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RAILWAY IMPACT ON FREIGHT TRANSPORT IN PORT OF PLOČE

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Abstract: *Already in the late nineteenth century, during the Austro-Hungarian government there was the need for the construction of railway lines to link with the Adriatic ports. The construction of the Metković - Sarajevo railway line (completed in 1891) with a capacity of 600,000 tons per year, connected the South Adriatic ports (especially the Port of Metković) with the interior of Bosnia and Herzegovina. The Port of Ploče realizes most of its business with customers in Bosnia and Herzegovina. In terms of companies with headquarters in Bosnia and Herzegovina it is certainly important to draw attention to the fact that the activities of such companies that are focused on business cooperation with the Port of Ploče, depend to a large extent on the railway infrastructure. By its location, the Port of Ploče has a large catchment area and it is irreplaceable as the final destination of the flow of goods in the railway corridor Vc. In the north-south railway connection there is the Sarajevo - Ploče railway line (195km), which is part of the railway branch of route C (Budapest - Osijek - B. Šamac - Sarajevo - Ploče in the length of 809km) of the Pan-European Corridor V (Venice - Trieste - Budapest - Uzhhorod - Lviv) and thus makes the Port of Ploče the seaport of this branch. The paper will show the structure of freight at the Port of Ploče, with the analysis of traffic at the given Port with regard to trends. The role of railways in the transport and development of the Port of Ploče will be defined, and a comparative analysis of the rail and road transport in relation to the competing ports will be carried out.*
Key words: *railway transport, Port of Ploče, freight transport*

FREIGHT STRUCTURE IN THE PORT OF PLOČE
INTRODUCTION

In the Port of Ploče the most represented types of transhipped freight are cereal grains, petcoke, alumina, metallurgical coke and container handling.

Table 1 – Description of dry bulk freight and main customers

Type of goods	Main customers			Turnover (2010.)
Cereal grains and oil grains		Export		2,000–3,000 t
Petcoke (energy)	Import			250,000 t
Petcoke (energy)	Import			
Petcoke (Mostar)	Import			50,000 t
Alumina (Mostar)	Import			220,000 t
Alumina (Zvornik)		Export		10,000 t

Bauxite (Zvornik)	Import			180,000 t
Waste iron		Export		
Coal (Lukavac)	Import			
Metallurgical coke		Export		
Coal (Zenica)	Import			550,000 t
Iron ore	Import			
Coal (energy)	Import			
Coal in the region	Import			850,000 t
Coal		Export		1,250,000 t
Bulk cement	Import			
Coal/quartz stone	Import			

TURNOVER OF THE PORT OF PLOČE REGARDING TRANSPORT ROUTES

The data on the realized turnover per transport routes (Table 2) show that on the average 80% of total turnover refers to transit. After extremely bad years 2000 and 2001, the year 2002 saw an increase in the transit by 26% and in the year 2004 an increase of 64% compared to the previous year was realized. The period from 2005 to 2008 marked an increase in transit by 30% annually, marking in 2008 the biggest increase in transit traffic of the Port of Ploče. In 2009 there was a fall in transit by 40% in relation to the best year 2008, the main cause being the global financial crisis which had strong influence on the operation of the main port customers in Bosnia and Herzegovina, Croatia and Italy.

Last year a significant increase of transit traffic was realized, which is approximately like the one in 2008.

The mentioned data confirm that the Port of Ploče through Corridor Vc is fully in the function of serving the Central European countries in the hinterland. This refers first of all to serving the economies of the neighbouring Bosnia and Herzegovina, and to a lower extent also of the economic partners from Italy, Serbia, Montenegro, Hungary and other countries of Central Europe such as the Czech Republic, Slovakia, Rumania and Poland.

Table 2 – Realized turnover per transport routes (in 000 t)

YEAR	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010
IMPORT	9	89	118	181	172	182	249	208	53	155
EXPORT	2	7	2	5	19	14	1	22	1	16
TRANSIT	710	894	1,018	1,673	2,314	2,613	3,555	4,541	2,506	4,038
TRANSPORT	83	73	143	172	310	372	408	371	308	319
TOTAL	804	1,063	1,281	2,031	2,815	3,181	4,214	5,142	2,869	4,530

Export in the studied period was negligible with a growth tendency in 2005 and 2006, whereas in 2007 the export fell to only 1,000t. The biggest increase was in the year 2008, and in 2009 the export fell to the 2007 level, whereas last year marked a significant growth in export as an indication of coming out of the crisis.

A continuous increase in transport (80% increase in 2005 compared to 2004) with 11.7% of share in the total turnover in 2006. Unlike export, transport in 2007 marked the biggest growth in the history of the port, with slight fall in the last three years.

Considering the Port of Ploče as an essential element in the development of the Croatian economy and as the connection of the Northern, Central and Southern Europe via Corridor Vc, it may be concluded that the Port of Ploče has significant value in the context of the process of economic and transport integration of the Republic of Croatia and the Central European space. Precisely because of all this, as well as because of the possibility of competitiveness towards alternative routes, a high-quality infrastructure is required and necessary, both regarding the Port of Ploče as the origin of this corridor and the road and rail connections of Corridor Vc.

The backbone of the road and rail connections of Corridor Vc that connect the Port of Ploče with its hinterland consists of:

Adriatic Highway which extends from Trieste, via Rijeka and Split to the final point of the Republic of Croatia and which represents an element of the European road network;

The main route Hungary - Osijek - Bosanski Šamac - Zenica - Sarajevo - Mostar - Metković - Ploče represents the shortest and regarding traffic the most favourable connection between the Baltic and the Adriatic Sea;

In the North-South direction there is the Sarajevo - Ploče (195km) railway line which represents a part of the railway route of the Branch Vc (Budapest - Osijek - B. Šamac - Sarajevo - Ploče in the length of 809km) and Pan-European Corridor V (Venice - Trieste - Budapest - Uzgorod - Lvov) and thus makes the Port of Ploče the seaport of this branch.

The traffic infrastructure is inadequate and obsolete and it is the reason of redirecting traffic to closer neighbouring or even more distant European ports. In order to attract the freight and to respond to the needs of customers for the increasingly demanding and improved transport services, it is necessary to construct modern road routes and to modernise the railway infra- and suprastructure. The construction of new roads is planned in order to connect optimally the Port of Ploče to the catchment area. The key role belongs to the state which defines by its traffic policy measures the construction of adequate infrastructure and thus influences that on certain routes strong traffic corridors are formed.

Traffic corridor Vc should have adequate modern traffic infrastructure that would allow expansion of the Port of Ploče and the entire traffic route. Apart from the influence on the Port of Ploče, the construction of new roads would enable social, cultural and civilisation permeation of different countries and regions and it would create assumptions for future Euro-regional cooperation in the widest sense.

Apart from the construction of Corridor Vc the plans also include the realisation of the Adriatic-Ionian highway which would connect the Port of Ploče with the South-east of Europe. Since there are different opinions regarding the route of the Adriatic-Ionian highway (Croatia plans that the highway should pass through the Croatian territory all the way to Osojnik, whereas B&H proposes that the route enters after Ploče into their territory and passes along the Popovo polje), the construction project of this section of the highway has not been clearly determined yet, which can be reflected on the traffic of the Port of Ploče, including Corridor Vc.

ROLE OF RAIL TRANSPORT IN THE PORT OF PLOČE

In the North-South direction there is the Sarajevo – Ploče railway line in the length of 195km. It is part of the network of main railway lines and belongs to the Beli Manastir, Osijek, Vrpolje, Sarajevo and Ploče route. This line features all the characteristics of a mountainous line with climbs and descents that range from 3‰ to 23‰. Via Vrpolje it connects to the double-track railway line Zagreb - Belgrade, and thus connects to the railway lines of the Western, Central and South-eastern Europe.

The railways form the main part of the port activities, since 90% of freight is carried by rail. The railway operators and the port have established cooperation related to the development of railways and have set a common management team for railway development. The set objectives and responsibilities have been distributed among the network operators and the port.

The railway operators are responsible for:

- the development of the railway network outside the port, and
- manoeuvring and moving trains and wagons to the loading place.

The port is responsible for:

- the development of the railway infrastructure within the port, including new tracks and their maintenance - signalisation,
- manoeuvring for the needs of loading.

Table 3 – Turnover per type of freight through HŽ-CARGO in 2007 and 2008 (in tonnes)

YEAR	2007	2008 (I - X)
TOTAL	1,838,094	2,196,370

Table 4 – Turnover per type of freight through HŽ-CARGO in 2009 and 2010 (in tonnes)

YEAR	DISPATCH		ARRIVAL		TOTAL	
	wagons	tonnes	wagons	tonnes	wagons	tonnes
2009	27,235	1,164,211	14,225	506,456	41,640	1,670,667
2010	38,483	1,694,802	15,416	572,266	53,899	2,267,068

The increase in freight transport can be seen in railway transport, especially in 2008 when within ten months more freight was transported than in the entire year 2007 (Table 3).

In 2009 the railway subsystem transported 1.6 million tonnes of freight, which makes 41,640 wagons, with dispatch towards B&H accounting for about 80% of the entire transport. There were 1,210 trains that entered the Port of Ploče, and 1,326 trains exited from it (Table 4).

In 2010 there were 2.2 million tonnes of freight transported by rail, i.e. 53,899 wagons, which is by about 30% more than in 2009. In the entry and exit of the wagons towards and from the Port of Ploče a significant increase is recorded, so that 1,617 trains entered and 1,477 trains exited (Table 4).

Comparing the analysis of turnover regarding the type of freight and turnover of freight carried by rail subsystem in the past three years in the Port of Ploče, one comes to the conclusion that rail carries about 62% of total freight which arrives to or leaves from the Port of Ploče. Considering the bad condition of the railway lines towards B&H, to whose users the port has been realising the largest volumes of transported freight, one can conclude that fast revitalisation of the railway line through Croatia and B&H is necessary for the port to keep its position of one of the largest Adriatic ports and one of the most significant ports in the Mediterranean.

DEVELOPMENT PLAN OF RAIL TRAFFIC IN THE PORT OF PLOČE

Railway transport is the most important mode of land freight transport. It depends on the throughput and transport capability of the railway lines, development of the rail network, capacities and other infrastructure of the rail company. The development and improved existing rail infrastructure in B&H, as well as in Croatia, on Corridor Vc will feature improved railway line capacity and greater competitiveness on the international market. Public railway corporation B&H, Željeznica Federacije B&H (Railways of the Federation of B&H), Željeznica Republike Srbije (Railway of the Republic of Serbia) and Hrvatske željeznice (Croatian Railways) have signed a Cooperation Agreement in order to promote the development of the railway within the Branch Vc of Corridor V. A task group was founded for the four parties, which is responsible for the development and realisation of the Action Plan which refers to the development of traffic from and into the Port of Ploče funded by the World Bank and the European Bank for Reconstruction and Development. The Croatian Railways are planning to construct a ten million euro worth logistic centre in the Port of Ploče, that would provide workplaces for 100 employees, and that would be realised in the first half of the next year on the territory covering an area of almost 63 thousand square metres.

Unless the modernisation of the railway line on Corridor Vc is realised, the following consequences can be expected both for the Republic of Croatia and for the Port of Ploče itself:

- continuous increase in the cost of infrastructure maintenance for the minimal level of traffic performance;
- isolation of the Port of Ploče Ltd. without adequate railway support;
- large number of economic subjects who cooperate with railway would lose an important market;
- loss of high-quality transport alternative of economy;
- large volumes of mass freight would shift to road;
- many local governments and self-governments would feel the negative consequences of the business erosion of the railway.

COMPARATIVE ANALYSIS OF ROAD AND RAIL TRANSPORT

The condition and the competitiveness of the land connections of the port with the hinterland are considered through three basic components of land transport:

- space,
- time,
- tariff.

The transport service user takes into consideration a number of elements that influence the quality and efficiency of transport. They opt for the traffic route and for the transport carrier that offers them the most favourable conditions, regarding distance, speed and price of transport. The analysis of the land traffic connections and integration of port and traffic systems should be realised taking into consideration road and rail connections, inland waterways and other transport modes that can participate in the realisation of the land connection of the port with the hinterland. In the comparative analysis of road, sea and rail transport the necessary data have been collected and they show that regarding offer the road traffic lags behind the rail traffic. Therefore, the traffic routes on branch Vc of Corridor V should be modernised.

Although the analysis has used concrete data on distances, time and price of road and rail transport, the obtained results regarding the Port of Ploče and the competitive ports should be considered taking into account a certain significance percentage. The reason for this is the presence of different factors that may affect the choice of certain land traffic routes to the ports. Some of the factors are special discounts for the transport services on certain routes that are not contained in the public tariffs, additional services that are demanded by the transport service user, and that may have significant influence on the price and time of transport.

Also, there are long-term contracts according to which certain freight sometimes takes an even less favourable route either regarding time, space or tariff factor. The need to bypass certain routes may be caused by political circumstances and various other factors.

The spatial component of land transport is an important indicator of the condition, density and development of road and rail traffic infrastructure, including also the indicator of competitiveness of a certain traffic route. An important indicator that influences the competitiveness of the traffic route is the spatial component, i.e. kilometre distance in land connection of certain origins and destinations. The realisation of road transport is not exclusively related to the shortest kilometre distance, but rather an essential element of transport planning. In transport planning, the quality of the road, i.e. type of the road for the realisation of transport is important.

The price of land transport is an instrument which can influence that two physically different distances become equal. There are marked tariff differences and specific characteristics in road and rail transport of certain types of freight, and consequently, the catchment area of the port from the aspect of land connection of the port with its hinterland should be determined for every type of land transport and for every type of freight separately.

Table 5 – Costs of road transport per ton (EUR)

	Rijeka			Ploče			Bar		
	Croatia	B&H	Total	Croatia	B&H	Total	Montenegro	B&H	Total
Sarajevo	26.10	20.70	46.80	2.25	14.85	17.10	17.55	8.10	25.65
Mostar	42.30	4.95	47.25	2.25	4.05	6.30	10.80	10.80	21.60
Zenica	26.10	15.30	41.40	2.25	17.55	19.80	17.55	14.40	31.95
Zvornik	36.45	9.45	45.90	2.25	25.65	27.90	17.55	17.55	35.10
Lukavac	36.45	6.30	42.75	2.25	24.75	27.00	17.55	18.00	35.55

Table 6 – Costs of rail transport per ton (EUR)

	Rijeka			Ploče			Bar		
	Croatia	B&H	Total	Croatia	B&H	Total	Montenegro	B&H	Total
Sarajevo	12.00	17.20	29.20	0.60	6.36	6.96	16.93	11.95	28.88
Mostar	12.00	11.87	23.87	0.60	1.72	2.32	16.93	16.60	33.53
Zenica	12.00	8.60	20.60	0.60	9.12	9.72	16.93	9.20	26.13
Zvornik	12.00	9.25	21.25	0.60	16.94	17.54	16.93	0.00	16.93
Lukavac	12.00	6.67	18.67	0.60	14.36	14.96	16.93	2.75	19.68

The above tables (Tables 5 and 6) clearly show that the Port of Ploče, due to the lowest costs of domestic transport is the best alternative both for the rail and for road transport. Therefore it is the

adequate choice for the industry of B&H. For road transport the Port of Rijeka seems more expensive than the Port of Bar. For the rail transport Rijeka offers comparative advantage over the port of Bar for freight that goes from/to Mostar and Zenica. For the freight from/to Sarajevo and Lukavac the difference in rail costs may be considered as marginal. Finally, it is obvious that the Port of Bar has a better position for serving Zvornik compared to Rijeka.

CONCLUSION

Considering the Port of Ploče as an essential element in the development of the Croatian economy and as a connection of Northern, Central and Southern Europe via Corridor Vc, it may be concluded that the Port of Ploče has a significant value in the context of the process of economic and traffic integration of the Republic of Croatia and the Central European region.

As the leading mode of land traffic, the rail transport has become the generator of the port development. It is therefore necessary to continue with investments into the modernisation of rail infrastructure, and traction vehicles, especially on the branch which passes through B&H, since the infrastructure is in very poor condition, both due to inadequate maintenance and because of war-inflicted damages. It is necessary to improve the traffic organisation and to agree to cooperation with the neighbouring rail administrations in order to create the assumptions for smooth operation of traffic and unnecessary staying of wagons for the customs clearance.

Apart from improvement of the rail transport organisation it is necessary to establish container transport at the port. The establishment of the feeder line in March 1999 enabled the connection of the Port of Ploče, as well as other Croatian ports with hub ports in the Mediterranean. This has provided the port users with the possibility of integrating into the world container flows.

The positive indicators about the traffic growth and the dynamics of the goods flows on Corridor Vc, as well as the lowest costs of domestic traffic for rail and for road transport make the Port of Ploče an important intermodal corridor between the Republic of Croatia and Northern, Central and Southern Europe. Therefore, it is necessary to determine adequate strategy that will render the Port of Ploče competitive on the valuable Central European transit market and the wider European environment. In this context it is necessary to emphasise the importance of the construction of the Bosanski Šamac – Vukovar waterway, construction of Vc Budapest - Osijek - Sarajevo – Ploče road, and the section of the Adriatic highway Split - Ploče, as important assumptions based on which the Port of Ploče and Corridor Vc can evaluate their important traffic significance in combined transport with the countries in narrower and wider Central European hinterland and play an important role in the integration of Croatia (and other countries through which the respective route passes) into the European traffic and economic system.

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ВЪЗДЕЙСТВИЕ НА ЖЕЛЕЗНИЦИТЕ ВЪРХУ ТОВАРНИТЕ ПРЕВОЗИ В ПРИСТАНИЩЕ ПЛОЧЕ

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ХЪРВАТИЯ

Ключови думи:ж*елезопътен транспорт, пристанище Плоче, товарни превози.*
Резюме: *Още в края на деветнадесети век по време на австро-унгарското правителство е съществувала необходимост от изграждане на железопътни линии за връзка с пристанищата на Адриатическо море. Изграждането на железопътната линия Меткович-Сараево (завършена през 1891 г.) с капацитет от 600 000 тона годишно свързва южноадриатическите пристанища (специално пристанището Меткович) с вътрешността на Босна и Херцеговина. Пристанището Плоче реализира по-голямата част от бизнеса си с клиенти в Босна и Херцеговина. По отношение на компаниите със седалище в Босна и Херцеговина е изключително важно да се привлече вниманието към факта, че дейността на тези компании, които се насочват към бизнес сътрудничество с пристанище Плоче, зависи до голяма степен от железопътната инфраструктура. Със своето местоположение, пристанище Плоче има голям събирателен район и е незаменим, като крайна дестинация на товаропотока по железопътен коридор Vc. Железопътната връзка в посока север-юг е линията Сараево - Плоче (195 км), която е част от железопътния клон на маршрут C (Будапеща - Осиек - Б. Шамас - Сараево - Плоче с дължина 890 км) от паневропейския коридор V (Венеция - Триест - Будапеща - Ужгород - Лвов), като по този начин прави пристанище Плоче морско пристанище на този клон. Докладът показва структурата на товарите в пристанище Плоче с анализ на трафика в дадено пристанище по отношение на тенденциите. Определя се ролята на железниците в транспорта и развитието на пристанище Плоче и е направен сравнителен анализ на железопътния и автомобилния транспорт във връзка с конкуриращи се пристанища.*