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Transport Logistics
Review
Accepted: Dec. 4, 2008
Approved: May 11, 2009

COMPARATIVE ANALYSIS OF CARGO FLOWS ON BRANCHES V_B AND V_C OF THE PAN-EUROPEAN CORRIDOR V

ABSTRACT

Pan-European Corridor V that passes through the territory of the Republic of Croatia, i.e. Branches V_B (Rijeka-Zagreb--Budapest) i V_C (Budapest-Osijek-Sarajevo-Ploče) are of extreme importance for the traffic and economic system of the Republic of Croatia and the wider European area. Taking this into consideration, this study has analysed the relevant indicators of the traffic growth, structure and dynamics of the cargo flows on the Branches V_B and V_C of the Pan-European Corridor V. The cargo flows, as important elements of the traffic demand have been analysed regarding the presence of competition of alternative North-Adriatic and North-European traffic routes as important element of competitive environment in fighting to attract valuable transit market of Central Europe. Based on a detailed analysis of concrete statistical data, significant conclusions are derived about: quantity, dynamics and structure of the cargo flows, current traffic demand, competitiveness of corridors on Central European transit market, expected traffic demand, and conclusions about factors and circumstances that would positively, i.e. negatively affect the growth of cargo flows, and thus also the valorisation of the analysed Branches V_B and V_C of the Pan-European Corridor V within the European environment.

KEY WORDS

Pan-European Corridor V, branches V_B and V_C, cargo flows, intensity, structure, dynamics, traffic demand

1. INTRODUCTION

The Pan-European Corridor V and the respective Branches V_B (Rijeka-Zagreb-Budapest) and V_C (Budapest-Osijek-Sarajevo-Ploče) are transversal routes which, including the Port of Rijeka and the Port of Ploče and the respective road and rail communications, provides the traffic connection of the Central European area with the Adriatic and the wider Mediterranean area. Consequently, there is no need to emphasise particularly the geo-traffic and economic significance of the cargo flows formed on Branches V_B and V_C of the Pan-European Corridor V, nor the significance of their valorisation within the integration of the Republic of Croatia into the European traffic and economic system.

Therefore, the basic aim of research in this paper is the analysis of the relevant indicators of forming the cargo flows on the Branches V_B and V_C of the Pan--European Corridor V, as important indicators of the traffic demand, including also the competitiveness of the mentioned traffic routes on the valuable transit market.

Although the hypothesis of the important geo-traffic significance of the Branches V_B and V_C as vital Croatian traffic routes has been emphasised in many studies of this topic, the basic contribution of this research is that the competitiveness of the mentioned Branches of the Pan-European Corridor V is analysed, elaborated and commented based on the concrete statistical data about the intensity, structure and dynamics of the respective cargo flows. Besides, significant conclusions about the strategic market segment of Branches V_B and V_C of corridor V, and their competitiveness regarding the existence of alternative traffic routes in attracting the cargo flows, result from the analysis of concrete macro-economic indicators – foreign trade of the Republic of Croatia and the overseas trade of the European countries.

As relevant indicators of traffic demand on the analysed traffic routes, the intensity, dynamics and structure of the cargo flows that circulate through the

Table 1 - Goods exchange of Croatia per regions and economic groups of countries in 2006 (mill. USD)

Economic groups of countries	Export	Import	Total	Share (%)
Developed countries	7,546	16,066	23,612	74.01
EU[1)] countries	6,671	14,442	21,113	66.26
EFTA[2)] countries	151	373	524	1.64
Other developed countries	725	1,077	1,802	5.66
Developing countries	2,830	5,422	8,252	25.89
CEFTA[3)] countries	166	360	526	1.65
OPEC[4)] countries	281	88	369	1.16
Other developing countries[5)]	2,466	5,153	7,619	23.91
Total	10,376	21,488	31,864	100.0

1) European Union (Austria, Belgium Denmark, Finland, France, Greece, Ireland, Italy, Luxembourg, Monaco, Netherlands, Germany, Portugal, Spain, Sweden, Great Britain + since May 2004 Cyprus, the Czech Republic, Estonia, Lithonia, Lithuania, Hungary, Malta, Poland, Slovakia, Slovenia)
2) EFTA (European Free Trade Association) (Island, Lichtenstein, Norway, Switzerland)
3) CEFTA (Central European Free Trade Agreement) - (Bulgaria, the Czech Republic, Hungary, Poland, Rumania, Slovakia, Slovenia + since August 2006 - Macedonia)
4) OPEC (Organisation of Petroleum Exporting Countries) - (Alger, Indonesia, Iraq, Iran, Qatar, Kuwait, Libya, Nigeria, Saudi Arabia, United Arab Emirates and Venezuela)
5) Other European developing countries: European, Asian, African, American, Oceania countries
Source: developed by the authors according to the data of the State Office for Statistics (Economy, March 2007)

strategic transit points of these corridors – the Ports of Rijeka and Ploče, are analysed in particular. Based on the analysis, this research makes significant conclusions about the expected traffic demand and the factors and circumstances that could positively, i.e. negatively affect the growth and the structure of cargo flows on the analysed branches V_B and V_C of the Pan-European Corridor V, and thus also their valorisation in the competitive European environment, respecting at the same time the existing as well as forecast constellations on the traffic services market.

2. INDICATORS OF CARGO FLOWS GENERATION ON BRANCHES V_B AND V_C OF PAN-EUROPEAN CORRIDOR V

One of the basic principles of the traffic policy is the one that emphasises the interconnection of traffic and the economic system [1]. Therefore, this part of research analyses the foreign trade of the Republic of Croatia and the overseas trade of the European countries as relevant indicators of forming the cargo flows on Branches V_B and V_C of the Pan-European Corridor V.

2.1 Foreign trade of the Republic of Croatia

Branches V_B and V_C of the Pan-European Corridor V represent vital traffic routes of the Republic of Croatia in the traffic connection of Croatia with a wider European region. Regarding the direct and wider European area that gravitates to these corridors, the analysis of the intensity, dynamics, values and directions of Croatian cargo flows towards the European regions and economic groups of countries is very interesting. The structure of the goods exchange of Croatia, i.e. the conclusions about its intensity towards single groups of countries can be, conditionally speaking, considered indicative for the orientation of the goods flows on the analysed traffic routes.

Table 1 shows that in 2006 about 73% of Croatian goods exchange referred to the trade with developed countries, out of which 64% of the trade value was realized with the European Union countries. With the developing countries 27% of the total goods exchange was realized, out of which about 6% with the countries signatories of the Central European Free Trade Agreement (CEFTA).

The total value of the goods exchange of Croatia in 2006 was about 32 million euro, and it was by about 16% greater than the exchange realized in the previous year. Out of this over 85% of goods exchange was realized with the European countries [10]. Judging by this, the forming of the vital Croatian cargo flows on Branches V_B and V_C of the Pan-European Corridor V are greatly affected by the foreign trade of Croatia with the European countries, particularly with the countries of the European Union and CEFTA, and these Branches of Corridor V are the traffic routes of extreme traffic and economic significance for the Republic of Croatia and the mentioned European group.

In order to define precisely the relations which generate valuable cargo flows, Table 2 shows the value of the goods exchange of the Republic of Croatia towards the most valuable trade partners in 2006.

According to data in Table 2 it is obvious that the biggest trade partners of the Croatian export destinations in 2006 were: Italy, B&H, Germany, Slovenia

Table 2 - The most important trade partners of the Republic of Croatia in 2006

Countries	Foreign trade with RH (000 USD)			Share in foreign trade RH (%)		
	Export	Import	Total	Export	Import	Total
Austria	628,296	1,067,278	1,695,574	8.31	6.88	7.35
B&H	1,256,121	453,159	1,709,280	16.62	2.92	7.41
the Czech Rep.	76,762	434,810	511,572	1.02	2.80	2.22
Italy	1,859,837	2,969,454	4,829,291	24.61	19.15	20.94
Hungary	137,493	574,161	711,654	1.82	3.70	3.09
Germany	936,093	2,751,127	3,687,220	12.39	17.74	15.99
Slovakia	42,464	159,655	202,119	0.56	1.03	0.88
Slovenia	711,670	1,257,383	1,969,053	9.42	8.11	8.54
Other countries	1,907,926	5,842,200	7,750,126	25.25	37.67	33.56
Total	7,556,662	15,509,227	23,065,889	100	100	100

Source: Statistical yearbook of the Republic of Croatia – 2006, State Office for Statistics, Zagreb, 2007

and Austria, as well as Serbia and Montenegro. In the same year, the biggest trade partners according to the origin of the Croatian import were: Italy, Germany, Russia, Slovenia, Austria, B&H. On the basis of these data, the biggest value of foreign trade of the Republic of Croatia is realized with the countries in the close and wider hinterland of the Ports of Rijeka and Ploče. Since the mentioned main foreign trade partners of the Republic of Croatia include countries with which Croatia is connected by the Branches of the Pan-European Corridor V - V_B and V_C, this is another argument that speaks in favour of the importance of the mentioned corridors, not only for the traffic and the entire economic system of the Republic of Croatia, but rather for the wider European environment as well.

If among the main trade partners of the Republic of Croatia those countries that have their own access to the sea through their own ports, or have some other European port closer to them, are excluded, then special significance for the Branches V_B and V_C is on the markets i.e. overseas trade of the following Central European countries: Austria, the Czech Republic, Slovakia and Hungary, as well as Bosnia and Herzegovina. Taking this into consideration, one should not forget the significant value of the foreign trade of the Republic of Croatia with overseas and economically developed countries such as China and USA, which means that Branches of the Corridor V - V_B and V_C are significant transit routes for the goods flows that circulate on the relations of the mentioned overseas countries to Central European and East European countries.

2.2 Analysis of foreign trade and overseas trade of the European countries

The analysis of the orientation and the value of the foreign trade of the European countries, main trade partners of Croatia is indicative of the volume and orientation of the cargo flows and an indicator of the presence of the competitive routes (ports) when considering the overseas trade of these countries. Therefore, this part of research analyses the foreign trade and overseas trade of the Central European countries that are landlocked and that are therefore naturally oriented to the Port of Rijeka and the Port of Ploče, i.e. the North Adriatic and South Adriatic traffic routes.

According to the data about the realized goods exchange of Croatia in 2006 (Table 2), one may discuss the share of individual European countries in the total value of the foreign trade of Croatia. Thus, regarding the European countries as trade partners of Croatia the highest value of the goods exchange was realized with Italy (21%), Germany (16%), Slovenia (9%), Russia (8%), Bosnia and Herzegovina (7%), Austria (7%), Hungary (3%), the Czech Republic (2%) and Slovakia (1%).

Regardless of the share of the goods exchange value with which the mentioned countries trade partners participate in the total exchange of Croatia, a significant fact is the share of Croatia in the total foreign trade and overseas trade of the analysed European countries, especially regarding the presence of the competitive North European and North Adriatic ports and the alternative traffic routes which may be used by these countries to realize the goods exchange. This fact is a valuable indicator of the intensity (volume) of the cargo flows from the European countries towards the Ports of Rijeka and Ploče, i.e. an indicator of the intensity of the cargo flows on the Branches V_B and V_C of the Pan-European Corridor V. Consequently, it should be briefly emphasised that Croatia has a minor share in the total foreign trade of Hungary (5%), Slovakia (1%), the Czech Republic (0.9%) and eventually Austria (0.5%) [11].

Judging by the small share of Croatia in the goods exchange of the analyzed European countries, it is interesting to determine the main trade partners of these countries. Thus the main partners of Austria are mainly the European Union countries realizing 99.3 billion euro or 54% of trade (out of this 56% with Germany, 7% with Italy, 4% with France, 1.3% with the Netherlands). About 33% of the trade of Austria was realized with Asia, 4.5% with North America, 4.1% with EFTA countries (Hungary - 3%, the Czech Republic – 2.7%, Slovenia – 0.8%, Slovakia – 1.4%, Russia – 1.3%, Poland – 1.2%, Slovenia – 1.3%, Rumania - 0.9%, Croatia – 1.4%, Ukraine – 0.4%, Bulgaria – 0.2%). About 60% of foreign trade of the Czech Republic is oriented to the European Union member countries, and about 20% to the transition countries. The most significant countries, trade partners of Slovakia are: Germany, the Czech Republic, Italy, Austria, Poland, Hungary, France, and Slovakia. The most significant countries trade partners of Hungary are: Germany, Austria, Italy, France, USA, Russia, Great Britain, the Netherlands, Belgium and Japan. The most significant countries partners of B&H are: Germany, the Czech Republic, Italy, Austria, Poland, Hungary, and France.

Consequently, it may be concluded that the majority of the foreign trade of the analysed European countries is realized with other European Union member countries. It may also be assumed that progressive connecting of the West and the East as part of the European Union enlargement is reflected not only on the foreign trade of the European countries, but also on the traffic between Central and Central-Eastern Europe with overseas countries, directing it towards the ports of Northern Europe, and not to geographically closer ports of the Northern Adriatic.

It is, namely, in the circumstances of insufficient traffic infrastructure and diversion of traffic from the routes that they should follow naturally, that there is very large overseas turnover of the countries of Central and Central-Eastern Europe towards the ports of Northern Europe, although these are twice as far from the ports of the North and South Adriatic. This is also proven by the concrete data on the orientation of the transit traffic of the Central European countries to the North Adriatic and South Adriatic ports [3]. According to these data the share of the North European ports in the transit traffic of Austria, the Czech Republic, Slovakia and Hungary is progressively growing from year to year. Out of the total overseas traffic of Austria, the Czech Republic, Slovakia and Hungary, as much as 61% of cargo is oriented to the ports of Northern Europe, and 39% to the North Adriatic ports. The overseas trade of the Czech Republic and Slovakia is oriented to North European ports, whereas Austria (bordering on Slovenia and Italy) and Hungary (bordering on Slovenia and Croatia) are still oriented to the ports of the North Adriatic.

The continuation in the growing tendency of the share of the North European ports in the transit traffic of Central European countries might, conditionally speaking, result in a situation in which the entire transit traffic of Austria, the Czech Republic, Slovakia and Hungary and other Central European countries could be directed to the North European ports, instead of the North Adriatic and South Adriatic traffic route, which would have significant influence on the intensity of cargo flows on the Branches V_B and V_C of the Corridor V. However, if one considers that the Republic of Croatia is soon to integrate into the European Union, as well as considering the planned investments into the capacities of the Port of Rijeka and the Port of Ploče, and the respective Branches V_B and V_C of the Corridor V, it is to be expected that the described lack of balance will certainly be corrected in favour of higher intensity and valuable structure of the cargo flows on the mentioned traffic routes.

3. INTENSITY, STRUCTURE AND DYNAMICS OF CARGO FLOWS ON BRANCHES V_B AND V_C OF PAN-EUROPEAN CORRIDOR V

The intensity, structure and dynamics of cargo flows on Branch V_B (Rijeka-Zagreb-Budapest) and Branch Vc (Ploče-Sarajevo-Osijek-Budapest) of the Pan-European Corridor V, are greatly conditioned by the traffic at the Port of Rijeka and the Port of Ploče as significant origin (transit) points of the mentioned corridors. The cargo flows, namely, from the direct and wider European catchment area towards the ports of Rijeka and Ploče and vice versa, directly affect the formation of cargo flows on the mentioned branches of Corridor V. Therefore, further in the text the turnover of the ports of Rijeka and Ploče is analysed and the strategic market which gravitates to the analysed corridors in the geo-traffic sense is defined depending on the volume, structure, and orientation of the goods flows through the mentioned ports.

3.1 Analysis of turnover at the ports of Rijeka and Ploče as strategic points of Branches V_B and V_C of Pan-European Corridor V

The Port of Rijeka is the biggest Croatian port which has no major competition within the Croatian port system. The reason lies in the fact that the Port of Rijeka has been realizing a turnover that for a number of years in the total cargo traffic of all the Adriatic ports has accounted for more than 50%. Concretely, judging by the data in Table 3, in the total realized

Table 3 - Goods turnover at ports of special economic significance for RH (in 000 tonnes)

Port	2000	2001	2002	2003	2004	2005	2006	2007
Rijeka	6800	7901	7970	10,416	12,100	11,932	11,300	12,824
Ploče	804	921	1062	1284	2031	2815	3181	4214
Zadar	303	330	361	432	235	497	570	493
Šibenik	570	515	460	601	841	1410	739	-
Total	8477	9667	9853	12,733	14,368	16,900	15,775	-

Source: According to the data of the Ministry of the Sea, Transport and Infrastructure, Republic of Croatia, 2008

Table 4 - Turnover of the Port of Rijeka per cargo structure from 1996 to 2007 (in mill. tonnes)

Type of cargo	1996	1997	1998	1999	2000	2001	2002	2003	2005	2006	2007	2006/2007, difference (%)
Liquid cargo	4.67	5.36	5.59	5.24	4.28	4.99	5.24	6.26	7.02	5.88	7.59	+29%
General cargo	0.68	0.70	0.62	0.73	0.80	0.83	0.80	1.10	1.44	1.57	2.16	+37%
Bulk cargo	1.50	1.70	2.50	1.70	1.70	1.90	1.70	2.30	3.19	3.20	3.14	-2%
Wood	0.14	0.14	0.14	0.14	0.17	0.15	0.2	0.17	0.22	0.24	0.33	+38%
Total turnover*	6.99	7.9	8.85	7.81	6.95	7.87	7..94	9.83	11.87	10.89	13.21	+21%
Public transloading*	2.32	2.54	3.29	2.55	2.56	2.91	2.73	3.56	4.84	5.01	5.62	+10%

Note: * Total turnover includes traffic of liquid cargo of the Port of Omišalj, whereas public transloading refers to the traffic of dry cargo
Source: According to http://www.portauthority.hr/rijeka/info_statistika.shtml (10.04.2008.)

cargo traffic in the ports of special economic significance for the Republic of Croatia, the Port of Rijeka accounts for about 70%. This is at the same time an important argument for the claim that the Branch of the Pan-European Corridor V - V_B (Rijeka transport route) represents a land-sea traffic route of vital significance for the traffic and economic system of Croatia.

On the contrary, the Port of Ploče, although it is beyond comparison to the Port of Rijeka, with about 20% of share in the total port cargo traffic of Croatia, represents the second important port in the Croatian port system. Consequently, it is justified to state that Branch V_C is an important Croatian route that, passing, although just a minor section, through the territory of the Republic of Croatia (compared to Branch V_B), plays a significant role for the overseas trade of countries in the close and wider European hinterland via the Port of Ploče.

In favour of emphasising the importance of the transit role of the Port of Rijeka and the Port of Ploče, and the respective corridors, it should be emphasised that a significant part of cargo traffic of the sea ports of Croatia, as much as 37% refers to transit traffic, whereas 39% refers to import and 24% to export [19]. Similarly, the transit traffic forms the main part of the turnover at the Port of Rijeka (about 75%) and the Port of Ploče (about 84%), and it is justified to consider the mentioned ports as important transit ports which accommodate valuable cargo flows towards/ /from the Central European transit market. In other words, the overseas trade of the countries in the Central European hinterland is mainly oriented to the Port of Rijeka and the Port of Ploče, forming valuable cargo flows on the Branches V_B and V_C of Corridor V.

In order to analyse the intensity and the structure and the dynamics of cargo flows on the Branch V_B, Table 4 presents the turnover of the Port of Rijeka in the period from 1989 to 2007.

Table 4 shows clearly that the Port of Rijeka in the past six years realized total increase of traffic by 106% or 2.9 mill. tonnes. General cargo has increased by 172%, bulk cargo 81%, and traffic of wood 61%. Not taking into consideration the liquid cargo, in 2007 the Rijeka port realized a turnover of 5.62 million tonnes, and compared to 2006, the total turnover of dry cargo in 2007 increased by about 10%. In the structure of dry cargo the share of general cargo amounted to 38%, bulk cargo 56%, and wood 6%.

The data on turnover of the Port of Rijeka indicate that after some ten years the Rijeka port in 2007 marked a record turnover of 13.2 million tonnes, out of which 5 million tonnes refer to the traffic of general and bulk cargo and the traffic of wood which was realized as part of the business activities of the Port of Rijeka, d. d., whereas the remaining 5.8 million tonnes refer to the traffic of liquid cargo that was realized at the oil terminal in the Omišalj port basin. The pre-war volume of cargo on the Rijeka traffic route was such that in the 90s the turnover dramatically fell. Among other things, this was caused by the war risks, deterioration of the national ship operator "Croatia Line",

reduction in production, condition of the Croatian economy, poor government support, absence of modern technology at the port, etc. whereas at the same time the neighbouring Slovenia and Italy invested in the development of the ports of Koper and Trieste.

Regarding the structure of traffic, all types of cargo in 2007 marked increase in traffic, except for bulk cargo. Thus, in 2007, compared to the previous year the general cargo marked an increase of 37%, liquid cargo 29% and wood 38%. The increase in individual types of cargo was reflected also on their shares in the total traffic and as continuation to 2006 an equally good relation of single types of cargo in the total traffic was kept. Thus, for the sixth year in a row the Port of Rijeka has increased the total turnover and, according to some estimates in 2007 with the realized turnover of the Port of Rijeka 12% more cargo flows for the Rijeka traffic route i.e. Branch V_B of the Pan-European Corridor V was ensured [12].

Similarly to the case of the Port of Rijeka and Branch V_B, the Port of Ploče and Branch V_C also experience a significant fall in turnover during the war. According to data in Table 5 one may see that the total turnover of the Port of Ploče in 1991 marked a significant fall in relation to the pre-war years. In the post-war period the turnover of the Port of Ploče was increasing again and in 2007 the Port of Ploče marked a total turnover of 4.2 mill. tonnes, which represents an increase of 32% in relation to the turnover in the previous year. The most part of this turnover (87%) was realized by the operator of the Port of Ploče d. d., whereas the remaining turnover was realised by the operators of liquid cargo so that NTF d. o. o. handled 9% and LPT d. o. o. 4% of the total volume of all goods that passed through the Port of Ploče [13].

Regarding the dynamics of the turnover at the Port of Ploče, it may be already foreseen that 2008 will be marked as the year in which the Port of Ploče, including the respective Corridor V_C will realize maximum turnover in its history. Regarding the structure of the cargo flows through the Port of Ploče, it should be emphasised that the traffic of bulk cargo in the period from 2001 to 2007 marked a constant growth that in this period amounted to 67%. Regarding the remaining cargo, general cargo also marked a slight increase, whereas the traffic of liquid cargo is mainly constant. One can notice a record growth in traffic of general cargo which in 2004, compared to the previous year increased by as much as over 100%. The turnover of liquid cargo which has been falling since 1991 (with the exception of 2001) participated in 2007 with 15.2% of share in the total turnover and therefore has no further major significance for the traffic on the Adriatic.

Thus, the structure of cargo flows through the Port of Ploče marked an increase of all the categories, general, bulk as well as liquid cargoes, with special emphasis on the turnover of containers which in 2007 exceeded the amount of 30,000 TEU which is by as much as 65% greater turnover compared to 2006. The most part of the turnover of the Port of Ploče (79%) refers to bulk cargo, followed by the share of liquid cargo (14%) and general cargo (7%). The situation is similar also to the previous years, with the difference that in the period from 1988 to 2004 the share of general cargo was larger compared to the liquid cargo, whereas since 2005 a greater share of liquid cargo was marked in relation to general cargo.

The comparison of turnover of the ports of Rijeka and Ploče indicates unquestionably greater competition of the Rijeka port compared to the Port of Ploče, which is illustrated by the data according to which in 2007 the total turnover of the Port of Rijeka was more than three times greater compared to the Port of Ploče. The reasons, naturally, are significantly greater capacity of the Port of Rijeka and the more developed line services, especially considering container cargo flows. Regarding the increasing significance and volume of container cargo flows it is necessary to take especially into consideration the realized container turnover at the ports of Rijeka and Ploče (Table 6).

Regarding, namely, the Port of Rijeka, the best business results in the period from 2002 to 2007 were realized precisely by container terminal where, after technological modernisation at the end of 2002, the turnover increased almost ten times. Thus, the leading position regarding the turnover growth rate at the Port of Rijeka is still held by the container turnover. Regarding the flow dynamics and the intensity in the increase of container flows it should be noted that the Port of Rijeka in 2004 compared to 2002 marked an increase in the container traffic by about 400%. In 2005 the container terminal of the Rijeka port real-

Table 5 - Turnover of the Port of Ploče per cargo structure from 1988 to 2007 **(in 000 tonnes)**

Type of cargo	1988	1991	1995	2000	2001	2002	2003	2004	2005	2006	2007
General cargo	0.881	521	251	266	356	396	420	346	301	405	277
Bulk cargo	3336	1356	78	417	365	474	675	1518	2211	2291	3097
Liquid cargo	360	360	84	121	200	193	186	167	303	485	552
Total turnover	4577	268	413	804	921	1063	1281	2031	2815	3181	4215

Source: According to www.port-authority-ploce.hr (10.04.2008.)

Table 6 - Container turnover at the ports of Ploče and Rijeka (in TEU)

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
Port of Ploče	1410	5258	5507	8638	14.121	15.686	18.000	18.516	30.202
Port of Rijeka	6866	8925	12.711	15.215	28.205	60.864	76.258	94.390	145.040

Source: http://www.lukarijeka.hr(10.04.2008.);http://www.www.port-authority-ploce.hr (10.04.2008.)

ized a turnover of 76,258 TEU, which, compared to 2004 is an increase of 25%. Expressed in TEU, in 2005 there were 15,394 TEU handled more, with the average handling consisting of 6355 TEU in a month. In the next year already 94,390 TEU were handled which is an increase of 24% compared to 2005.

The fact that container turnover at the Port of Rijeka has been setting new records is confirmed also by the datum according to which in 2007 a turnover of 145,040 TEU was marked, which is an increase of as much as 54% compared to the previous year. The increase of the number of TEU units means also the development of the port front, so that the Rijeka port is already accepting ships of capacities of as much as 4000 TEU, and the regular line transport is operated by more than a dozen big ship operators. Analogue, regarding the high share of transit traffic in the Port of Rijeka turnover structure, the same trend of the intensity of container cargo flows can be assumed also on the Branch V_B of Corridor V which provides the connection of the Rijeka port and the Central European transit hinterland.

In container transport the Port of Ploče is connected to the Rijeka port since both ports accommodate "feeder" service towards the Mediterranean ports, mainly for the ports of Gioia Tauro and Malta. This is, among other things, the reason for a significant growth in container cargo flows in the port of Ploče which in 2007 increased by as much as 65% compared to the previous year.

The increase in port turnover is the basis for entering a new investment cycle which will see modernization of the existing port capacities and construction of new modern terminals. Therefore, it should be emphasised that in both ports adequate terminals are being built for container handling, which will significantly affect attracting of the container cargo flows on Branches V_B and V_C of Pan-European Corridor V.

3.2 Central European transit hinterland – strategic market segment of Branches V_B and V_C of Pan-European Corridor V

With the aim of defining the strategic market segment of Branches V_B and V_C of Pan-European Corridor V, this part pays special attention to the analysis of the dominant transit traffic in the Port of Rijeka and the Port of Ploče. Speaking of the structure of cargo flows regarding orientation, compared to national traffic and land-land traffic (which does not include port cargo handling), the transit traffic of the Rijeka port (with a share of about 70%) in 2007 and the port of Ploče (with a share of 84% in 2007) is the most significant segment of their total turnover [8,9]. In other words, this refers to the majority of port traffic which travels along the respective routes (Branches V_B and V_C) to the transit hinterland.

The statistics department of the Port of Rijeka registers the structure of transit traffic per countries traditionally in such a way that the transit partners of the Rijeka port especially emphasised are Austria, the Czech Republic, Slovakia, Hungary and Italy, whereas traffic realized with other countries is managed within a special group (various countries). However, it should be noted that more recently, also new transit markets have appeared, and these are the markets of Bosnia and Herzegovina, Serbia and Montenegro which means return of lost cargoes in the past. This is also confirmed by the structure of transit traffic to-

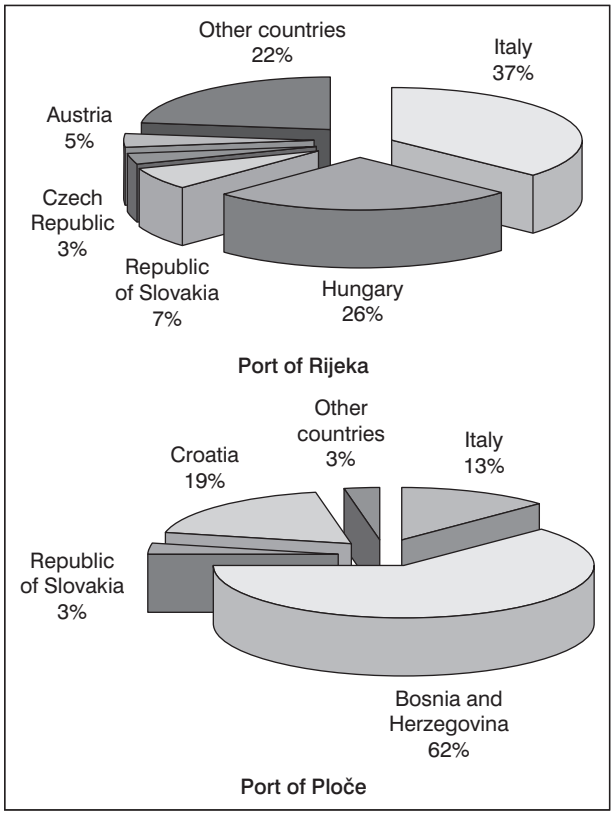

Figure 1 - Structure of the transit traffic of the Ports of Rijeka and Ploče in 2007

Source: Port of Rijeka, d. d., 2008; (10.04.2008.)

wards the main transit partners of the Port of Rijeka which is presented in Figure 1.

The structure of transit traffic of the Port of Rijeka in 2007 indicates that the biggest share of transit traffic (37%) was realized with Italy. Hungary, as a traditional partner of the Rijeka port in its closer hinterland, accounts for 26, the Czech Republic and Slovakia together 10%, Austria 5%, and other countries 22%. The mentioned Central European countries represent at the same time the strategic traffic market of the Rijeka port, owing to which valuable transit cargo flows on Branch V_B of Pan-European Corridor V were designed. Based on the analysed data about the quantity and structure of the transit traffic, it may be concluded that the Central European hinterland (Austria, the Czech Republic, Slovakia and Hungary) represent an important strategic segment of the transit market of the Port of Rijeka and Branch V_B of Corridor V. However, the data indicate the threat of loss of this traditional transit market of the Port of Rijeka, regarding the growing share of the North European traffic routes and other North Adriatic routes (from the Port of Koper, and Trieste) in the overseas trade of these countries.

Considering the fact that Hungary naturally gravitates to the Rijeka traffic route and the Port of Rijeka, and that Austria, although near the other two North Adriatic ports (Koper and Trieste), has always marked significant transit traffic with the Port of Rijeka, the question is what are the reasons for the tendency of the turnover decline of the Rijeka port towards the mentioned countries. The transit traffic of Austria and Hungary via North European ports (Hamburg, Bremen, Polish ports – Gdansk, Gdynia, Szecin) has marked a slight increase, and this may be one of the possible reasons. Similarly, the orientation of the overseas trade of these countries to competitive North Adriatic ports of Koper and Trieste need also be taken into consideration. Regardless of the reasons, these flows, i.e. fall in the transit traffic to these countries should be taken seriously and solutions should be found which would return the cargo of the mentioned countries to Branch V_B of Corridor V.

The Port of Ploče through Branch Vc of Corridor V is fully in the function of serving the North European countries in the hinterland. This refers primarily to the serving of the economy of the neighbouring Bosnia and Herzegovina, and to a lesser extent also the economic partners from Serbia and Montenegro, Hungary and other Central European countries. The rest of the cargo (ca. 12%) refers to distribution between the Port of Ploče and the industrial ports, and to domestic cargo intended to its hinterland (Graph 1).

The cargo flows that take the mentioned Branch of Corridor V towards Bosnia and Herzegovina refer especially to the import of coal and iron ore for the ironworks in Zenica and the coke plant in Lukavec [4]. Besides, the Port of Ploče is an interesting partner to other countries of Central and Eastern Europe, which represent the joint transit market of the ports of Ploče and Rijeka. The presence of the competition of other North Adriatic ports (Koper and Trieste) needs to be emphasised here, and in a wider sense also the North European ports, and the Port of Bar which, regarding the hinterland it serves (region of Eastern Bosnia and Herzegovina, as well as Serbia and Montenegro), represents direct competitor especially to the Port of Ploče. In the context of potential effects of other corridors it should be noted that the intensity of cargo flows on Branch Vc could be greatly affected also by the realization of the Adriatic-Ionian motorway that should connect the Port of Ploče with the South-east of Europe [2].

4. POTENTIAL TRAFFIC DEMAND AND FORECAST OF CARGO FLOWS ON BRANCHES V_B AND V_C OF PAN-EUROPEAN CORRIDOR

The estimate of the traffic demand and cargo flows on the traffic route depends on numerous factors and subjects that participate in the production of the traffic service on the traffic route. However, in accordance with the limited scope of this research, the current cargo flows that circulate through the Port of Rijeka and the Port of Ploče, are the most reliable starting point to estimate the traffic on Branches V_B and V_C of Pan-European Corridor V.

Apart from the conclusions on the estimate of the traffic demand and the estimate of intensity, structure and dynamics of cargo flows on Branches V_B and V_C of Corridor V, which are the result of this research, various forecasts of the development plans and studies of the Port of Rijeka and the Port of Ploče have also been analyzed. Based on the analysis of the mentioned existing forecasts it may be concluded that many forecasts of the expected traffic have already been overcome.

For instance, if data on the realized total traffic of dry cargo of the Rijeka port in 2005 of 4.85 mill. tonnes are compared to the forecast of traffic of the Rotterdam Maritime Group, which according to high scenario amounts to 3.79 mill. tonnes, one finds that the forecast traffic of the Port of Rijeka was already exceeded at that time [2]. According to the forecast of the Institute of Transport and Communications in 2005, the forecast traffic of the Rijeka port is between 4.5 and 5.5 million tonnes, and in 2010 between 6.0 and 8.0 million tonnes [20]. The mentioned forecast, compared to the previous one, was nearer the realized traffic in 2005, and, conditionally, the traffic forecast

of about 6.0 to 8.0 mill. tonnes in 2010 can be considered as the more realistic one, especially since in 2007 the Rijeka port realized a turnover of 5.62 mill. tonnes.

For the data on the forecast traffic volumes in the Port of Ploče (Table 7) one may say that in compliance with the forecast growth of traffic at the Port of Ploče by the year 2010 by as much as 73% (compared to traffic in 2006), a similar growing tendency is expected in cargo flows on the respective Branch Vc of Corridor V, which takes 84% of the traffic of the Port of Ploče.

Table 7 - Traffic forecast of the Port of Ploče 2005 – 2010 (in 000 tonnes)

Year	2006*	2007**	2008**	2009**	2010**
General cargo	405	1,025	1,080	1,130	1,235
Bulk cargo	2291	6815	6865	6865	6965
Liquid cargo	485	500	500	500	500
Total turnover	3181	8340	8445	8495	8700

* data on the realized traffic of the Port of Ploče;
** forecast traffic of the Port of Ploče
Source: The Port of Ploče d. d., Odjel za istraživanje tržišta (Department for Market Research)

The mentioned traffic forecast of the Port of Ploče is justified by new investments regarding the construction of the multipurpose terminal (container terminal), and a new terminal for dry and bulk cargo, as well as the construction of Branch Vc thus enabling high-quality communication with the existing catchment zone and use of preconditions for the expansion of the market of port services towards Croatia, the Czech Republic, Slovakia and Hungary. The location of the Port of Ploče provides good maritime connection both to the cities at the Adriatic coast of Croatia and Italy and the ports worldwide. Special quality has been achieved by establishing a weekly "feeder" line which connects the Port of Ploče with Malta and Gioa Tauro. Apart from the Port of Ploče this "feeder" line connects also the ports of Rijeka, Koper and Bar.

Regarding the constantly increasing value of the container flows and the world tendencies to containerize almost all cargo, the relevant indicators of potential intensity of container flows through the Port of Rijeka and the Port of Ploče along the respective surface routes towards the hinterland of these ports are specially analyzed.

The potential volume of the container traffic of the Central European countries and its orientation to North Adriatic and North European ports, obtained in cooperation with the Rijeka agents, has been presented in Table 8. This refers to the relevant forecast indicator of cargo flows of container cargo on the North Adriatic and South Adriatic traffic routes, especially on Branches V_B and Vc of Pan-European Corridor V since this is a valuable transit market which traditionally gravitates to the usage of analyzed corridors and the respective ports as their reference points. Since this is a transit market that exists in a concrete environment, the presence of competitive traffic routes and ports is only logical. In other words, in case of Branch V_C it is the competitive alternative of the North Adriatic routes (from/to the ports of Koper and Trieste) and the North European routes (from/to the ports of Rotterdam, Hamburg,...), whereas in case of Branch V_B it refers to the alternative North Adriatic and South Adriatic routes (from/to the ports of Bar, Thessaloniki,...).

According to these data the main part of the container traffic of the countries of Northern Germany,

Table 8 - Forecast of the orientation of container traffic of the European countries to North-Adriatic and North European ports

Hinterland countries	Turnover volume (TEU/year)	ORIENTATION – SHARE		
		North Adriatic ports	North European ports	Other ports
		Koper, Trieste, Rijeka	Bremerhaven, Hamburg, Rotterdam	
Hungary	100-130,000	ca. 30%	ca. 70 %	
Austria	360,000		ca. 80%	
Slovakia	60,000		ca. 50%	
Slovenia	53,000	ca. 98% (Koper)		
the Czech Rep.	170,000		ca. 80%	
Northern Germany	500,000		ca. 80%	
Serbia	50,000	ca. 60% (Rijeka)		ca. 40 % - (Bar, Thessaloniki)
B&H	20,000	ca. 75% (Koper, Rijeka)		ca. 25% (Ploče)

Source: developed by authors according to the data of Rijeka agents

Austria, the Czech Republic, Slovakia, and even Hungary (about 70-80%) will be sent to the North European ports, whereas the North Adriatic ports will have the advantage only for Slovenia (ca. 98% - the port of Koper), Serbia (ca. 60% - the Port of Rijeka) and Bosnia and Herzegovina (ca. 75% - the ports of Koper and Rijeka), with the note on the competition from the ports of Bar and Ploče when the market of Serbia and B&H is considered. It should be noted that the forecast plans a very small share of North Adriatic ports on the Hungarian market (30%) which naturally gravitates precisely to these ports. By comparing the forecast volume of container traffic it may be expected that the position of the North Adriatic ports in relation to the North European ports will be marginalized even more. However, a new phenomenon referring to the formation of "hub" ports leads to the phenomenon that the Mediterranean port system has an increasing share in the traffic parallel to the North European ports.

The demand forecast of the Mediterranean container ports presented in Table 9, is based on the existence of the "hub" ports on the Mediterranean, which will greatly affect even larger volumes of container traffic in this region, thus also affecting the greater demand for port services of the container ports on the Mediterranean, among which the North Adriatic and the South Adriatic ports and the respective corridors have special significance.

According to this forecast, in the period from 2004 to 2015 an increase is expected in the container traffic in the West Mediterranean by 54%, in Central Mediterranean by 61% and Eastern Mediterranean by 67%. The forecast about the significant increase in the demand for port services of the container ports in the Central Mediterranean implies also the forecast of greater demand for port services of the North Adriatic ports, and within these, of the Port of Rijeka and Ploče.

Table 9 - Forecast of container turnover in the Mediterranean (in mill. TEU)

Year	Western Mediterranean	Central Mediterranean	Eastern Mediterranean/ /Black Sea
2004	8.7	11.5	8.3
2005	9.2	12.2	8.7
2006	9.6	12.8	9.1
2007	10.0	13.4	9.6
2008	10.4	14	10.1
2009	10.9	14.7	10.6
2010	11.3	15.4	11.1
2015	13.4	18.5	13.9

Source: The Port of Rijeka, d. d., 2006.

At the moment, the Port of Rijeka marks the biggest growing trend of container turnover on the Mediterranean. The container terminal Brajdica has been brought to the verge of maximal capacity utilisation, and over the recent several years by levelling, another 12,000 square metres of space have been obtained, thus increasing the capacity of Brajdice to 170,000 TEUs yearly. The plan is for the traffic to reach in the period of three years this maximal level of Brajdice, and to solve the problem of insufficient space by organizing a new container terminal at the Zagreb quay, the construction of which has already started.

The world trend in port transport is that almost all the goods will be placed into containers, among other things wood as well, even part of the bulk cargo. Judging by the plans of the leading shipping companies that have long-term interest in the Port of Rijeka, in 2016 this port (after the construction of the Prague and Zagreb quays, and expansion of Brajdice) should feature a turnover of 700,000 TEU/annually, which is approximately an equivalent of 7 million tonnes of cargo [14]. These forecasts will be reflected absolutely also on the major volume of the cargo flows on Branch V_B of Pan-European Corridor V.

Analysing the position of the Port of Ploče and Branch V_C, an interesting forecast is regarding the orientation of the container transport from the immediate catchment area of the Port of Ploče, i.e. the neighbouring countries, Serbia and Bosnia and Herzegovina. It says that there is "only" 25% of "certain" container transport of the neighbouring countries, and this refers exclusively to the immediate hinterland of the Port of Ploče and Branch V_C of Pan-European Corridor V i.e. the territory of Bosnia and Herzegovina.

However, assuming that the operation will be improved and there will be adaptation to new conditions both within the Port of Ploče and in relation to the macro-environment (development of a free port zone, development of trade and industrial function of the port and development of the port front), the more optimistic forecasts of the cargo flows through the Port of Ploče, including Branch V_C of Corridor V are realistic. This is also confirmed by the data according to which the first nine months of 2007 saw a realized turnover of 3.2 million tonnes of cargo at the Port of Ploče, whereas by the end of the year more than 4 million tonnes of cargo are expected. A significant increase in the container turnover at the Port of Ploče is of similar importance, and compared to 2006 it increased in 2007 by as much as 58%. After having completed the 50 million euro worth container terminal, whose construction is expected in two years at the latest, the container traffic at the Port of Ploče is planned to be more than 100 thousand TEU a year [13].

Regardless of the mentioned current forecasts regarding the growth of total and container traffic of the ports of Rijeka and Ploče, the past dynamics and the traffic growth of these two Croatian ports certainly imply the forecast of further growth of the total and container traffic on Branches V_B and V_C of the Pan-European Corridor, especially considering the close as well as wider transit hinterland.

5. CONCLUSION

The carried out analysis of the foreign trade of the Republic of Croatia, the orientation of the foreign trade and overseas trade of the European countries and the structure of the transit traffic of the ports of Rijeka and Ploče confirm that Branches V_B and V_C of Pan-European Corridor V are capital infrastructure routes of Croatia that directly participate in serving the Central European regions (Austria, the Czech Republic, Slovakia and Hungary, Bosnia and Herzegovina, Serbia, …) as the strategic transit market.

Although this Central European region is traditionally oriented to the mentioned North Adriatic and South Adriatic traffic route, the analysis of the orientation of the transit traffic of the Central European countries indicates a danger of losing this market regarding the presence of competition from the North European traffic routes (the ports of Hamburg, Rotterdam, …), competition from other North Adriatic routes (ports of Koper and Trieste), and the competition of the Montenegro port of Bar (especially regarding the South Adriatic route towards the Port of Ploče).

Although in accordance with the limited scope of research, the forecast given in this paper regarding the cargo flows on vital Croatian corridors analysed for intensity, structure and dynamics of traffic recorded in the ports as important traffic junctions in which the traffic can be "measured", it should be emphasised that a precise estimate of the traffic demand on the analysed corridors requires "depth analysis". For instance, valorisation of each traffic route, i.e. its competitiveness and attraction on the traffic market depends on a number of factors (qualitative, economic, …) that need to be taken into consideration as relevant indicators of cargo flows formation. Similarly, the possible effects of other corridors should not be neglected, especially those that intersect with Branches V_B and V_C (Corridor X - Branch X_A; Corridor VII, potential Adriatic-Ionian Corridor), which may also significantly affect the formation of cargo flows on the analysed corridors.

In spite of geo-traffic predispositions, and positive forecasts on the traffic growth and dynamics of cargo flows on the analysed corridors, especially regarding container traffic, the continuation of tendency of growth of the share of North European traffic routes in transit traffic of the Central European countries, may lead to a significant loss of valuable transit cargo flows on Branches V_B and V_C of Pan-European Corridor V. This would substantially reduce the competitiveness of the North Adriatic and South Adriatic route from the existing potentials.

In order to prevent negative tendencies, adequate strategy should be defined, that will make these routes competitive on the valuable Central European transit market and in the wider European environment by integrated and coordinated approach to all the subjects in the logistic chain of the analysed traffic routes. It is only with such approach that Branches V_B and V_C of Pan-European Corridor V will be able to play their important role in the integration of Croatia in the European traffic and economic system.

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SAŽETAK

KOMPARATIVNA ANALIZA ROBNIH TOKOVA NA OGRANCIMA V_B I V_C PANEUROPSKOG KORIDORA V

Paneuropski koridor V koji prolazi teritorijem Republike Hrvatske, odnosno ogranci V_B (Rijeka-Zagreb-Budimpešta) i V_C (Budimpešta-Osijek-Sarajevo-Ploče) od iznimnog su značaja za prometni i gospodarski sustav Republike Hrvatske te šireg europskog prostora. Uvažavajući navedeno, u ovom se istraživanju analiziraju relevantni indikatori prometnog rasta, strukture i dinamike robnih tokova na ograncima V_B i V_C paneuropskog koridora V. Robni tokovi kao važni elementi prometne potražnje analizirani su obzirom na prisutnost konkurencije alternativnih sjevernojadranskih i sjevernoeuropskih prometnih pravaca kao bitnog elementa konkurentnog okruženja u borbi za pridobivanje vrijednog tranzitnog tržišta Srednje Europe. Temeljem detaljne analize konkretnih statističkih podataka izvode se značajni zaključci o: količini, dinamici i strukturi robnih tokova, trenutnoj prometnoj potražnji, konkurentnosti koridora na srednjoeuropskom tranzitnom tržištu, očekivanoj prometnoj potražnji, te zaključci o čimbenicima i okolnostima koje bi pozitivno, odnosno negativno mogle utjecati na rast robnih tokova, a time i na valorizaciju analiziranih ogranaka V_B i V_C paneuropskog koridora V u europskom okruženju.

KLJUČNE RIJEČI

paneuropski koridor V, ogranci V_B i V_C, robni tokovi, intenzitet, struktura, dinamika, prometna potražnja

LITERATURE

Books:

[1] **Padjen, J.**, *Prometna politika* (*Transport Policy*), Informatika, Zagreb, 1996

[2] **Dundović, Č.**, **Poletan Jugović**, **T., Jugović, A.**, **Hess, S.**, *Integracija i koordinacija lučkog i prometnog sustava Republike Hrvatske* (*Integration and Coordination of the Port and Traffic System of the Republic of Croatia*) , University of Rijeka, Maritime University of Rijeka, Glosa, Rijeka, 2006

Papers in Journals:

[3] **Favaretto, T.**, *La situazione delle infrastruttore di transporto tra l'Italia Nord-orientale*, Trieste e l'Europa Centro-orientale e Sud-orientale, Papers ISDEE, 2004

[4] **Kesić**, **Komadina**, **Dundović**, *Utjecaj prometnih koridora na razvoj luke Ploče* (*Influence of Transport corridors on the development of the Port of Ploče*), Proceedings, Faculty of Transport and Communications University of Sarajevo, Scientific Symposium on Transport with international participation, Traffic system of Corridor 5c - new development possibilities, Sarajevo, April, 2006

[5] **Poletan Jugović T.**, **Jugović, A.**, *Cargo Flows Intensity, Structure and Dynamics on Rijeka's Traffic Route*, Second International Scientific Conference on Port and Waterways, POWA 2007

[6] **Poletan Jugović, T.**, *Pogodnost i značenje Riječkoga prometnoga pravca u europskom sustavu kombiniranog prometa*, 26th Conference on Transport Systems with International Participation, Automation in Transportation 2006, Proceedings - KoREMA '06, 8-11. November, Split-Croatia, 2006

[7] **Poletan Jugović, T.**, *The integration of the Republic of Croatia into the Pan-European transport corridor network*, Pomorstvo - Journal of Maritime Studies, Maritime University in Rijeka, University of Rijeka, Vol. 20, No.1, Rijeka, 2006

[8] **Poletan, T.**, *Relevantni indikatori prometnog rasta i dinamike robnih tokova na Paneuropskom koridoru V_B*, (*Relevant Indicators of Traffic Growth and Cargo Flow Dynamics on the Pan-European Corridor V_B*) Pomorstvo - Journal of Maritime Studies, Maritime University in Rijeka, University of Rijeka, od/Vol. 18, Rijeka, 2005.

Dissertation:

[9] **Poletan Jugović, T.**, *Višekriterijska analiza u valoriziranju paneuropskog koridora V_B*, (*Multi-criteria Analysis in the Evaluation of the Pan-European Corridor V_B*), Maritime university in Rijeka, Rijeka, 2005, Doctoral dissertation

Internet sources:

[10] http://www.mvp.hr (16.06.2004.)

[11] http://www.hgk.biz.net.hr (04.06.2004.)

[12] http://www.lukarijeka.hr/novosti (10.04.2008.)

[13] www.port-authority-ploce.hr (10.04.2008.)

[14] http://www.portauthority.hr/rijeka (10.04.2008.)

[15] http://devdata.worldbank.org (27.09.2004.)

[15] http://www.moit.gov.il (17.06.2004.)

[16] http://epp.eurostat.ec.europa.eu (17.06.2006.)

[17] http://w3.unece.org (17.06.2006.)

[18] www.porto.trieste.it (16.2.2001.), The Study Plan in the Co-ordination of Transport System in the Region

Other sources:

[19] *Statistical yearbook of the Republic of Croatia - 2006*, State Office for Statistics, Zagreb, 2007

[20] *Traffic connections of Rijeka and its influence on the development of the port*, Institute of Transport and Communications, Zagreb, Sept. 2001, Port Authority Rijeka, Info, promotional material, Rijeka, 2003

[21] *Economic memorandum for Croatia, Strategy for economic development through European integrations*, Vol. 2, Main report, World Bank Document, July, 2003

[22] **Mencer, I.**, *Marketing*, authorized lectures, Faculty of Maritime studies and Transport in Rijeka, Rijeka, 1992

[24] *Port Function Restoration and Development Study - Rijeka Port Project*, Rotterdam Maritime Group, the Netherlands, May, 2002