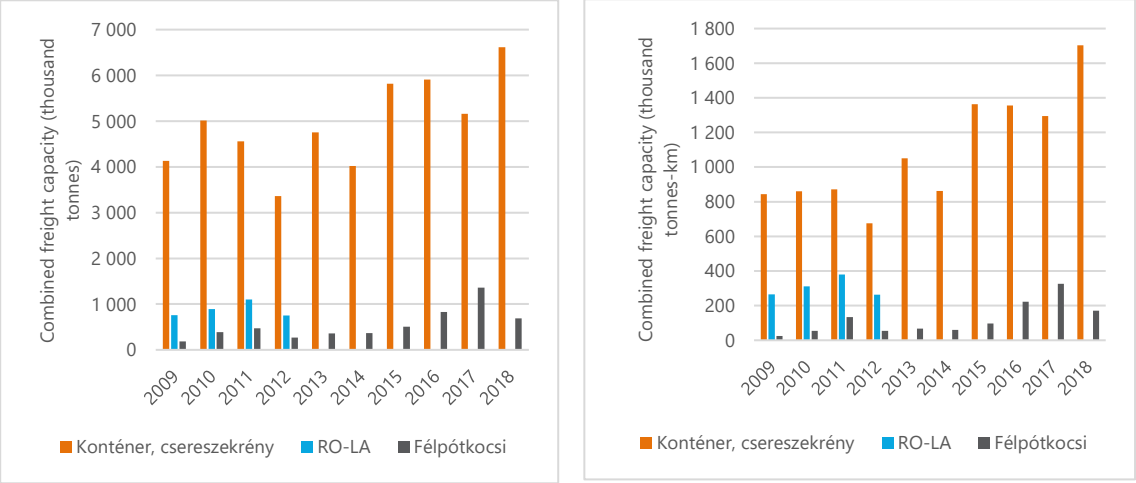
50. Figure. Category J4 road transit traffic from Slovakia to Romania, Serbia, Croatia and Slovenia

Source: NUSZ, MLSZKSZ

Combined freight transport

The most dynamically developing sector of rail freight traffic is combined freight transport, due to the easy loading of universally usable means of transport. In terms of freight traffic, it is based on the growth of transcontinental freight traffic, which projects an increase in the share of long-distance transport. In Europe, the volume of combined traffic has increased by 50% since 2005, while general rail freight traffic has stagnated.

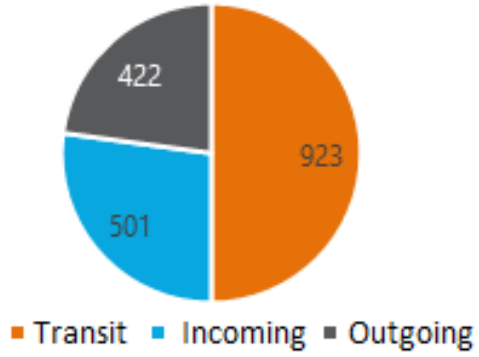
Combined transport has also grown dynamically in Hungary; in terms of the quantity of the container, swap body is the most common technology. The previously present RO-LA service was completely discontinued after the end of the subsidy, while the semi-trailer remained modest despite significant growth. The performance of container and swap body freight transport in terms of freight tonne-kilometres has doubled in Hungary since 2009.



51. Figure. The performance of combined freight transport (thousand tonnes, million freight tonne-kilometres) in Hungary, 2009-2018

Source: Eurostat

Combined freight transport is almost exclusively linked to international trade, almost half of which is transit traffic.



52. Figure Performance of combined freight traffic with containers and swap bodies (million tonnes-km) in Hungary in 2018 according to the direction of freight traffic, Eurostat

Source: Eurostat

MARKET ANALYSIS

to develop existing and build up new market ready train concepts (for conventional wagon load and/or intermodal services) between Scandinavia (defined as Sweden, Norway, Denmark and Finland) and Hungary via the Port of Rostock

D.T2.3.2 In-depth analyses **September 2020**

Port of Rostock

THE PROJECT IS CO-FINANCED BY THE EUROPEAN UNION.

Prepared by the consortium of:

EX ANTE Consulting Ltd.

MLSZKSZ

LUB Consulting GmbH

Contracting entity:

ROSTOCK PORT GmbH

Port Strategy / Business Development

Thomas Biebig

Ost-West-Strasse 32

18147 Rostock, Germany

Date: 25.09.2020

2

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

ROSTOCK PORT, owner and operator of the port infrastructure, is among the construction and maintenance even responsible for the port's general development. In that sense, the company cooperates with different international institutions in the Interreg project "CorCap" (Interreg Central Europe Programme). The main focus of this project is the further logistics development of the TEN-T transport corridor "Orient-East Med" to make it ready for growing transport volumes.

ROSTOCK PORT GmbH[1]

The Federal State of Mecklenburg-Western Pomerania and the Hanseatic City of Rostock are the owner of the port of Rostock. Their interests are protected by the company ROSTOCK PORT GmbH. The company's mission is to develop this state´s largest port in such a way that it is able to meet the constantly increasing requirements of the shipping and tourism industries.

The work of ROSTOCK PORT is focused on the foresighted development of the port infrastructure as well as its maintenance. As the owner of the property, the quays and the water areas, it works closely together with the shipping industry and the companies located at the port to ensure that Rostock has all it needs at its disposal in order to continuously improve its competitive position.

ROSTOCK PORT is the single operator of the ferry and cruise ship port. Additionally, it is co-owner of the operating company of the terminal for combined freight transport.

A further task of the company is to provide services oriented towards the improvement of the competitive situation of the company or of the location. In this capacity, it can be found, acquire or have a share in companies or use the services of other companies, establish, acquire or lease auxiliary companies and open branch offices. Neither the company itself nor a company in which it has a majority share is allowed to engage in cargo handling or activities involved in the storage and handling of goods.

The stated objective of ROSTOCK PORT is, to continually develop the port in order to be able to meet new and changing demands.

With the winning of large production companies such as Liebherr, EEW Special Pipe Construction, Bio Petrol, Power Oil as well as the preparations for the establishment of additional handling, distribution and industrial companies, this location is sure to distinguish itself further in the second half of this decade.

[1] https://www.rostock-port.de/en/rostock-port/rostock-port-gmbh

2. METHODOLOGY OF THE TRANSPORT CONCEPT

In order to perform the requested analysis, which includes the analysation of the potential for either pure intermodal or mixed (convention-al/intermodal) trains between Hungary and Scandinavia via the Port of Rostock in due consideration of feeder trains or concepts to/from neighbouring countries like Slovenia, Romania and Bulgaria, we covered the following tasks.

A Transport analysis was carried out to examine the relevant statistics and literature for the affected area. It was followed by the Market analysis focussed on the train concept development. In order to get an even more accurate picture of the transport volumes and connections to Scandinavia, a market analysis was also be carried out by involving a number of freight forwarder companies. Questionnaire survey and several interviews with key operators/forwarders/industrial companies and embassies were also conducted in order to get even more in-depth answers.

We received questionnaires completed by 27 companies, but we contacted more than 120 companies with our request (we received responses from 50 companies). Therefore, the response rate was 42%.

In the interview phase, we first organised the online meeting in groups (companies that have and do not have cranable trailers), and then we continued negotiations with these companies separately. The results of this are summarized in Section 3.4.

The development of the train concept will be built on the results of previous sections. After creation of a draft train concept the market penetration activity starts. With the help of this advertising activity, we will be able to communicate the possibility of the new train service to potential stakeholders. The product sheet will contain the results gained in the previous work packages which we also want to display with the help of an info graphic.

3. WORK PACKAGE 2 "MARKET ANALYSIS FOCUSSED ON TRAIN CONCEPT DEVELOPMENT"

In order to get an even more accurate picture of the transport volumes and connections to Scandinavia, a market analysis was also be carried out involving a number of freight forwarder companies. These potential stakeholders were involved in a number of ways, which are detailed in this section.

3.1. Developing questionnaire

As a first step, we developed a questionnaire, which focused on the followings:

- on rail affine cargo groups;
- on current transport flows and routes on road, rail and other means of transport;
- on export and import volumes in Hungary towards Scandinavian countries;
- on the intention of the freight forwarders to change their transport modes or routes;
- on their interests and requirements to use intermodal and/or conventional trains in terms of most relevant origin and destination, routings.

Questionnaires for the definition of rail and road freight traffic volume towards Scandinavia can be found in the annexes section.

3.2. General information

In terms of value of trade in goods, 50% of both exports and imports are to Western Europe. Hungarian foreign trade to Western Europe takes place mainly on the RFC7 Orient/East-Med corridor in the direction of Győr-Hegyeshalom/Sopron-Vienna, and to a lesser extent on the RFC6 Mediterranean corridor in the direction of Békéscsaba - Hódos - Trieste.

Among the goods transported by rail, small value-added products, such as raw materials and mined products, still stand out. The quantity of goods to be shipped as solid bulk goods dominates. The current total volume of product groups that can be partially containerised is about 20,000 tonnes.

In consultation with the foreign representatives in the Scandinavian countries in connection with the survey, the foreign economic departments of the Hungarian embassy support the market access and capital investment efforts of Hungarian companies, promote the growth of Hungarian exports of goods and services and provide information to Scandinavian companies about business environment and business opportunities in Hungary.

Sweden: Swedish-Hungarian foreign trade relations are developing dynamically. In 2017, Hungarian exports to Sweden increased by 21.5%. Exports of machinery and transport equipment accounted for 78.5% of Hungarian exports, but also exports of chemical goods and beverages and tobacco are significant. [2]

Denmark: Compared to the stagnant year of 2018, Hungarian exports to Denmark increased by 2.84% in 2019, while imports of goods unfortunately decreased by 4.3%. Two-thirds of the Hungarian export to Denmark is coming from machinery, transport vehicles and processed products such as chemical goods and medicines.

In 2019, Denmark was Hungary's 24th most important trading partner. [3]

Finland: Hungarian product exports to Finland increased by 10.4% in 2019 compared to the previous year. According to the data of the HCSO, last year Hungary exported 383.6 million euros to Finland, while the opposite trade amounted to 274.3 million euros.

In Hungary, almost 80 Finnish companies conduct business directly or through subsidiaries. [4]

Norway: The embassy operates a 27-member chamber of commerce in Oslo to strengthen foreign economic relations and to promote bilateral trade, commerce, industry, tourism, manufacturing, professional and all other business activities between Hungary and Norway. [5]

Baltic States: Since 2002, the Baltic States have become export-oriented countries open to the world market and regional cooperation, showing high economic growth.

Russia: Co-operation takes place in several sectors, but agricultural and food turnover is the most significant, Hungary is the 4th largest seed corn supplier of the Russian market. The water industry as another key area of Hungary's exports.

Hungary's export strategy has led to major achievements in recent years primarily in the areas of agriculture, the food industry, animal fodder production, the dairy industry, the pharmaceutical industry and the production of surgical instruments.[6]

[2] https://stockholm.mfa.gov.hu/eng/page/business

[3] https://koppenhaga.mfa.gov.hu/eng/page/business-and-trade

[4] https://helsinki.mfa.gov.hu/eng/page/gazdasagi-kapcsolatok

[5] https://oslo.mfa.gov.hu/eng

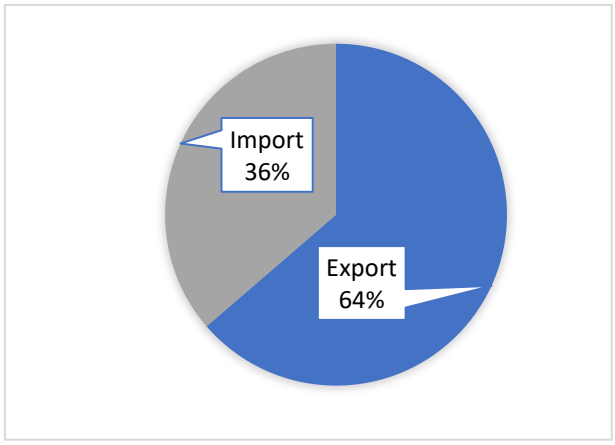
[6] https://moszkva.mfa.gov.hu/

3.3. Questionnaire survey

ROAD FREIGHT TRANSPORT

The export-import ratio of road transport is very unequal, the number of export-oriented transports is almost double that of imports, which is due to the fact that there are often not enough returns from the Scandinavian region, so vehicles return empty to Northern Europe and return from there.

In terms of numbers, this can also be seen in the figure below:



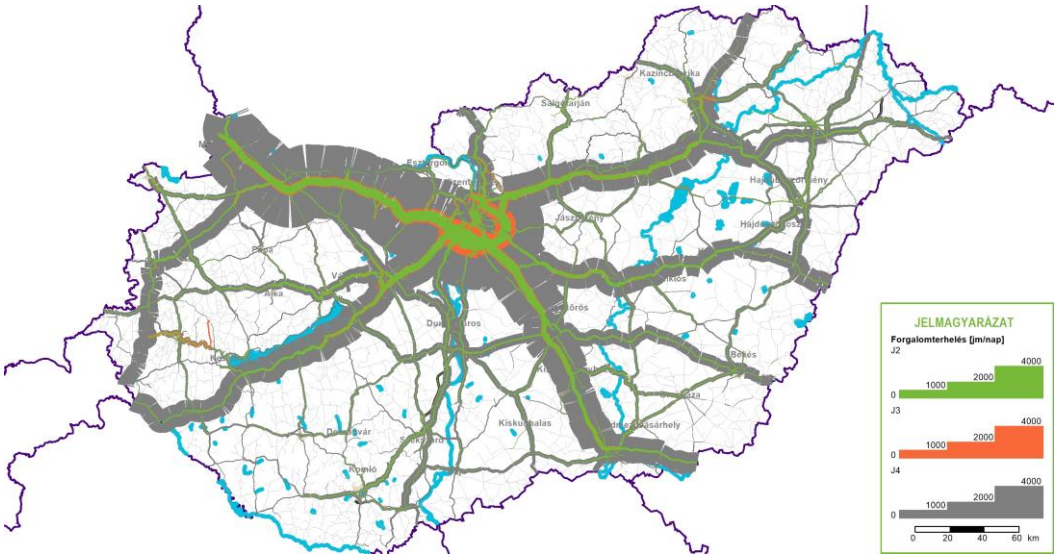
1. Figure Export-import ratio of road transport oriented to/from Scandinavian in 2019

Source: Own editing based on the responses

Data obtained from NUSZ

Analysing the 2019 traffic data received from NÚSZ (Nemzeti Útdíjfizetési Szolgáltató Zrt.), in road traffic, the Austria-Romania transit axis is the strongest direction. The Romanian-Slovak traffic, which is close to 250,000 J4 category trucks, is going in this direction, the Romanian-Austrian traffic is 150,000 trucks per year, and the Slovak-Slovenian traffic is also 150,000 trucks. In comparison, the annual turnover of 50,000 trucks in Serbia-Slovakia and nearly 70,000 trucks in Romania-Slovenia is low. This significant traffic burdens Budapest on the M0 ring road, which is already operating at the limit of its capacity - despite the recent development of capacity in the busiest southern part.

If we look at the development dynamics of these traffic over the last 4 years, there are directions in which traffic has increased by 100,000 trucks during this period. The average traffic growth in 4 years is 50,000-70,000 trucks. This very strong development dynamics creates opportunities for the development of combined transport. Within combined transport, in addition to the container branch, the transport of non-crane road semi-trailers by rail will play a major role. This is at least as big an option as a container, as 97% of trailers on the road are non-crane.



2. Figure Traffic load J2 (green), J3 (orange) and J4 (grey)

Source: TRENECON Kft.

Data obtained from EKÁER

Traffic data were obtained from EKÁER (Electronic Public Road Trade Control System) for this Study, thus, on the basis of the data of the EKÁER data obligors, we analysed the annual import, export and domestic goods turnover of the most important domestic combined terminals (GYSEV CT-Sopron, METRANS, MCC, BILK) for EKÁER obligatory goods.

Export

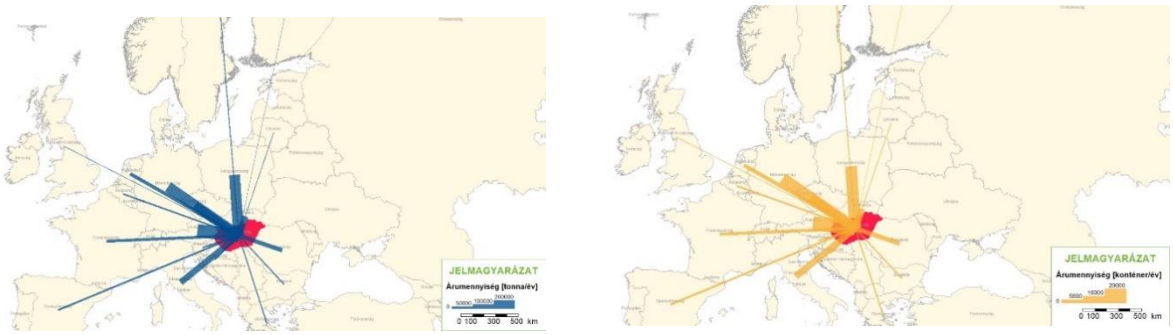
The three Budapest terminals have an export turnover of more than 325,000 tonnes/year, while the Sopron terminal has an annual export turnover of 165,000 tonnes/year. The largest export turnover is directed to Austria, with an annual volume of more than 106,000 tonnes, which corresponds to nearly 7,000 containers. Exports to Germany (76,000 tonnes/year, 5,000 containers), Poland (64,000 tonnes/year, 4,000 containers) and Slovakia (53,000 tonnes/year, 3,000 containers) are also significant.

Import

The import turnover for the terminals in Budapest is 1.15 million tonnes (72,000 containers) annually, and for the terminal in Sopron 210,000 tonnes (13,000 containers). The largest quantities of goods arrive for the examined Hungarian combined terminals from Austria (200,000 tonnes/year, 13,000 containers), Poland (193,000 tonnes/year, 12,000 containers) and Germany (176,000 tonnes/year, 11,000 containers).

In terms of imports, the largest turnover is to Austria, with imports between the two countries and annual volumes in excess of 200,000 tonnes, equivalent to more than 12,000 containers. In

addition, there is a significant annual turnover of more than 100,000 tonnes to Poland, Germany, the Czech Republic and Italy.

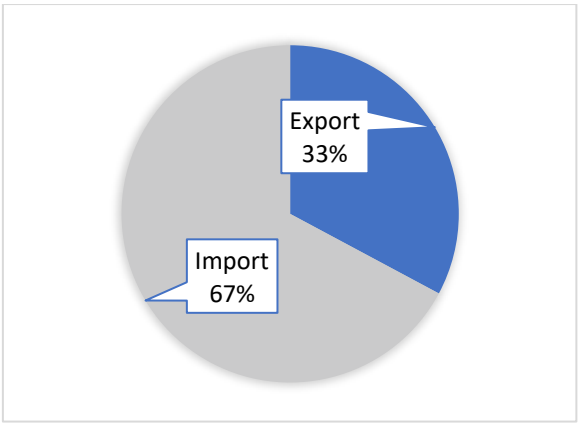


3. Figure Annual import and export turnover of the three combined terminals in Budapest and the Sopron combined terminal (tonnes/year and container/year)

Source: EKÁER

RAIL FREIGHT TRANSPORT

The export-import ratio of rail transport is also unequal, but here the balance is tilting in favour of imports. Items mainly from Sweden make up this balance.



4. Figure Export-import ratio of rail transport oriented to/from Scandinavian in 2019

Source: Own editing based on the responses

In the examination of traffic data, it was an important aspect to survey the type of currently used vehicles. In order to reduce the loads on the environment and to divert most of the traffic to rail, it is essential that more cranable trailers should be used.

The survey also well reflects the fact that of the 7.860 export transports, only 689 were transported by cranable semi-trailers. In imports, this ratio is significantly better, out of 4.484 transports, 1.571 were transported on cranable semi-trailers.

A questionnaire survey was conducted among operators/forwarders/industrial companies. We received questionnaires completed by 27 companies, but we contacted more than 120 companies with our request (we received responses from 50 companies). The companies contacted and their responses are shown below.

LEGEND

non-response	
response	
questionnaires completed	

INTERVIEWED RAILWAY TRANSPORT COMPANIES

1	rail	MMV Zrt.	9	rail	Rail Cargo Hungaria Zrt.
2	rail	METRANS Danubia Kft.	10	rail	DB Cargo Hungária Kft.
3	rail	Rail Cargo Logistics Hungária Kft.	11	rail	VTG Rail Logistics Hungaria Kft.
4	rail	Rail Cargo Operator - Hungaria Kft.	12	rail	GYSEV Cargo
5	rail	LTE Hungária Kft.	13	rail	FOXrail Zrt
6	rail	AWT Rail HU Zrt.	14	rail	TRAIN HUNGARY MAGÁNVASÚT Kft.
7	rail	Floyd Zrt.	15	rail	CER Hungary Zrt.
8	rail	Austromar Kft.			

INTERVIEWED RAOD TRANSPORT COMPANIES

1	road	Alba-Zöchling Kft.	51	road	Kelet-Trans 2000 Kft.
2	road	Industria Kft.	52	road	Raaberlog Kft.
3	road	K & V Nemzetközi Fuvarozó Kft.	53	road	DSV Hungaria Kft
4	road	Horváth Rudolf Intertransport Kft.	54	road	Transdanubio'96 Kft.
5	road	Raben Trans European Hungary Kft.	55	road	DKD International
6	road	RBT Europe Kft.	56	road	Timesped BT
7	road	Versteijnen Logistics Kft.	57	road	Zsenák Trans
8	road	G.E.B.E. Kft.	58	road	Makrai Kamion (Tatabánya)
9	road	BI-KA LOGISZTIKA Kft	59	road	Inter-VM Trans Kft
10	road	EKOL Logistics Kft.	60	road	Sandolita Kft.
11	road	Galambos Logistic Kft.	61	road	AGL Transport Kft.
12	road	BÁBOLNA Sped Kft.	62	road	3P-Transport Kft.
13	road	FLOTT-TRANS Szállítmányozó és Fuvarozó Kft.	63	road	Ilyés Intertransport Kft.
14	road	Liegl internationale Transporte Kft.	64	road	Szekeres Trans Ker Kft
15	road	Innovatív Speciál Transport Kft.	65	road	Adler Trans Kft
16	road	LOCARGO Nemzetközi Szállítmányozó és Logisztikai Kft.	66	road	LKW Walter
17	road	Kanizsa Sprint Kft	67	road	HIRVI TRANSPORT Kft.
18	road	Waberer's International	68	road	Sziberia-Trans

19	road	Trans-Sped Kft.	69	road	WTL LOGISZTIKAI KFT
20	road	Duvenbeck IMMO Logisztikai Kft.	70	road	ÁCHIM + ÁCHIM Kft.
21	road	P-Development Kft.	71	road	Zsoldos-Trans Kft.
22	road	Maglog	72	road	Jumbo Transport Hungary
23	road	Botlik - Trans Kft.	73	road	SPEED LINE, s.r.o.,
24	road	F-Trans	74	road	Sebestyén Intertransport Kft.
25	road	Gartner Intertrans Hungária Kft.	75	road	Hellmann Worldwide Logistics
26	road	Transdanubia Logisztikai Kft.	76	road	Eurocamion Kft.
27	road	cargo-partner Hungary Kft.	77	road	Skygate Transport Kft.
28	road	DOÓR & DOÓR TRANS Fuvarozási és Kereskedelmi Kft.	78	road	Ferrara 2006 Kft.
29	road	J&S Speed Kft.	79	road	CONTINENTAL CARGO Kft.
30	road	EUROSPED Zrt.	80	road	LANDO Hungária Kft
31	road	Szám Sped Kft.	81	road	Mező Team Kft.
32	road	Transintertop Szállítmányozó és Fuvarozó Kft.	82	road	HIS-Hungary InterSped Kft.
33	road	BHS Trans Kft.	83	road	Eurasia Logistics Ltd.
34	road	Gászler Fuvarozási és Kereskedelmi Kft.	84	road	Gallcargo Fuvarozó Kft.
35	road	Gelbmann Kft.	85	road	DB Schenker Kft
36	road	Fiala-Trans Kft.	86	road	G. Transport 96 Kft.
37	road	Liegl & Dachser Szállítmányozási és Logisztikai Kft.	87	road	Wahr Cargo Kft
38	road	DHL Global Forwarding-Hungary Kft.	88	road	AGROTRAIN KFT
39	road	HUNCARGO HOLDING Szolgáltató Zrt.	89	road	Kordika Kft.
40	road	Lagermax Autotranszport Fuvarozási Kft.	90	road	BHS Trans Kft
41	road	Gyarmati Trans Kft.	91	road	Bau-Trans Kft.
42	road	Waberer's-Szemerey Logisztikai Kft.	92	road	Truck Force One
43	road	Révész Holding Zrt.	93	road	Csősz Trans Kft
44	road	Plimsoll Zrt.	94	road	Makrai Kamion
45	road	TransAgent Kft.	95	road	Mondo Trade Szállítmányozó és Szolgáltató Kft.
46	road	Palmsped Cargo 2009 Kft.	96	road	DFA SPEDITION Kft.
47	road	Petrolsped Kft	97	road	Oia Global Kft.
48	road	Seacontonentál Kft.	98	road	Hödlmayr Hungária Logistics Kft.
49	road	GHIBLI Raktárlogisztikai Kft.	99	road	Speed Line S.r.o.
50	road	Intersped-Mulde Kft.	100	road	P&O Ferrymasters
			101	road	Maurice Ward Kft.

INTERVIEWED OTHER COMPANIES

1	other	Embassy of Hungary / Copenhagen
2	other	Embassy of Hungary / HNCC
3	other	Embassy of Hungary / Stockholm
4	other	Embassy of Hungary / Helsinki

The summary result is shown in the table below.

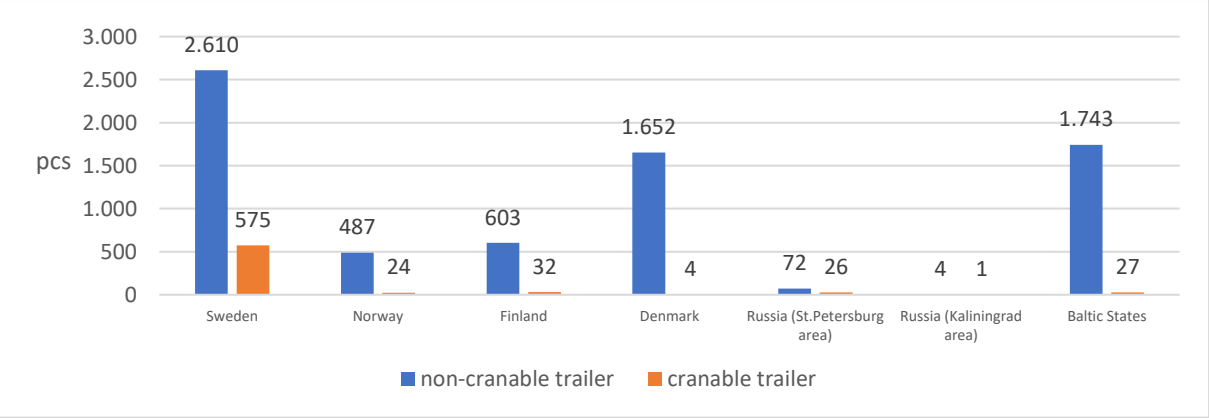
2019	ROAD - Units / Hungary				RAIL - Tons / Hungary	
Destination	Export		Import		Export	Import
Type	non-cranable trailer	cranable trailer	non-cranable trailer	cranable trailer		
Sweden	2 610	575	1 183	911	15 800	33 977
Norway	487	24	46	16	0	0
Finland	603	32	156	58	0	0
Denmark	1 652	4	595	26	800	0
Russia (St. Petersburg area)	72	26	113	21	0	0
Russia (Kaliningrad area)	4	1	4		0	0
Baltic States	1 743	27	816	539	0	0

1. Table Result of the questionnaire survey

Source: Own editing

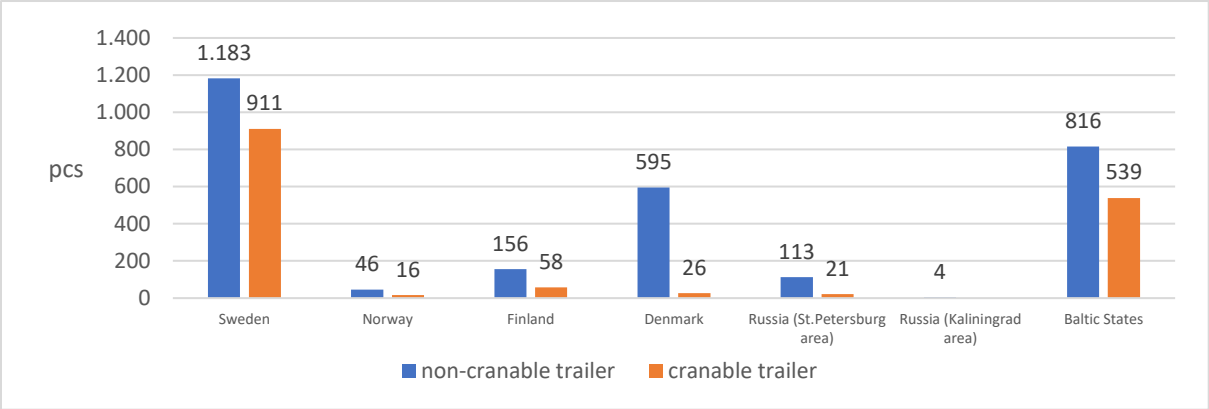
BREAKDOWN OF ROAD DATA BY COUNTRY

The figures below also show that the most significant traffic is between Hungary and Sweden, which may provide a basis to build a railway connection through Port of Rostock.



5. Figure Export - units from Hungary (2019)

Source: Own editing based on the responses



6. Figure Import - units from Hungary (2019)

Source: Own editing based on the responses

For haulage and forwarding companies with their own fleet, the success of the project also depends on what solution the project can offer to make the fleet suitable for rail transport.

BREAKDOWN OF RAIL DATA BY COUNTRY

7. Figure Breakdown of rail data by country (export, tons, 2019)

Source: Own editing based on the responses

8. Figure Breakdown of rail data by country (import, tons,2019)

Source: Own editing based on the responses

The data of railway companies and railway operators are not really relevant because in their case, most of the transport tasks end in most cases at the Hungarian border or on the Austrian stretch.

Regarding to foreign sections, they do not run on their own track, so they rely on foreign railway companies to offer a complete transport routing.

3.4. Interviews

We conducted several interviews with key operators/forwarders/industrial companies in order to get even more in-depth answers. We implemented these within the framework of online meetings due to the current COVID-19 situation with the possible participation of the Rostock Port (where language barriers allowed such participation). In the first round, we organised the online meeting in groups (companies that have and do not have cranable trailers), and then we continued negotiations with these companies separately. A detailed contact list can be found in the annexes section.

CORCAP - ROSTOCK PROJECT VIDEO CONFERENCING

DATE: 25.08.2020 -morning session 1

PARTICIPANTS:

- ROSTOCK PORT GmbH: Thomas Biebig, Tino Lueth
- Ex Ante Consulting: Zsanett Brunner, Zoltán Barna Lázár
- MLSZKSZ Ltd.: Koppány Ajtony Bíró, Dóra Kaszás
- BI-KA Logisztika Ltd.: Dávid Horváth
- Maurice Ward Co. Ltd.: Rita Etlényi
- Transintertop Ltd.: Norbert Szabó
- Trans-Sped Ltd.: Ervin Bakos

BI-KA Logisztika Ltd.

As the company indicated in the questionnaire, relatively few of the shipments arrive to the Scandinavian and Baltic regions, and these are also highly seasonal. Approximately 90% of the deliveries to this area take place between March and July.

The company does not have cranable semi-trailers, so they are interested in those solutions that can be used to attach a non-cranable semi-trailer to a railway train. They do not plan to install tractors in these countries either, so they would think of solving the external follow-up and the return of the goods with the involvement of local subcontractors.

The vast majority of their deliveries are agricultural machinery or other agricultural-related parts, which they usually have to deliver on a specific date.

An important aspect for their partners is that the cost of intermodal logistics should not be higher than the cost of normal road transport. Their general view is that almost every contractor wants their goods to be transported in a "greener" way, but no one wants to pay more for it.

Based on their opinion it can be a problem that reloading of the replacements from the Scandinavian countries to Hungary is very difficult, typically they can reload these trains in other EU countries. Therefore, the issue of the import in trailers should definitely be resolved.

Their deliveries are time and price sensible, but they are open for new possibilities considering the current availability of the truck drivers.

MAURICE WARD Co. Ltd.

The company has previously examined the background infrastructure of its subcontractors and found that 95% of them have only non-crane semi-trailers.

If this is not a problem for the concept, then if it will be competitive with the current market price and with the current transit times, then they are open to it.

TRANSINTERTOP Ltd.

The company's fleet contains only very few cranable trailers and their shipments are extremely price and time sensitive.

However, in addition to all this, they are open to the new opportunity, considering the current availability of truck drivers.

TRANS-SPED Ltd.

The main commodities they supply are pharma products (requiring temperature control) and normal commercial cargo.

According to the company's representative, the Budapest-Rostock route is very interesting in terms of Swedish export shipments. They believe that the main concern from their point of view would be to solve the problem of train drivers traveling by train, as only semi-trailers are not possible. They were also interested in how to secure the driver's journey.

Some questions arose in them related to this topic that will need to be discussed during the development of the concept:

- Where would the road vehicle be mounted on or off the railway? With what technical solution?
- Will there be a refrigerated transport option?

CORCAP - ROSTOCK PROJECT VIDEO CONFERENCING

DATE: 25.08.2020 -morning session 2

PARTICIPANTS:

- ROSTOCK PORT GmbH: Thomas Biebig, Tino Lueth
- Ex Ante Consulting: Zsanett Brunner, Zoltán Barna Lázár
- MLSZKSZ Ltd.: Koppány Ajtony Bíró, Dóra Kaszás
- Waberer's International Nyrt.: Ákos Brandhuber, Manó Matiz

Waberer's International Nyrt.

Representatives of the company were invited to a joint video call also with Port of Rostock, during which they communicated the following about their company:

Waberer's Scandinavian presence is reducing due to post-Covid period and internal change of the fleet's business model. Currently they offer truck solution to Sweden and Denmark only to Key Account customers from Hungary thus the volume of average 30 trailers per week per direction (dated back to 2019) decreased to 10 trailers per week.

Waberer's International Nyrt. has also a fleet of 400 pieces of Huckepack-trailers and ready to re-gain the previous volume to Sweden (and 5 trailers per week to Denmark additionally) if a sustainable and competitive multimodal connection between Rostock and Budapest is launched with at least 3 departures per week starting from the second quarter of 2021.

3.5. Summary study

After the abovementioned workflow, a summarisation and analysation of the results obtained from the surveys and interviews was followed. Based on these, this document was created and some further conclusions and proposals were also drawn for the future implementation of this new concept.

Traffic is typically running by road, which means that rail transport is not significant on this corridor.

Road transport companies are open for new opportunities, but given the intensifying competitive situation, only that solution is competitive with road freight transport whose charges does not exceed road transport charges and the current transit times can be taken into account.

In addition, the delivery of trailers in the host countries is an important issue, which in any case requires an evacuated fleet of vehicles or cooperating partners. To ensure this, further research should be conducted in the receiving countries with the involvement of potential partners and cost analysis should be carried out.

If charges and transfer times are convincing for the road sector, railway companies are willing to set up the necessary and appropriate wagons for transport.

If a co-operation could be established on the Rostock - Berlin - Dresden - Prague - Bratislava - Vienna - Budapest freight corridor between the railways / rail operators, then this solution could offer a more competitive price and provide the road with the possibility to transport trailers by rail. This would be a significant advantage for both sectors.

The international road transportation fees are in the 0,9-1,0 Euro/km range for the door to door solution. The intermodal transportation solution should be able to provide more compelling fees. Preliminary orientating data suggests that in terms of Budapest-Rostock the indicative intermodal price is 600-800 EUR/transport unit (0,50…0,70 EUR/km), plus the additional pre/post transportation charges. These prices show that the costs of road transport and intermodal transportation are similar. Changing the transport method is only available via a detailed and encouraging system, because the mass use of the new method is needed from the start in order to maximise the capacity of the trains.

The project can only be implemented with the cooperation of the railway and the road sector, possible state incentives would increase the chances of the success.

There is potential for intermodal trains between Hungary and Scandinavia as only based on the responses there is a traffic of almost 8.000 trucks in export and about 4.400 trucks in import. During the implementation of the intermodal transport concept, it has to be considered that only 9% of the outbound traffic was carried out with cranable vehicles whereas in the inbound traffic this ratio was over 50%.

These issues will also be addressed in more detail in the transport concept work package (WP3).

The results of the survey and the customer expectations from this chapter will form the basis of the market penetration activities (WP4).

4. ANNEXES

4.1. Questionnaire on road transport

Questionnaire on road transport (please fill in 2019 data)

1. Company name (earlier company data only need to be requested where they are not freely accessible on-line):

   Company's address:.....

   VAT number:.....

2. Please specify the quantity of goods yearly basis carried to the following countries *(noting countries followed by the quantity of goods carried to each, in transport units; modify/supplement the list as appropriate)*:

	From Hungary – units					
	there			**back**		
	non-craneable semitrailers	craneable semitrailers	container	non-craneable semitrailers	craneable semitrailers	container
Sweden						
Norway						
Finland						
Denmark						
Russia (Saint Petersburg region)						
Russia (Kaliningrad region)						
Latvia, Lithuania, Estonia						

3. Request of information on route:
   - The route through which the destination country is reached (*only list the countries/cities through which goods are carried*): ....
   - Do you reach Scandinavian countries via Rostock Port? Yes/No
   - If the answer is No. What conditions would make you switch your current route to one through Rostock (e.g. cost, journey time, services etc.)?

4. Do you use combined transport means to the above northern destinations?
   - no
   - yes – what is the annual quantity (*container, trailer, swap body*) and in what direction are they being transported (*please specify the main directions*)? ... ----------

5. If it were possible to transport semi-trailers from Hungary (non-craneable, craneable) to Scandinavia, under what terms and conditions would it be of interest to you (*please leave the relevant ones and delete the irrelevant aspects, new ones may be entered or ones included may be changed*):
    - train service frequency required/week ...
    - what price would be acceptable? .....
    - route:
        - Through Rostock Port by ferry, or
        - other destination may be entered ……
    - service requirement:
        - traction for bringing out trailers,
        - other service requirement: ...
6. Goods carried, in breakdown by main type of goods:
    - food (livestock, agricultural products etc. - in %): ...
    - raw material (ore, raw hide, oils, cellulose, timber etc. - in %): ...
    - energy carriers (coal, oil etc. - in %):
    - processed products (fertilisers, metal products, rubber products, wood products etc. - in %):
    - machines and means of transport (industrial, metal, wood, special machines, means of communications, road transport means etc. - in %):
    - special goods (refrigerated, chemical goods, dangerous goods etc. - in %):
    - please specify

4.2. Questionnaire on rail transport

Questionnaire on rail transport (please fill in 2019 data):

1. Company name (earlier company data only need to be requested where they are not freely accessible on-line):

   Company's address:.....

   VAT numbers:.....

2. Please specify the quantity of goods carried to the following countries (noting countries followed by the quantity of goods carried to each, in tonnes; modify/supplement the list as appropriate):

	From Hungary – tonnes	
	there	**back**
Sweden		
Norway		
Finland		
Denmark		
Russia (Saint Petersburg region)		
Russia (Kaliningrad region)		
Latvia, Lithuania, Estonia		

3. Request of information on route:
   - The route through which the destination country is reached (*only list the countries through which goods are carried*): ....
   - Do you have direct rail traffic to Rostock Port? If yes: From which cities? ...
4. Goods carried in breakdown by dispatch type:
   - single car (%):
   - block train (%):
5. Goods carried, in breakdown by main type of goods:
   - food (livestock, agricultural products etc. - in %):
   - raw material (ore, raw hide, oils, cellulose, timber etc. - in %):
   - energy carriers (coal, oil etc. - in %):
   - processed products (fertilisers, metal products, rubber products, wood products etc. - in %):
   - machines and means of transport (industrial, metal, wood, special machines, means of communications, road transport means etc. - in %):
   - special goods (refrigerated, chemical goods, dangerous goods etc. - in %):

4.3. Detailed contact list

BI-KA LOGISZTIKA Kft.

Dávid Péter HORVÁTH

horvath.david@bi-ka.hu

Mobil: +36 30 7404 401

Maurice Ward & Co Kft

Rita ETLÉNYI

rita.etlenyi@mauriceward.hu

Mobil : +36 20 408 2289

Transintertop Kft.

Norbert SZABÓ

Norbert.Szabo@transintertop.hu

Mobil: +36 30 327 4502

Trans-Sped Kft.

Ervin BAKOS

bakos.ervin@trans-sped.hu

Mobil: +36 20 344 2466

WABERER'S INTERNATIONAL Nyrt.

Manó MATIZ

matiz.mano@waberers.com

Mobil: +36 70 373 6785

MARKET ANALYSIS

to develop existing and build up new market ready train concepts (for conventional wagon load and/or intermodal services) between Scandinavia (defined as Sweden, Norway, Denmark and Finland) and Hungary via the Port of Rostock

D.T2.3.3 Development of logistics concept **October 2020**

Port of Rostock

THE PROJECT IS CO-FINANCED BY THE EUROPEAN UNION.

Prepared by the consortium of:
EX ANTE Consulting Ltd.
MLSZKSZ
LUB Consulting GmbH

Contracting entity:
ROSTOCK PORT GmbH
Port Strategy / Business Development
Thomas Biebig
Ost-West-Strasse 32
18147 Rostock, Germany

October 2020

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

ROSTOCK PORT, owner and operator of the port infrastructure, is among the construction and maintenance even responsible for the port's general development. In that sense, the company cooperates with different international institutions in the Interreg project "CorCap" (Interreg Central Europe Programme). The main focus of this project is the further logistics development of the TEN-T transport corridor "Orient-East Med" to make it ready for growing transport volumes.

ROSTOCK PORT GmbH[1]

The Federal State of Mecklenburg-Western Pomerania and the Hanseatic City of Rostock are the owners of the port of Rostock. Their interests are protected by the company ROSTOCK PORT GmbH. The company's mission is to develop this largest port in the state in such a way that it is able to meet the constantly increasing requirements of the shipping and tourism industries.

The work of ROSTOCK PORT is focused on the foresighted development of the port infrastructure as well as its maintenance. As the owner of the property, the quays and the water areas, it works closely together with the shipping industry and the companies located at the port to ensure that Rostock has all it needs at its disposal in order to continuously improve its competitive position.

ROSTOCK PORT is the single operator of the ferry and cruise ship port. Additionally, it is co-owner of the operating company of the terminal for combined freight transport.

A further task of the company is to provide services oriented towards the improvement of the competitive situation of the company or of the location. In this capacity, it can be found, acquire or have a share in companies or use the services of other companies, establish, acquire or lease auxiliary companies and open branch offices. Neither the company itself nor a company in which it has a majority share is allowed to engage in cargo handling or activities involved in the storage and handling of goods.

The stated objective of ROSTOCK PORT is, to continually develop the port in order to be able to meet new and changing demands.

With the winning of large production companies such as Liebherr, EEW Special Pipe Construction, Bio Petrol, Power Oil as well as the preparations for the establishment of additional handling, distribution and industrial companies, this location is sure to distinguish itself further in the second half of this decade.

[1] https://www.rostock-port.de/en/rostock-port/rostock-port-gmbh

2. METHODOLOGY OF THE TRANSPORT CONCEPT

In order to perform the requested analysis, which includes the analysis of the potential for intermodal, conventional wagonload or mixed (intermodal/conventional) trains between Hungary and Scandinavia via the Port of Rostock in due consideration of feeder trains or concepts to/from neighbouring countries like Slovenia, Romania and Bulgaria, we covered the following tasks.

A transport analysis was carried out to examine the relevant statistics and literature for the affected area. It was followed by the Market analysis focussed on the train concept development. In order to get an even more accurate picture of the transport volumes and connections to Scandinavia, a market analysis was also be carried out by involving a number of freight forwarder companies.

The development of the train concept was built on the results of previous sections. After creation of a draft train concept the market penetration activity starts. With the help of this advertising activity, we will be able to communicate the possibility of the new train service to potential stakeholders. The product sheet will contain the results gained in the previous work packages which we also want to display with the help of an info graphic.

3. WORK PACKAGE 3 "DEVELOPMENT OF A TRAIN CONCEPT"

3.1. Theoretical train concept

The development of this work package builds on the results of Work Package 2. The key objective is to elaborate a train concept that is competitive with through road haulage. This means that not only the costs for the transport chain is crucial but that – depending on the type of rail service – additional advantages and incentives for modal shift should be generated. This could be shorter or at least equal transit time or extra payload compared to road haulage. As far as transit time, costs and frequency are concerned, the most favourable concept will be the block train as a shuttle service between origin and destination terminal with daily departures in each direction. On the other hand, this requires substantial consolidated goods flows. In particular in combined transport for semi-trailers, swap bodies and containers this consolidation can be achieved through pre-haulage by road to a well-located intermodal terminal. A similar concept applies for conventional wagonload trains, when loading facilities in rail ports or inland ports in Hungary will be used as consolidation points.

In order to achieve higher frequencies, also mixed conventional/intermodal trains will be considered. However, this could result in longer transit times and operating costs, e.g. due to additional train handlings or stopovers. Finally, for conventional wagonload traffic, also the integration of wagon groups or even single wagons in existing networks linked to Rostock Port can be used as a first step for the implementation of a new service, though with usually significantly higher transit times (only feasible for less time sensitive goods.

The explained framework conditions for the theoretical train concept - including relevant commodities and goods flows - are illustrated in the figure below.

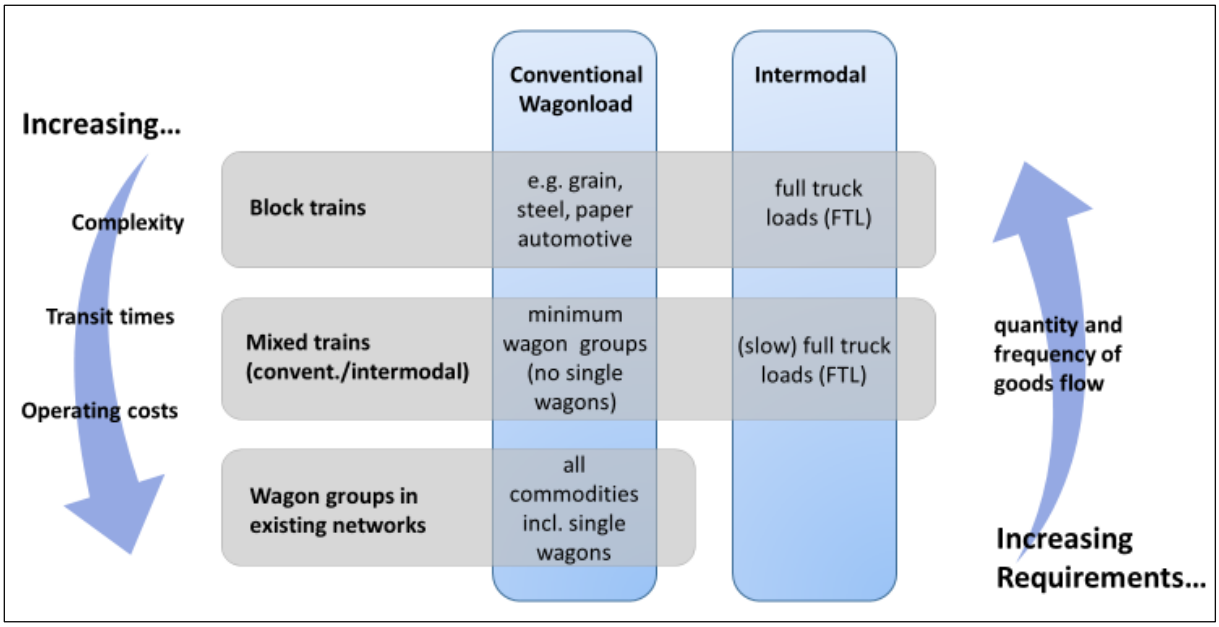


Figure 1: Framework conditions

In intermodal transport exists several configurations in order to connect origins and destinations of transport chains.

With so called point-to-point or **shuttle services** exactly one transhipment is necessary at each end of a journey with one fixed train or ship configuration. Therefore, these shuttles have generally the highest attractivity in terms of market acceptance of intermodal transport. Nevertheless, the basic condition for shuttle service is a sufficient transport demand between the departure and arrival terminal. For example, intermodal rail services typically require an average utilization of some 85 % of a train with 30 wagons and at least two to three round trips per week.

If this condition cannot be fulfilled, additional traffic flows can be integrated with so called **liner train concepts** with multiple stops within one transport route. These multiple stops can either be carried out with a fixed set of wagons stopping en route for loading and unloading of ITU's. Alternatively, several wagon groups can be coupled or uncoupled during the stops. The disadvantages of both constellations are the extra time and cost to be consumed for shunting at the stops and the technological interdependences generating risks for delays. The complications increase if the total time window for the liner train service cannot be limited to the night time but will also interfere with passenger services in the early morning or in the later afternoon. In these cases, the risk of delays increases significantly as priority is given to passengers services so intermodal train may become subject to long breaks for extra waiting.

An important technological instrument to establish attractive intermodal services on a multitude of routes is the so called **gateway concept**. This concept is usually applied to connect national feeder services to international routes. A typical example for an intermodal gateway is the terminal Munich where trains from all over Germany feed in and loading units are transhipped between those national trains and shuttles to gateways in Italy like Verona which again offer a variety of national intermodal services. So, gateways can function as funnels for the consolidation of traffic flows.

3.2. Framework conditions

The findings of the transport analysis describe the framework conditions for the train concept and can be summarized as follows:

- the semi-trailer is the dominant loading unit in the Hungarian road haulage market
- the share of cranable semi-trailers in Hungarian vehicle fleets is considerably low, consequently the train concept needs to consider this fact in terms of handling technology
- although there are also substantial flows of maritime ISO containers, these are nearly exclusively oriented to North Sea ports such as Hamburg, Bremerhaven or Rotterdam and are therefore not relevant for the train concept
- the transport analysis did not give an indication for conventional wagonload flows, nevertheless this should be considered as an additional option, in particular in connection with rail ferry services between Rostock and Scandinavia
- relevant international road freight flows have their origin and destination in the Budapest region, followed by Győr (border crossing Raika M15)
- handling techniques for non-cranable trailers are not common yet

- the indicative price level for an intermodal service between Hungary (e.g. Budapest region) and Rostock ranges between 0.50 and 0.70 EUR/km, resulting in 600 to 800 EUR per unit (semi-trailer) and direction

These framework conditions were considered in the train concept. It was assumed, that the new rail freight service – either intermodal or wagonload – should be started short-term (e.g. < 12 months) and therefore needs to be integrated into existing terminal facilities. In cases when alternative handling techniques are required, there should be at least tangible plans for their implementation.

3.3. Terminal locations and capacity

All intermodal terminals in Hungary are equipped either with RMG or mobile handling equipment such as reach stackers and handle mainly maritime ISO containers.

The intermodal terminal capacity of Hungary is concentrated in the Budapest region (BILK, MAHART, Metrans) with a total throughput estimated in a range of some 400,000 TEU. Although the Győr region – with the second largest transport flow into the Northern direction - is less congested, the intermodal capacities are limited and therefore not considered as relevant. The same refers to the Sopron terminal with its high capacity but low geographical relevance for transport flows to Rostock.

The use of existing terminal facilities in the Budapest region (BILK or MAHART) for intermodal services with Rostock Port enables also the coverage of other important economic locations:

- Kecskemét (90 km)
- Dunaújváros (85 km)
- Szolnok (120 km)

The following figure shows the locations and characteristics of the intermodal terminal landscape in Hungary.

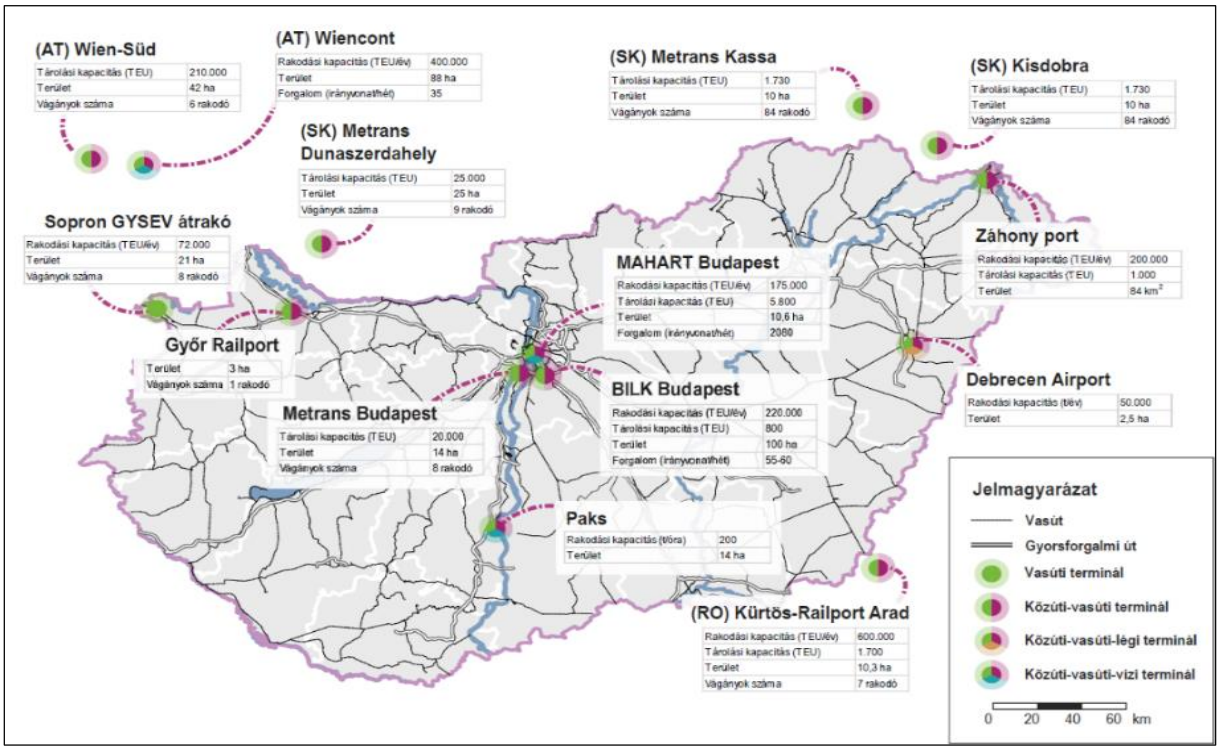


Figure 2: Terminal locations and capacity

3.4. Loading units and handling technologies

The transfer of the intermodal loading units (ILU) at each end of the rail journey of an intermodal road-rail transport chain can be accomplished by the use of several handling techniques. One characteristic distinction for these techniques is the main direction of the handling movement. It can be undertaken either vertically or horizontally. The vertical lift-on-lift-off operation (lo-lo) is the most widely used form of intermodal transfer. It is applied to the transhipment of containers, swap bodies and liftable semitrailers.

Containers are usually top-lifted at corner fittings by adjustable spreaders with twist-locks. Swap bodies and semitrailers are bottom-lifted by so-called grapple arms which fit into lifting pockets at the bottom side of the loading units.

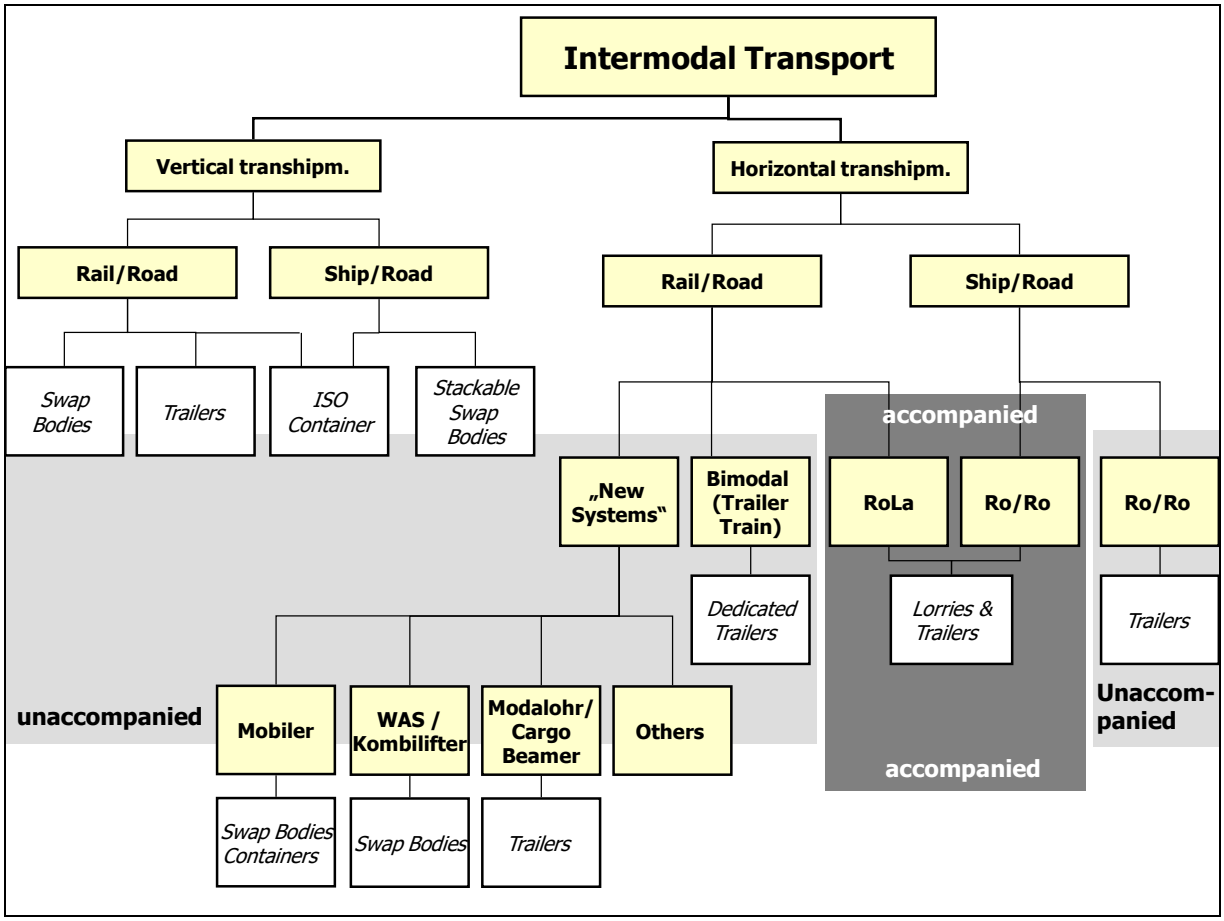


Figure 3: Intermodal handling technologies

The following pictures show examples of the vertical handling technologies of swap bodies, semitrailers.

Figure 4: Bottom lifted swap bodies (left) and semitrailers

Containers and swap bodies are placed on platform wagons for rail transport which are available in comparatively high quantities all over Europe. On the other hand, liftable semitrailers require special pocket wagons which are available only in limited quantities.

ISO containers do not require any specification for intermodal handling. On the other hand, semitrailers and swap bodies require a certificate as permission for rail transport and also a reinforced construction for lifting. These requirements can be seen as major constraints for modal shift from road to rail.

Since 2011, the European standard EN 13044-1 provides an owner code for the identification of European intermodal loading units, the ILU code, which is compatible with the worldwide BIC code used for containers according to ISO 6346. Since then only one uniform type of owner codification of loading units is applied: the worldwide BIC code for freight containers and the new, compatible ILU code for European loading units. This enables the simplification of the electronic data processing and operations of the transport chain. The code adapted to electronic data processing reduces the number of data capture errors as the majority of the possible typing errors are immediately spotted using the check digit. Correction costs for data errors are consequently considerably reduced.

The yellow codification plate describes the characteristics of the intermodal loading unit such as geometric dimensions and the strength which are retained properties of the ILU in case of a change of ownership. Thereby, in case of a sale, a new codification is not needed anymore. Thus, all swap bodies and liftable semitrailers, even if purchased to be used in pure road transport only, are usable in rail transport. Logistics companies and road hauliers only have to – as this is already the case for containers – equip their loading units with an owner key consisting of four letters followed by six digits, with which they can codify their ILU's according to own criteria, followed by a check digit.

Figure 5: Example for ILU codification

According to the findings of the Market Analysis, the planned intermodal transport offer to between Hungary Scalable should contain offers for cranable and non-cranable semi-trailers as well as options for 45 ft containers (dimensions equal to semitrailers).

Non-cranable equipment has no gripping edges or corner castings. As a result, it is not possible to reload and transport these LE with conventional transhipment facilities on wagons. Compared to cranable equipment, these units are not codified for rail transport either, to ensure fast transhipment and safe rail transport. As already mentioned, this equipment makes up the majority of the units

currently on the road. It is estimated that the vast majority of semi-trailers used in Europe cannot be craned. Various solutions have been developed and used for this equipment in recent years. Three solutions for non-cranable semi-trailers were included in the investigation. These are described below.

3.4.1. NiKRASA / VEGA

The aim of NiKRASA technology is to move non-cranable semi-trailers onto the rails. A transport platform is used into which the trailer is driven. A stationary platform is required in the terminal to accommodate the transport platform and thus enable the semi-trailer to be loaded. The tractor is not carried along in this solution. After loading into the transport platform, it is handled at the gripping edges with the gripping arms in a standard pocket wagon TWIN or T3000. Standard gripper harnesses with gripper arms are used here, which have already been described when handling cranable equipment. The transport platform on which the trailer is standing is carried in the wagon and also handled again at the destination terminal. The NiKRASA system is referred to as vertical handling technology, since the loading units are lifted on the transport platform.

The loading of the trailer with the NiKRASA platform takes a little longer than with a cranable vehicle. However, every semi-trailer must be driven into the transport platform, which takes additional time and thus lengthens the loading of a block train. The transport platform carried along reduces the overall transport load of the train. However, the semi-trailer weighs 300 to 500 kg less, as no gripping edges have to be attached.

Similar to the transport of cranable semi-trailers, the pre- and post-carriage must be carried out by other drivers in some cases to use this system.

The technical system was developed by intermodal operator TX Logistik together with the German inland port operator Bayernhafen. Since 2019, the system is also available separate from TX services based on purchase or rental of the equipment.

Since February 2020, NiKRASA is used by TX on its intermodals service between the German terminal Herne (near Dortmund) and the MAHART terminal in Budapest (see Figure 6). In addition to NiKRASA, on this train service the similar system VEGA/r2L from Austria is also used in this train service (see Figure 7). The difference between the two systems is, that VEGA can also be used for transporting vehicles other than semi-trailers (e.g. vans, tractors, see Figure 8). In theory, also accompanied inermodal transport is then feasible. However, the tractors on the train reduce the wagon capacity for semi-trailers.

The VEGA system is also planned to be applied to a service between Rostock Port and Bettembourg in Luxemburg starting in the beginning of 2021.

As handling of non-cranable semi-trailers with the two mentioned systems require extra lifts and space, terminal usually charge extra for this equipment. According to interviews with TX and CFL Multimodal, both systems are not seen feasible for entire block trains to be into busy terminals, as the adapters block a substantial part of the loading lane under the crane. Only in less crowded terminals, e.g. the German terminal Rheine, where interference with other traffic is low, full trains can be equipped with these adapters.

Figure 6: Loading system NiKRASA in the MAHART intermodal terminal in Budapest (source: www.dvz.de)

Figure 7: Loading system VEGA (source: www.roadraillink.eu)

Figure 8: handling of lorry tractors with VEGA equipment

3.4.2. CargoBeamer

CargoBeamer is a system that uses special wagon and terminal technology. The system consists of a special pocket wagon with a so-called JetModule (transport tray), which is pushed horizontally from the wagon in the terminal. The semi-trailers can be driven into the transport tub, uncoupled and then loaded. During loading, the transport trays are pushed onto the side of the wagon. Simultaneous loading and unloading is the optimal condition: the train drives into the terminal and the outbound trays are already loaded. Then the inbound trays are pushed from the wagon and the outbound trays are pushed onto the wagon from the other side. According to the manufacturer, the transhipment of the train is completed after approx. 15 to 20 minutes. In order to use this effect, however, a corresponding terminal must be built / used. Also, the semi-trailers to be loaded must already be ready in the transport tubs when the train arrives, so that additional tubs are required.

The transport tubs have gripping edges so that they can also be handled in a standard crane or reach stacker terminal.

A test system was installed at the CargoBeamer AG headquarters in Leipzig to test the handling technology. Another transhipment facility for the temporary test of the transhipment process was already in operation on the VW factory premises in Wolfsburg. The first horizontal loading terminal is under construction in Calais since summer 2020. However, CargoBeamer train sets have been in operation in transalpine traffic between Germany and Italy for several years. The transport trays are handled in conventional crane terminals.

One advantage of the CB technology is that a service for non-cranable semi-trailers can be started without the installation of the horizontal loading equipment. On the other hand, lifting the CB trays

in conventional crane terminals also requires extra lifts and space as explained previously for NiKRASA/VEGA. Therefore the handling of CB block trains in busy terminals such as Rostock Port is rather inconvenient because of interference with the other handling processes. Nevertheless, the installation of a small-scale CB terminal with several loading modules near to a conventional intermodal can generate opportunities for mixed services for cranable and non-cranable semi-trailers.

Figure 9: system CargoBeamer[2]: horizontal (left) and vertical (right) handling

Figure 10: truck enters the transport tray (left), test terminal in Leipzig (right)

[2] Source: CargoBeamer AG

3.4.3. LOHR

The system developed by the French group LOHR is also based on horizontal handling. In difference to the CargoBeamer system, the transport tray is not moved sideways but rotated over the center. It remains connected to the (double) wagon and cannot be handled vertically with a crane. A corresponding LOHR transhipment facility is therefore essential for transhipment. However, an example outside the investigation area shows that the LOHR railway system can also be integrated into conventional intermodal terminal: In 2020, two LOHR transhipment modules (for 2 double with 4 semi-trailers) were put into operation in the Polish CLIP freight center in Swarzędz near Poznań. The Luxembourg based intermodal operator CFL Multimodal S.A. will offer mixed trains for cranable and non-cranable loading units on a route to Bettembourg from beginning of 2021. Cranable loading units have been transported since January 2020. The additional offer for non-cranable trailers in LOHR double wagons will lead to an increased frequency of departures. According to CFL, the train sets will consist of up to 2/3 of LOHR wagons, which proofs that such quantities can be handled also with small-scal horizontal terminals.

The terminal in Bettembourg is equipped with both a high capacity crane unit as well as with a large-scale LOHR terminal which is able to handle block trains.

The installation of a small-scale LOHR terminal in Rostock Port was also under consideration for an intermodal service to Bettembourg, operated by CFL together with ferry operator StenaLine which is planned to start in 2021 with 3 weekly roundtrips. Finally, the decision was taken to us NiKRASA system for non-cranable semi-trailers for the short term and to keep LOHR as a future option.

Another planned intermodal service with relevance for this study is the connection between Budapest and Bettembourg. LOHR is currently seeking a location for a first terminal installation in Budapest, preferably close to an existing terminal for vertical handling in order to allow the mentioned mixed trains for cranable and non-cranable units.

The following figures show the handling principle as well as the above CT ratio (blue) next to LOHR railway transport services that are already in operation (red).

Figure 11: LOHR railway system

Figure 12: LOHR railway system in the CLIP intermodal terminal near Poznan

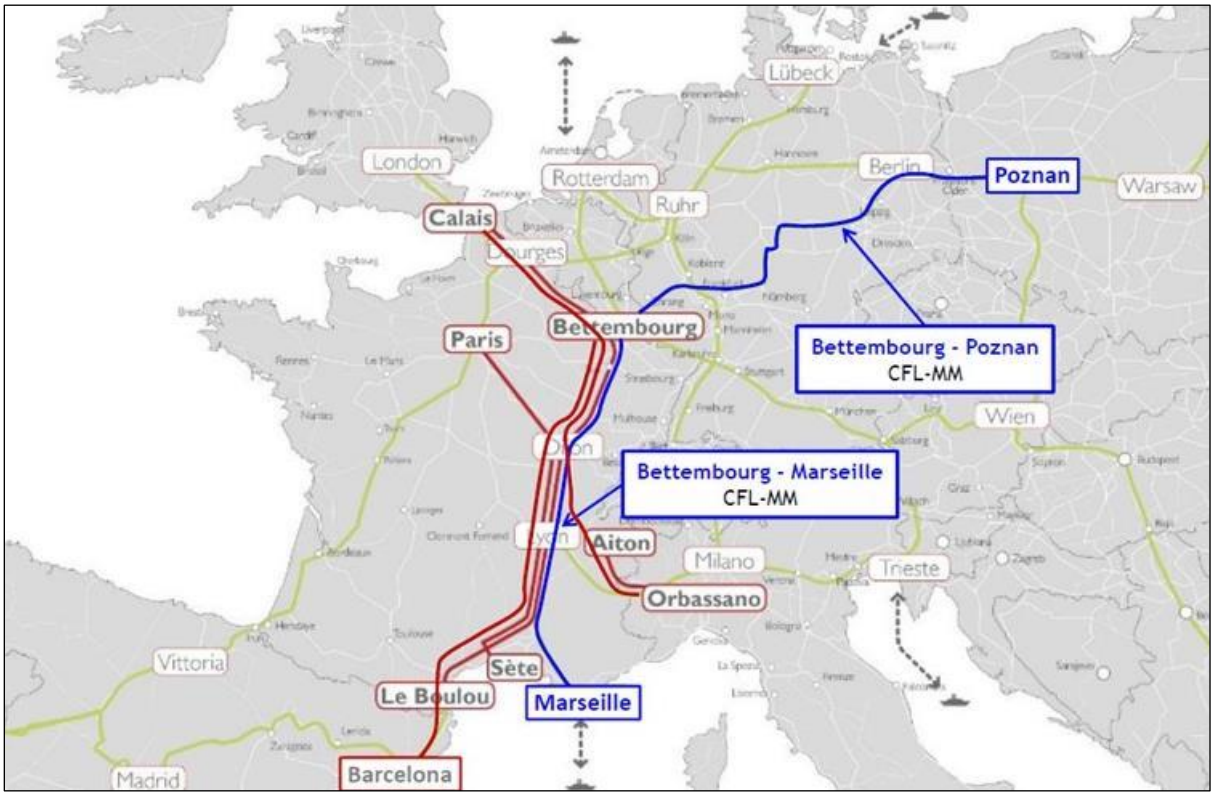


Figure 13: LOHR traffic routes3

[3] Source: LOHR Industrie

3.4.4. Megaswing

The Megaswing technology is based on a wagon whose pocket can be moved out hydraulically. The semi-trailer can be pushed backwards into the bag, then the tractor is uncoupled and the tray with the semi-trailer swings back onto the wagon. This technology does not require a terminal or handling equipment, only a person who operates the hydraulics on the wagon for moving in and out. A paved area next to the track with sufficient maneuvering options is sufficient.

Due to the technology installed on the wagon, maintenance is more complex and therefore more complex / cost-intensive. The electrical and hydraulic components are also very complex and therefore more difficult to repair.

The system is operated by the company HELROM. The first published service is between Düsseldorf and Vienna. According to the operator, more connections are under consideration. Like for the other mentioned systems, a loading process for full block trains is not feasible to be integrated in a busy crane terminal such as Rostock Port, but can be applied to existing tracks with adjacent paved area. However, the mentioned service is only in the starting phase and there is no information available what could be the next steps of extending both the wagon fleet and the number of services.

Figure 14: system Megaswing: loading process

Figure 15: Megaswing wagon[4]

3.4.5. Conclusions

The technologies examined all offer the possibility of moving non-cranable semi-trailers onto the rails. Compared to cranable equipment, the acquisition costs of the required material are higher and maintenance and repair processes might be more complex. Some of the technologies can be used in existing terminals or only require a levelled transhipment area. The advantage of the cranability of the various wagon trays has definitely also to be evaluated against the background of the required storage space in the transhipment area.

Certainly, the technically most flexible solution – because of its compatibility with existing pocket wagons - is the system NiKRASA/VEGA. However, the system has limitations and causes interferences with other trains in the terminal, when the train capacity is dominated by non-cranable semi-trailers. Either the transition period from non-cranable to cranable units can be kept to a minimum and the long-term share of non-cranable trailers is rather marginal or a separate location for (horizontal) handling needs to be established. In that case, LOHR is currently the only known system provider – apart from the fully location-independend but not yet very mature technology MegaSwing – which shows visible activities to install a terminal facility in Hungary. Therefore it can be relevant for future intermodal services to Rostock Port. It should be considered that both LOHR and also CargoBeamer technology does not necessarily require space for a full train length set of transhipment modules. As the example in the CLIP terminal near Poznan shows, facilities for parallel handling of at least 4 semi-trailers are sufficient to handle trains with a substantial share of non-cranable semi-trailers.

3.4.6. Route options

For the establishment of a new train service between Budapest region and Rostock Port, there are in principle three route options: via Poland/Horka, via Passau and via Bad Schandau.

The route via Poland should not preferred because of the additional border crossings: The service would cover 5 instead of 4 countries with additional operational needs, e.g. loco change or loco with Polish additional signalling system.

The route via Passau is also not seen as the best choice because of the lower payload due to the track gradient.

[4] Source: Own representation

The route via Bad Schandau (OEM) is the preferred route because of train length (620 m + loco) and the payload of approximately 1,800 t. In case of congestion or construction works, the alternative routes via Passau and Poland are still feasible but seen only as fallback option.

The length of all relevant route options is similar and ranges around 1,200 km. The following figure shows one of the routings via Bad Schandau, calculated with DIUM[5].

HU	100412	Budapest-Jozsefvaros rh.*	9,a	0887	Szob hatar	1	73
SK	0887	Sturovo st.hr.	1,2	0890	Kuty st.hr.	1,2	203
CZ	0890	Lanzhot st.hr.	1	0649	Decin st.hr.	1	416
DE	0649	Bad Schandau Grenze	1,2	270611	Rostock Seehafen	3,4,8,c	460
							1152

Figure 16: Routing between Budapest and Rostock via Bad Schandau (source: DIUM)

3.4.7. Train configuration

For the mentioned train length of 620 m + loco, several train configurations apply, which are listed in the following table. It shows that the highest capacity (36 semi-trailers) can be achieved either with a complete set of conventional T3000 double pocket (e.g. with NiKRASA) or of LOHR wagons. In case that the length of 620 m can be slightly exceeded (subject to the detailed track offer), even 19 of the LOHR wagons can be carried at a total length of 627 m.

If T3000 (cranable) and CargoBeamer (non-cranable) wagons are combined, a capacity of 34 semi-trailers can be achieved.

Table 1: Wagons at 620 m train length

Wagon type	Wagon length	Number of wagons	Trailer capacity
T3000 double pocket	34.20 m	18	36
LOHR double pocket	33.00 m	18	36
CargoBeamer single pocket	19.33 m	32	32
T3000 + CargoBeamer		9 + 16	34

[5] dium.dbcargo.com

3.5. Business concept indication

The operating costs were calculated on a roundtrip basis between the departure point in Hungary (Budapest BILK or MAHART) and Rostock Port (port terminal) including all handling, shunting and other costs. The cost for the transport service on the long-distance route (e.g. main freight station in Hungary to Port of Rostock) were determined together with interested railway undertakings respectively intermodal operators and were verified with own figures from similar project activities (knowledge database). This includes rail traction, track access charges and typical wagon costs. In case of conventional wagonload, specific wagon requirements and wagon availability were considered.

The calculation was based on a an average train utilization levels of 90% (incl. balanced/unbalanced flows). It can be used as a business concept (product sheet) for providers of the services to be identified in WP 4.

The calculation was broken down to the cost per truck consignment (FTL) with reference to the average train utilization level.

The following tables show estimated revenues and costs for one round trip based on a frequency of three roundtrips per week. The assumed train configuration was the previously mentioned mix of T3000 and CargoBeamer wagons with an utilization of 30 semi-trailers in each direction.

The minimum revenue was calculated at 0.50 EUR per comparable road kilometre, which results into 1,200 EUR per wagon slot and roundtrip respectively 36,000 EUR for the complete train. In case, that the revenue level can reach up to 0.70 EUR per km, the revenue level for the roundtrip can reach 48,000 EUR (see table 2). The comparison with the basic costs listed in table 3 shows, that a break-even can be achieved also under the consideration of additional costs (e.g. extra shunting), lower utilization level or revenue differences between northbound and southbound direction.

Table 2: Revenues

Revenues
Assumed train utilisation: 30 trailers (90 % of 34 wagon slots)
Revenue range per round trip (1,200 to 1,600 EUR): 36,000 to 48,000 EUR

Table 3: Costs

Costs	
Rail traction via Bad Schandau (incl. track charges):	22,000 EUR
Handling (160 EUR/round trip):	4,800 EUR
Wagon cost (3 days/round trip):	4,000 EUR
Wagon adapters (NiKRASA):	800 EUR
Overhead: (20 EUR/trailer,roundtrip):	1,200 EUR
Total	**32,800 EUR**

3.6. Timetable

The timetables for planned rail freight services will be aimed at optimized handling along with all crucial points along the transport routes (loading, borders, seaport, ferry). That means that ferry departures and arrivals need to be considered and terminal operators (loading slots), railway undertakings (rail paths), intermodal operators need to be contacted.

A good benchmark for such an optimised timetable is the wagonload block train service jointly operated by RCA and Stena Lines between Vienna and Trelleborg via Port of Rostock. The transit time totals at around 25 hours for the land route (ca. 900 km) and some 30 hours including the ferry transfer.

According to the indicative offers of two railway undertakings (RU), the transit time between Budapest and Rostock can be estimated between 25 and 28 hours, which is comparable with the Rostock – Vienna train service also operated via Bad Schandau by RCA. One crucial element to optimize timetables is the use of multi-system locomotives to avoid loco change at the border.

The following figure shows an indicative timetable for three weekly roundtrips between Budapest BILK and Rostock Port.

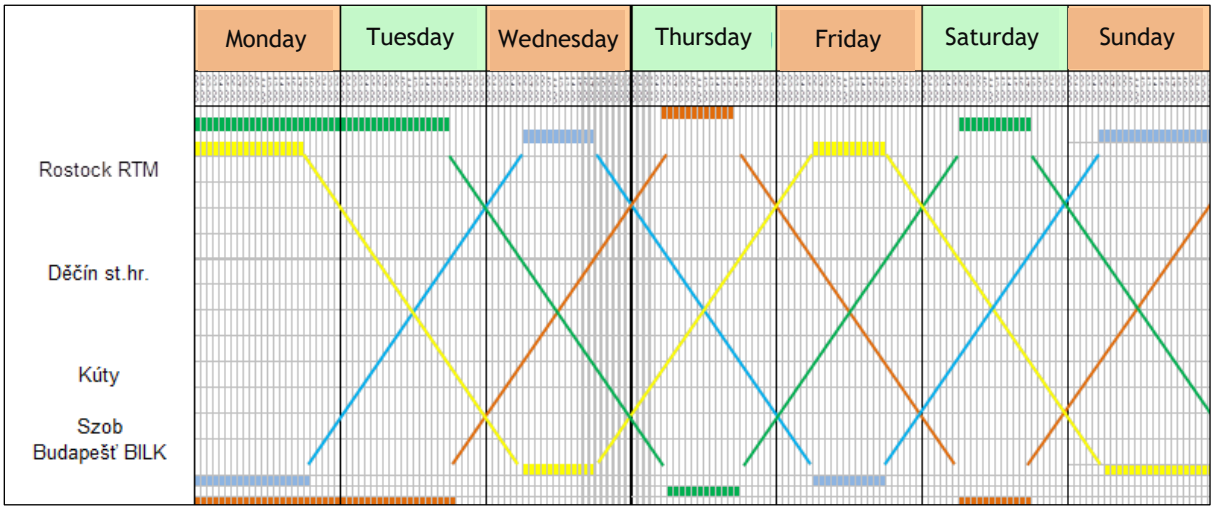


Figure 17: schematic timetable for round trips between Budapest and Rostock

4. OUTLOOK

In the next step, the explained draft train concept will be discussed with potential users. Afterwards the train concept will be finalized with the following options:

- Block train (cranable and non-cranable trailers)
- Potential synergies with findings of the Turkey study (e.g. Budapest as gateway)
- Potential synergies with the CORCAP liner train concept

In principle, the train concept is elaborated as a separate shuttle train concept between Budapest and Rostock. On the other hand, the findings of the market analysis indicate, that the current demand may not be sufficient to start a new intermodal service at a minimum frequency of three weekly roundtrips. Therefore, combination and links with other services like the above mentioned are feasible when Budapest is considered as a gateway terminal. For example, the BILK terminal in Budapest is already linked to two relevant services.

First, the mentioned Rostock-Vienna services, now conventional wagonload only, could be opened also for intermodal volumes and frequency of two weekly departures can be increased if BILK would be linked with Vienna by an additional rail service.

Second, Scandinavia flows from Turkey can use the existing service between Halkali and BILK and therefore can link into a new service between BILK and Rostock.

Third, a combination of the two previously mentioned options, i.e. a harmonised connection Halkali-BILK-Vienna-Rostock.

These options can be helpful steps to start-up and stabilize intermodal flows between Hungary and Scandinavia via Rostock with the perspective of a separate shuttle train service.