

Tomas Kalina - Martin Jurkovic - Helena Binova - Bruno Gardlo *

WATER TRANSPORT - THE CHALLENGE FOR THE AUTOMOTIVE INDUSTRY IN SLOVAKIA

An important factor in choosing the transport mode in the automotive industry is not only the current price but also the shipping time. In some cases the latter one is even crucial and significantly affects the choice of the transport mode. Geographical location of the port of Bratislava allows its direct connection to the North and Black Sea. The study provides a comparison of transportation time from the selected Slovak car producers and shows advantages of water transport. Time of delivery is a criterion that can be easily quantified and mutually compared. The fastest transportation mode - the road transport saves the time of delivery eight times more on average than the water transport in the European transport network. The waterway, on the other hand, is cheaper and environmentally friendlier.

Keywords: Automotive industry, transportation time, vehicles, logistics operator, water transport.

1. Introduction

An approximate duration of the navigation from the port of Bratislava towards the North and Black Sea is based on the standard nautical terms, i.e. on water and weather conditions permitting safe navigation (Table 1). In autumn and winter may the period of the navigation be longer because of the early morning fog, ice drifts, which are necessary to take into account when planning the transportation. It is also important to consider the possible high water levels on the Main, which do not allow the navigation of pushed vessels [1].

Slovak Shipping and Ports (major shipping operator in Slovakia) has three vessels which enable the transportation of wheeled technologies. The standard DE IIB vessel type has the container transport capacity of 63 TEUs, 21 truck trailers or 70 cars can be transported by the Ro-Ro vessel. The formation of two or three pushing convoys of Ro-Ro vessels transport a maximum of 200 cars.

One possibility of increasing the transportation capacity is to extend the Ro-Ro fleet of multi-storey Ro-Ro vessels or of pushing convoys enabling the transportation of more than 500 cars. An example may be 2-3 storeys Bulgarian Ro-Ro ships called INTERSHIPPING-1, INTERSHIPPING-2, INTERSHIPPING-3 and INTERSHIPPING-4 pushed by the tugboat Naiden Kirov (Fig. 1) [2].

Transportation time from/to Bratislava Table 1

Travel Time in Hours				Distance km	Port	Number of Locks	Travel Time in Hours			
4-unit pushed convoy	2-unit pushed convoy	MCV* 2,000 t	MCV 1,350 t				MCV 1,350 t	MCV 2,000 t	2-unit pushed convoy	4-unit pushed convoy
	196	183	194	1703	Ghent ¹	69	195	179	202	
	192	179	190	1682	Antwerp ¹	68	191	175	198	
	185	173	182	1588	Amsterdam ¹	68	185	170	191	
	185	173	183	1599	Rotterdam	65	183	168	189	
	167	157	164	1382	Duisburg	65	171	157	178	
	141	135	135	1098	Mainz	65	155	141	162	
	137	131	131	1071	Frankfurt	63	152	138	159	
	65	63	63	643	Nuremberg	24	91	77	92	
	48	47	47	543	Kelheim	15	75	61	76	
	45	44	44	505	Regensburg	13	69	56	71	
	36	35	35	416	Deggendorf	11	57	47	58	
	26	22	22	263	Linz	7	36	30	37	
	24	20	20	244	Enns	6	33	28	34	
	19	16	16	190	Ybbs	4	26	22	27	
	13	12	12	130	Krems	3	19	16	20	
	6	5	5	52	Vienna	0	9	8	10	
	0	0	0	0	Bratislava	0	0	0	0	
	16	15	15	228	Budapest	11	24	21	24	
	25	23	23	389	Baja	11	39	33	39	
	35	32	32	535	Vukovar	11	54	46	54	
	41	38	38	615	Novi Sad	11	63	55	63	
	47	43	43	698	Belgrade	11	73	63	73	
	72	66	66	1077	Vidin	3	106	90	103	
	89	81	81	1376	Gurgiu	3	131	110	126	
	109	99	99	1744	Reni	3	161	134	155	
	116	106	106	1868	Sulina	3	172	143	164	
	107	98	97	1628	Constanta ^{1,2}	5	154	129	148	
	113	103	103	1811	Ismail ¹	3	167	139	160	
	115	105	105	1857	Kilia ¹	3	171	142	163	

1 - connection for maritime transport, 2 - in the case of low water level 100 km detour through the shoulder Borcea, * Motor Cargo Vessel
Source: Authors

* ¹Tomas Kalina, ¹Martin Jurkovic, ²Helena Binova, ³Bruno Gardlo

¹Department of Water Transport, Faculty of Operation and Economics of Transport and Communications, University of Zilina, Slovakia

²Technical University in Prague, Faculty of Transportation Sciences, Czech Republic

³Austria FTW Forschungszentrum Telekommunikation Wien GmbH, Austria

E-mail: tomas.kalina@fpedas.uniza.sk



Fig. 1 Pushed convoy TR Naiden Kirov + INTERSHIPPING 2 (3)
Source: www.intershipping-bg.ne

2. SWOT analysis of the use of the port of Bratislava for transportation of automobiles and containers from Slovakia

SWOT analysis is a strategic planning tool used for the evaluation of the strengths, weaknesses, opportunities and threats that lie in a given project in an effort to undertake a certain goal. It involves monitoring internal and external marketing environment.

The following Table 2 presents the SWOT analysis which focuses on potential of the port of Bratislava in the transportation of cars and containers in export and import [3].

SWOT analysis

Table 2

<p>Strengths</p> <ul style="list-style-type: none"> • strategic geographical position in relation to the localization of potential customers, • connection to the inland waterways of international importance (Danube-Main-Rhine) • cost of transportation, • environmental aspects, • direct connection to the rail network, • support of water transport by the EU, • direct connection of the port of Bratislava to the ports of Rotterdam and Zeebrugge. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • long transport time in water transport, • low transport capacity of the existing fleet, • obsolescence of fleets • navigation restrictions on the waterway, • poor awareness of the possibilities of using waterway by carriers and logistics operators in Slovakia, • technical condition of port infrastructure, • the need for multiple reloading, • weak waterway connection to the main target destinations in Western Europe.
<p>Opportunities</p> <ul style="list-style-type: none"> • the improvement of the road network by completing the Bratislava ring road, • possibility of expanding capacity and activities of the port. • a growing trend in the field of logistics and international transport of goods, • increase production of cars and consumer goods in Slovakia, • orientation of the Slovak economy mainly for export. 	<p>Threats</p> <ul style="list-style-type: none"> • direct competition of rail transport • dependency on weather and hydrological conditions, • increased used of rail and road transport, • development of Koper port as a major logistics hub for Slovak automakers.

Source: Authors

3. Evaluation of requirements and needs of logistics operators in automotive industry

There is a difference between the transportation of completed vehicles and transportation of components and parts for automobile production. The components are supplied to the factories by Just-In-Time or Just-In-Sequence. This means to deliver the components to the appropriate production line in the correct order, in the required amount and in the given time. Trucks of different sizes and different types of semi-trailer may be used for these operations according to the quantity and nature of the cargo. As every automobile company tries to keep the lowest stock, they have the components only for 1 or 2 days or in some cases just for a few hours. The car manufacturers (PSA and VW), where the engine production is carried out of the Slovakia,

average stock lasts only about **8 hours**. Their import is done from France only by the truck transport as it presents a high degree of flexibility. Shippers and logistics suppliers have to follow strict requirements. The vehicle transportation has its specifics because special transporters (especially trucks and trains), intended exclusively for the transportation of vehicles, are required for the implementation. And the vehicles transported by carriages require special instruments to provide loading and unloading. Moreover, the conditions of transportation on the open carriages are completely different from the transportation in the closed carriages. In practice, the carriages and vessels for the intermodal transportation of trucks fully loaded by cars or specially modified aircraft are also used [4, 5 and 6].

Delivery time, within the transportation of completed cars, plays an important role when choosing the transport mode. The attention of commercial policy of almost every company is primarily focused on the final customer, i.e. to satisfy their requirements on time and at the required level. An average delivery time, from setting the order by customer to taking the vehicle, is approximately **18 days**. Logistics schemes of operators are adapted to this priority.

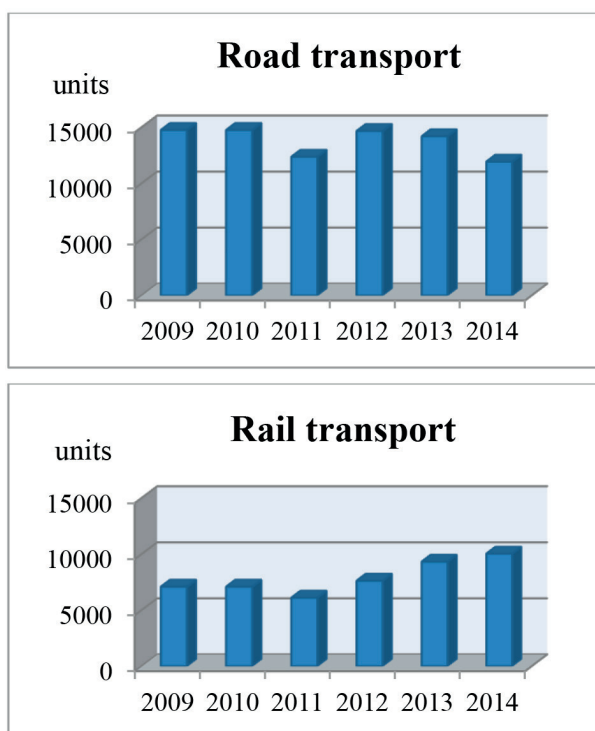


Fig. 2 The development of means of transport for the export of cars from Slovakia
Source: Annual reports, edited by authors

In the logistics process, transportation itself forms the largest component of the time fund. Administration, customs clearance and assurance of all the other requirements represent only about

10% of the time fund. The time of transportation is significantly affected by the final destination and the road approaches [7].

Logistics within the export of finished cars by “Finished Vehicle Logistics”, is focused only on the road and rail transport (Fig. 2). The inland waterway transport is not currently used. In the last five years, there has been a significant shift in volumes from the road to the rail transport network (Fig. 3). Statistics in the year of 2014 were not completed [4, 5 and 6].

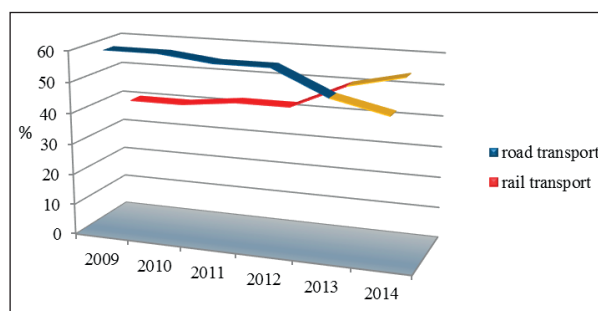


Fig. 3 The development of transport modes used for export of cars made in Slovakia
Source: Annual reports, edited by authors

Modernization of the railway transport network and the transport policy of the European Union aimed at finding the alternatives to the road transport are important factors that affect the constant increase of the environmental transport modes portion when transporting the goods all over the world. The EU orientation to alternative transport modes (in relation to the road transport) represents a high potential of the involvement in the “rare” usage of the inland waterway transport not only when transporting the vehicles [8].

However, if the water transport wants to be a competitive partner to the rail and road transport (Fig. 4), it is necessary to draw attention to its main advantages (environmental aspects, price of transport, capacity) and weaknesses (transport time, location and availability of trimodal logistics centres and their connection to the manufacturing companies, multiple transshipment) [9].

The capacity of a **truck**, when transporting the vehicles from PSA, is **6 personal cars**, the capacity of the double-deck carriage of the Lggs type is 14 personal cars, of the BLG carriage type (used by KIA) only 6 personal cars. A **train**, depending on the transportation road, can take about **220-250 personal cars** from PSA. **Inland vessels** have a capacity up to **500 cars**, which is more than twice compared to capacities of the railway transport. However, it is important to consider the shipping area, its possibilities and limitations [4, 5 and 6].

Slovakia has an important position in the automotive industry in Europe. Annual production of cars, approaching the million, confirms this fact. A huge amount of the car production is for the European market. France, Germany, Italy, the United Kingdom

and Belgium are the countries with the highest import of vehicles produced in Slovakia. However, the export is realized only by the road or rail transport. Exports of cars from Slovakia according to their final destinations are expressed in Fig. 5 [10 and 11].



Fig. 4 Intermodal transport

Source: http://america.pink/intermodal-transport_2094257.html

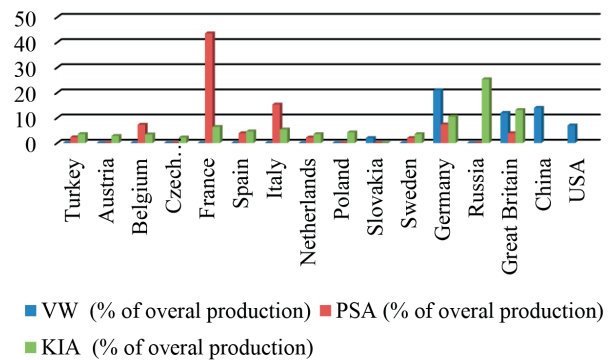


Fig. 5 Exports of cars according to their final destinations

Source: Annual reports, edited by authors

4. Conclusion

Europe has over 30,000 km of canals and rivers, which link together hundreds of key industrial towns and areas. The core of the network, approximately 10,000km, connects the Netherlands, Belgium, Luxembourg, France, Germany, Poland, the Czech Republic, Austria, Slovakia and Hungary, Switzerland, Croatia, Serbia, Montenegro, Romania, Bulgaria, Moldova and Ukraine. The main part of this network consists of the main rivers such as the Rhine and the Danube, many tributary rivers and canals connect a network of smaller towns and industrial zones. A considerable number of ports in the network enables to use various types of the transport modes. Connection of Slovakia and the inland waterway network using the Danube River is a way how to unburden the transportation flows, especially from the road networks and also to reduce costs of this transport. It is necessary to meet the delivery time and consider navigation restrictions.

References

- [1] EHK OSN: Statistics: Inland freight transport, 2014.
- [2] EUROPEAN BARGE UNION: Power of Inland navigation 2010-2011, 2011.
- [3] Sector analysis of the waterway transport, 2013.
- [4] KIA Motors: Annual Report, 2013.
- [5] Volkswagen Slovakia, a. s.: Annual Report, 2013.
- [6] PSA Peugeot - Citroen, a. s.: Annual Report, 2013.
- [7] GROBARCIKOVA, A., SOSEDOVA, J.: *Possibilities of Transporting Containers through Inland Waterways*, CER Comparative European research 2015: proceedings/research track of the 3rd biannual CER, intern. scientific conference for Ph.D. students of EU countries, London, March, 2015.
- [8] SULGAN, M., SOSEDOVA, J.: Procurement of Materials and Components for Manufacturing Activity, *Communications - Scientific Letters of the University of Zilina*, No. 2, 2014, pp. 58-62. ISSN 1335-4205.
- [9] Project VEGA No. 1/0331/14. *Modelling of Distribution Logistics System Using Software Solutions* (in Slovak), Faculty of Operation and Economics of Transport and Communications : University of Zilina, 2014-2016.
- [10] VIA DONAU: *Manual on Danube Navigation*. Wien : Via donau, 216 p., 2013, ISBN 978-3-9502226-2-3.
- [11] MIKUSOVA, M: *European Road Traffic Safety*, Moving towards more effective road safety campaigns: including the experiences and results of the CERS 2012 conference on traffic safety. Budapest : Premium Relations Communication Consulting Ltd., 2010, pp. 22-27, ISBN: 978-963-08-4186-3.