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MARKET OBSERVATION FOR DANUBE NAVIGATION RESULTS IN 2017




Budapest 2018

European Commission **Danube Commission**

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Chapter 1

Overview of the Danube navigation market

1.1 Overview of transport demand on the Danube

Transport demand in the Danube river basin is shaped primarily by the following factors:

- Passenger transport on cruise ships and excursion ships: A cluster system provides passenger services at the traditional centres of Danube tourism.
- Cargo transport: Five metallurgical enterprises established in the Danube river basin have a combined potential iron and steel output of approx. 10.5 million tonnes per year; in addition, there is a well-developed agricultural sector in the Danube countries, as well as import and export potential for a great amount of bulk goods using the Danube's transit potential.

1.1.1 Passenger shipping

The most important transport modes in passenger shipping on the Danube are:

- international river cruises on cabin ships, the mainstay being cruise lines on the Upper Danube and in the direction of the Danube delta;
- national and international liner services on passenger ships without cabins, the mainstay being liner services from the urban centres (Vienna, Budapest, Bratislava);
- non-scheduled services at the major tourist centres.

Passenger transport on cabin ships is the segment of Danube shipping that has seen the most dynamic development: In 2017, the number of passengers on cabin ships on the Danube amounted to 50% of passengers on cabin ships in Europe, and in the period from 2012 to 2017, passenger transport on the Upper Danube grew by 72%. Transport in the direction of the Danube delta is stable, making up 17-19% on average of passenger transport on the Upper Danube, while transport from and to the Rhine ports contributes approx. 30% of total passenger numbers. The market for this transport mode is characterized by a stable customer base, which ensures profitable fleet operation, as well as a potential for market saturation in view of the new vessels likely to go into operation in the period from 2018 to 2019.[1]

National and international liner services are more extensively developed on the Upper Danube, showing stable indicators. Liner services transport between 650,000 and 700,000 passengers on the Austrian section of the Danube and more than 800,000 passengers on the Hungarian section every year.

Non-scheduled services also transport great numbers of passengers: consistently between 110,000 and 115,000 in Austria, and more than 850,000 by pleasure craft and urban transport in Hungary.

[1] According to data by *Danube Tourist Consulting*

1.1.2 Cargo transport

Danube shipping accounted for less than 10% of the total volume of cargo transport on European inland waterways in 2017.

In general, it is assumed that the dynamism of the transport market depends on the development of a country's gross domestic product (GDP). For 2017, GDP growth in the Danube countries was projected at between 1.5% and 4.2%, and accordingly, the Danube cargo transport market was expected to grow at a similar rate.

According to a forecast by the Danube Commission in late 2016, a stable market for raw materials (accounting for more than 40% of total transport volume on the Danube) and metallurgical products (approx. 6%) as well as agricultural products (more than 20% of total transport volume) was expected for 2017. In the former case, this was based on steady growth of demand for metal products in the first half of 2017, and in the latter case on the good harvest results in the 2016 crop year.

The relative upswing of the global economy and growing demand for finished goods[2] led to an increase in raw materials delivered to the metallurgical industry (iron ore, pellets, coking coal, scrap metal); in the course of the year, a price increase for finished products was also recorded (by 4-8% for flat-rolled products and wide flats). In view of increasing activities at the steelworks *ISD Dunaferr* (Hungary) and *HBIS* (Serbia), this positive development was expected to continue in the first half of 2018.

The volume of agricultural product stocks at the beginning of the year made it possible to begin large transports of grain and other foodstuffs in the first half of 2017. However, due to unfavourable weather conditions in the exporting countries along the Danube in January, April and Mai, forecasts for the grain harvest (especially maize) and accordingly for transport volume were reduced. Moreover, the decline in grain prices and strong growth in volumes exported by countries of the Black Sea region had an impact on export volumes of grain from the Danube countries to their traditional markets (Middle Eastern and North African countries).

Forecasts for 2018[3] suggested that production indicators in agriculture would improve as compared to 2017 in all of the Danube countries.

As in 2017, a stable market for chemical products (which make up more than 6% of total cargo transport volume on the Danube) was projected for 2018; some growth in transports of petroleum products (more than 8% of total cargo transport) was also expected.

1.1.3 Navigation conditions

It would be a mistake to base market forecasts for the Danube countries, especially as regards cargo transport on the Danube, directly on GDP development. When assessing the impact of general economic developments in the Danube countries on Danube

[2] According to forecasts by the European Steel Association (EUROFER), demand for steel was expected to increase by 1.7% in 2017.
[3] Sources: *Strategie Grains, COCERAL, FAS USDA*

navigation, it must be considered that the latter is particularly susceptible to fluctuating navigation conditions, especially during the low water periods in summer and autumn, which cause a significant deterioration of the waterway's navigation status on critical sections. These factors have an essential impact on market confidence and slow the introduction of fast technologies (container transport). In addition, there are other unpredictable weather conditions to be considered (freezing and floods), which have a significant impact on the transport market and primarily on cargo transport. Systematic works to improve infrastructure, especially fairway maintenance, in order to reduce sensitivity to meteorological conditions are therefore of particular importance for the Danube navigation market.

1.2 Overview of transport supply on the Danube

1.2.1 Passenger shipping

Pleasure cruises on European inland waterways have seen marked growth over the past 15 years and continue on a stable upward trend. On the Danube, this is apparent especially in the number of passengers travelling on cruise ships. From 2010 to 2015, the number of ships increased by 70 to 170 ships (see Table 1.1).

Table 1.1
Capacity development of cruise ships on the Danube

Year	Number of ships	Passenger capacity
2012	124	19,980
2013	137	22,300
2014	150	24,700
2015	170	28,100
2016	168	27,700
2017	170	28,100

It should be noted that ships added to the fleet generally have a capacity of 158 to 169 passengers, a length of 135 m and a maximum draught of up to 1.8 m, which allows stable operation even under low water conditions.

As regards ships built between 1995 and 2017, a number of fundamental factors affecting their operation can be identified (see Table 1.2).

Table 1.2
Factors affecting the operation of cruise ships

No.	Factors	Status
1	Ships	Given
2	Stable customer base, leading to profitable fleet operation	Given
3	Potential for long-term operation, yielding a return on investment	Given
4	Qualified crew	Given
5	Adjustment to very low water levels	Given
6	Modern communication system (RIS)	Given

1.2.2 Cargo transport

According to the Danube Commission's data, compiled on the basis of questionnaires addressed to shipping companies in the DC member states, 3,800 vessels with a total tonnage of more than 4.1 million tonnes were available on the Danube in early 2017, including:

- self-propelled barges with a total deadweight tonnage (DWT) of more than 500,000 tonnes,

- self-propelled tankers and tank barges with a total DWT of approx. 300,000 tonnes,

- dumb barges with a total DWT of approx. 3,300,000 tonnes, and

- pushers and tugs with a total pushing and tugging power of approx. 700,000 kW.

When analysing the fleet currently available, it makes sense to consider the active fleet and operational vessels, i.e. the number of ships used in goods transport that have been certified as required in accordance with international rules regarding class certificates and inspection certificates. In view of the fact that a large number of ships on the Danube fly the flags of states that are not members of the DC (Netherlands, Belgium, Malta and Panama), the size of the active fleet can only be determined by recording the number of vessels entering ports or passing through locks.

In its work on market observation for Danube navigation, the Danube Commission uses the statistical data provided by the locks at Kelheim, Jochenstein, Gabčikovo, Iron Gate I (data by Serbia) and the Port of Mohács, with the number of vessels in the active merchant fleet (ships with cargo holds) coming in between 1,500 and 1,600 annually.

The aging cargo fleet and its lacking expansion by new vessels are primarily attributable to numerous operational factors that arose in late 1990 (see Table 1.3).

Table 1.3
Factors affecting the operation of cargo ships (including pusher craft and barges)

No.	Factors	Status
1	Ships in operation	Limited
2	Stable customer base, leading to profitable fleet operation	Limited
3	Potential for long-term operation, yielding a return on investment	Limited
4	Qualified crew	Limited
5	Adjustment to very low water levels	Limited
6	Modern communication system (RIS)	Given
7	River monitoring	Given

1.2.3 Overview of cargo handling in Danube ports

A port's importance in Danube navigation results from a country's national interest in the economic activity carried out in the port, which depends primarily on cargo handling (goods dispatched and received by ship), on the types of goods handled (loaded and unloaded), and on logistical factors.

Under the European Agreement on Main Inland Waterways of International Importance (AGN), the List of inland navigation ports of international importance (E ports) includes 46 Danube ports (group P80-xx), including those on the Chilia branch and the Danube-Black Sea Canal. Each of these ports should have the capacity to handle a total cargo volume of at least 0.5 million tonnes per year.

All in all, some 70 ports are in operation on the Danube, including ports that handle significant cargo volumes (more than 1 million tonnes) and port complexes consisting of a base port and several private terminals (for grain or oil tankers), established due to demand for them on the Danube from late 1990 onwards.

The largest share in cargo handling in ports is held by ports that serve the metallurgical industry: Linz (4.25 million tonnes in cargo handled), Bratislava (approx. 2 million tonnes), Smederevo (3.16 million tonnes), Galaţi (4.33 million tonnes) and Ismail (more than 5.1 million tonnes).

1.3 Danube transport market trends in 2017

1.3.1 Due to extreme hydrometeorological events, in particular extensive ice events in January and February, navigation was completely suspended for long periods of time in the first quarter (Q_1) of 2017, causing considerable losses in cargo transport. Measures to combat ice events on the Danube were in effect for a total of 42 days.

For this reason, the volumes of cargo transport and cargo handling in ports were significantly lower in the first quarter (Q_1) of 2017 than in the corresponding period of 2016.

In January and February 2017, transport volume on the Upper Danube came to only 41% of the figure recorded in the corresponding period of 2016, with the decline due mainly to a drop in upstream transports of raw materials and iron ore (as convoys lay idle and unloading was suspended in the estuary ports, transport volume came to only 40% of the figure recorded in the corresponding period of 2016).

On the Middle Danube, transport volume in January and February 2017 came to 37% of the figure recorded in the corresponding period of 2016, with the decline due mainly to a drop in upstream transports of raw materials and iron ore (to 22.3% of the recorded in the corresponding period of 2016, as convoys lay idle and unloading was suspended in the estuary ports).

1.3.2 The stabilization of navigation conditions, ensuring loaded draughts around 2.5 m in the period from March to May, led to a relative normalization of the transport market situation, reflected in a stabilization of cargo handling in ports towards the end of the first half of the year (Q_1+Q_2).

1.3.3 Despite the drop in transport results in the first quarter (Q_1) and unstable navigation conditions, the market situation stabilized markedly over the first nine months of 2017 (see Table 1.4).

Table 1.4
Cargo handling in the ports of the Danube countries

Year, figures in thousand tonnes, % / Ports in	2014	2015	2016	2017 (Q_1+Q_2+Q_3)	in % of 2016 (Q_1+Q_2+Q_3)
Germany	4,031	3,257	2,958	2,606	120.1%
Austria	8,611	7,449	7,493	5,818	99.3%
Slovakia	1,800	2,009	2,020	1,560	105.9%
Hungary	5,673	5,978	5,439	4,288	103.2%
Croatia	491	566	677	512	84.0%
Serbia	7,270	6,504	7,269	6,132	91.3%
Bulgaria	5,689	6,114	7,013[4]	4,211	
Romania	23,406	24,462	25,096	17,308	91.5%
Republic of Moldova	678	840	876	333	
Ukraine	4,547	5,754	6,680	4,433	92.1%

In the fourth quarter (Q_4), loaded draughts were between 2.3 and 2.2 m, and transport volume receded along the entire Danube for all groups of goods, except for transports of raw materials for the metallurgical industry and of fertilizers.

[4] Including ferry traffic between Bulgaria and Romania

Chapter 2

Market observation for Danube navigation: Ship traffic and cargo transport

2.1 Navigation conditions on the Danube in 2017

2.1.1 Navigation conditions on the Danube in the first half of 2017

In December 2016, consistent low water at levels 100-150 cm below mean water level (MWL) was recorded along the entire Danube. In early January 2017, water levels on the Upper Danube and the Middle Danube were consistently beneath low navigable water level (LNWL) at some hydrometric stations.

Ice events began occurring in early January 2017, particularly on the Middle Danube and the Lower Danube, following an inflow of Arctic air masses, severe cooling and a drop in temperature while water levels were low. In a first phase, ice events consisted mainly of porous ice with a cohesiveness of 40-50%, which then changed to small lump ice with a thickness of 7-10 cm and a cohesiveness of 8 points. Consequently, suspension of navigation was announced successively on the Serbian, Hungarian, Romanian and Slovakian sections of the Danube in the period from 8 to 11 January.

As the river froze over rapidly, the entire fleet could not be sheltered in time, so that some ships were trapped in ice fields, and icebreakers had to be deployed to free them. Icebreakers also had to be deployed to salvage jetties and landing stages that had been carried away by moving ice fields, potentially endangering ships during ice drift.

At the beginning of February, ice events on the Danube consisted of successive stretches of ice drift (10-30%), as well as ice fields on the banks and stretches of open water; towards the end of the first ten days of the month, ice drift (20-50%) continued on the Lower Danube.

From the second ten days of February on, works began to restore signalling equipment and restart ship traffic on sections of the Upper Danube and the Middle Danube.

The measures to combat the ice events on the Danube were fully concluded by 22 to 23 February.

During the first ten days of March, water levels around MWL were recorded along the entire Danube, intermittently exceeding MWL by 20-30 cm on the Upper Danube and by 60-80 cm on the Lower Danube (see Figures 1, 2 and 3).

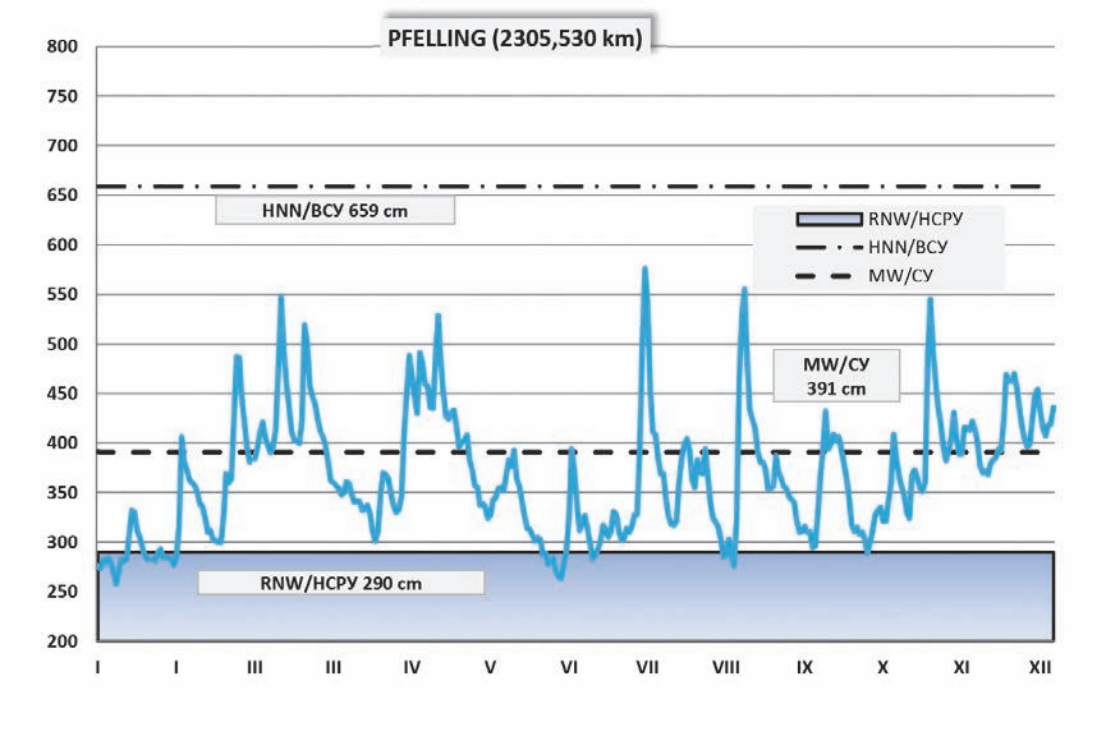


Fig. 1: Daily mean water levels in cm at hydrometric stations on the Upper Danube for selected years

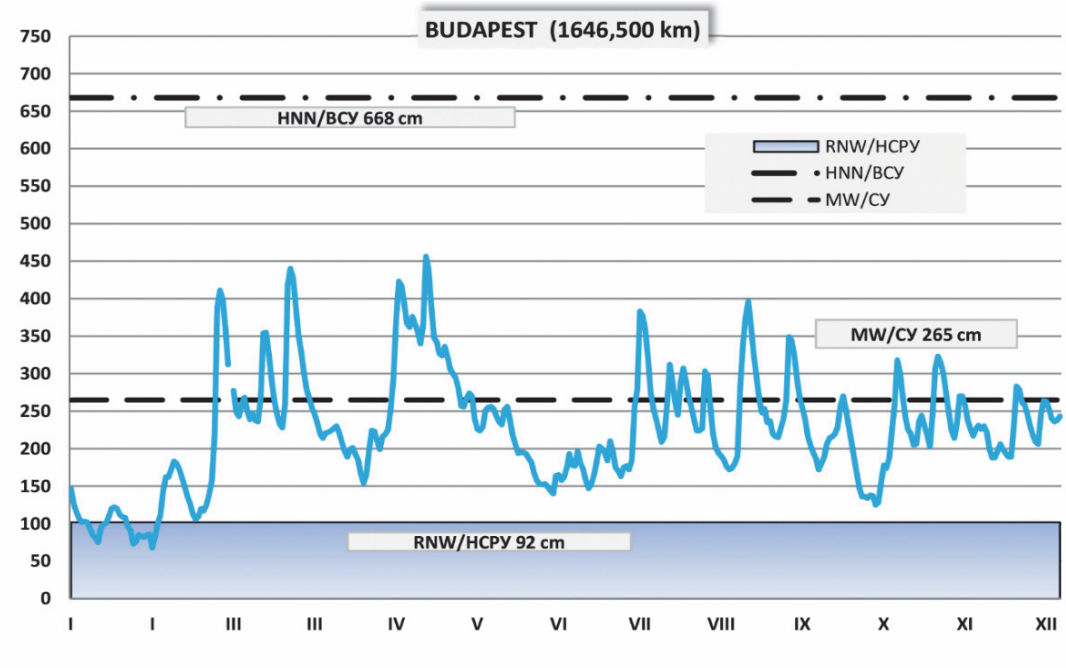


Fig. 2: Daily mean water levels in cm at hydrometric stations on the Middle Danube for selected years

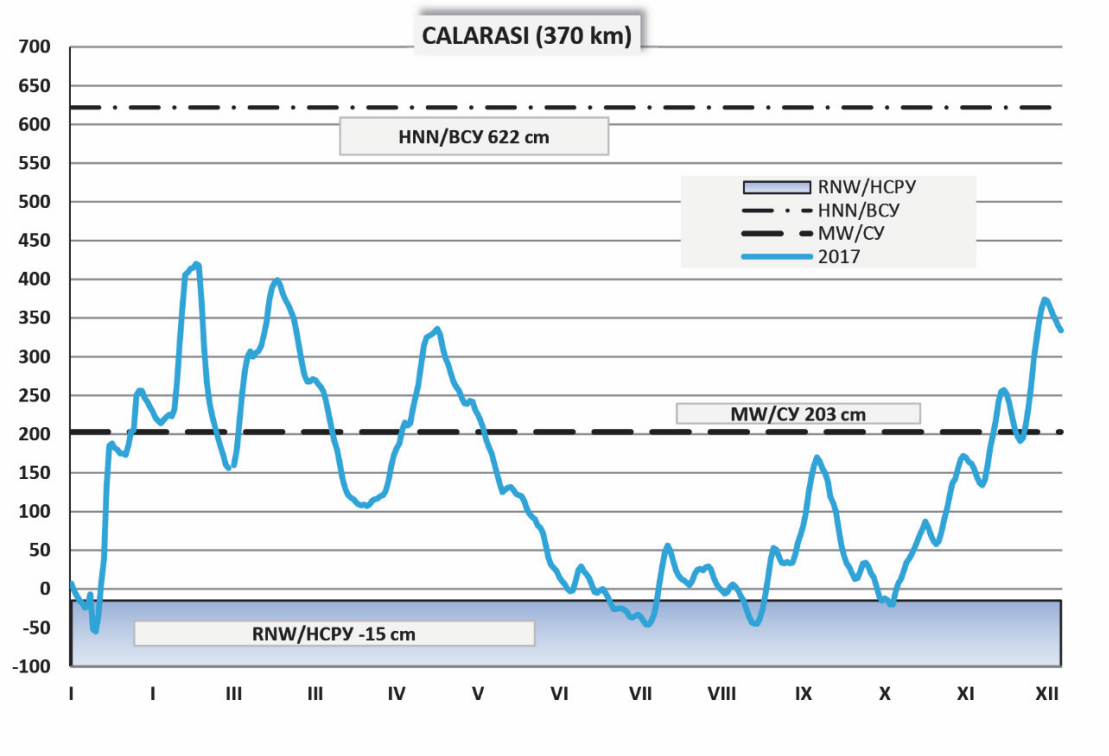


Fig. 3: Daily mean water levels in cm at hydrometric stations on the Lower Danube for selected years

In April, water levels by and large corresponded to long-term averages; a rise in water levels along the entire Danube at the beginning of May did not lead to a stabilization of water levels around MWL.

In June, water levels essentially remained below long-term averages along the entire Danube. In the course of the month, a consistent decline in water levels by 80-100 cm below MWL was recorded, intermittently bringing water levels down to LNWL on some stretches of the Upper Danube and the Middle Danube.

2.1.2 Navigation conditions on the Danube in the second half of 2017

In July, water levels were below MWL along the entire Danube, specifically:

- by 50-60 cm below MWL on the Upper Danube, including a sharp, temporary increase at the end of the month with an amplitude of up to 2 m, and a subsequent, equally sharp drop below MWL;
- by 100-150 cm below MWL on the Middle Danube, including a sharp, temporary increase at the end of the month with an amplitude of up to 2 m, and a subsequent, equally sharp drop below MWL;
- by 2-2.5 m below MWL on the Lower Danube, with a decline to levels below LNWL.

In August and September, water levels remained low but stable.

In October, water levels along the entire Danube continued to come in under MWL; occasional slight rises were followed by declines bringing water levels close to LNWL.

A gradual rise in water levels along the entire Danube began in November, though water levels intermittently exceeded MWL only on the Upper Danube and the Middle Danube.

In December, water levels on the Upper Danube and the Middle Danube were unstable, fluctuating around MWL; on the Lower Danube, water levels were above MWL.

2.1.3 Conclusions

Due to the rapid occurrence of ice events within a short time at the beginning of the year, a considerable number of ships were trapped in the ice on some stretches of the Danube. The reasons for this situation are seen (as in the comparable period of 2012) in a lack of attention paid by some shipowners and boatmasters to official notifications by the competent authorities about the danger to navigation posed by the ice events and the resulting consequences.

While water levels remained stable during the months with the greatest activity in waterway transport (May and June, as in the previous year 2016), the summer low-water period began decidedly earlier in 2017 (practically in mid-June), limiting loaded draughts of ships at an early point in the year.

The relative stabilization of water levels in the period from March to April led to draughts of 2.5 m and more for waterway transport; in June, however, loaded draught decreased to 2.2-2.3 m.

In mid-June, water levels declined sharply along the entire Danube, dropping distinctly below long-term averages. From mid-July till the end of September, water levels on the Upper Danube and the Middle Danube fluctuated sharply as compared to long-term averages, while relatively stable low water was recorded on the Lower Danube.

All in all, low water was recorded on 80 days during the second half of the year under review, intermittently leading to suspension of navigation on the Lower Danube and to considerable losses for shipowners.

During this period, loaded draughts of cargo vessels were between 2.2 and 2.3 m.

2.2 Observation of ship traffic and cargo transport

2.2.1 Passenger shipping

2.2.1.1 Transport on the Upper Danube

In 2017, stable passenger transport on cabin ships (river cruises) began in late March.

Table 2.1
Passenger transport trends[5]

Year / Section	Passenger numbers in thousands						
	2012	2013	2014	2015	2016	2017	in % of 2016
Upper Danube	328	493	486	534	564.7	595.5	105.4%
To the Danube delta	82	84	89	83	86.9	97.7	112.4%

Short trips lasting 5, 7 or 8 days on the lines Passau-Vienna-Bratislava-Budapest-Passau and Vienna-Bratislava-Budapest, as well as trips to and from the ports on the Rhine and the Main, made up the major part of passenger transport on cabin ships.

- A total of 1,106 passages were recorded at the Kelheim lock (trips to and from the ports on the Rhine and the Main), an increase by 7.14% compared to 2016 (figures for 11 months).

- A total of 4,210 passages were recorded at the Gabčikovo lock (cross-border transport between Hungary and Slovakia (HU/SK), see Figure 4), which corresponds to 106.7% of the figure for 2016. 595,500 passengers were transported, corresponding to 105.4% of the figure for 2016 (see Table 2.1).

- A breakdown of passenger numbers on the Upper Danube by flag state is shown in Table 2.2.

Table 2.2
Breakdown of passenger numbers on the Upper Danube by flag state

Flag state	2012	2013	2014	2015	2016	2017
Germany	17%	20%	16.5%	17.4%	15%	18.9%
Bulgaria	6%	5%	6%	4.3%	6.9%	5.1%
Ukraine	4.7%	2.5%	2%	1.8%	3.9%	5.0%
Romania	6.2%	5.3%	3%	1.9%	1.3%	
Non-members of the DC	60%	64%	72%	74%	70.5%	68.5%

[5] As calculated by the Secretariat of the Danube Commission, based on data from Gabčikovo and Mohács.

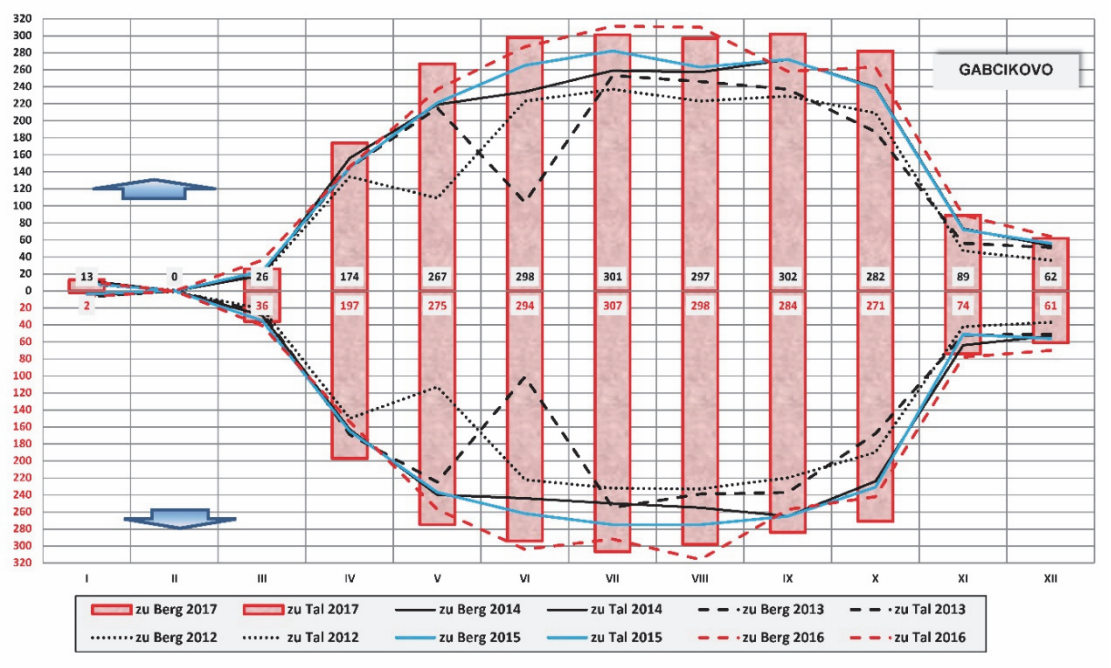


Fig. 4: Upstream and downstream passages of passenger cabin ships through the GABČIKOVO lock per month in 2012-2017

The greatest activity in passenger shipping was recorded in the months June through October (see Figure 4).

In 2017, the following numbers of passages through the Gabčikovo lock were recorded for passenger vessels:

- Vessels with a length of 110 m: 1,312 passages, amounting to 103.2% of the corresponding figure for 2016, with 27.2% of passenger numbers recorded on the Upper Danube.

- Vessels with a length of 135 m: 1,673 passages, amounting to 113.2% of the corresponding figure in 2016. 5.2% were vessels flying the flag of Germany; the remainder operated under the flags of non-member states of the DC. In total, vessels with a length of 135 m accounted for 42.9% of passenger transport on the Upper Danube.

In June, average capacity utilization was 128 passengers on vessels with a length of 110 m, and 160 passengers on vessels with a length of 135 m.

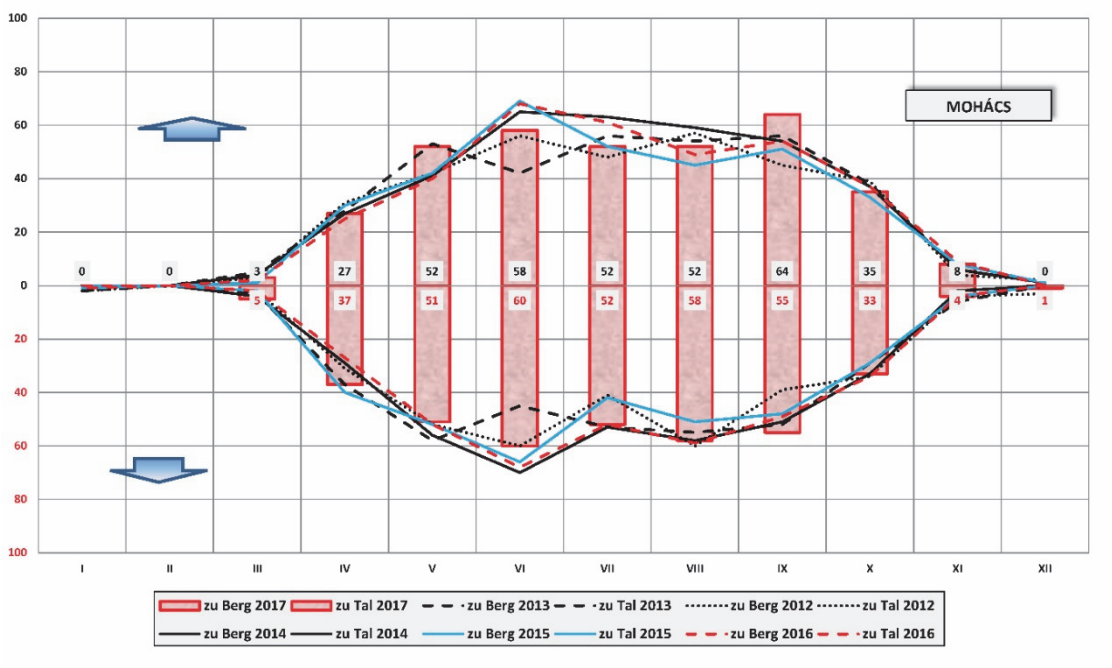


Fig. 5: Upstream and downstream passages of passenger cabin ships through MOHÁCS per month in the years 2012-2017

2.2.1.2 Transport on the Middle Danube: cross-border transport between Hungary, Croatia and Serbia (HU/HR/RS), statistics of the checkpoint at Mohács

Passenger transport on cabin ships began in late March (see Figure 5). Trips lasting 14, 15 or 16 days from Passau to Vienna and to the Danube delta made up the major part. The number of passages through the checkpoint at Mohács came to 707, corresponding to 102% of the figure recorded in 2016.

A total of approx. 97,700 passengers were transported through Mohács on cabin ships, which amounts to 112.4% of the corresponding figure for 2016 (see Table 2.1).

2.2.2 Cargo transport

2.2.2.1 Transport on the Upper Danube

Volume

The volume of cargo carried in cross-border transport between Germany and Austria (DE/AT) came to 4,339,000 tonnes, of which 2,620,000 tonnes were transported upstream (according to data collected by the Passau checkpoint).[6] Broken down by product groups, the largest volumes were the following:

- Upstream: 38.8% agricultural products (group 01 of the NST-2007 classification), 24.1% metal products (group 10) and 11.5% chemical products (group 08).

[6] www.destatis.de

- Downstream: 29.5% metal ores (group 03 of NST-2007), 18% coal and lignite (group 02), 16% food products (group 04) and 14.4% chemical products (group 08).

Cargo transport volume through the Jochenstein lock by months is shown in Figure 6.

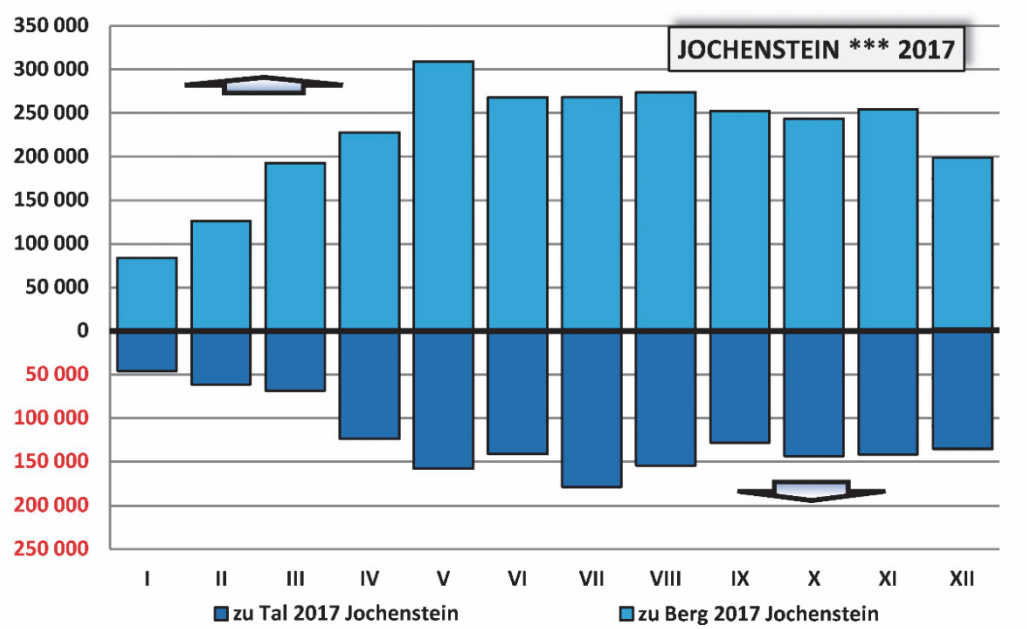


Fig. 6: Upstream and downstream cargo transport volume through the JOCHENSTEIN lock in 2017 in tonnes per month

The volume of goods transported through the Gabčikovo lock in cross-border transport between Hungary and Slovakia (HU/SK) came to 5,495,000 tonnes in 2017, corresponding to 103.8% of the figure for 2016 (see Figure 7). Upstream transit, amounting to 3,591,000 tonnes, made up 64.8% of total volume (as compared to 73% in 2012 and 2013, 75% in 2014, 66% in 2015 and 65% in 2016).

The volume of dry goods transported came to 4,588,000 tonnes, with

- upstream transport at 3,276,000 tonnes and
- downstream transport at 1,312,000 tonnes, resulting in a ratio of 2.5 to 1.

Liquid cargo transported totalled 907,000 tonnes, with

- upstream transport at 292,000 tonnes and
- downstream transport at 615,000 tonnes, resulting in a ratio of 0.47 to 1 (as compared to 0.45 to 1 in 2016).

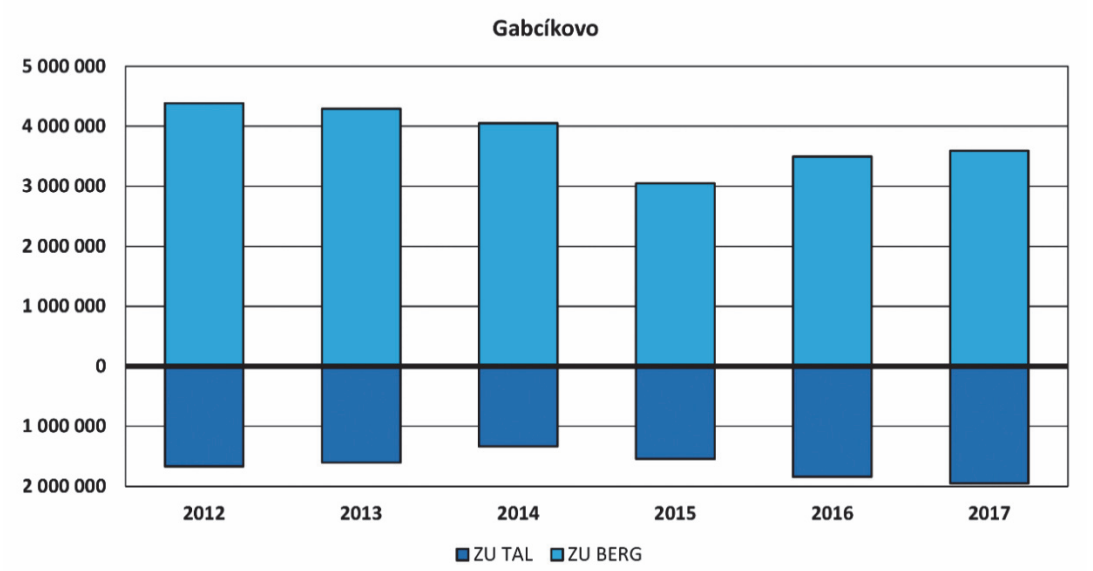


Fig. 7: Upstream and downstream cargo transport volume through the GABČIKOVO lock in tonnes per year

Ship traffic

To analyse ship traffic through the locks at Jochenstein and Kelheim, the unit used was the fleet family “cargo vessels” (consisting of motorized vessels, as well as convoys of motorized vessels and barges of the Europe II type).

Transport by pushed convoys (statistics of the Gabčikovo lock)

In total, pushed convoys carried more than 3,227,000 tonnes of cargo through the Gabčikovo lock in 2017, which corresponds to 108.1% of the volume transported in 2016, and amounts to 58.7% of total cargo volume, including liquid cargo, carried through the Gabčikovo lock (as compared to 52% in 2014 and 2015, and 56% in 2016).

Under stable navigation conditions, an average of 125-140 convoys per month passed through the Gabčikovo lock.

Cargo transport by pushed convoys (see Figure 8) was carried out primarily under the following flags: 28.6% of dry cargo and 8.7% of liquid cargo were carried by vessels flying the flag of Germany; 22.9% of dry cargo and 33% of liquid cargo by vessels flying the flag of Austria; 15.6% of dry cargo by vessels flying the flag of Ukraine; 13.2% of dry cargo by vessels flying the flag of Romania; 42.1% of liquid cargo and 7.7% of dry cargo by vessels flying the flag of Slovakia.

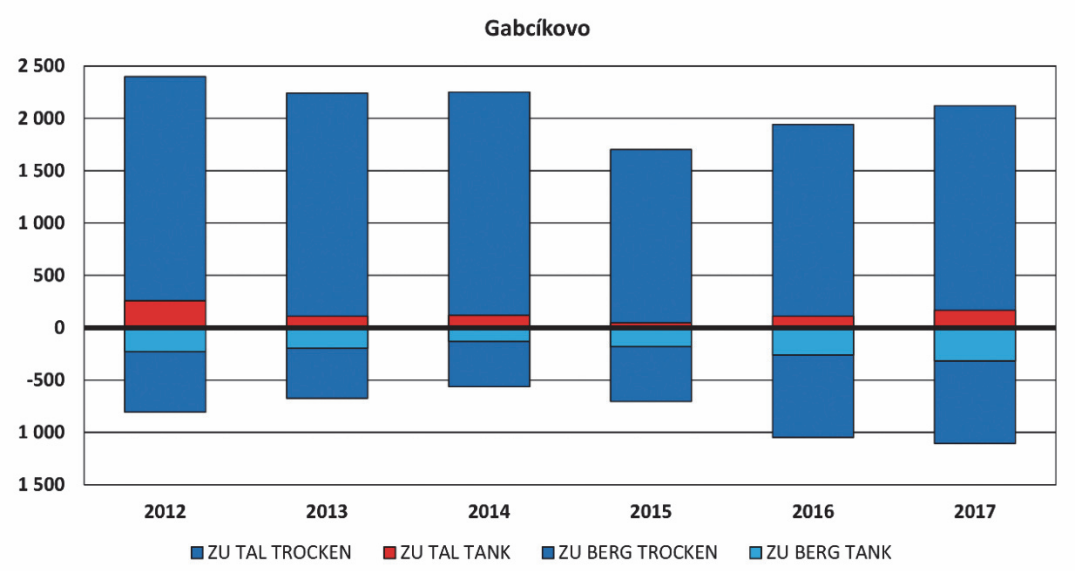


Fig. 8: Upstream and downstream cargo transport volume carried by pushed convoys through the GABČIKOVO lock in tonnes per year

a) Pushed convoys carried a total volume of 2,747,000 tonnes in dry cargo (see Figure 9), with

- upstream transport at 1,955,000 tonnes, making up 59.7% of all dry cargo carried upstream (as compared to 58% in 2014, 55% in 2015 and 58% in 2016), and
- downstream transport at 792,000 tonnes, accounting for 60.4% of all dry cargo carried downstream.

A total of 2,003 dumb barges in pushed convoys travelled upstream, only 17% of them carrying ballast (as compared to 10% in 2014, 14% in 2015 and 17.6% in 2016). At the same time, 51% of dumb barges travelling downstream in pushed convoys were ballasted (as compared to 63% in 2013, 66% in 2014, 56% in 2015 and 45% in 2016), indicating a persistent imbalance of the cargo base for transports by pushed convoy on the Upper Danube.

b) Tank barges in pushed convoys carried a total volume of 483,000 tonnes in liquid cargo (see Figure 9), with

- upstream transport at 167,000 tonnes (141% of the figure for 2016) and
- downstream transport at 316,000 tonnes (121% of the figure for 2016).

A total of 156 loaded tank barges and 8 ballasted tank barges travelled upstream in pushed convoys, while 474 loaded tank barges and 41 tank barges carrying ballast travelled downstream.

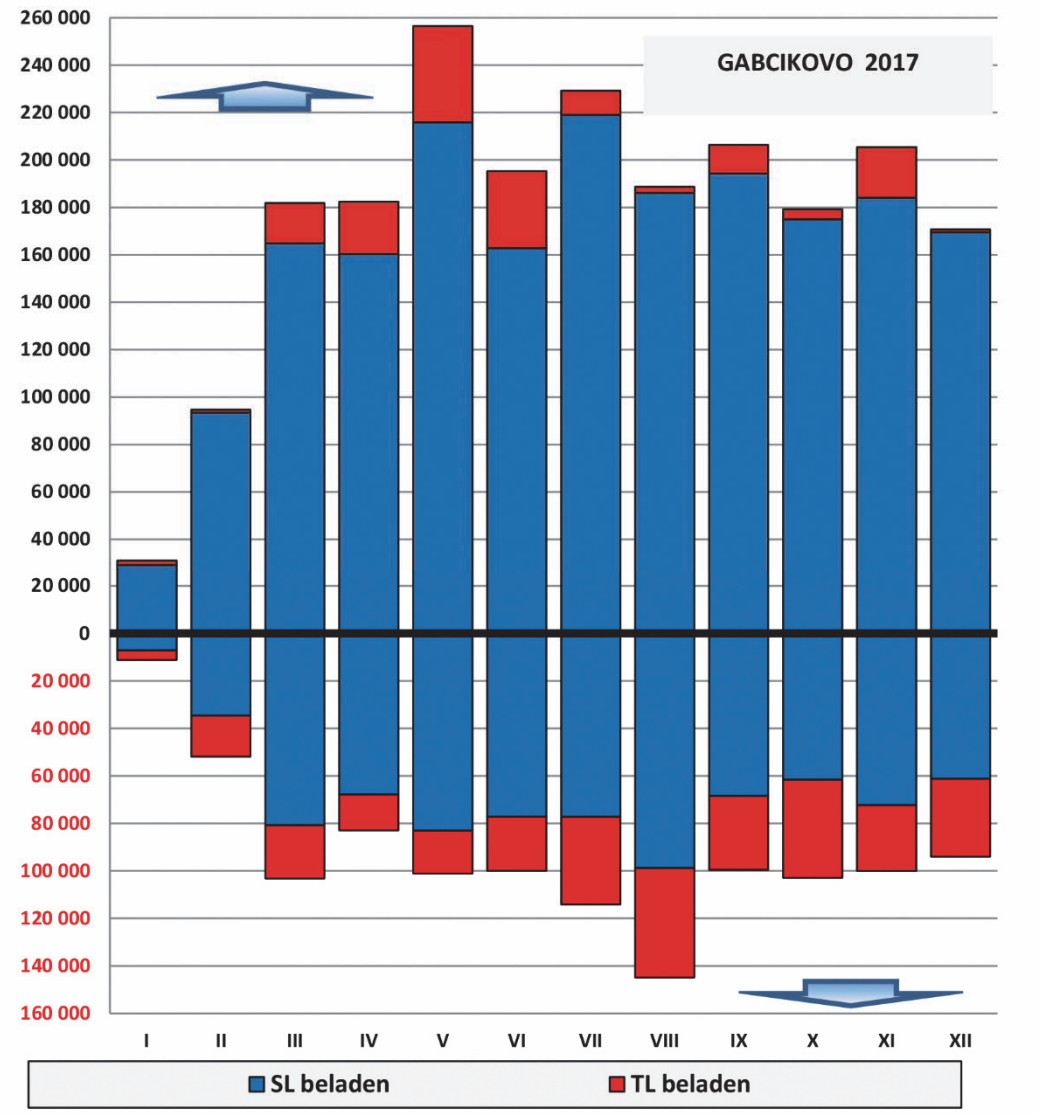


Fig. 9: Upstream and downstream cargo transport volume carried by dumb barges (SL) and tank barges (TL) in pushed convoys through the GABČIKOVO lock in 2017
in tonnes per month

Cargo transport by motorized vessels

Motorized vessels carried a total of 2,267,000 tonnes of cargo through the Gabčikovo lock in 2017, accounting for 41.3% of total cargo volume (as compared to 47% in 2012, 51% in 2013, 48% in 2014 and 2015, and 44% in 2016), with

- upstream transport at 1,445,000 tonnes and
- downstream transport at 822,000 tonnes,

resulting in a ratio of 1.76 to 1 (2.8 to 1 in 2013, 2.3 to 1 in 2014, 1.63 to 1 in 2015, and 1.93 to 1 in 2016).

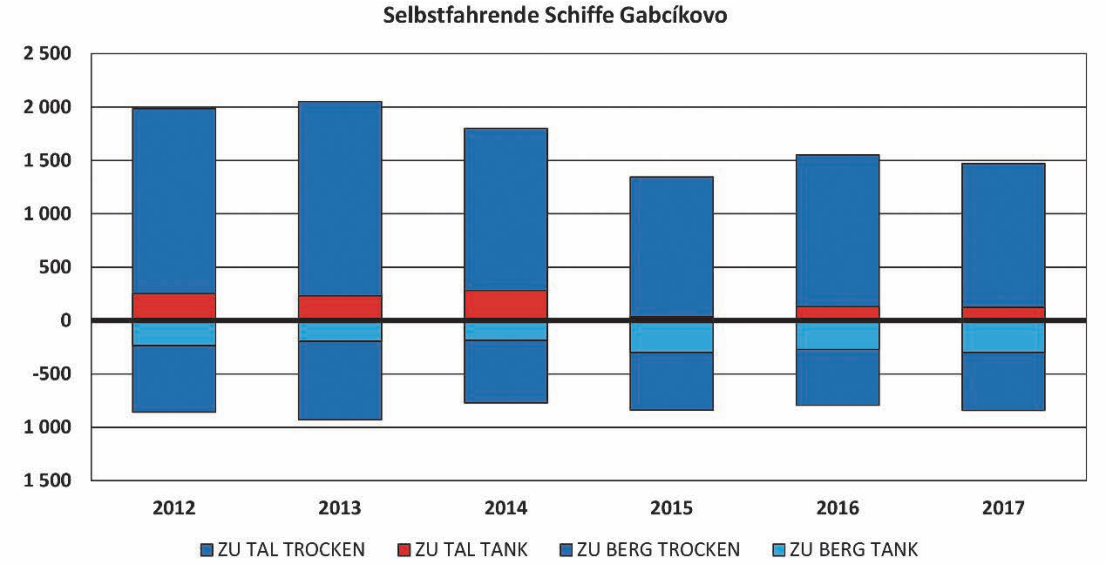


Fig. 10: Upstream and downstream cargo transport volume carried by motorized vessels through the GABČIKOVO lock in tonnes per year

Cargo transport by motorized vessels (see Figure 10) was carried out primarily under the following flags: 38.9% of total cargo volume, 40.7% of dry cargo and 31% of liquid cargo were carried by vessels flying the flag of Germany; 11.9% of dry cargo by vessels flying the flag of Bulgaria; 3.8% of dry cargo and 37.7% of liquid cargo by vessels flying the flag of Slovakia; 4.4% of dry cargo by vessels flying the flag of Hungary; 17.7% of liquid cargo by vessels flying the flag of Serbia; 5.4% of dry cargo by vessels flying the flag of Romania; 19% of dry cargo by vessels flying the flags of non-DC member states.

a) Self-propelled barges carried a total of 1,841,000 tonnes in dry cargo (see Figure 11), with

- upstream transport at 1,321,000 tonnes and
- downstream transport at 520,000 tonnes.

In 2017, a total of 1,356 self-propelled barges travelled upstream and 1,360 downstream, indicating a balance in transport by self-propelled barges on the Danube.

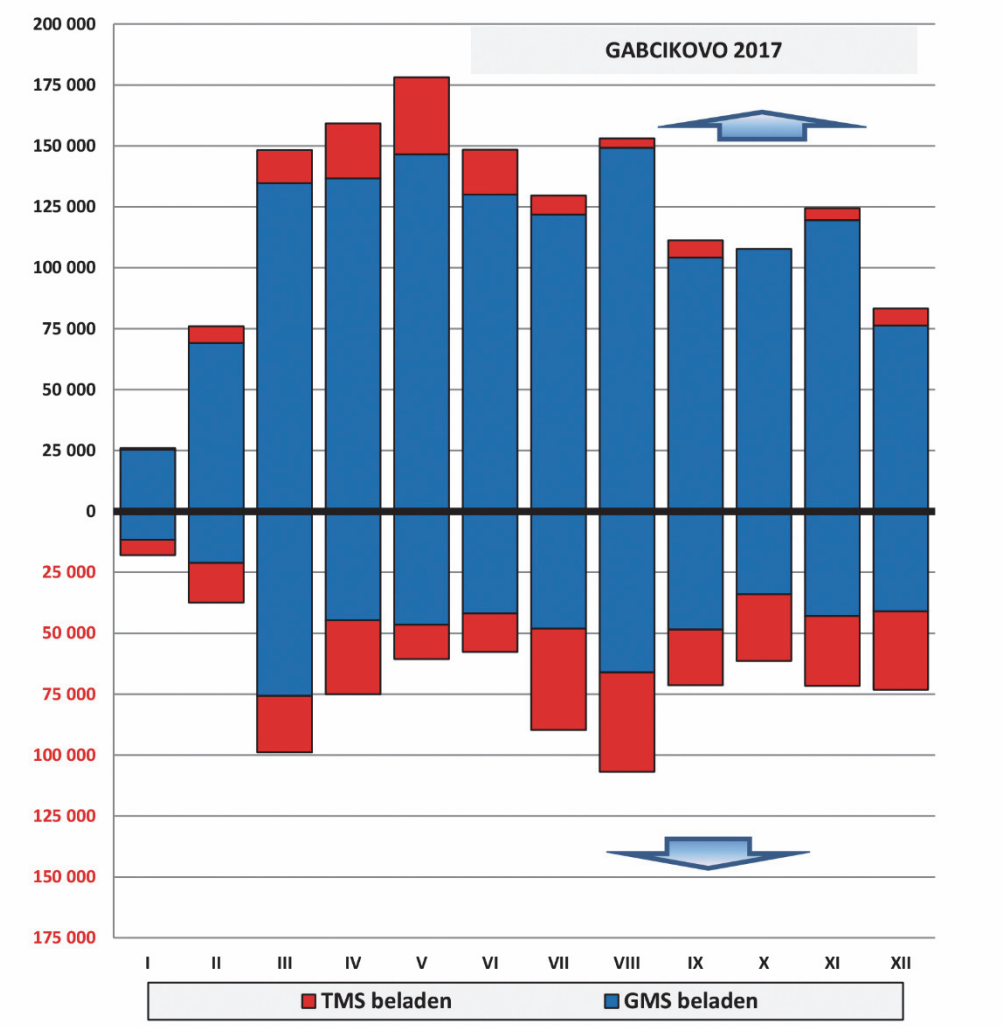


Fig. 11: Upstream and downstream cargo transport volume carried by self-propelled tankers (TMS) and self-propelled barges (GMS) through the GABČIKOVO lock in 2017 in tonnes per month

Ratios for transport by self-propelled barges are shown in Table 2.3.

Table 2.3
Ratios for transport by self-propelled barges on the Upper Danube

Ratio	2013	2014	2015	2016	2017
Loaded upstream to downstream	2 : 1	2 : 1	2.1 : 1	2.4 : 1	2.16 : 1
Loaded to ballasted upstream	18 : 1	18 : 1	8.8 : 1	13.7 : 1	16.3 : 1
Loaded to ballasted downstream	0.77 : 1	0.76 : 1	0.76 : 1	0.64 : 1	0.76 : 1

Accordingly, only 6.1% of self-propelled barges travelled upstream carrying ballast, while 23.6% travelled downstream carrying ballast.

In 2017, the following numbers of passages through the Gabčikovo lock were recorded for cargo vessels:

- Vessels with a length of 110 m: 264 loaded units (see Figure 12), with a total cargo volume of 317,000 tonnes, and 151 ballasted units (see Figure 13).
- Vessels with a length of 135 m: 85 loaded units (see Figure 12), with a total cargo volume (see Figure 13) of 145,000 tonnes (103% of the figure for 2016), und 40 units carrying ballast.
- Specialized ships (ro-ro ships, container ships et al.): 131 units in total.

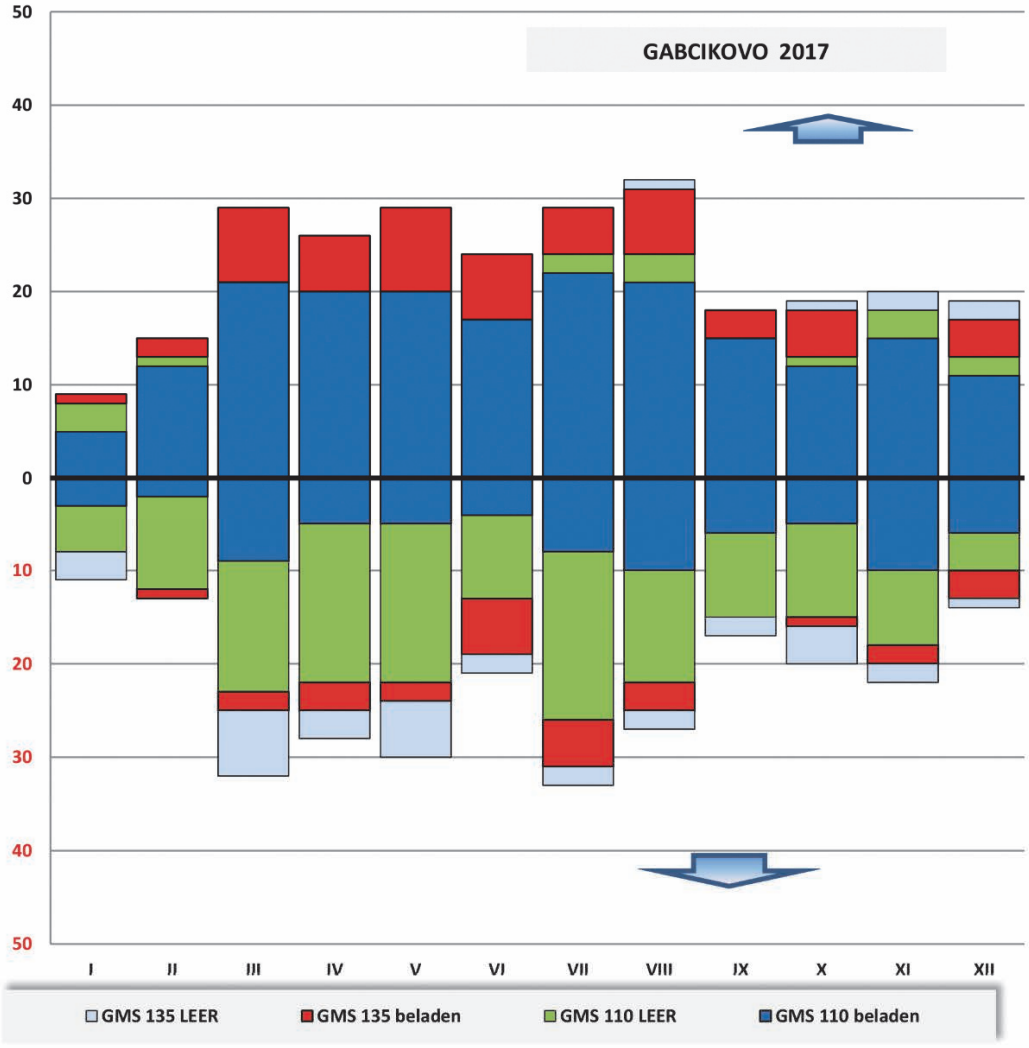


Fig. 12: Upstream and downstream passages of large motorized vessels (empty and loaded) through the GABČIKOVO lock in 2017 per month

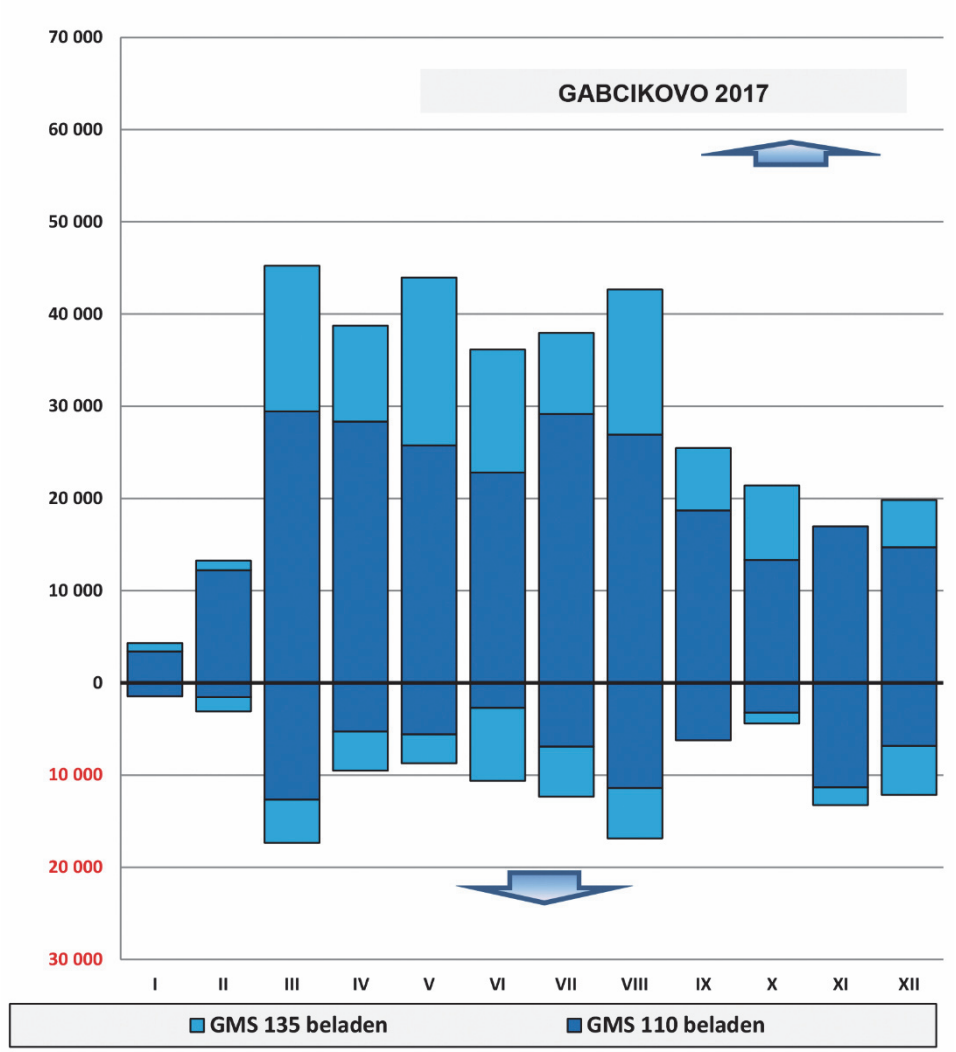


Fig. 13: Upstream and downstream cargo transport volume carried by large motorized vessels through the GABČIKOVO lock in 2017 in tonnes per month

b) Self-propelled tankers carried a total of 424,000 tonnes in liquid cargo (see Figure 11), corresponding to 106% of the figure for 2016, with

- upstream transport at 125,000 tonnes and
- downstream transport at 299,000 tonnes.

In the period from April to July, 50-60 self-propelled tankers on average passed through the Gabčikovo lock every month; in the period from August to December, the monthly average was 60-70 self-propelled tankers.

In 2017, a total of 364 self-propelled tankers travelled upstream and 367 downstream, indicating a balance in transport by self-propelled tankers on the Danube.

Ratios for transport by self-propelled tankers are shown in Table 2.4.

Table 2.4
Ratios for transport by self-propelled tankers on the Upper Danube

Ratio	2013	2014	2015	2016	2017
Loaded upstream to downstream	2 : 1	2 : 1	0.13 : 1	0.48 : 1	0.41 : 1
Loaded to ballasted upstream	2.3 : 1	2.3 : 1	0.1 : 1	0.48 : 1	0.44 : 1
Loaded to ballasted downstream	0.37 : 1	0.37 : 1	8.5 : 1	2.1 : 1	2.7 : 1

Accordingly, 44% of self-propelled tankers travelled upstream carrying cargo, while 63.5% travelled downstream carrying cargo. The major part of downstream transport of liquid cargo took place in the second half of 2017.

Transport by groups of goods (statistics of the Gabčikovo lock)

Food products, ferrous minerals, liquid cargo and metal products accounted for the major part of cargo transport volume through the Gabčikovo lock (see Figure 14). The percentage shares of goods groups in upstream and downstream cargo transport volume in cross-border transport between Hungary and Slovakia (HU/SK) are shown in Tables 2.5 and 2.6; they correspond approximately to the distribution of cargo transport volume in the years 2012 through 2016.

Table 2.5
Cargo volumes in upstream HU/SK cross-border transport (by groups of goods)

Year, figures in thsd. t / Goods group	2012	2013	2014	2015	2016	2017	in % of 2016
Food products and animal feed	1,660 38%[7]	1,250 29%	1,440 35%	1,283 42%	1,316 37.8%	1,389 38.7%	105.6%
Ferrous minerals	1,130 26%	1,250 29%	1,080 26%	749 24.6%	862 24.8%	803 22.3%	93%
Grain	514 8.6%	514 12%	206 5%	200 6.5%	298 8.6%	308 8.5%	103.2%
Metal products	391 8.9%	425 9%	376 9%	358 11.7%	417 12%	473 13.1%	113.4%
Petroleum products	505 11%	339 7.9%	406 10%	84 2.7%	233 6.7%	286 7.9%	122.7%
Organic and synthetic fertilizers	280 6.4%	250 5.8%	238 5.8%	171 5.6%	167 4.8%	165 4.6%	98.8%

[7] In % of total upstream cargo transport volume

Table 2.6

Cargo volumes in downstream HU/SK cross-border transport (by groups of goods)

Year, figures in thsd. t / Goods group	2012	2013	2014	2015	2016	2017	in % of 2016
Organic and synthetic fertilizers	557 33%[8]	501 31%	434 33%	414 26.8%	563 30.5%	513 26.6%	91.1%
Petroleum products	452 27%	389 24%	323 24%	480 31%	530 28.7%	631 32.7%	119%
Metal products	280 16.8%	374 23%	290 22%	399 25.8%	493 26.7%	432 22.4%	87.6%

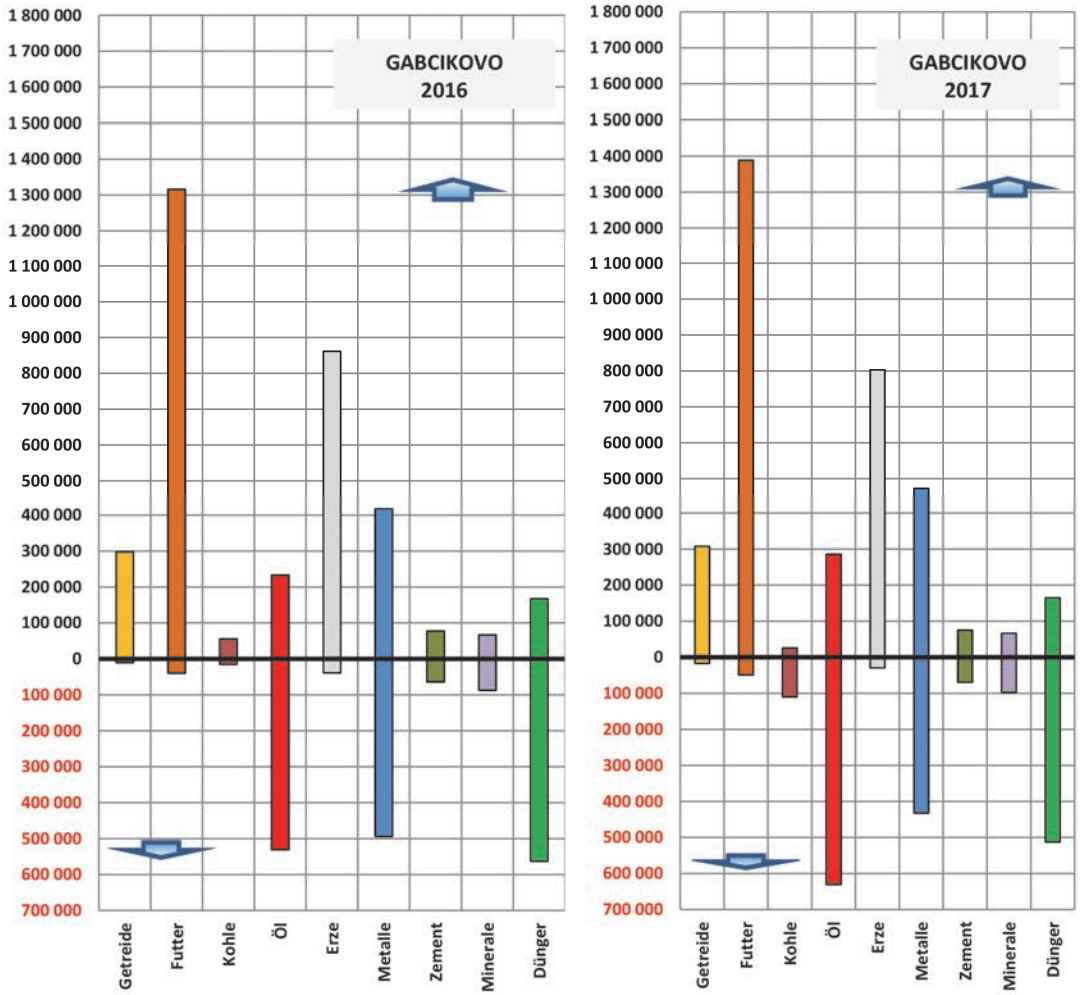


Fig. 14: Upstream and downstream cargo transport volume through the GABČIKOVO lock by groups of goods in tonnes in 2016-2017

[8] In % of total downstream cargo transport volume

2.2.2.2 Transport on the Middle Danube (statistics of the checkpoint at Mohács, cross-border transport between Hungary, Croatia and Serbia (HU/HR/RS))

Volume

The volume of goods transported through Mohács came to more than 5,748,000 tonnes in 2017, corresponding to 91.8% of the figure for 2016 (see Figure 15). (The drop in volume was due to a decline in downstream transports of grain). Upstream transit, amounting to 2,766,000 tonnes, made up 47.8% of total volume (as compared to 51% in 2012, 58% in 2013, 51% in 2014, 39% in 2015 and 46% in 2016).

The volume of dry goods transported came to 5,047,000 tonnes, with

- upstream transport at 2,573,000 tonnes and
- downstream transport at 2,474,000 tonnes.

Liquid cargo transported amounted to 727,000 tonnes, with

- upstream transport at 170,000 tonnes and
- downstream transport at 557,000 tonnes.

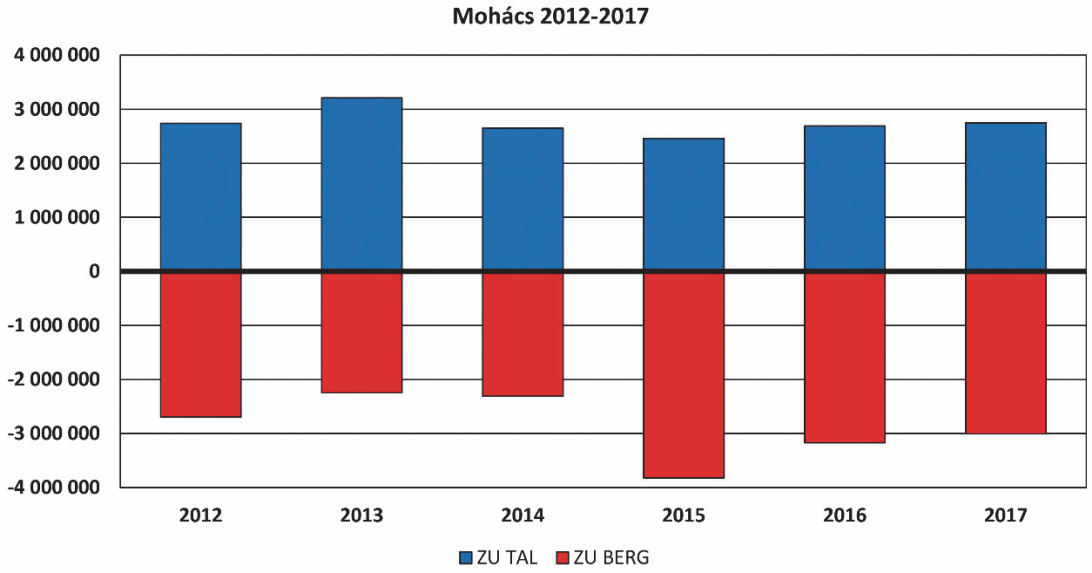


Fig. 15: Upstream and downstream cargo transport volume through MOHÁCS in tonnes per year

Ship traffic

Transport by pushed convoys

In total, pushed convoys carried more than 4,483,000 tonnes in cargo through the checkpoint at Mohács in 2017 (see Figure 16), which amounts to 78% of total cargo volume, including liquid cargo (as compared to 75% in 2013 and 2014, 81.7% in 2015 and 79% in 2016).

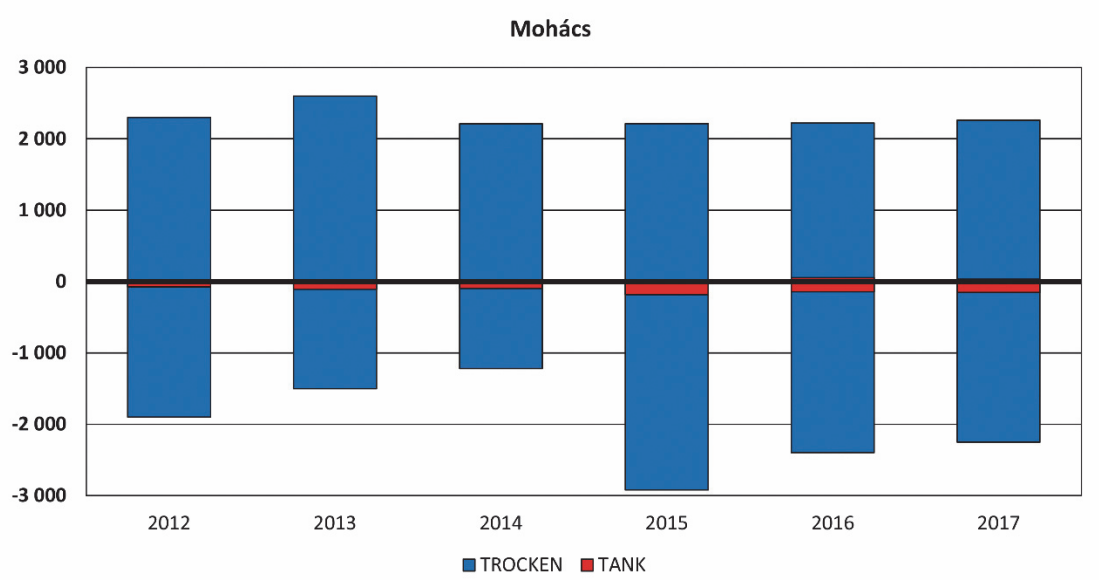


Fig. 16: Upstream and downstream cargo transport volume carried by pushed convoys through MOHÁCS in tonnes per year

Under stable navigation conditions, an average of 70-85 convoys per month passed through the checkpoint at Mohács. In June, 37 passages of convoys were recorded.

Cargo transport by pushed convoys was carried out primarily under the following flags: 28.2% of dry cargo was carried by vessels flying the flag of Romania; 30.6% of dry cargo by vessels flying the flag of Germany; 15.4% of dry cargo by vessels flying the flag of Ukraine; 5.9% of cargo by vessels flying the flag of Bulgaria; 4.3% of dry cargo by vessels flying the flag of the Republic of Moldova; 48.8% of liquid cargo by vessels flying the flag of Serbia; 6.6% of dry cargo and 28.8% of liquid cargo by vessels flying the flag of Slovakia; 3.4% of dry cargo by vessels flying the flag of Austria.

a) Pushed convoys carried a total volume of 4,295,000 tonnes in dry cargo (see Figure 17), with

   - upstream transport at 2,227,000 tonnes, making up 85.6% of all dry cargo carried upstream (as compared to 86% in 2014, 91.4% in 2015 and 86.5% in 2016), and
   - downstream transport at 2,068,000 tonnes, accounting for 83.6% of all dry cargo carried downstream (as compared to 76% in 2014, 85% in 2015 and 84.4% in 2016).

   In 2017, a total of 2,522 dumb barges in pushed convoys travelled upstream, 27.8% of them carrying ballast (as compared to 18% in 2014, 42.7% in 2015 and 31% in 2016). In the same period, 23.5% of 2,469 dumb barges travelling downstream in pushed convoys were ballasted (as compared to 18.6% in 2016).

b) Tank barges in pushed convoys carried a total volume of 186,000 tonnes in liquid cargo (see Figure 17), with

   - upstream transport at 34,000 tonnes and
   - downstream transport at 152,000 tonnes.

A total of 152 tank barges travelled upstream in pushed convoys, 24.3% of them loaded, while 155 tank barges travelled downstream, 83.8% of them loaded, indicating a balance in transport by tank barges on the Danube.

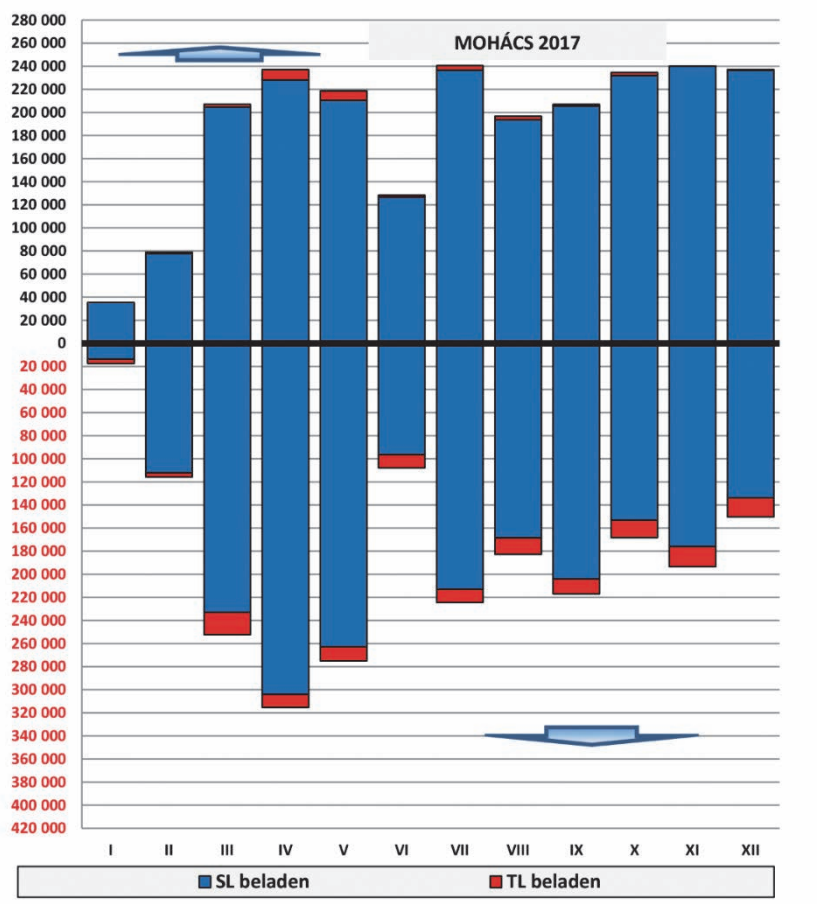


Fig. 17: Upstream and downstream cargo transport volume carried by dumb barges (SL) and tank barges (TL) in pushed convoys through MOHÁCS in 2017 in tonnes per month

Cargo transport by motorized vessels

Motorized vessels carried a total of 1,288,000 tonnes of cargo through the checkpoint at Mohács in 2017 (see Figure 18), accounting for 22% of total cargo volume transported through Mohács (as compared to 25% in 2013, 24% in 2014, 18.3% in 2015 and 21% in 2016), with

- upstream transport at 478,000 tonnes and
- downstream transport at 810,000 tonnes.

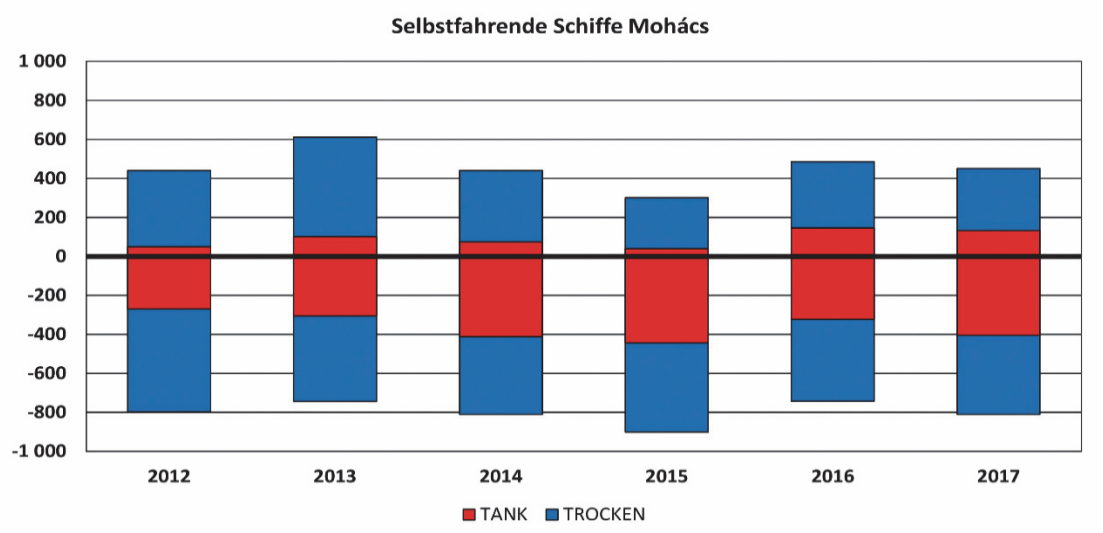


Fig. 18: Upstream and downstream cargo transport volume carried by self-propelled tankers and self-propelled barges through MOHÁCS in tonnes per year

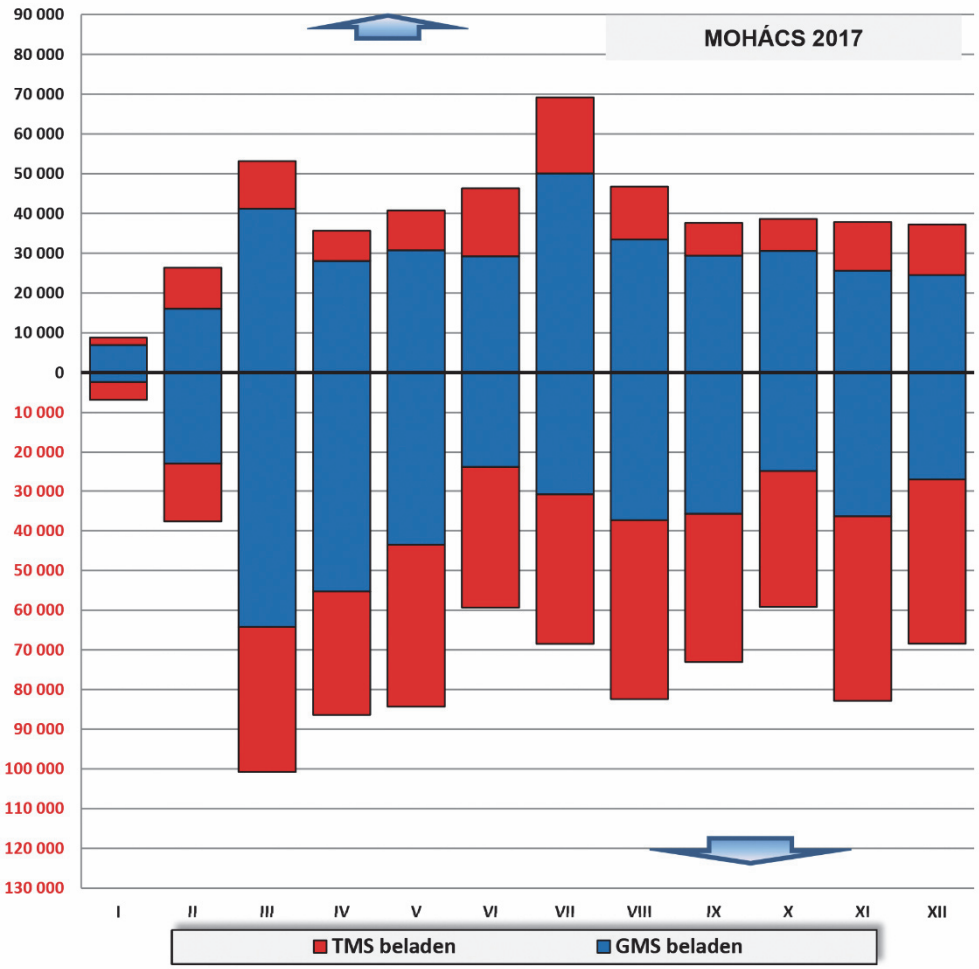


Fig. 19: Upstream and downstream cargo transport volume carried by self-propelled tankers (TMS) and self-propelled barges (GMS) through MOHÁCS in 2017 in tonnes per month

An average of 60-70 loaded motorized vessels per month passed through the checkpoint at Mohács.

Cargo transport by motorized vessels was carried out primarily under the following flags: 23% of dry cargo was carried by vessels flying the flag of Germany; 33.3% of dry cargo by vessels flying the flag of Bulgaria; 51.5% of liquid cargo by vessels flying the flag of Serbia; 23% of liquid cargo by vessels flying the flag of Romania; 20.2% of liquid cargo by vessels flying the flag of Slovakia; 13.6% of dry cargo by vessels flying the flags of non-DC member states.

a) Self-propelled barges carried a total of 752,000 tonnes in dry cargo (see Figure 19), with
   - upstream transport at 346,000 tonnes and
   - downstream transport at 406,000 tonnes.

b) Self-propelled tankers carried a total of 538,000 tonnes in liquid cargo (see Figure 19), with
   - upstream transport at 133,000 tonnes and
   - downstream transport at 405,000 tonnes.

   An average of 35-40 loaded self-propelled tankers per month passed through the checkpoint at Mohács.

c) In 2017, 46 motorized vessels with a length of 135 m passed through the checkpoint at Mohács (amounting to 54% of such large motorized vessels operated on the Danube).

Transport by groups of goods

Grain transported downstream, ferrous minerals carried upstream, metallurgical products and chemical products accounted for the major part of cargo transport volume through the checkpoint at Mohács (see Figure 20). The percentage shares of goods groups in upstream and downstream cargo transport volume in cross-border transport between Hungary, Croatia and Serbia (HU/HR/RS) are shown in Tables 2.7 and 2.8.

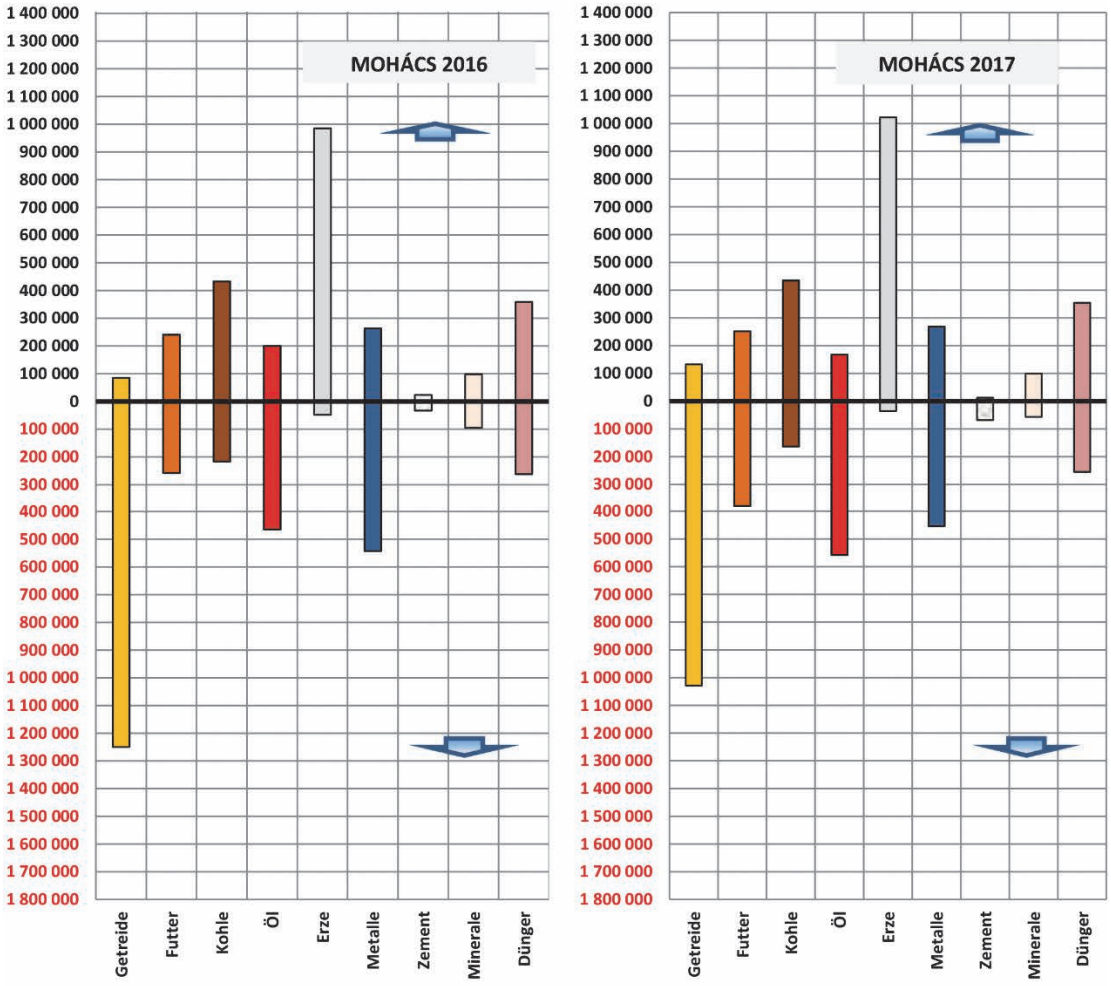


Fig. 20: Upstream and downstream cargo transport volume through MOHÁCS in tonnes by groups of goods in 2016-2017

Table 2.7

Cargo volumes in upstream HU/HR/RS cross-border transport (by groups of goods)

Year, figures in thsd. t / Goods group	2012	2013	2014	2015	2016	2017	in % of 2016
Ferrous minerals	1,300 44.8%	1,350 42%	1,010 41%	933 38%	985 36.6%	1,023 37%	103.8%
Coal (coke)	636 23%	879 27%	600 23%	605 24%	433 16.1%	435 15.7%	100.5%
Fertilizer	237 8.6%	241 7.5%	344 13%	395 16%	359 13.3%	354 9.2%	98.6%
Petroleum products	< 5%	< 5%	< 5%	< 5%	200 7.4%	168 6.1%	84%
Metal products	156 5.7%	190 6%	176 6.9%	175 7.1%	264 9.8%	269 9.7%	101.9%

Table 2.8
Cargo volumes in downstream HU/HR/RS cross-border transport (by groups of goods)

Year, figures in thsd. t / Goods group	2012	2013	2014	2015	2016	2017	in % of 2016
Grain	1,100 41%	637 28%	674 29%	1,700 44.5%	1,249 39.8%	1,028 34.5%	82.3%
Petroleum products	318 12.3%	424 19%	520 22.5%	613 16%	465 14.8%	558 18.7%	120%
Metal products	275 10.7%	334 15%	276 12%	389 10%	543 17.3%	454 15.2%	83.6%
Food products and animal feed	354 13.8%	194 8.6%	430 18.6%	687 17.2%	257 8.2%	382 12.8%	148%
Fertilizer	< 5%	< 5%	182 7.9%	234 6.1%	261 8.3%	255 8.5%	97.7%

The relative percentages of the main goods groups both in upstream and downstream transport differ from the ratios recorded in the years 2012-2015 (see Figure 21). Moreover, the relative percentages differ from the ratios recorded in 2016 due to a relative decline in downstream transports of grain and metal products.

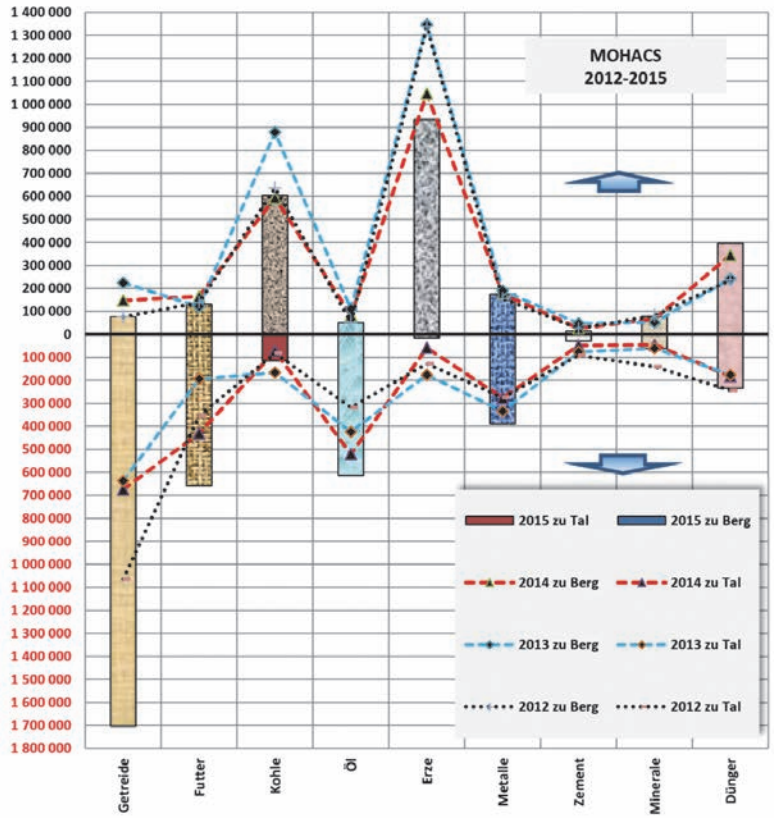


Fig. 21: Upstream and downstream cargo transport volume through MOHÁCS in tonnes by groups of goods in 2012-2015

2.2.3 Inter-basin transport

2.2.3.1 Transport on the Rhine-Main-Danube Canal

In 2017, a total cargo volume of 4,177,000 tonnes was carried through the Kelheim lock. In the first 11 months of 2017, 1,847 cargo vessels passed the lock upstream, approx. 87% of them loaded, and 1,760 vessels passed downstream, 94.4% of them loaded. A total cargo volume of 3,826,000 tonnes was transported, of which

- 1,902,000 tonnes went downstream to the Danube (a 6% increase over 2016), and
- 1,924,000 tonnes arrived from the Danube, headed for the ports on the Main and the Rhine (an increase by 5.42% over 2016).

Monthly trends in cargo transport, as compared to the years 2011-2016, are shown in Figure 22. Transport trends by years are shown in Table 2.9.

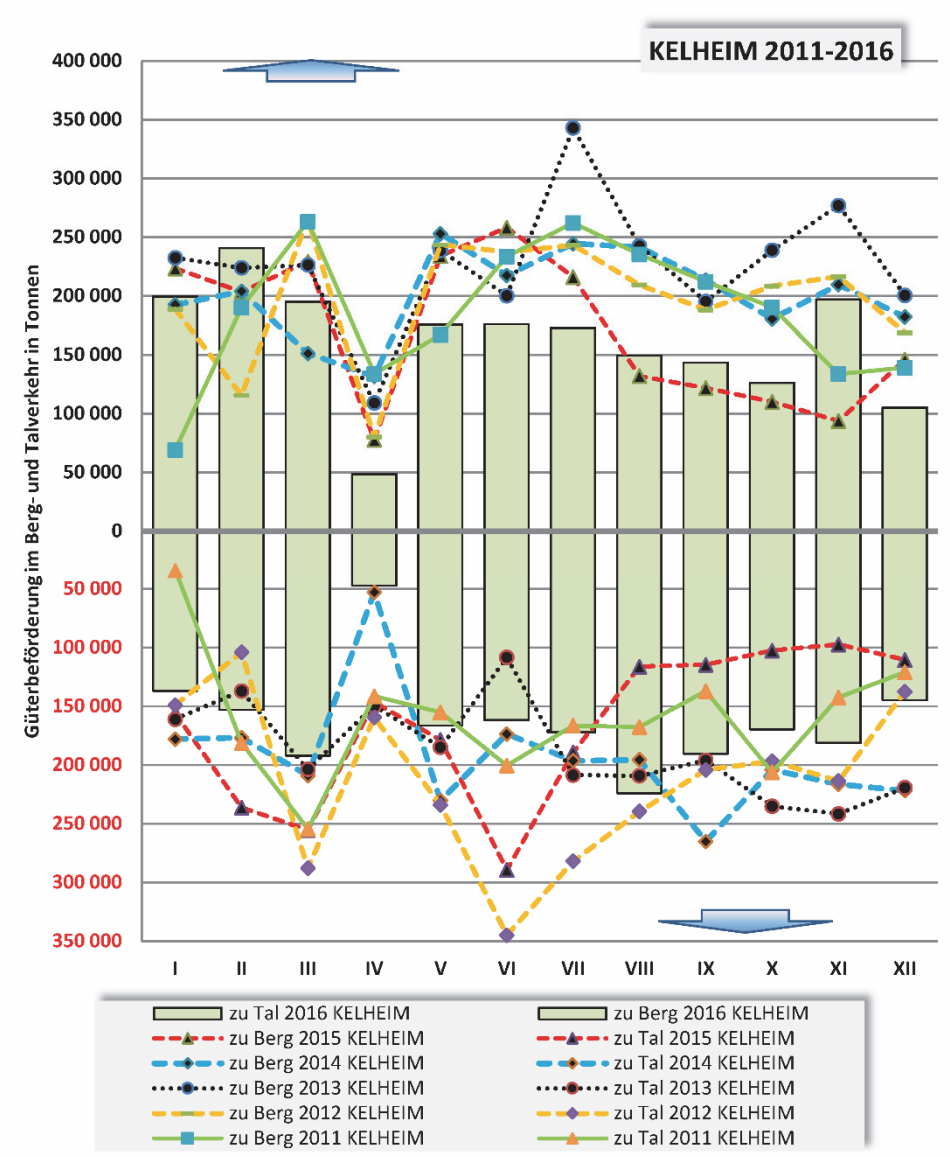


Fig. 22: Upstream and downstream cargo transport volume through the KELHEIM lock in tonnes per month in 2011-2016

Table 2.9

Cargo transport volume through Kelheim by years

Year, in million tonnes	2012	2013	2014	2015	2016	2017*
Cargo transport	4.91	4.98	4.74	4.04	3.87	3.82
To the Danube	2.36	2.26	2.32	1.99	1.93	1.90
Arriving from the Danube	2.55	2.72	2.42	2.045	1.94	1.92

*11 months

Cargo transport volume through Kelheim in the lock system on the Rhine-Main-Danube Canal is shown in Figure 23 (for the first 11 months of 2017).[9]

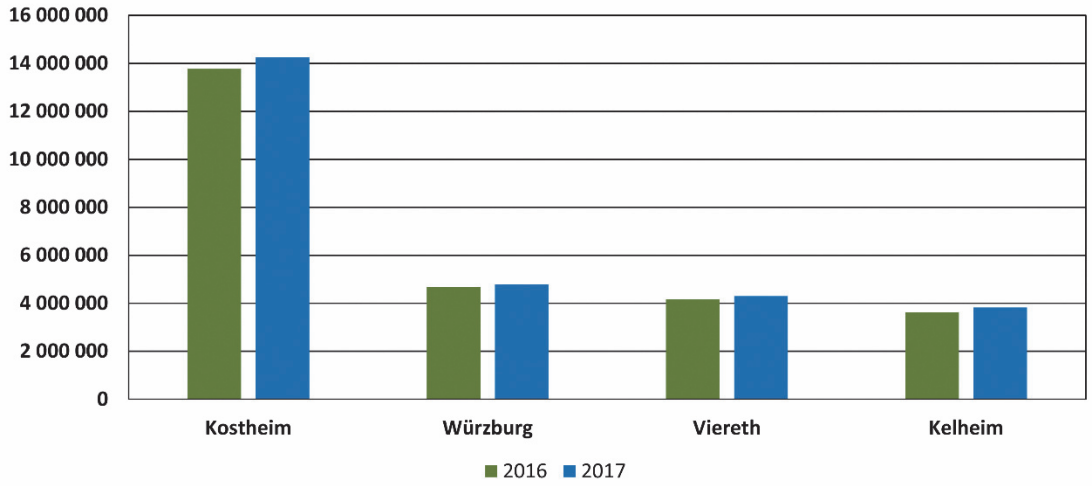


Fig. 23: Cargo transport volume through KELHEIM in the lock system on the Rhine-Main-Danube Canal in 2017 in tonnes

2.2.3.2 Cargo transport on the Danube-Black Sea Canal

In 2017, total cargo transport on the Danube-Black Sea Canal came to 13.77 million tonnes, corresponding to 94.6% of the figure for 2016, while international cargo transport amounted to only 86.1% of the corresponding figure for 2016 (see Table 2.10).

Monthly trends in cargo transport are shown in Figure 24; a sharp decline in cargo transport (both international cargo transport and domestic transport) began in October.

[9] According to data by *Generaldirektion Wasserstraßen und Schifffahrt, Standort Würzburg*

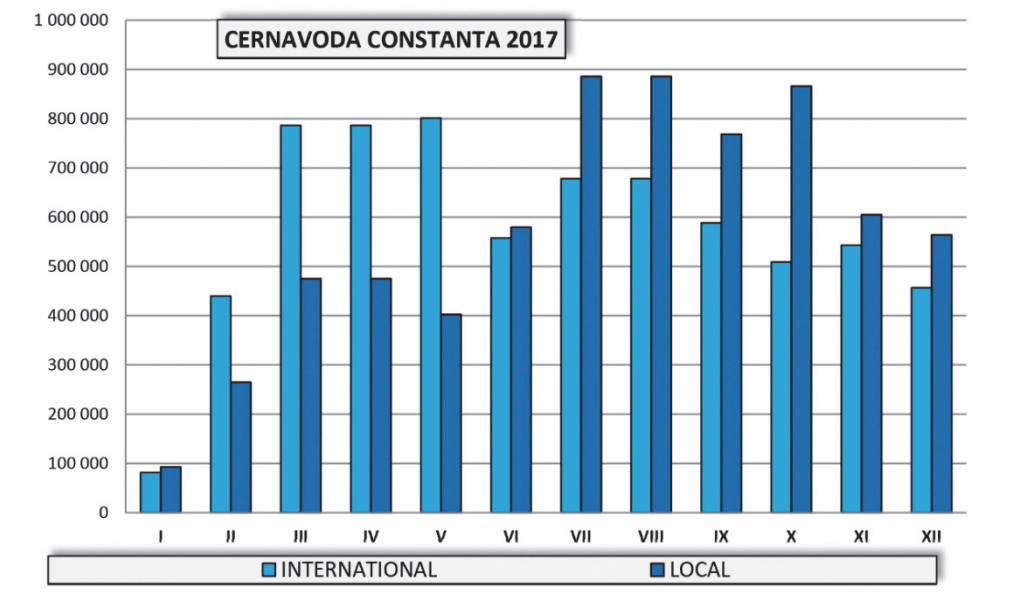


Fig. 24: International and domestic cargo transport volume on the CERNAVODA-CONSTANTA Canal in 2017 in tonnes per month

Table 2.10
Cargo transport on the Danube-Black Sea Canal by years

Year, in million tonnes	2012	2013	2014	2015	2016	2017	in % of 2016
Total cargo transport	13.72	13.96	14.43	14.02	14.55	13.77	94.6%
International cargo transport	8.43	8.63	7.90	8.62	8.03	6.91	86.1%
Domestic cargo transport	5.29	5.33	6.53	5.40	6.52	6.86	105.2%

2.2.3.3 Cargo transport on the Sulina Canal (see Figure 25) came to a total of 4,307,000 tonnes in 2017 (corresponding to 114% of the volume carried in 2016), of which

- 701,000 tonnes were carried from the sea to the Danube (136.6% of the volume recorded in 2016), and
- 3,606,000 tonnes were carried from the Danube to the sea (111% of the volume recorded in 2016), with 40% of cargo volume transported in the fourth quarter of 2017.

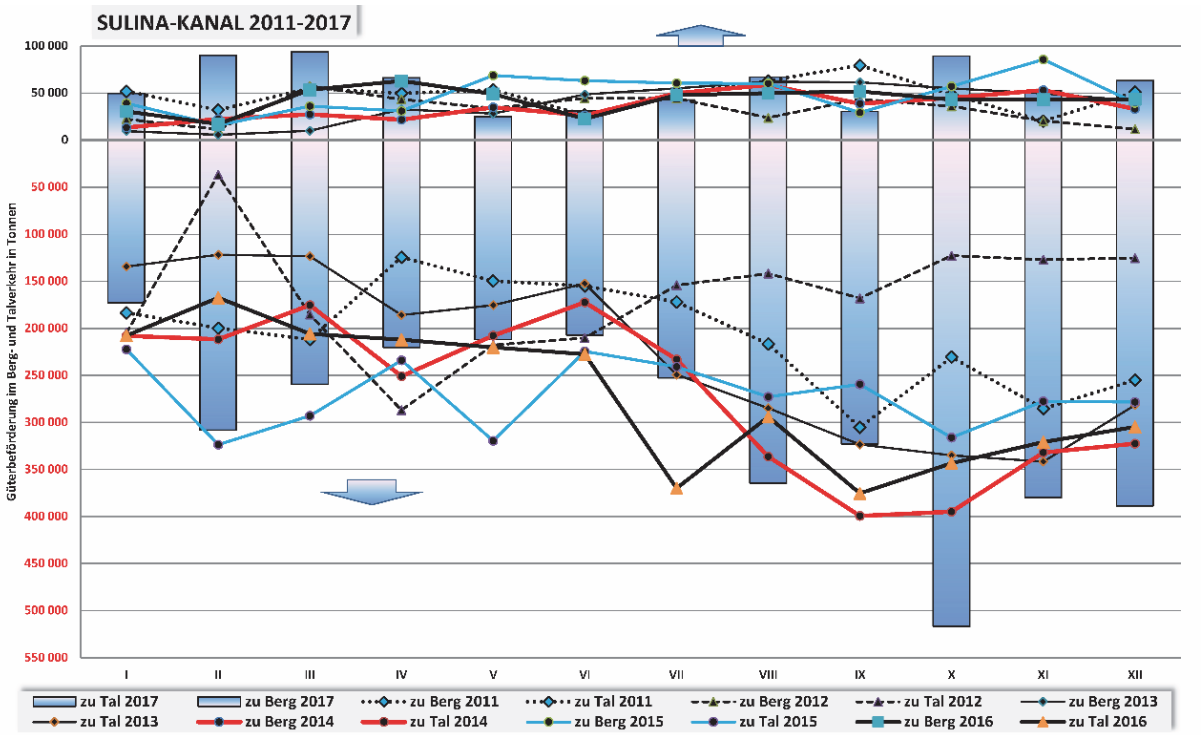


Fig. 25: Upstream and downstream cargo transport volume on the SULINA Canal in tonnes per month in 2011-2017

Chapter 3

Overview of cargo handling in Danube ports

3.1 DANUBE PORTS IN GERMANY

3.1.1 The total volume of cargo handled in Germany's Danube ports in 2017[10] came to 3,314,000 tonnes, representing an increase by 12% over total cargo volume handled in 2016 (see Table 3.1).

Table 3.1

Year (figures in thousand tonnes)	2014	2015	2016	2017	in % of 2016
Volume of cargo handled	4,031	3,257	2,958	3,314	112%

3.1.2 The volumes of cargo handled in Germany's major Danube ports are shown in Table 3.2.

[10] www.statistik.bayern.de

Table 3.2

Cargo handled (in thsd. t)	Kelheim	Regensburg	Straubing-Sand	Deggendorf	Passau	Others
2016	352.2	1,350	621	217.7	292	125.7
2017	347.5	1,502	795	235.5	328	106.7
Change from 2016 in %	-1.3%	+11.3%	+28.1%	+8.2%	+12.1%	-15.1%

Goods in five major groups of goods according to NST-2007 accounted for 86.2% of total volume of cargo handled in 2017 (see Table 3.3).

Table 3.3

Goods groups (figures in thsd. tonnes)	01	04	08	10	03
Unloaded	499	200	50.1	106.5	93
Loaded	666	239.8	424.7	344.2	234
Total	1,165	440	474.8	450.7	327
in % of cargo volume handled in 2016	109.8%	119%	94.2%	147.4%	141.6%

Capacity utilization of ports was not stable from month to month in 2017. After a sharp decline in the first half of 2017 led to decreased activity in ports, an upswing both in goods received (unloaded) and goods dispatched (loaded) was recorded in the second half of the year (see Figure 26).

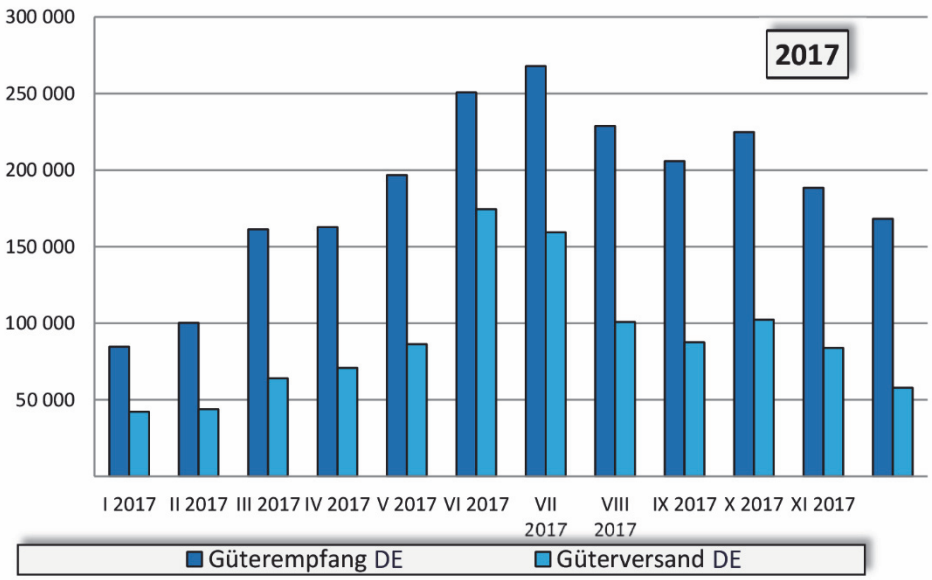


Fig. 26: Volume of cargo handled in Germany's Danube ports in 2017 (goods dispatched and received by ship) in tonnes per month

3.2 PORTS IN AUSTRIA

3.2.1 The total volume of cargo handled in Austrian ports in 2017[11] came to 7,981,000 tonnes, corresponding to 106.5% of cargo volume handled in 2016 (see Table 3.4).

Table 3.4

Year (figures in thsd. tonnes)	2014	2015	2016	2017	in % of 2016
Loaded	2,830	2,444	2,584	2,770	107.2%
Unloaded	5,781	5,005	4,909	5,211	104.4%
Cargo volume handled	8,611	7,449	7,493	7,981	106.5%

The total volume of cargo carried in domestic transport amounted to 389,000 tonnes.

Monthly trends of cargo volume handled are shown in Figure 27.

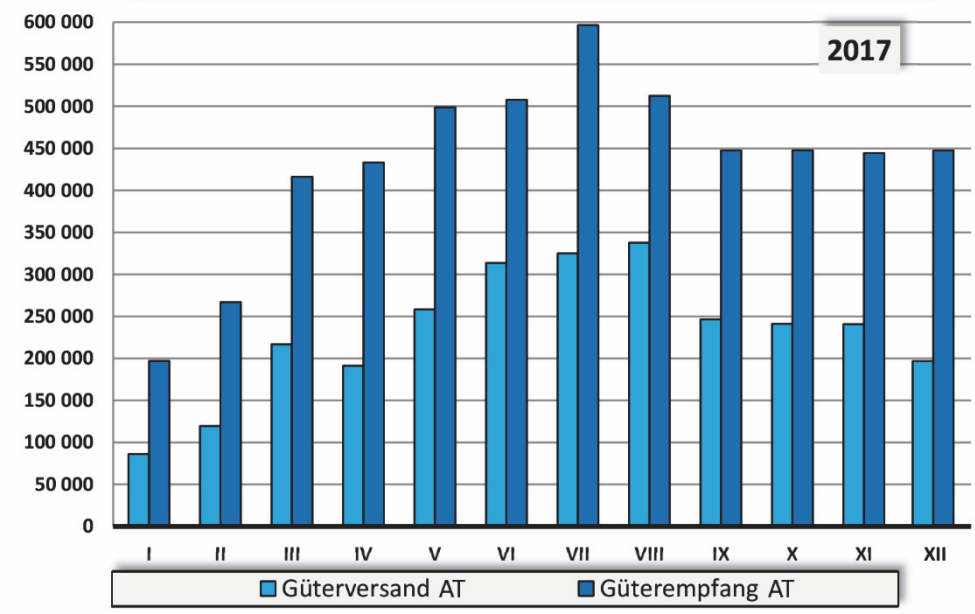


Fig. 27: Volume of cargo handled in Austria's Danube ports in 2017 (goods dispatched and received by ship) in tonnes per month

3.2.2 The volumes of cargo handled in Austria's major ports are shown in Table 3.5.

Table 3.5

Port (figures in thousand tonnes)	Vienna	Linz	Krems	Enns
Loaded	796	1,399	145	174
Unloaded	333	2,850	392.4	499.5
Cargo volume handled in 2016	1,068	3,994	467.3	596.1
Cargo volume handled in 2017 (January-November)	1,129	4,249	537.4	673.5

[11] www.statistik.at

3.2.3 Cargo handled for import and export was distributed as follows in 2017:

- goods exported from Austrian ports: 2,380,800 tonnes;
- goods received in Austrian ports (imports): 4,822,000 tonnes.

The volumes of goods exported to ports in other countries are shown in Table 3.6.

Table 3.6

Country (figures in thsd. tonnes)	Germany	Hungary	Romania	Netherlands	Belgium	Serbia
Exported to ports in	450.8	560.1	487.2	272.8	297.2	181.9

The volumes of goods imported from ports in other countries are shown in Table 3.7.

Table 3.7

Country (figures in thsd. tonnes)	Slovakia	Netherlands	Ukraine	Hungary	Germany	Romania
Imported from ports in	1,653	762.6	973.8	674.6	330.9	201

3.3 PORTS IN SLOVAKIA

3.3.1 Cargo volume handled in the Port of Bratislava accounted for the major part (approx. 95%) of the total volume of cargo handled in Slovakia's ports in 2017 (see Table 3.8).

Table 3.8

Year (figures in thsd. tonnes, %)	2014	2015	2016	2017	in % of 2016
Loaded	1,652	1,922	1,879	1,952	103.9%
Unloaded	63.4	87.2	89.2	175	152%
Cargo volume handled	1,715	2,009	1,969	2,127	108%

Monthly trends in the Port of Bratislava are shown in Figure 28.

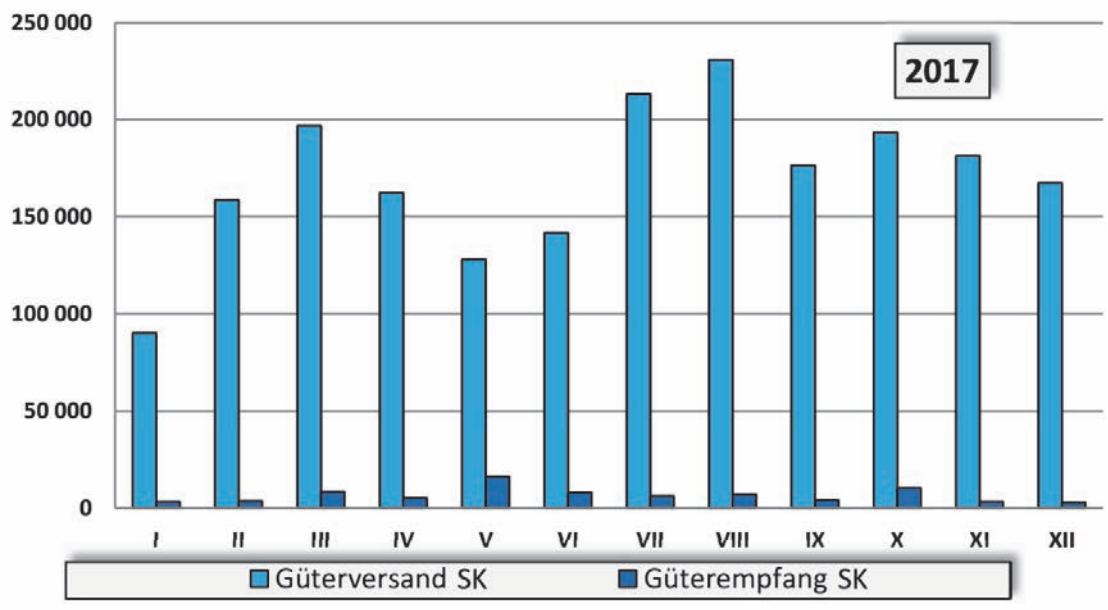


Fig. 28: Volume of cargo handled in the Danube port of Bratislava in Slovakia in 2017 (goods dispatched and received by ship) in tonnes per month

3.3.2 The major part of cargo handled was comprised of goods loaded (91.8%), including

- more than 65% ferrous minerals (pellets, agglomerates) dispatched to Austria, as well as 20% petroleum products and chemical products dispatched to Austria, Hungary and ports on the Rhine.

Cargo volume handled in the ports of Komarno and Klizska Nema came to 170,000 tonnes and 254,000 tonnes, respectively (figures for 2016).

3.4 PORTS IN HUNGARY

3.4.1 The total volume of cargo handled in Hungarian ports in 2017[12] came to 5,779,000 tonnes, corresponding to 106.2% of cargo volume handled in 2016 (see Table 3.9).

Table 3.9

Year (figures in thsd. tonnes, %)	2014	2015	2016	2017	in % of 2016
Loaded	3,917	4,190	3,602	3,692	102.5%
Unloaded	1,756	1,788	1,836	2,107	114.8%
Cargo volume handled	5,673	5,978	5,439	5,799	106.9%

The total volume of cargo carried in domestic transport came to approx. 280,000 tonnes.

Quarterly trends in Hungary's ports are shown in Figure 29.

[12] www.ksh.hu

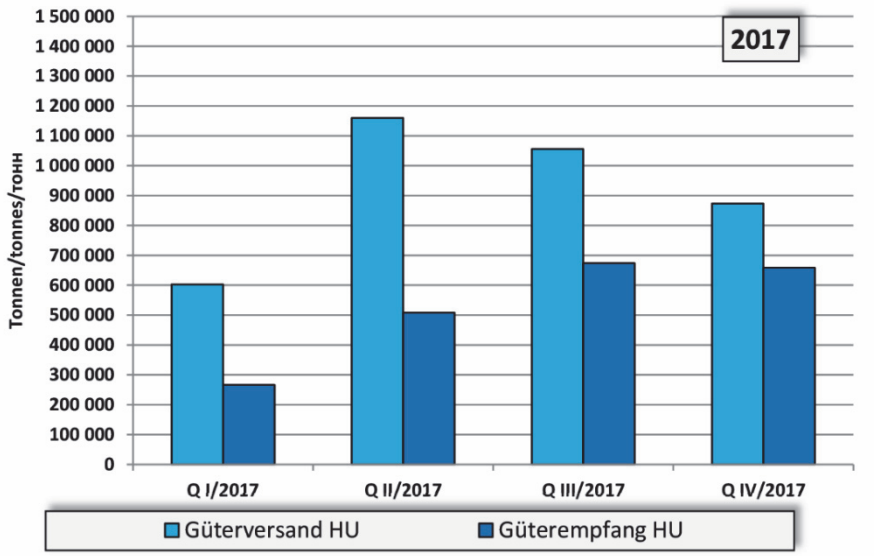


Fig. 29: Volume of cargo handled in Hungary's Danube ports in 2017 (goods dispatched and received by ship) in tonnes per quarter

3.4.2 The volumes of cargo handled in Hungary's major ports are shown in Table 3.10.

Table 3.10

Port (figures in thsd. tonnes, %) / year	Baja	Csepel	Győr - Gönyű	Others
2014	655	758.5	221	4,038
2015	722.5	846.9	336	4,072
2016	506.5	1,045	164.3	3,722
2017	644	1,122	167	3,865
in % of 2016	127.3%	107.4%	101.6%	103.8%

3.4.3 The main groups of goods loaded for export were:

- Agricultural products: 2,162,000 tonnes, amounting to 58.6% of the total volume of goods loaded and corresponding to 105.9% of the figure for 2016.
- Coke and petroleum products: 681,000 tonnes, amounting to 18.4% of the total volume of goods loaded and corresponding to 94.4% of the figure for 2016.
- Food products: 226,000 tonnes, amounting to 6.1% of the total volume of goods loaded.

The volumes of cargo exported to ports in other countries are shown in Table 3.11.

Table 3.11

Country (figures in thsd. t)	Romania	Germany	Serbia	Austria	Netherlands	Belgium
2015	2,290	482	423.8	357	173	69
2016	1,455	654.7	459.7	467	190.4	57.8
2017	1,433	730.7	393	608	79	55

Grain shipped via Romanian ports (Constanţa) accounted for the largest share, at 38.8%.

3.4.4 The main groups of goods unloaded for import were:

- Coal: 436,500 tonnes, amounting to 20.7 % of the total volume of goods unloaded and corresponding to 92% of the figure for 2016.
- Petroleum products: 664,700 tonnes, amounting to 31.5% of the total volume of goods unloaded and corresponding to 118.6% of the figure for 2016.
- Metal ores: 398,000 tonnes, amounting to 18.9% of the total volume of goods unloaded and corresponding to 139% of the figure for 2016.

The largest shares in goods imported were received from Romanian and Austrian ports (see Table 3.12).

Table 3.12

Country (figures in thsd. tonnes)	Romania	Austria	Netherlands	Belgium	Slovakia
2015	843.8	382.7	95.8	46	49.3
2016	694	475.8	67.4	81.2	62.2
2017	708	566.7	97.7	40.4	91.9

Furthermore, a volume of 204,000 tonnes in cargo was received from Serbian ports.

3.5 PORTS IN CROATIA

3.5.1 The total volume of cargo handled in Croatia's inland ports in 2017[13] came to 631,600 tonnes, corresponding to 93.3% of cargo volume handled in 2016 (see Table 3.13).

Table 3.13

Year (figures in thsd. t)	2014	2015	2016	2017	in % of 2016
Goods loaded for export	205.0	346.4	380.5	335.9	88.3%
Goods unloaded for import	236.0	168.4	200.5	180.7	90.1%
Volume handled incl. domestic transport	491.0	566.0	677.0	631.6	93.3%

[13] www.dzs.hr

3.5.2 Chemical products (group 08) accounted for more than 20% of cargo volume handled in ports; ferrous minerals (group 03) accounted for 29%, and coke and petroleum products (group 07) for 20.7%.

Monthly trends of cargo volume handled in ports are shown in Figure 30.

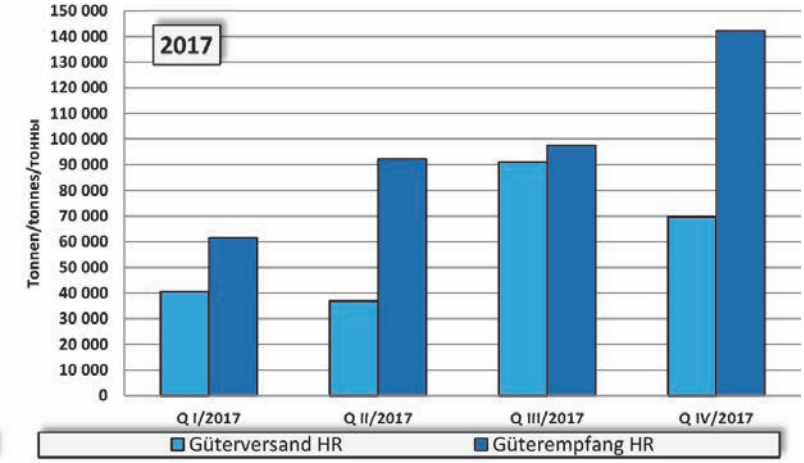


Fig. 30: Volume of cargo handled in Croatia's Danube ports in 2017 (goods dispatched and received by ship) in tonnes per quarter

3.6 PORTS IN SERBIA

3.6.1 The total volume of cargo handled in Serbia's ports in 2017[14] came to 6,390,000 tonnes, corresponding to 87.9% of cargo volume handled in 2016 (see Table 3.14). Quarterly trends of cargo volume handled are shown in Figure 31.

Table 3.14

Year (figures in thsd. tonnes)	2014	2015	2016	2017	in % of 2016
Goods loaded for export	2,288	1,937	2,451	1,917	78.2%
Goods unloaded for import	2,373	3,195	3,675	3,754	102.1%
Domestic cargo transport	1,301	677	1,143	718	62.8%
Cargo volume handled	7,263	6,486	7,269	6,390	87.9%

The largest shares in cargo volume handled in Serbian ports and terminals, including the ports on the Sava and the Tisza (7% of total volume of cargo handled), were held by the following groups of goods:[15] mining products (28%), ferrous minerals (19%), petroleum products (16%) and grain (13%).

[14] webrzs.stat.gov.rs, www.rzs.rs.ba
[15] Data by *Port Governance Agency*, Serbia

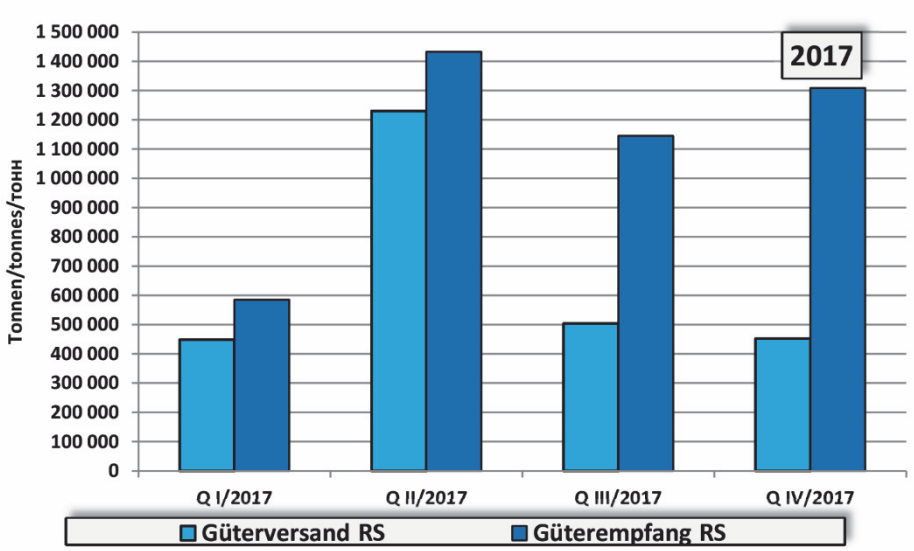


Fig. 31: Volume of cargo handled in Serbia's Danube ports in 2017 (goods dispatched and received by ship) in tonnes per quarter

In 2016, grain and other agricultural products (group 01) had accounted for 71% of exported goods, while mining products (group 03) accounted for 10.4%.

Imports are mainly comprised of goods of the following groups: ferrous minerals (55.8%), chemical products (group 08, 21.8%) and petroleum products (group 07, 9.8%).

In domestic cargo transport, mining and quarrying products (group 03) make up 69.7% of the volume of goods.

3.6.2 The volumes of cargo handled in Serbia's major ports are shown in Table 3.15.

Table 3.15

Port (figures in thsd. tonnes)	Pančevo	Smederevo	Belgrade	Novi Sad	Prahovo
Cargo volume handled in 2015	650	1,813	831	981	450
Cargo volume handled in 2016	1,040	2,466	828	1,325	673
Cargo volume handled in 2017[16]	1,070	3,163	177	1,180	805

3.6.3 In 2017, exported and imported goods accounted for approx. 89% of total cargo volume handled in ports (as compared to 90.6% in 2016). An approximate breakdown of the cargo volumes of such goods by country of destination and country of origin, respectively, is shown in Table 3.16 (figures for 2016).

[16] Data by *Port Governance Agency*, Serbia

Table 3.16

Country (figures in thsd. tonnes)	Austria	Bulgaria	Hungary	Germany	Romania	Ukraine
Exported to ports in	836	634	228	140	1,804	-
Imported from ports in	118.6	11.3	153.7	20.4	2,199	1,118

3.7 PORTS IN ROMANIA

3.7.1 The following ports contribute to the total volume of cargo handled in Romania's Danube ports:

- ports on the Maritime Danube,
- ports on the Fluvial Danube, and
- ports on the Danube-Black Sea Canal and the Port of Constanţa.

The volume of cargo handled in Romanian ports, including cargo volume handled in the Port of Constanţa and in ports on the Danube-Black Sea Canal (inland waterway vessels), consisted of 10,707,000 tonnes in goods loaded and 13,078,000 tonnes in goods unloaded in 2017. Quarterly trends of cargo volume handled are shown in Figure 32.

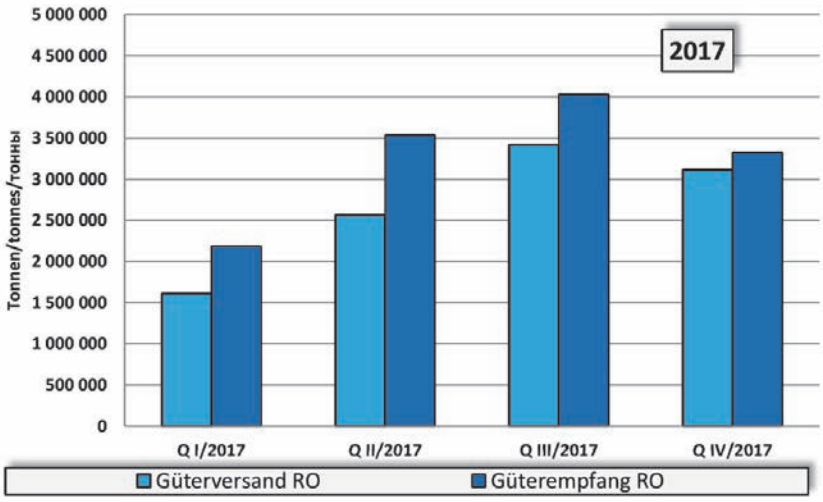


Fig. 32: Volume of cargo handled in Romania's Danube ports in 2017 (goods dispatched and received by ship) in tonnes per quarter

3.7.2 The total volumes of cargo handled in the main Romanian ports on the Maritime Danube are shown in Table 3.17.

Table 3.17

Port (figures in thsd. tonnes)	Brăila	Tulcea	Galaţi
Cargo volume handled: – Inland waterway vessels			
2015	1,723 (328)[17]	2,540 (1,503)	2,961
2016	352	1,545	3,287
2017 in % of 2016	355 100.8%	1,311 86.1%	3,150 95.8%
– Maritime vessels			
2015	494	9	1,357
2016	490	9	1,248
2017 in % of 2016	410 83.7%	90	1,177 94.3%
– Totals			
Total in 2015	2,217 (822)	2,549 (1,512)	4,318
Total in 2016	742	1,554	4,388
Total in 2017	765	1,421	4,237

The volume of cargo handled in other Romanian ports on the Fluvial Danube came to more than 5 million tonnes in 2017.[18]

3.7.3 The total volume of cargo handled in Romania's ports, including cargo carried by inland waterway vessels in the Port of Constanţa, is shown in Table 3.18.

Table 3.18

Year (figures in thsd. tonnes)	2015	2016	2017	in % of 2016
Loaded:				
– international cargo transport	3,861	3,469.3	3,872	111.6%
– domestic transport	6,575	6,879	6,835	99.3%
Unloaded:				
– international cargo transport	7,355	6,930	5,281	76.2%
– domestic transport	6,671	7,818	7,797	99.7%
Cargo volume handled	24,462	25,096	23,785	94.8%

[17] www.insse.ro
[18] www.acn.ro

3.7.4 Main groups of goods handled in 2017:

- Metal ores (group 03): 42.8% of cargo volume handled, 86% of which in domestic cargo transport
- Agricultural products (group 01): 33.8% of cargo volume handled, 40% of which in international cargo transport
- Chemicals (group 08): 5.6% of cargo volume handled, 97.2% of which in international cargo transport
- Coke and refined petroleum products (group 07): 5.5% of cargo volume handled, 75% of which in international cargo transport
- Metal products (group 10): 43.9% of cargo volume handled, 73.9% of which in international cargo transport
- Coal and lignite (group 02): 4.8% of cargo volume handled, 97% of which in international cargo transport

3.7.5 Main groups of goods exported (loaded) in 2017:

- Group 08: 28.8% of goods loaded, 79.7% of which dispatched to Serbia
- Group 07: 21.7% of goods loaded, 27.5% of which dispatched to Bulgaria and 30.7% to Serbia
- Group 02: 17.2% of goods loaded, 69.2% of which dispatched to Hungary
- Group 03: 21% of goods loaded, 53.9% of which dispatched to Serbia

3.7.6 Main groups of goods imported (unloaded) in 2017:

- Group 01: 58.9% of goods unloaded, 39.6% of which received from Serbia, 40.4% from Hungary and 16.3% from Bulgaria
- Group 03: 11.7% of goods unloaded, 61.3% of which received from Ukraine and 36.4% from Bulgaria
- Group 10: 8.2% of goods unloaded, 63.2% of which received from Austria
- Group 02: 8.7% of goods unloaded, 98.2% of which received from Ukraine

3.8 PORTS IN BULGARIA

3.8.1 The total volume of cargo handled in Bulgaria's ports, including all terminals, came to 5,570,000 tonnes in 2017 (see Table 3.19).

Table 3.19

Year (figures in thsd. tonnes)	2014	2015	2016	2017
Loaded for export	1,409	1,159	2,319	2,166
Unloaded for import	1,689	1,692	3,462	2,312
Goods loaded / unloaded in domestic cargo transport	1,412	1,695	1,222	1,092
Volume of cargo handled	4,510	4,547 (6,114)	7,013*	5,570

** Including ferry traffic between Bulgaria and Romania*

Quarterly trends of cargo volume handled are shown in Figure 33.

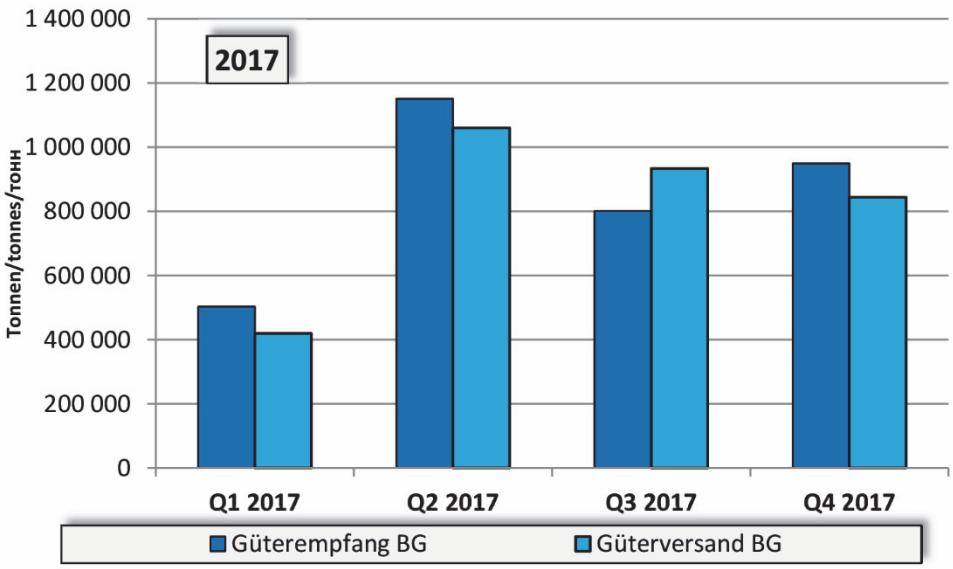


Fig. 33: Volume of cargo handled in Bulgaria's Danube ports in 2017 (goods dispatched and received by ship) in tonnes per quarter

3.9 PORTS IN THE REPUBLIC OF MOLDOVA

3.9.1 The total volume of cargo handled in the Giurgiuleşti Port Complex came to 1,208,000 tonnes in 2017, corresponding to 115% of cargo volume handled in 2016 (see Table 3.20).

Table 3.20

Year (figures in thousand tonnes)	2015	2016	2017	in % of 2016
Volume of cargo handled	826.0	1,050	1,208	115%

Bulk goods made up 70.5% of cargo volume handled in the port; petroleum products accounted for 23.95% and vegetable oil for 5.5%.

3.10 PORTS IN UKRAINE

3.10.1 The total volume of cargo handled in Ukraine's ports, including cargo transported by maritime vessels, came to 6,277,000 tonnes in 2017,[19] corresponding to 94% of cargo volume handled in 2016 (see Table 3.21).

Table 3.21

Year (figures in thousand tonnes)	2014	2015	2016	2017	in % of 2016
Volume of cargo handled	4,619.3	5,754	6,680	6,277	94%

Breakdown of cargo volume handled in Ukraine's ports in 2017:
- 91.7% granulated goods;
- 3% liquid goods.

Quarterly trends of cargo volume handled in Ukraine's Danube ports are shown in Figure 34.

3.10.2 The volumes of cargo handled in Ukraine's major Danube ports in 2017 are shown in Table 3.22.

Table 3.22

Port (figures in thousand tonnes)	Izmail	Reni
Volume of cargo handled		
2014	3,093.0	1,464.8
2015	4,825.0	906.9
2016	5,682	972
2017	5,097	1,125
in % of 2016	89.7%	115.7%

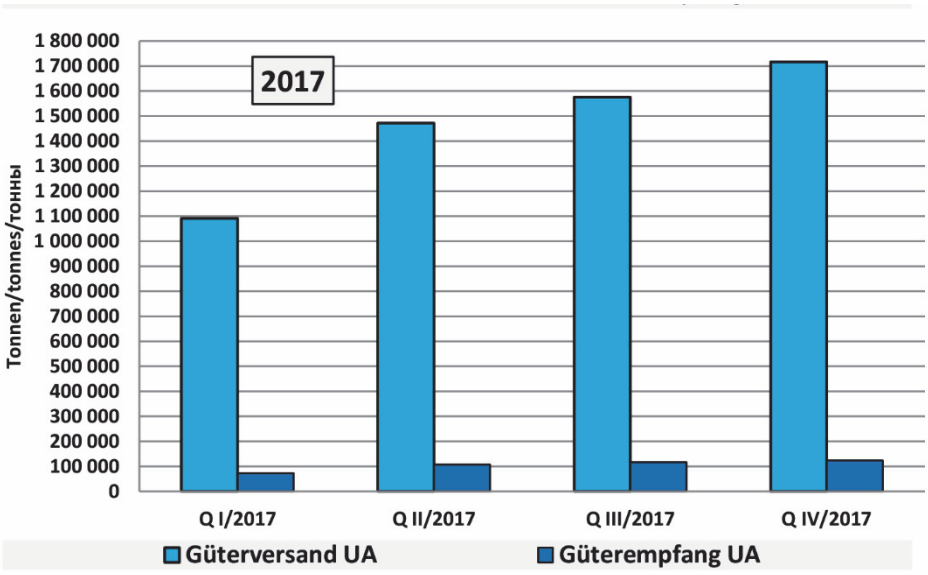


Fig. 34: Volume of cargo handled in Ukraine's Danube ports in 2017 (goods dispatched and received by ship) in tonnes per quarter

[19] www.uspa.gov.ua

Breakdown of cargo volume handled:

– Port of Izmail: 91.5% granulated goods (ores, pellets, coal);

– Port of Reni: 96% granulated goods, 50% of which was grain transported in transit.

The largest part (3,038,000 tonnes) of the volume of goods dispatched from the Port of Izmail consisted of exports of ferrous raw materials (84.6%) to Austria (Linz), Serbia (Smederevo) and Romania (Galaţi). 1,103,000 tonnes of coal were handled, of which 86.8% were carried in transit.

Chapter 4

Conclusions

4.1 Hydrological conditions

In January, water levels were extremely low, around LNWL, when the river froze over and subsequent ice events occurred. Ship traffic on the Upper Danube and the Middle Danube saw a considerable decline in loaded draughts during this period. After measures to combat ice events on the Danube had been concluded and navigation conditions stabilized, operation at loaded draughts of approx. 2.5 m for barges in pushed convoys began in early March.

Hydrological conditions on the Danube were unstable during the second quarter, and by late May, loaded draughts were no more than 2.3-2.2 m.

The summer low-water period began in June, and subsequent, intermittent precipitation in the third and fourth quarters did not lead to a stabilization of hydrological conditions, so that loaded draughts remained between 2.2 and 2.3 m from September until the end of the year 2017.

4.2 Changes in freight rates

Corresponding to the Rotterdam Platts price for marine gasoil (MGO), the average price of bunker fuel in ports on the Danube was 464.1 USD/t in the first quarter (Q_1), 438.8 USD/t in the second quarter (Q_2) and 470.8 USD/t in the third quarter (Q_3) of 2016.

In 2017, bunker fuel prices were between 575 and 580 USD/t in the second and third quarters, and around 592 USD/t in the fourth quarter, with a significant impact on freight rates for waterway transport, as fuel costs make up 50-60% of a vessel’s total operating costs.

Consequently, the price of bunker fuel in 2017 was 20.7% higher than the average price in 2016. It rose by 15% between January and December 2017.

Changes in the freight index for waterway transport, resulting from freight rate increases due to higher prices for bunker fuel and more expensive operation at low water levels, are shown in Table 4.1.

Table 4.1

Index Q_1 - Q_4 2016 = 100%	Q_1	Q_2	Q_3	Q_4
Bunker fuel	119	117	117	120
Freight rate	103	103.6	100	111

4.3 Market forecast for Danube navigation in 2018

- A general upswing in demand for steel in Europe has led to growth in cargo transport volumes of raw materials and metal products (as for the Danube, restarted production at the Smederevo steel mill in Serbia is bound to have a significant effect). Accordingly, cargo transport volume in this sector is expected to exceed the figures for 2017.

- Forecasts for the 2018 crop year in the Danube region are optimistic; accordingly, the volume of shipments of agricultural products from the ports on the Middle Danube to the estuary ports is expected to increase.

- After declining in 2015 and 2016, transports of petroleum products are expected to continue to stabilize in 2018; transport volumes of chemical products are also expected to remain stable.

- The aging Danube fleet (motorized and non-motorized vessels) requires great investment in maintenance. Due to the relative increase in freight rates in 2017, the necessary volume of investment will not be available, so that supply will likely outweigh demand only by a small margin.

- Passenger transport on cabin ships will continue to show a positive trend in terms of rising passenger numbers, both on the Upper Danube and on lines to the Danube delta.

- A lack of funds for waterway maintenance continues to be a pressing problem on the Danube. The main bottlenecks on the Danube are critical stretches of the waterway that currently do not meet the required parameters for waterways of international importance, resulting in long waits, suspended navigation and additional maintenance costs for ships operating at low water levels.

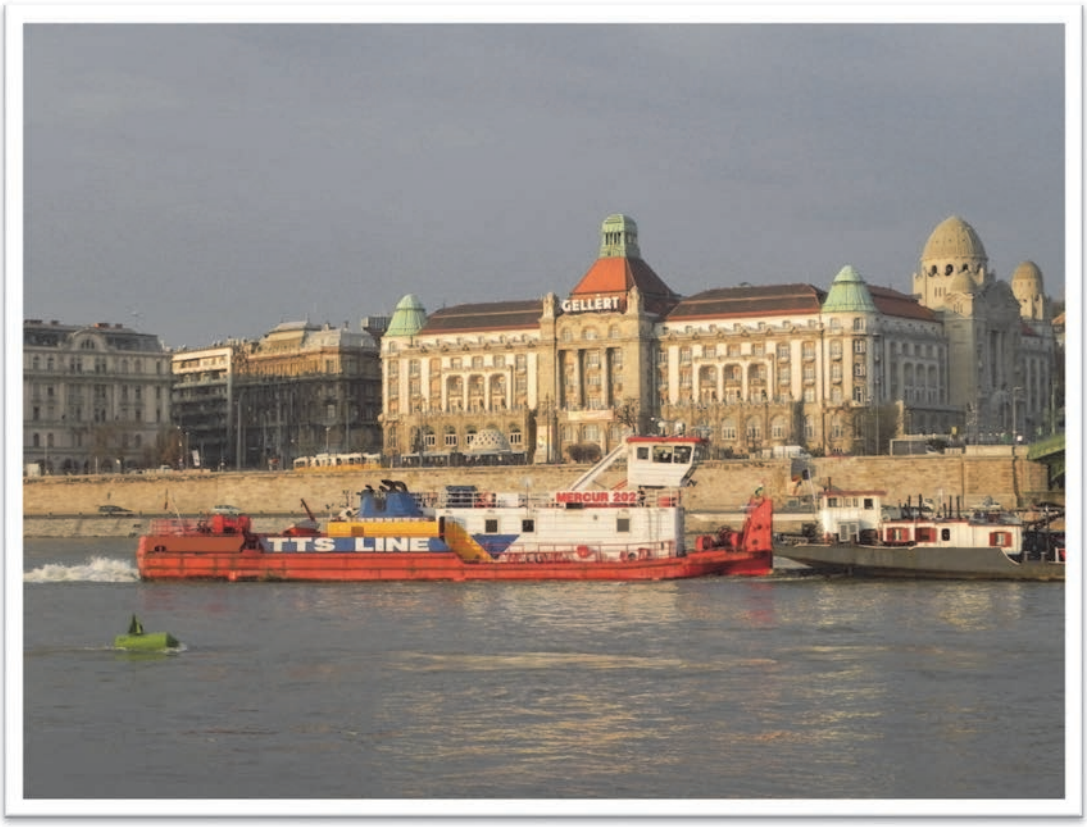
- According to published forecasts, the GDP growth rate in the countries of the Danube region will range from 1.8% to 4.4% in 2018. Given that the river did not freeze over, and provided that the summer low-water period is shorter, market conditions for Danube navigation can be expected to be more stable in 2018 than they were in 2017.

Passenger ships

Photos: Vladimir Rybkovskiy, Danube Commission


River Countess

Cargo ships



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