ELEKTROTEHNIŠKA ZVEZA SLOVENIJE

ZBORNIK REFERATOV
PROCEEDINGS

10. MEDNARODNI SIMPOZIJ O
ELEKTRONIKI V PROMETU

10th INTERNATIONAL SYMPOSIUM
ON ELECTRONICS IN TRAFFIC

ISEP 2002

Znanstveno-strokovni simpozij
Scientific-technical symposium

3. in 4. oktober 2002
October 3 and 4, 2002
LJUBLJANA

Izdala:
Elektrotehniška zveza Slovenije
zanjo dr. Marko Jagodič

Razmnoževanje:
Borut Verhovec s.p. Ljubljana

Naklada:
160 izvodov

CIP - Kataložni zapis o publikaciji
Narodna in univerzitetna knjižnica, Ljubljana

656:504(063)(082)
656:004(063)(082)

MEDNARODNI simpozij o elektroniki v prometu (10 ; 2002 ; Ljubljana)
Zbornik referatov : znanstveno-strokovni simpozij = Proceedings : scientific-technical symposium / 10. mednarodni simpozij o elektroniki v prometu, 3. in 4. oktober 2002 = 10th International Symposium on Electronics in Traffic [also] ISEP 2002, October 3 and 4, 2002, Ljubljana ; [uredili Mario Anžek, Stojan Petelin, Peter Verlič]. - Ljubljana : Elektrotehniška zveza Slovenije, 2002

ISBN 961-6187-24-4
1. Anžek, Mario. - I. International Symposium on Electronics in Traffic (10 ; 2002 ; Ljubljana) glej Mednarodni simpozij o elektroniki v prometu (10 ; 2002 ; Ljubljana). - II. ISEP (10 ; 2002 ; Ljubljana) glej Mednarodni simpozij o elektroniki v prometu (10 ; 2002 ; Ljubljana)
120030976

VSEBINA
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AFIRMACIJA INFORMATIČKIH TEHNOLOGIJA - PUT K SIGURNOM MULTIMODALNOM TRANSPORTNOM SUSTAVU U REPUBLICI HRVATSKOJ

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Sažetak- ***Međunarodni gospodarski i prometni uvjeti, kao čimbenici u kojima djeluje Republika Hrvatska kao samostalana i suverena država, te kao sastavni dio Europe, postavljaju potrebu za intenzivnim ulaganjem u cjelokupni prometni sustav, posebice u multimodalnu transportnu infrastrukturu i informacijske tehnologije u predstojećem razdoblju gospodarskog i prometnog razvitka.***

Zemljopisno-prometni položaj Republike Hrvatske i njezino intenzivnije uklju čivanje u europske i svjetske prometne i gospodarske tokove, zahtjevaju definiranje prometnih koridora koji će prometno valorizirati prednosti njenog položaja u Europi. Imajući na umu navedene spoznaje nameće se nužnost čim veće primjene informacijskih tehnologija u multimodalnom transportu i na taj način povećanja sigurnosti u prometu. Ispravnim i pravodobnim povezivanjem različitih transportnih sredstava u konačnici može pridonjeti valjanoj geostrateškoj i geoprometnoj valorizaciji ovih područja uz povećanu sigurnost.

Summary-*International economy and transport conditions like subjects in which Croatia exist as an independent and save region state, as a basic part of Europe, force the needs for more intensive investments in the whole transport system, especially in multimodal transport infrastructure in the further period of economy and transport development.*

Geographical-transport exposure of Republic Croatian her intensive integration in European and worlds transport and economy corridors, has due to define a transport corridors that should valorised the advantage of position in Europe. Therefore, it is necessary to use multimodal transport as much as possible and to extend a safety in transport. With correct and prompt linking of means of transport in the end can result with achievement geostatic and geotraffic valorisation of our area with higher safety.

Key Words: ***economics, transport system, multimodal transport, safety, multimodal infrastructure.***

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1. INTRODUCTION

Transport in Croatia has just recently reached its expansion phase. Construction of few main roads, reconstruction of railway tracks, as the return of cargo into Croatian sea harbours identifies the need for introduction and affirmation of multi-modal transport. Unlike the conventional, classical transport, international multi-modal transport can not exist as a single, independent transport form, but only as a complex system in its surrounding. By internationalising economy subjects businesses concerning transport, a faster inclusion into international transport and economy flows shall be enabled. Multi-modal transport as a modern way of merchandise transport, successfully bonds almost every branch of transport (means) and modern transport technologies on international transport corridors.

Modern social and economy development of each country, as for Croatia, is tightly bonded with the development of its traffic movements. Transport flows modernization is regarded as an inevitable demand brought up by time and future needs. Quality transport infrastructure directly contributes to active economy potential usage, and acceptance transport information technology enables greater safety and transport modernization.

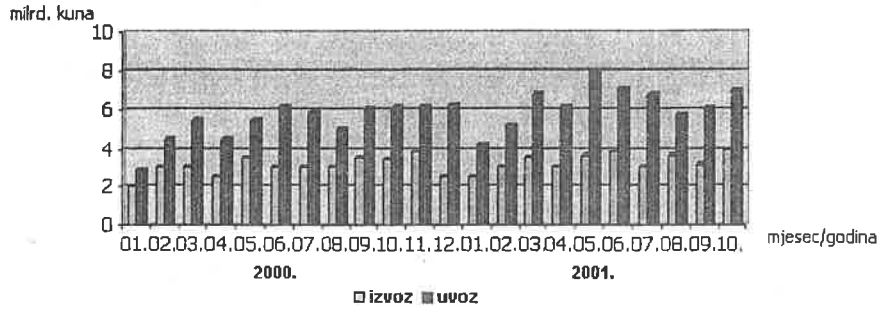
For achieving the goal of Croatia's faster inclusion into European traffic flows regarding this paper, **the subject of research** is: to explore and substantiate the relevant Croatian economy and transport system characteristics, especially information technology within those systems, and their influence on future development of adequate multi-modal transport structure. Problem and subject of this research have determined **a working hypothesis**: Consistent cognition concerning relevant Croatian economy characteristics, stage of transport infrastructure development and the opportunities given by the information technologies, it is possible to point out the advantages raised in multi-modal transport realization by bonding information technologies of different transport branches.

The results of research have influenced on a theme model interpretation within five linked parts. Following **introduction**, second part (**State, condition, situation of Croatian merchant flow analysis**), exactly shows Croatian international trade index concerning last couple of years and their implications on economic development; third part (**Croatian transport infrastructure analysis**), gives the transport infrastruction grading; fourth part (**Information technology role played in the multi-modal transport**), elaborates direct and indirect information technology and system influences on transport; last part (**Conclusion**) gives the research result synthesis.

2. STATE, CONDITION, SITUATION OF CROATIAN MERCHANT FLOW ANALYSIS

On a global scale, Croatia belongs to a group of small, open economies. The necessity of including Croatia into integration processes, and the interest Croatia has for bondage with EU is perfectly clear: advanced international cooperation by commodity and services movement liberalization, as well as creating conditions for foreign capital inflow. Next chart shows the commodity exchange movements in Croatia for 2000., and 2001, assembled by months.

Chart 1: Croatian commodity exchange, in years 2000. and 2001.
(By months)



Source: Statistics, 2001.

Commodity exchange by states shows powerful orientation of Croatian economy towards the EU market. That is the consequence of favourable changes of trade Croatian products treatment by members of EU and recently signed agreements, but also of insufficient relationship recovery concerning traditional market of narrow region. In the group of the rest European countries, the biggest part of exchange is with Russia and Bosnia and Herzegovina (approximately 76%), as for non-European countries, biggest ones are USA and Japan.

Almost 86% of commodity exchange concerning previous year has been done with European countries. Regarding the country graduations, far biggest part of Croatian commodity trading goes to European Union countries, 55%, while on the CEFTA countries as well as on the rest of the world goes approximate share of 14% each. Table 1 gives the interpretation of Croatian commodity exchange for 2001., grouped by countries.

Table 1: Croatian commodity exchange, 2001., grouped by countries.

Country integration	Export		Import		Total	
	mil. USD	%	mil. USD	%	mil. USD	%
EU Countries	2,547	54,7	5,061	56,0	7,608	55,52
EFTA Countries	49	1,1	193	2,1	242	1,2
CEFTA Countries	566	12,1	1,420	15,7	1,986	14,5
Other European countries	933	20,0	933	10,3	1,866	13,6
Rest of the world	564	12,1	1437	15,9	2,001	14,6
TOTAL	4,659	100	9,044	100	13,703	100

Source: Economy review, 1/2002,gouvement statistic office, http://www.mvp.hr 11.05.2002

After Croatian commodity exchange for 2001., grouped by countries table, next table shows the most important trading partners for Croatia, individually:

Table 2: Ten biggest Croatian trading partners for 2001., - by total value.

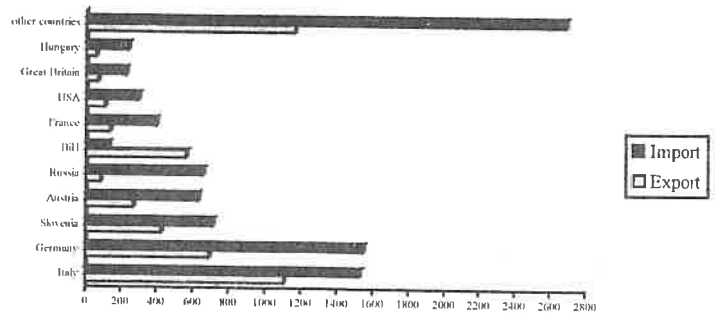
Num.	STATE	Export		Import		Total	
		Mil. USD	%	Mil. USD	%	Mil. USD	%
1.	Italy	1,104	23,7	1,524	16,8	2,628	19,2
2.	Germany	689	14,8	1,547	17,1	2,236	16,3
3.	Slovenia	426	9,1	712	7,9	1,138	8,3
4.	Austria	268	5,8	631	7,0	899	6,6
5.	Russia	83	1,8	654	7,2	737	5,4
6.	Bosnia and Herzegovina	560	12,0	127	1,4	687	5,0
7.	France	136	2,9	398	4,4	534	3,9
8.	USA	107	2,3	297	3,2	404	2,9
9.	Great Britain	67	1,4	226	2,5	293	2,1
10.	Hungary	57	1,2	238	2,6	295	2,2
11.	Other countries	1,162	24,9	2,690	29,7	3,852	28,1
	TOTAL	4,659	100	9,044	100	13,703	100

Source: Gospodarski pregled, 1/2002, Državni zavod za statistiku, www.mvp.hr (11/05/2002)

This rating chart has been unchanged with regards on the previous year. The exchange with the first ten countries sums up to $13,7 mil., which is 72% of total Croatian exchange with the world. 50% of exchange is with the first four countries. Besides Bosnia and Herzegovina, Croatia has a negative trading balance with all other nine partners. First ten partners represent 65% of Croatian commodity exchange deficit, which means that export is covered by import with 55%.

Largest commodity exchange Croatia has with Italy, which sums up to $2,6 mil., 19,2% of total exchange. Croatia has exported the value of $1,1mil. Into Italy, what is 12% more than the previous year. At the same time, import from Italy has summed for $1,5 mill. and has increased for 16%. Exchange with Germany, $2,2 mill., 16% of total exchange, and the export $689 mil., 9% increasment regarding the previous year, while the import, $1,5 mill. is 19% higher. In spite of diminished export by 11%, and import by 14% higher, Slovenia is still the third Croatian trading partner. Situation is similar with Austria, fourth, where Croatian export has decreased by 8%, and import from Austria has risen by 19%. Next ones are Russia (primary because of oil import), Bosnia and Herzegovina, France, USA, Hungary and Great Britain.

Chart 2: Most important country partners regarding Croatian export and import, 2001.



Source: Statistics, 2001.

3. CROATIAN TRANSPORT INFRASTRUCTURE ANALYSIS

After ex Yugoslavia falling apart, Croatian international transport, previously done by transport corridor Ljubljana-Zagreb-Beograd, has been altered to V.corridor Hungary-Zagreb-Rijeka. Insufficient investments and bad infrastructure shape concern ably diminishes transport on that corridor. Croatian transport infrastructure is generally below European standards. That includes roads, railways and airports. Demolished bridges on Dunav and Save still interrupt road and railway transport and land navigation.

Croatian railways sum up to less than a one third of transport they had in the nineties (last century). Service quality is unsatisfactory at almost the entire area of existing railways. As an exception to this there is only one part of railways that belongs to X. pan European corridor. Numerous speed limitations are the result of the unsatisfactory maintainment or aged signal-safety and telecommunication devices. Development of Croatian railways if far behind European Union countries, and greater part of railways is even behind Eastern European countries. This underdevelopment is especially visible concerning electrification of railways and dual-gage railroad. Maximal speed that can be driven at only 13% of railways is 100 km/h, while at the almost 43% of railways maximal allowed speed is 60 km/h. The only exception is the railway speed between Novska and Vinkovci, dual-gage railway, electrificated and allows speed of 160 km/h. The table shows length and thickness railways comparesment within Croatia territory and European Union countries as well as with the Middle East Europe.

Investments into roads have been six times greater than those in railways, regarding the last decades, but still nor road nor railway infrastructure are developed as they should have been, especially, concerning quality. By partial building planned highways, and further planes of building new and renewing current roads, Croatian road transport should easier and faster get closer to European road system. But, current situation is still far behind satisfactory. Road thickness is approximately 70% compared to European Union. Croatian road network quality is not satisfactory because of the same reason as it is not satisfactory regarding railways, which is insufficient investment into maintenance, which affects the safety aspect of road transport.

Croatia has its coast on the Adriatic Sea and its main harbours are: Rijeka, Zadar, Split, Ploče and Dubrovnik, along with the largest conventional transport (40 mil. tonnes) in the region of southeast Europe. It is realistic to expect that there shall be an orientation on to travel and freight harbours among these five. Concerning geographic position, and the background of these harbours, Rijeka and Ploče should be developed as freight harbours and Zadar, Split and Dubrovnik as travel ones.

Total length of Croatian inland waters is 936 km, on which there are different sales conditions. On certain parts of rivers only boats up to 1.500 tonnes are allowed, and on the some only up to 400 tonnes. According to international categorization, fourth international category of inland waterway for boats up to 1.500 tonnes in Croatia, have rivers Dunav at it total length in Croatia of 137,5 km and rivers Drava till Osijek, 14 km length. Third category, up to 1.000 tonnes have Sava till Jasenovac, second category up to 650 tonnes has Sava till Sisak, and the first category up to 400 tonnes has Sava till Zagreb of total length of 446 km.

Croatian air transport has been growing regarding the last years, which had a modernization and reconstruction of an air transport infrastructure as a consequence. Seven airports have takeoff –landing path that can accept conventional airplanes almost without limitations.

4.INFORMATION TECHNOLOGY ROLE-PLAYED IN THE MULTI-MODAL TRANSPORT

Modern information technologies are necessary in the multi-modal transport organization in Croatia, and so as in the European Union. Information project development realization should make transport companies more efficient, in all transport branches. Information multi-modal transport technologies should enable integration of data processing, information processing and communication systems.

Current technological and organizational bondage among transporters of different transport branches is unfortunately not on the level it should be. Modern economies seek faster and more precise data exchange. Some rare transporters have recognized the advantages of information technologies by which they can bond with their business partners, and also do complete service presentations to clients.

Information technologies basic purpose in multi-modal transport is bondage of all information systems within different transport branches. It represents bondage of road, railway, maritime, inland waters and air transport systems, and all with the purpose of optimisation and maximization of transport utility within different transport branches, and all that would require only one transport document.

All sub-systems, transport branches should be integrated within such system, so that multi-modal transport entrepreneurs could make better use of their recourses. Transporters can bond by their own information system, which also means including such system into national, and European information technology network. By including Croatia into European transport system transporters should have to establish the cooperation with the European transport, trading and freight forwarding companies, sea harbours, terminals and such.

The information system abilities are multiple. They enable exchange and transport of text, picture and sound information, make assumption for overcoming the space and time limitations. Information companies with their services unite transport supply information of multiple suppliers, present those information on the Internet to the potential users of those services. The potential transport service users can on that manner acquire all necessary information they need about realization of their transport project on a certain transport path. Only rare, internationally oriented transport companies in Croatia use information technologies by which they present their services.

Today, information technologies have become an extremely important factor of efficient, fast and safe forwarding and delivery organization, and as such they have inevitable meaning in the international multi-modal transport because this means "door to door" transport. In that manner, the bondage among few transporters of different transport branches is very interesting. Investing in such software programs in the beginning requires certain funding, which by bonding transporters into a certain multi-modal system pays off very quickly because in that way the transport capacities are offered as for that one transport branch as in the others.

The purpose of information technologies is to give an insight into multi-modal transport participants data held by commodity centres (terminals, harbours, docks...), than the approach to companies that have specific information necessary for transport, finding the multi-modal transport participants, finding multi-modal transport service users, and communication bondage realization (e-mail, lists, TC) and at the end tracking multi-modal transport realization as a whole.

Information technologies benefits concerning transport and freight forwarding, which are in direct relationship with the multi-modal transport functioning, are:

1) Booking, in a sense of reserving all transport service on time,
2) Permanent computer tracking and control of GMT and other transports,
3) Coordinating all participants in transport multi-modal chain,
4) Optimal multi-modal transport planning and programming,
5) Coordination income and expense planning concerning a multi-modal transport project, planning the service production processes of every participant individually,
6) Transport, freight forwarding and other services optimisation,
7) Achieving freight forwarding and transport market competitiveness,
8) Anticipating great transport burdens and eliminating them for better multi-modal transport functioning,
9) Coordinated and synchronised managing all MMT processes and
10) Successful strategic and operative management in classic and multi-modal transport, backed up by information systems and marketing.

Information technologies goal development is to provide the user with information, and therefore it is necessary to create information technologies in the area

of multi-modal transport that will be servicing all transport participants.

5. CONCLUSION

Increasing commodity flows and upgrading transport infrastructure quality can only benefit Croatian economy growth. Fast development in strategic processes on a national level, economic and transport, have to be harmonized with the processes in the European union so that Croatia can easier and faster get all that closer to European integrations.

European union is the most important Croatian trade partner with most transactions in the area of export and import of goods, then in the credit arrangements and technological transfers. Those are the reasons why EU represents logical path for Croatia entering into global international relations as a natural orientation. Establishing market mechanisms, which support modern way of doing business and adequate infrastructure, should make Croatian transporters competitive on a European transport market. After establishing organizational and technological cooperation among transporters of different transport branches there should be an information bondage following for creating a modern and competitive multi-modal transport system.

Information technologies give to different branches transporters the opportunity of completing the service to its potential users, and to users acquiring all relevant and information necessary for commodity "door to door" transport realization at one place.

Multi-modal transport in Croatia as important link in transport and economy chain has a difficult task laying before, establishing quality commodity and transport flows, which as such will have a substantional part in the gross national product (GNP). Besides transport infrastructure and supra structure quality, establishing information system by which different transport branches will be bonded is a basic condition for establishing efficient multi-modal transport which will be serving a more adequate and complete services on a national and international market.

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