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Traffic Planning
Review
Accepted: Mar. 15, 2007
Approved: Nov. 6, 2008

TRAFFIC ON THE CROATIAN INLAND WATERWAYS IN THE CONTEXT OF THE EUROPEAN PROGRAMME NAIADES*

ABSTRACT

On 17 January 2006, the European Commission accepted the Action Programme NAIADES for the promotion of navigation on the inland waterways on the European Union territory for the period 2006 - 2013. The programme has been harmonized with the White Paper guidelines – the "European traffic policy for 2010: time for decision", and recommends joining of the countries who are currently not the EU members, which includes Croatia.

The NAIADES action programme is based on five strategic, interdependent areas: market - improvement of market conditions; fleet – fleet modernization; personnel policy – development of human resources; image – creation of a better image and infrastructure – realization of infrastructure preconditions.

This paper analyses the basic hypotheses of the NAIADES action programme in order to shed light on the possible implementation of its guidelines regarding the development and promotion of traffic on the Croatian inland waterways.

KEY WORDS

Action programme NAIADES, market, fleet, personnel policy, image, infrastructure

** Naiades – from the Greek mythology - the Naïads, the nymphs of the inland waters, lakes, rivers, and wells; here, an acronym for Navigation and Inland Waterway Action and Development in Europe*

1. INTRODUCTION

Since its founding, i. e. with the signing of the 1957 Rome Agreement, the European Community has had as its objective the design of a common transport policy. More concrete measures in order to realize the mentioned objective started in the middle of the eighties, and the first "White Paper" on common transport policy appeared at the end of 1992. The basic principle of this document is liberalization of the transport market regarding its opening and enabling competition.

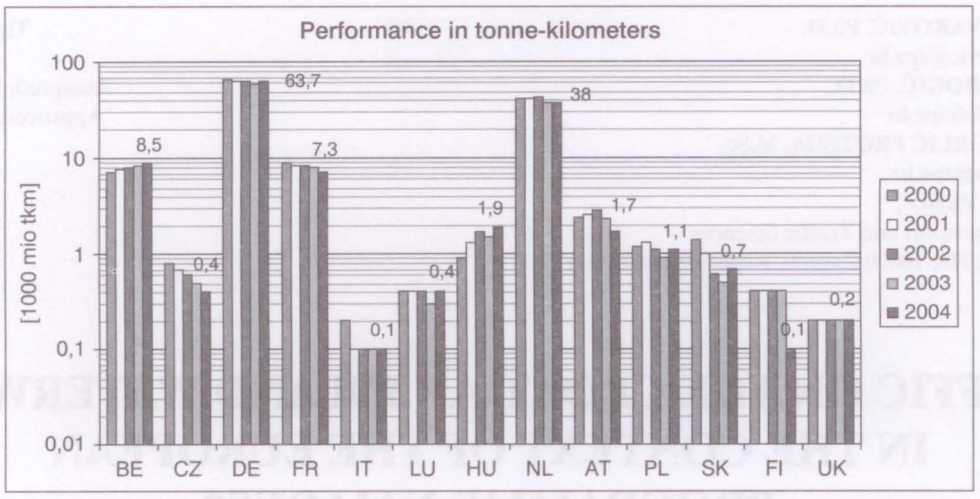
At the end of 2001 the second White Paper was issued[1]: "European Transport Policy for 2010: Time to Decide". This document proposed 60 specific measures that need to satisfy the requirements of sustainable transport development in the next decade. The measures include changes in the pricing system of individual transport modes in order to revive the transport modes that could replace road traffic, but also qualitative improvement of road traffic, revitalization of railway, promotion of water transport, affirmation of traffic intermodality, upgrading and target investments into trans-European transport network, increasing safety, efficient infrastructure charging, increase in the quality of urban traffic, functionality of research and technological development, achievement of environmental objectives of sustainable traffic system.

During 2006, the midterm review of the White Paper[2] was published. It resulted from the needs of recognizing new conditions of sustainable transport policy – conditions resulting from the processes of globalization, increase in the number of the European Union member states, Lisbon strategy oriented to development and increase in employment, constant rise in the price of oil, Kyoto protocol which stipulates reduction of CO_2 harmful emissions, and threats from terrorist attacks that have given a new dimension to the notion of safety and protection in traffic.

All the mentioned guidelines represent the foothold of the strategic programme for the promotion of transport on inland waterways.

2. ACTION PROGRAMME *NAIADES*

The development of overseas trade and EU enlargement to the area of Central and Eastern Europe



Graph 1 - Inland waterway transport performance in tonne – kilometres in European countries

Source: Commission of the European Communities „Communication from the Commission on the Promotion of Inland Waterway Transport NAIADES" Brussells, 2006.

Table 1 - Performance in tonne-kilometres in the Republic of Croatia 1996-2005

	Railway transport [Mln tkm]	Road transport [Mln tkm]	Pipeline transport [Mln tkm]	Sea water and coastal transport [Mln tkm]	Inland waterway transport [Mln tkm]	Air transport [Mln tkm]
1996	1717	1117	930	209382	22	4
1997	1715	1091	996	199440	22	3
1998	1831	1151	1183	165716	53	3
1999	1685	1093	864	142441	52	3
2000	1788	1090	669	140085	63	4
2001	2074	6783	1158	132168	78	4
2002	2206	7413	1557	128043	90	4
2003	2487	8241	1623	130090	84	4
2004	2493	8819	1841	134464	199	4
2005	2835	9328	1774	126064	311	4

Source: Statistički ljetopis Republike Hrvatske 2006, DZS, Zagreb, 2006.

brings, as expected consequence, the growth in freight transport in Europe by one third by 2015. Current indicators of the transport growth and its relying on road transport have become synonyms of congestion and pollution, and their costs are expected to double and thus reach 1% of the European annual gross national income by 2010.

Apart from railway traffic and short sea shipping, the transport on inland waterways can contribute to the sustainability of transport system in compliance with the White Paper guidelines. In the context of market liberalization in the area of transport on inland waterways, the European Commission is oriented to its promotion and increasing competition, particularly regarding integration processes in multimodal supply chains, which should result in greater share of this transport mode than up to now. The data on the realized traffic performance in the traffic on inland waterways in that period is stagnating or slightly falling. According to Table 1, in the Republic of Croatia in the same period it shows a growing trend.

Absolute value of the realized transport performance, however, is not adequate regarding the potential available in our country in that area.

In January 2006 the European Commission adopted the Integral European action programme for the promotion of transport on inland waterways named **NAIADES**[3] - **N**avigation **A**nd **I**nland Waterway **A**ction and **D**evelopment in **E**urope which is based on the implemented fundamental estimation and a large number of consultations with the member states and economy. The programme includes the recommendations for the activities that should be undertaken by the stakeholders in the period from 2006 to 2013. and the programme should be implemented in close cooperation between national and regional

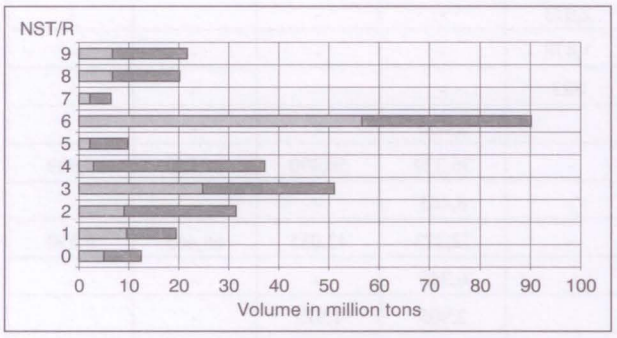
administration, river commissions and European economy.

The programme is focused on five strategic interdependent fields for a comprehensive policy of navigation on inland waterways: *market, fleet, staff, image (reputation, impression, picture) and infrastructure.*

Improvement of each of these areas, and consequently also their common synergic effect will allow creation of conditions for faster development and greater participation of transport on inland waterways as one of the most cost-efficient of traffic modes.

2.1 Market of freight transport on inland waterways

Bulk freight still occupies the leading position among the goods that are transported on inland waterways. Recently, especially in the area of West Europe, other types of freight are included such as containers, exchangeable vessels, palettes, and container-freezers, but still to a smaller extent. However, the fact cannot be neglected that the companies involved in freight transport on inland waterways have been recognized and have fast provided the possibility of transporting containerized freight, especially of those delivered by sea, that need then transport to remote inland places. Only on the internal waterways of Germany such freight almost reached until 2004 the number of 2,000,000 TEU, and the annual growth rate of container freight on the Flemish inland waterways within the period from 1997 to 2004 amounted to 31%. Such success is the result of the combination of competitive cost structures and offer of attractive logistic services.



Graph 2 - Inland Waterway Transport per Group of Goods 2001

Source: NewCronos, EuroStat 2003

The NST/R chapters represent:
0 agricultural products and live animals
1 food stuffs and animal fodders
2 solid mineral fuels
3 petroleum products
4 ores and metal wastes
5 metal products
6 crude and manufactured minerals, building materials
7 fertilisers
8 chemicals
9 machinery, transport equipment, manufactured articles, others

In the Republic of Croatia, there is the example of the port of Vukovar, where the annual transloading until 1991 ranged between 1.0 and 1.2 mil. tons of various goods that arrived mainly from Russia, Ukraine and Rumania, and for Bosnia and Herzegovina (coke plant Lukavac and ironworks Zenica). Coal was imported and iron products exported, usually metal sheets and reinforcing bars. Besides, bauxite had a significant share in export (Bosanska Krupa and Vlasenica) to the Czech Republic, and iron ore that arrived by combined transport from Brazil for the Austrian steelworks in Linz. Currently, over 900,000t of various goods are trans-loaded annually, usually, bagged sugar, cereals, oil crops, iron ore, artificial fertilizers, coal, bricks, with constant tendency of transport growth.

The possibility of market expansion suitable for using this transport mode can be found *also in new, still insufficiently developed "transport niches"* such as waste disposal and recycling, transport of dangerous substances, vehicles, heavy and inseparable freight and in the field of river-sea navigation. Although the volume of traffic on Corridor VII (the river Danube), comparing western with central and eastern Europe is falling, in Romania this transport mode is occupying again a respectable share in the total volume of freight transport, due to river-sea navigation.

Regarding transport of dangerous substances the port of Sisak needs to be mentioned which in the place of Crnac, where there is a terminal for handling crude oil and oil derivatives, over the Danube Lloyd from the port of Slavonski Brod delivered and trans-loaded 174,003 tons of crude oil during 2005, i. e. 156,935 tons during 2006.

The specific example for finding market niches in order to improve the market operation is the Port of Transit in Osijek, which, owing to the revenues realized from the sales of construction materials, successfully survived the period of war blockade of the navigation on the Drava and the Danube in the period from 1991 to 1997. Untraditional forms of operation of this Port refer to: trade of construction material, separation of gravel, production of concrete, vehicle parking.

The programme NAIADES emphasises that constant communication between the interested market parties and the local and regional initiative for cooperation of the internal waterway system and forwarders lead to the expansion of the market oriented towards transport on inland waterways. *Shippers and port authorities have to guaranteed orientation to users' requirements, satisfaction of demand and successful breakthrough of new users' services.* Thus, one of the big users of the Port of Vukovar includes also the biggest Danube shipper UDP Izmail from Ukraine, with whom an especially successful cooperation is being

Table 2 - Traffic by type of goods in the Port of Vukovar 2001 – 2007

Ord. No	Type of goods	2001	2002	2003	2004	2005	2006	2007. (January)
		[t]	[t]	[t]	[t]	[t]	[t]	[t]
1	Sugar	34,810	45,895	49,730	51,334	85,242	96,088	3,313
2	Logs	1,150	-	-	-	-	-	-
3	Transform., spec. freights.	692	981	1.002	765	3,642	2,003	181
4	Corn	4,851	-	-	2,539	-	-	-
5	UREA 46%	7,102	8,749	15,853	10,500	4,814	-	-
6	NPK 16-16-16 bagged	1,023	908	2,988	-	-	-	-
7	NPK 15-15-15 bulk.	1,825	12,132	4,671	-	2,069	-	-
8	KAN 27%	7,259	10,548	6,419	8,059	4,845	-	-
9	PK	-	1,014	-	-	-	-	-
10	Potassium chl/F.kal/A.nitr.	-	4,027	5,105	5,559	-	-	-
	MAP,KAN,	-	-	-	-	21,865	-	-
	Urea MOP	-	-	-	-	-	16,206	2,003
11	MAP bagged	-	-	-	-	-	3,349	-
12	Wheat	6,767	-	-	29,678	43,759	10,169	-
13	Oil rape	2,710	4,428	4,032	4,303	3,153	-	-
14	Soya	-	4,813	751	-	-	-	-
15	Sunflower sweet bread	-	2,833	7,835	13,559	4,435	7,618	811
16	Iron ore	-	10,049	-	14,150	489,048	564,450	38,750
17	Iron	1,476	2,175	-	-	-	-	-
18	Rolled metal sheets	2,917	1,257	10,135	-	-	-	-
19	Tyers	2,032	-	-	-	-	-	-
20	Barley	-	-	9,594	14,579	8,791	-	-
21	Am. nitr. bagged	-	-	1,435	-	-	-	-
22	Soya beans	-	-	1,114	3,704	7,005	9,692	3,732
23	Tiles	-	-	14,146	-	-	1,694	-
24	NPK 0120/30 pallet.	-	-	2,073	-	-	-	-
25	NPK 0/10/30 pallet.	-	-	1,478	-	-	-	-
26	POLYETHYLENE	-	-	883	-	-	-	-
27	NPK 9/15/15	-	-	-	2,000	-	-	-
28	Coal	-	-	-	36,339	50,490	27,568	1,959
29	NPK 15-15-15	-	-	-	6,465	-	-	-
30	Sheet, reinf. iron., wire	-	-	-	72,223	43,055	68,463	6,690
31	Ammon. phosphate	-	-	-	6,345	-	-	-
32	Old iron	-	-	-	2,905	1,913	-	-
33	Raw iron	-	-	-	1,924	4,344	6,395	-
34	Resin	-	-	-	50	793	-	-
35	PK 28120	-	-	-	3,143	-	-	-
36	Coke	-	-	-	709	-	48,153	8,353
37	Bricks	-	-	-	-	7,985	50,005	7,599
38	Oil rape sweet bread	-	-	-	-	9,320	3,195	539
39	Sunflower pellets	-	-	-	-	-	750	-
TOTAL		74,614	109,809	139,244	290,832	796,568	915,798	73,930

Source: Luka Vukovar

developed, so that in February 2006 the Agreement on agency services was signed.

Apart from the participants from industry, the chambers of commerce at regional and national levels play an especially important role in promoting transport of goods on inland waterways.

One of the proposed measures of the Programme was the *introduction of line traffic in order to support intermodal transport.* As shift to new forms of services requires high financial means, also the introduction of subsidies and reduction of external costs resulting from the shift to freight transport on inland waterways is proposed. The subsidized intermodal services should insist on constant schedules and regularity of lines.

Apart from financial support, the *strategic connection of shippers and port authorities* is of extreme importance for the success of intermodal transport on inland waterways, *as well as organizational and practical support of the EU member states in creating operative and business plans, lobbing, market activities on the legal framework of every single member.*

Small entrepreneurs have high influence on the development of target market, which is reflected in the current commercial success of container transport on inland waterways of the European Union. It was mainly performed by small shippers that navigate and operate with their families thus having a large number of working hours in a day and low overheads. Such type of entrepreneurship is traditional in freight transport on inland waterways, but noticeable decline in the number of successors in business represents a great problem in the future development. The solution could be looked for in new models of operation, such as e. g.: two or more families exchange themselves on one ship, but the constant achievements can only be brought by stronger measures, such as: better access to capital, elimination of administrative barriers, education, etc.

The mid- and small-size enterprises that are just about to join the freight transport on inland waterways have the big problem of difficult access to capital, so that it is necessary to *facilitate the acquiring of preconditions to get financial support* through the writing of the Financing manual that will provide the necessary information on the subjects of financing, financing criteria, examples of projects, contact persons and financial organizations (funds). Help is expected also from the *reduction of administration (one-stop-shop), i. e. creation of key places to solve a large number of issues in the field of inland waterways transport.* These initiatives should allow shippers easier access to financial funds and financing instruments, that include the European Investment Fund, Programme Marco Polo for intermodal transport, and the Programme for development of competition and innovativeness.

Table 3 - Economic indicators of Inland Waterway Transport Enterprises in EU in 2002

	Country	Number of enterprises	Turnover [mil. €]	Number of employees
1	Belgium (2001)	235	163.1	735
2	Czech			
3	Germany	1257	1690.7	11223
4	France	1176	476.7	
5	Italy	711	211.9	2959
6	Luxemburg	103	42.7	1212
7	Hungary	105	66.1	1920
8	Netherlands	3510	1374	9207
9	Austria	59	83	330
10	Poland			
11	Portugal	26	23.4	838
12	Slovenia	20	0.4	26
13	Slovakia			
14	Finland	85	21.6	252
15	Sweden	393	69.5	1021
16	United Kingdom	217	165.5	1921
	EU 25	7662	4225.5	30909
17	Bulgaria	12		
18	Romania	102	77.8	4123

Source: Eurostat (economic activitiy according to NACE Rev. 1 classification)

Harmonization of administrative requirements, such as technical conditions for ships, the stipulated number of working hours, etc. will also contribute to the integration of freight transport on inland waterways into intermodal logistic chains.

2.2 Fleet of vessels on inland waterways

During 2005, about 12,500 motorized vessels were registered on inland waterways of the European Union countries, out of which 95% were registered in the Netherlands, Germany, Belgium and France. Regarding number and capacity Germany has the biggest fleet, and the most common regarding the type of freight in transport on inland waterways are the self-propelled ships for dry freight (7,100 registered) and tankers (1,400), and the rest includes push- and tow-boats[4].

The average age of today's European self-propelled ships for dry bulk freight is 37 years, whereas for tankers it amounts to 31 years. In Germany, the age of fleet for the transport of dry freight is still greater and exceeds 50 years. However, as opposed to old age of

Table 4 - Fleet on inland waterways of Republic of Croatia

	Tug-boats and pusher crafts		Self-propelled barges, self-propelled tanker barges, non-powered cargo vessels	
	Number	kW	Number	Capacity [t]
1996	25	11801	107	89301
1997	25	11801	104	87150
1998	27	11189	98	73276
1999	27	11166	98	73297
2000	32	11515	103	71738
2001	32	11515	99	66786
2002	24	9586	76	56330
2003	25	9736	74	55149
2004	25	9465	73	52321
2005	24	10315	73	57231

Source: Statistički ljetopis Republike Hrvatske 2006, DZS, Zagreb, 2006.

the ship hull, the rest of the equipment (engines, ship propellers, and communication equipment) *have been constantly changing and have been modernized*.

The ship owners install new engines and other components as soon as they become available and economically justified, and new information and communication technologies require constant upgrading of the existing equipment. One of the guidelines of the NAIADES action programme is precisely the stimulation of this type of fleet modernization.

Over time, ships of increasing capacities have been introduced on the EU inland waterways, so that today those of 5,000 tons are not rare, and in case of tankers even of 8,000 tons capacity. Smaller ships, according to the recommendations of the NAIADES action programme also have a future, mostly in the area of feeder services from and towards the ports – hubs and on lower category waterways, and therefore it is necessary to work on the improvement of their economic cost-efficiency, which can be contributed by the faster freight handling technologies, greater number of navigations annually, reduction in fuel consumption, etc. Apart from them *attention should be paid also to ships that can navigate in extreme conditions (e. g. at low water levels or ice), and recognized as perspective area is the river-sea navigation. It is also necessary to adapt the structures and standard ships to the conditions on the waterways of certain rivers.* It is recommended to seek the means for research and implementation of possible innovations in this area within the frame of the Main European scientific-research programme for the period from 2007 to 2013, the so-called FP7 (Framework Programme 7).

France, Belgium and the Netherlands approved during 2005 the programmes for co-financing the purchase and installation of more economic and environmentally friendlier engines and advanced information and communication technologies.

The fact that 70% of the EU fleet is owned by small-size enterprises makes it difficult to modernize the fleet because such enterprises have difficult access to the capital. Therefore, the NAIADES action programme proposes establishing a fund at the European Union level. By regulation (EC) N° 718/99 a Reserve fund for inland waterways was established, financed by the profession, that can be directed to supporting and co-financing of the innovative concept in the field of fleet modernization regarding improvement of working and living conditions on ships and fulfilling the safety and environmental protection, stimulation of the shippers to join the professional associations, thus strengthening the position, development of new services and logistic concepts, training of the navigation personnel and related entrepreneurships, including the personnel that will provide and manage their training.

The idea is that the fund be financed in equal shares by the transport sectors on inland waterways, the European Union and member states.

The presentation of standards for harmful emissions by the Central Commission for Navigation on the Rhine (CCNR) represents the first step in the redefinition of their permitted levels, and additional regulations may be expected from the Commission towards reducing the allowed (sulphur) contents in fuels. Therefore, it is necessary to provide co-financing of the *research and development of projects that treat the environmentally-oriented propulsion engines, design of ship structures, ship propellers, introduction of catalytic converters, new technologies of filtering and services of collecting bilge water and waste as provided on the river Rhine*. There, during the year, about 60,000 tons of bilge waters with ca. 5,000 tons of grease, other waste, filters, coolants, etc. are collected in specialized disposal areas[5]. Such services or places of this type do not as yet exist on the river Danube.

In any case, the NAIADES action programme recommends further research towards the development and application of non-fossil fuels, bio-fuels, particularly bio-diesel and engines with zero rate of harmful emissions.

2.3 Transport staff on inland waterways

The existence of a sufficient number of highly educated employees is the basis for successful operation of any economy branch. Unfortunately, the statistics show a decreasing number of craftsmen, pupils and students in the professions related to transport and navigation on inland waterways. Germany has marked a fall in those enrolled in handicrafts from 400 appren-

tices in 1990 to 164 during 2000, and in Dutch schools the percentage of those giving up further education for the ship crew jobs is as much as 42%[6]. The result is that it is more and more difficult to find and employ qualified and motivated workers, which has been a bit alleviated in the Netherlands by the employment of foreign workforce. During 2004, they have registered the issuing of about 700 work permits to Czech citizens who work in the crews of the Dutch ships. Employment of people from the countries of Central and South-eastern Europe has somewhat increased the total costs of operation (compared to domestic family enterprises), but for the moment it is one of the possible solutions. In the future, with the development of transport on inland waterways of these parts of Europe, a reversible process is expected as well.

With the aim of improving the situation of the personnel segment, the NAIADES action programme proposed several guidelines. As imperative, the conditions of work and social conditions of employees need to be improved and balanced with the social conditions in other economic sectors. In order to harmonize the conditions of operation for all the companies that operate in the sector of inland waterways it is necessary to harmonize their national legislation. More attractive working and living conditions of the crew should result in a larger number of those interested for this type of profession. The right place for solving such issues is the Sectoral Dialogue Committee on Inland Waterways, founded in 1998 for establishing a dialogue between social partners at the European level.

The next proposal is the improvement of business possibilities and strengthening of knowledge about them. Local employment agencies need to present the employment programmes in the inland waterway transport sector with focus on job security, possibility of promotion, and modern tendencies that have been developed in the meantime in this sector. Education should be made attractive for those who have acquired qualifications in other transport courses so that the modular system may facilitate their transfer to the course in water transport.

The lack of workforce will be alleviated not only through the free protocol of employees within the European Union, but also through inflow from the third countries whose rights should be covered by the general guideline announced in the Plan of legal migrations policy for 2007 (COM (2005) 669, 21.12.2005). The emphasis is on the introduction of clear and harmonized employment rules, that will be strictly controlled after implementation, in order to avoid misuse.

The NAIADES action programme further warns that the past efforts in regulating recognition of qualifications acquired in different EU countries have to be maximally developed in order to achieve complete social mobility of employees in internal waterways transport. This is the basis for the preparation underway of the European Qualifications Framework (EQF) which will facilitate recognition and acknowledgement of the obtained certificates by connecting the national and regional systems.

For the future it is of crucial importance to maintain the work of the institutions that educate the personnel involved in inland waterways. The study of water traffic at the Faculty of Transport and Traffic Sciences, University of Zagreb, provides acquiring of competences in the area of traffic on inland waterways, but there certainly exists the need for professionals of this profile also at the level of secondary education. Therefore, the establishing of secondary schools and colleges involved in courses of water traffic should be considered, especially in the cities with the existing river ports where there is tradition and possibilities of employment.

All this requires not only financial means, but it is also necessary to bring educational curricula maximally close to the advanced business requirements. Education using simulators such as used in curricula for air and maritime transport would contribute a lot to the inland waterway navigation safety.

The programme emphasises the importance of lifelong education considering the constant modernization of the operating and business conditions, which can be achieved not only through the usual institutional forms but also specific courses (e. g. work with radars or obtaining of ADNR certificates). Upgrading of education level will open up new possibilities and attract a greater number of students than in the past.

Education should not be directed only to technical and technological specific characteristics of water transport, but has to provide knowledge in the field of business management, law, economy and investment operation, in order to create independent entrepreneurs in this area completely adapted to the market requirements.

2.4 Image of inland waterways transport

In spite of modernization and technological innovations that have marked inland waterway transport over the past 15 years, the public image of this form of transport is still as if it were an old-fashioned, slow transport oriented to bulk freight. Therefore, a shift in the way of thinking plays an important role as well as its inclusion in the operation of supply chains. The past initiatives have not been successful enough, because they were *sporadic and prepared ad hoc, not realizing the satisfactory level of communication with decision-makers, strategic factors and the public.*

In some EU countries promotion agencies for transport on inland waterways have been established, because of the recognized need for *permanent work on*

informing the public and economy about the possibilities it provides, as well as on actual changes with the aim of improving the level of service and modernization. Funds established for financing such agencies have means of €200,000 to 500,000 annually. The efficiency of operation of these agencies is reflected in the growth rates of using inland waterway freight transport.

The NAIADES action programme has proposed that this transport mode be presented as a successful partner in business through *coordinated and co-financed promotion campaigns.* The campaigns should be carried out at two levels – one intended for wider public through mass-media and special seminars and personal contacts would be intended for target groups. The common leading idea that should underline both types of communication is in realizing the synergic effects.

The objective of promotion represents greater share of this transport mode compared to the previous situation and therefore the emphasis should be placed on intensive information of the public on its advantages especially *focusing on the decision-makers in logistic processes.*

Adequate structures for the promotion of inland waterways should be established both in the EU member countries and in the accession countries. They should work on directing and encouraging the economic entities towards the transport of freight on inland waterways by means of adequate transport and logistic solutions, cooperation with the ports, port authorities, shippers and forwarders. Besides, the agencies should offer assistance to government bodies in defining and implementing national strategies of transport development on inland waterways.

Essential factors in the efforts of the Republic of Croatia to improve the image of internal waterway navigation and to stimulate its cooperation with other transport modes certainly include:

CRUP - (Centar za razvoj unutarnje plovidbe) Inland Navigation Development Centre – a company founded in 2003 on the principle of public-private partnership (PPP) by the Port authorities of Osijek, Sisak, Slavonski Brod and Vukovar, port operators and shipping companies with the main objective in the development and modernization of inland waterway navigation in the Republic of Croatia. The following projects are being developed:

- revitalization of the Croatian rivers the Danube, the Sava and the Drava;
- development of Croatian ports and port berths;
- CRORIS – introduction of river information service (RIS) along the Croatian section of the Danube;
- CB-RIS – international, Croatian-Hungarian project of introducing information technology of the river transport systems of the Drava and the Danube started at the end of March 2006 on the sections of both rivers where Croatia borders on Hungary.

IPC - Intermodal Danube-Adriatic promotion centre, umbrella society of intermodal transport in the Republic of Croatia and the member of EIA – European Intermodal Association with the main objective of improving intermodal transport on the Adriatic-Danube basin area. The activities directed to achievement of the objective include stimulation of the projects connecting sea, rail and inland waterway transport:

- connection of the Adriatic ports (Ploče, Rijeka) through pan-European corridors X, Xa, Vb, Vc and intermodal terminals with the countries of Central and Eastern Europe;
- incentive to the development of the Port of Vukovar as potentially key intermodal transport-logistic centre in this part of Europe that connects all the transport modes and three trans-European corridors Vc, X and VII

The work of the agencies requires *political, financial and practical support* from all the stakeholders, and therefore the Programme plans their integration for the sake of systemic campaign directed to the public.

Among other things, the EU countries as well as the candidate countries should establish the *national administrative one-stop-shop.* In their operation the government services should work on the promotion and development of transport on inland waterways, present the coordinated activities on this plan and exchange information and experiences at international level. In this way a *European network* would be formed that would multiply their individual efforts and make their operation more efficient.

2.5 Traffic infrastructure on inland waterways

The total length of inland waterways in the European Union amounts to ca. 37,000 km, out of which more than 12,000km is accounted for by international waterway category (category IV and higher) of interconnected rivers and canals, 444 locks and several hundred of river ports and berths. In the same area the total length of railway lines is approximately five times greater. The network of European inland waterways connects the majority of European economic centres, and at the same time represents with its free capacities a significant potential. The total capacity of the river Danube has been used only by 7–10%. This, as well as poorer usability of some other parts of the European network of inland waterways is contributed by a certain number of "bottlenecks" which are the result of smaller depths and widths of some rivers and canals, limiting capacities of locks, bridge clearances, and

poorer freight handling capacities of some ports and terminals. It has been calculated that e. g. per every decimetre of reduction in the water level of the Danube waterway there is a reduction of capacity by 70 to 100 tons per vessel.

River ports affect also to a great extent the possibilities provided by inland waterway transport – this refers especially to their level of equipment, possibility to provide intermodal transport in their territory and to provide different logistic services. Integration of inland waterway transport into intermodal transport does not depend only on physical assumptions of the port but rather on the possibilities of providing and exchanging information, with a very significant role in this played by the River Information Service – RIS. It allows avoiding of many errors and maximal usage of the possibilities they provide. This requires realization of interoperability of its applications, which is complicated by the fact that for the moment there are different standards – those accepted by PIANC and by CCNR. A unique concept is about to be accepted, with the bases that exist in the European White Paper for transport, revised guidelines of TEN – T programs and finally in RIS Directives. The European Union is also financially supporting the master plan IRIS, which will create the frame for coordinated implementation of RIS in Europe.

In the Republic of Croatia, as part of creating the River Information Service there were different activities related to the following phenomena:

D4D – databases for the Danube waterway is the project started within Interreg III B programme as part of GIS forum for the Danube. GIS forum was joined in 2001 by Hungary and Croatia and after them Rumania, Ukraine, Serbia and Montenegro, and Bulgaria. The basic tasks of the GIS forum is more intensive cooperation in managing the Danube waterway;

CRORIS – implementation of the Croatian river information service along the Croatian section of the Danube;

CB-RIS – international, joint project of Croatia and Hungary aimed at informatization of river transport systems of the Drava and the Danube, started at the end of March 2006 on the parts of both rivers where Croatia borders on Hungary.

The NAIADES action programme recommends *maintenance and improvement of the European inland waterway network condition* which is not just the task of some countries but should be handled and supported at the European level. The proposal is therefore to form the European development plan for maintenance and improvement of inland waterway infrastructure. This plan would go beyond the priority frames of the TEN – T network, including the projects of general interest and taking care also of minor waterway networks.

The plan should define:

- the standards of widths and depths of waterways, bridge clearances, and average waiting times at terminals and locks;
- the priorities of investments both in the main waterways, and those that are regarded as secondary from the European aspect;
- elimination of bottlenecks and connecting of the as yet unconnected waterways;
- inclusion of environmental requirements;
- condition and status of the European network of inland waterways and the respective infrastructure – through regular assessments.

The NAIADES action programme also recommends *stimulation of joint agreement on multi-purpose usage of inland waterways,* which will be realized only if both economic and ecological interests are taken into consideration. The interdisciplinary dialogue should consider all the relevant standpoints of a certain project in order to find the optimal solution.

The next recommendation is *to give incentive to the development of port and freight handling capacities,* which will result as a consequence of inter-cooperation of the port authorities, operators, and users, but also proper investment strategies. It should be noted that the Programme has recognized the need to build a network of terminals on inland waterways, especially in the countries that have only recently joined the EU and the candidate countries, thus providing the necessary freight handling capacities.

Some steps have already been undertaken in the Republic of Croatian in this aspect at several locations. After a thorough market research, a high-quality Master plan has been made, i. e. the Development study of the port of Vukovar, which was made by the Engineering bureau from Zagreb, ordered by the Vukovar Port Authority, and with participation of foreign companies MHC (Material Handling Consulting), Duisburger Hafer AG and ABX Logistics (Deutschland) GmbH. The elements of the Study include:

- the concept of the port,
- logistics concept,
- concept of ownership and management; description of infrastructure, buildings and equipment,
- financial concept.

At the beginning of 2005 the Feasibility study of the project "New port of Vukovar" was presented, made by the Dohr Capital GmbH from Munich, consisting of the following:

- the project feasibility study,
- assessment of the Development study and the existing scenarios of the development of the Port of Vukovar,

- financial analysis and cost-benefit analysis,
- risk analysis,
- study of the environmental impact,
- structuring of the project, possibility of realization through public-private partnership,
- transport sector analysis, updating and harmonization of the projected transport conditions for the port of Vukovar,
- solving of legal ownership issues in the port area.

The entire port complex would form an integral whole connecting water, rail and road transport, as well as production and trade.

As part of investments into infrastructure and the freight handling capacities, public lighting has been installed in the port of Vukovar, which allows working in three shifts. Besides, an agreement has been signed with Inland Waterway Development Centre for the construction of the system of control and supervision of traffic and as part of it, the Port authority has joined the CRORIS system. Software for monitoring logistic processes at the port (e-Port) has been developed, and it will facilitate monitoring and control of transport by the Port authority, containing the data on weather, ship arrivals and departures, quantity and type of freight, etc. Its usage will be available to the port users, thus facilitating their business operations. The implementation of the e-Port system will automate the process of monitoring and charging transport at the port of Vukovar, and will enable statistical monitoring of freight and passenger traffic.

During 2005 the larger part of legal ownership relations in the port area has been solved, so that 2006 saw the preparation activities for the beginning of the preliminary design of the construction of the "New port East" and in 2007 the port dockside crane was installed and started operating. At present, the purchase of a diesel forklift of 20,000kg load capacity on a 1200mm block is underway.

Regarding other infrastructure investments into the port capacities in Croatia, one should mention the construction of the building berth that started to operate at the beginning of December 2005, for ships at Sisak. On that occasion a special system of cranes was used to lift the river ship Sisak, the largest ship of the Danube Lloyd onto dry-land in order to carry out the necessary overhaul.

For the ports of Osijek and Slavonski Brod, the development plans are about to be completed and they will define the future investments into the port and freight handling capacities.

Within the development of the river ports the emphasis should be on the complementary characteristics of water and rail transport, and with the aim of further integration of water transport into intermodal logistic chains tri-modal interfaces need to be established wherever possible, including the EU accession candidate countries. For the moment, only several ports (e. g. Duisburg and Basel) have the possibility of loading containers from barges onto railway cars, and the condition is even worse in the new EU member countries and the candidate countries where the absence of intermodal freight handling infra- and suprastructure represents a great problem in establishing intermodal logistic services in water transport.

The development of industrial zones in the vicinity of inland waterways is another recommendation resulting from the Programme, which belongs to the task of spatial and economic planning at federal, regional and local level. Moreover, the spatial planning should put an emphasis on revival and development of the existing industrial zones in the vicinity of waterways.

3. CONCLUSION

Apart from railway traffic and short-sea shipping, the transport on inland waterways is maybe in the best position to contribute to the sustainability of the transport system in compliance with the White Paper guidelines. Therefore, the European Commission want to increase the competitiveness of inland navigation by promoting it, especially in the context of multimodal supply chains.

The NAIADES action programme has focused on the improvement of five strategic areas and the resulting synergic effects, which are used to create the assumptions for faster development and greater share of economic and ecologically acceptable water transport in the overall freight transport. Water transport of containerized freight from sea ports to inland destinations has marked over the last several years in certain European regions large growth rates, based on the competitive cost structure. This is the reason that in this area of freight transport, with, as it seems, inevitable high future growth, the tendency is to increase the share of this transport mode, and the attempt to increase its ecological acceptability is made through development and use of non-fossil fuels, bio-fuels, and especially engines with zero rate of harmful emissions. At the same time, a number of measures give incentive to personnel policy which would remove the threat of short-supply in professionally qualified workforce. This is also contributed by the efforts to change the general image of inland waterway navigation. And finally, the infrastructure assumptions for the trimodality of river ports represent the basis for their integration into the multimodal logistic supply chains.

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SAŽETAK

PROMET NA UNUTARNJIM PLOVNIM PUTOVIMA REPUBLIKE HRVATSKE U SVJETLU EUROPSKOG PROGRAMA NAIADES*

Europska komisija je 17. siječnja 2006. godine prihvatila Akcijski programme NAIADES za promociju plovidbe na unutarnjim plovnim putovima na prostoru EU za period 2006 -2013. Programme je usklađen sa smjernicama Bijele knjige „Europska prometna politika za 2010: vrijeme za odluku", preporučuje uključivanje država koje trenutno nisu članice EU, pa tako i Hrvatske. Programme NAIADES se temelji na pet strateških, međusobno ovisnih područja: tržištu - tj. poboljšanju tržišnih uvjeta, floti - modernizaciji flote, kadrovima - razvoju ljudskih resursa, imidžu - stvaranju boljeg imidža i infrastrukturi odnosno ostvarenju infrastrukturnih preduvjeta. Ovim člankom se analiziraju temeljne postavke programa NAIADES u cilju rasvjetljavanja moguće implementacije njegovih smjernica u funkciji razvitka i promocije prometa na unutarnjim plovnim putovima RH.

KLJUČNE RIJEČI

Akcijski program NAIADES, tržište, flota, kadrovi, imidž, infrastruktura

** Naiade – from the Greek mythology, the iz grč. mitologije, nimfe kopnenih voda, jezera, rijeka i izvora, no predstavlja i kraticu Navigation And Inland Waterway Action and Development in Europe*

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