

IT Appliance and Intermodal Transport in Serbia Today as the Factors of Logistic Services Improvement

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Abstract:

The paper deals with the problems of ITs and the intermodal transport as the factors of logistic services improvement in Serbia. The state of intermodal transport development in Serbia is analyzed in the light of the influence of the intermodal transport in the region as well as the modern tendencies in the Europe. Some problems, like the problems of the infrastructure, informatization, institutional problems, operational problems, legally binding and regulation problems, economy-related problems, and cognizant and knowledge problems are listed and analyzed. Special attention is paid to the strategies of intermodal transport in Serbia development related to the corridors K10 and K7.

Introduction

In the epoch when the Planet Earth is considered as the “Global Village”, one of the most important roles is given to the transport. The modern economy demands economical shipment of a merchandise “from door to door”. Frequently it is not possible realize by only one mean of transportation. The intermodal transport appeared as the result of real needs. It is, by definition, combination of a transport-technology operation with a complex of elements under mutual relation and interaction. The technology uses at least two means of transportation from, at least, two types of transport, to improve the overall efficiency of the transport system. This way it is enabled that a merchant could order a container from any part of the world and that the container reaches the desired warehouse.

The level of the logistic services is hard to define, much harder then the level of production services, mainly because of their complexities. There is no universal algorithm for logistic services quality defining, but basic elements of the quality could be divided into three service quality elements groups:

1. applied before the direct activities in the frames of goods distribution;
2. applied during the transport and distribution and
3. applied after goods distribution.

Improvement of the elements leads to the improvement of the whole logistic process. ITs and intermodal transport covers activities from all named groups, and their modernization gives the real base for service quality rise.

Defining the service quality is difficult. User often defines his evaluation of the services on the base of unclear and undefined criteria that is difficult cover by mathematical model, so the evaluation of the quality of the logistic services is frequently given linguistically as: “low”, “average”, “high” etc.

Intermodal transport in the region

In the developed countries all kinds of merchandise are transported by containers as the most suitable means for all modes of the transport. Transshipment on route volume in harbors besides in tons, more frequently is presenting in the numbers of TEU containers of 20 foote.

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Fig. 1 Intermodal transport review

Intermodal transport is in the focus and it is the subject of many projects, as well as scientific and vocation meetings. There are the projects at the global level such as UN/CEFACT (United Nations Center for Trade Facilitation and Electronic Business). It's mission is too improve the ability of business, trade and administrative organizations, from developed, developing and transitional economies, to exchange products and relevant services effectively - and so contribute to the growth of global commerce - and focus on the worldwide facilitation of international transactions, through the simplification and harmonization of procedures and information flows.

For European countries of great importance is the European Union initiative INTERREG, co-funded by the European Regional Development Funds (EFRE), promotes transnational co-operation in various fields of social, economic and territorial development. In particular, cross-border co-operation is promoted by the INTERREG III initiative to analyze common problems and to develop shared guidelines and solutions within homogeneous co-operation areas.

GILDANET is the project, approved and funded in the framework of the INTERREG III B operative program for transnational co-operation in the Central European Adriatic, Danubian and South-Eastern European Space (CADSES). According to priority 2 of the CADSES program, the GILDANET project supports transnational co-operation to enhance efficiency and sustainability of intermodal transport chains and systems.

International Consortium comprises partners from Austria, Greece, Italy and Slovenia - with the leadership role of the Emilia Romagna Region. Current actions could be grouped as follows:

- Spatial planning;
- E-business standardization and open systems, interoperability and external integration;
- The problems of present infrastructure of railway, road and inland-waterways;
- Social-Ecological group of actions.

Avoiding transport idle motion and effective load increasing lead to ecology benefits around transport routes. Intermodality leads to the reducing of road transport and its steering to the other, ecologically more favorable means of transport.



Fig. 2 GILDANET Project

While the INTERREG III C projects GILDA and TRANSLOGNET focused on the provision of generic services to the maritime transport community, GILDANET will not only increase the scope of these services but will also try to improve the support for the operation of three specific supply chains:

- The “EMPTYES” chain: to improve the utilization of containers and reduce the security risk of unattended empty containers outside transport terminals. The aim is to develop solutions for “Track&Trace” based on current best practices;
- The “FRESHLOG” chain: the information and merchandise flow optimization;
- The “AUTOMOTIVE” chain: to preserve and increase the competitive capacity of the suppliers to industry in the automotive sector by simplifying the transport of car assemblies and finished automobiles in Europe.

OASIS (Organization for the Advancement of Structured Information Standards), a not-for-profit, international consortium drives the development, convergence and adoption of e-business standards and produces itself worldwide standards for security, web services, conformance, business transactions, supply chain, public sector, and interoperability within and between marketplaces.

Trends in the logistics industry in South-East Europe were recognized along with the main potential Intermodal Corridors to be set by the market according to forecasts. The event made clear that intermodal transport couldn't be viable without the proper contribution of the state. Concrete actions are required from public authorities in order to provide incentives to attract the private operators, which are the main investors in the domain of freight transport.

State of the progress of the intermodal transport in Serbia

Transport policy of Serbia leads towards intermodal transport system development. Several hundreds of heavy trucks are circulating on Serbian roads and highways. It shows that the need for intermodal transport really exists. Even small redirection of these flows could result in considerable ecological, economical, safety and other positive effects. According to the reports of the state Institute for statistics, during the year 2004, 407,659 trucks passed through the Serbia and Montenegro. Specified number consists of 122,146 Turkish, 109,788 Bulgarian and 25,000 Greek trucks. That is around 700 vehicles per day. If only 10% of vehicles started to use combined transport road – railway, it would be great contribution to the safety and ecology.

The main barrier in the construction of modern transport systems in the Region sits in the low level of industry development in Serbia and Montenegro and bordering countries. A chance for the development of intermodal transport could be found in private partnerships and foreign aid and investments either from the mutual funds or from the local governments.

The Ministry for the capital investments of the Republic of Serbia, Department for railways and intermodal transport is organized in the year 2003. Its purpose was to work on the study and analytical affairs in the area of intermodal transport, to participate in creating traffic policy in the area of intermodal units' transportation, and to overlook and support development of intermodal technology of transportation as well as the terminals for intermodal transport. At the same time legislation is being prepared. Implementation has started from the beginning of this year through the cooperation with interested foreign investors first of all in the area of modernization of infrastructure and intermodal terminals in Serbia.

In the legislative area, Serbia has already signed and ratified European agreement of important international corridors for combined transport and concomitant plants (AGTC). This agreement enables system approach to the reconstruction, construction and assorting of the railways of the highest international importance, as well as terminals, border crossings and other infrastructure. Also, the Agreement of combined transport between Serbia and Montenegro and Bulgaria is signed.

An analogical activity Serbia and Montenegro has with Croatia and Hungary, and intention is to make such agreements with all European countries of interest.

Ministry for the capital investments of the Republic of Serbia in cooperation with the Faculty of Transport Belgrade University and Institute SITEF from Norway already started on the project: „Intermodal solutions for competitive transport in Serbia“. The main objects of interest in the project are the terminals for intermodal transport and logistic services in Serbia. Analyzing the state of the progress of the intermodal transport in Serbia it is possible to recognize a variety of problems, which could be systematized in the following basic groups:

- **Problems of infrastructure** relate on inadequate and poorly developed objects, insufficient capacities and antiquated technology and equipment. Investment problems are referring to the lack of funds and cash to invest into the transport means, reconstruction and revitalization of infrastructure and its development. Special problems are caused by heterogeneous IT systems.
- **Institutional problems allude** feckless institutions, bad organization, unskilled staff and lack of relevant societies and organizations.
- **Operational problems** comprise weak coordination and cooperation between all participants in the transport chain, as well as the lack of initiative for organizing of intermodal transport.
- **Legally binding and regulation problems** are referring to the complicated, inadequate, frequently changing of administrative and custom procedures, disrespect of law, incompatibility with European legislation and lack of tariff policy and stimulant measures.
- **Economy problems** are referring to the small and unbalanced ware flows because of the small industrial production in Serbia.
- **Cognizant and knowledge problems** are referring to the ignorance of the intermodal transport, lack of consciousness of its benefits, amiss understanding of its importance, and lack of the interest for developing initiative. It is quite sure that a several years will elapse until new directives for intermodal transport in Serbia will take a place, because the government of Serbia has urgent problems connected with the problems of Kosovo, development of industrial production, lowering of current inflation, and negotiations with IMF etc. It is a big financial loss because the transport is a real flywheel for the whole economy.

Overall production is based just on the interchange of material goods: raw, semi products and products. Anyway, when intermodal transport will be enriched with the transport of containers by the water transport (Constance – Belgrade line) new possibilities for transport in Serbia will be opened. Besides container, it is to expect the transport of the huge amount of steel from Ukraine to Zenica (BH), as well as the notable amounts of coal and gravel which are transported by the Sava River.

In the first quarter of the year 2005, comparing to the year 2004, based on the physical volume of services a growth of 3.3% is recorded as follows:

- Land transport recorded the growth of 11.5% (railway 13.2%, road 26%, urban 0.3% and pipe-line transport 1.2%);
- Water transport recorded the growth of 9%;
- Air transport recorded a descension of 14.7%.

In accordance to the type of transport, the volume of services measured in gross ton-kilometers, recorded the growth of 14.3%.

- Land transport recorded the growth of 15.5% (railway 18%, road 64.5% and pipe-line transport 1.2%);
- Water transport recorded the growth of 9%;
- Air transport recorded a descension of 22.8%.

Due to the reduction of the territory of the country, physical volume of traffic is lower than in the age of SFRJ. The comparison of the cargo traffic in the period January-March for the years 2004 and 2005 is given in the Table 1.

Table 1. The cargo traffic for the period Jan-Mar

I-III	Ton (thousands)		TKM (milions)		Index TKM	
	2004	2005	2004	2005	2004	2005
Traffic – total	5,207	5,436	1,264	1,444	104.4	114.3
1. Land traffic:	4,823	5,015	1,041	1,202	104.0	115.5
a) Railway	2,635	2,766	649	766	105.0	118.0
b) Road	335	391	62	102	116.7	164.5
c) Pipe-line	1,853	1,858	330	334	100.3	101.2
2. Water traffic	383	420	221	241	109.7	109.0
3. Air traffic	1.39	1.01	1.71	1.32	73.4	77.2

Source: Republic Institute for statistic, Republic of Serbia

Strategies of development of the intermodal transportation in Serbia

Development policy of transportation in Serbia is aimed towards the development of the system of intermodal transportation. Every day several hundreds of heavy trucks cruise the highways and roads of Serbia. That gives a good picture of need for intermodal transportation. The government sees the chance for intermodal transportation in private initiative and foreign investments, and cooperation with local authorities.

Besides establishing the Department for railways and intermodal transportation, and ratifying European agreement on international corridors for combined transportation, the government has realized some other legislative activities. Serbia has made many bilateral agreements that:

- allow transportation from/to intermodal terminal for combined transportation of merchandise toto be exempt from road fees and permissions for ground transportation;
- provide detainment of the trains in station to be no longer than 30 minutes;
- encourage railway companies and ports that deal with combined transportation to undertake efficient and coordinated measures;
- help investments in infrastructure of its ofn railways, intermodal terminals and harbors;
- when possible, free transportation to/from the transportation terminals from traffic ban during holidays;
- make prerequisites for passing of 44 tone vehicles;
- provide appropriate working conditions for customs offices on intermodal terminals;
- support cooperation of international associations for combined transportation;
- improve mutual communication regarding measures that improve quality of combined transportation of goods, and quality of the logistics and
- increase compatibility of technical devices for combined.

Strategically, Serbia is very interested in two corridors: K7 and K10.

Pan European corridor K10 is defined at Pan European conference in Helsinki in the year 1997, and presents the shortest way between the western and the southern part of Europe. It leads from Salzburg through Ljubljana, Zagreb, Beograd, Niš, Skopje, to Thessalonica. It has several legs:



- Graz – Maribor – Zagreb;
- Budapest – Subotica – Beograd;
- Niš – Dimitrovgrad – Sofia;
- Veles – Bitola – Florina.

Fig. 3 Corridor K10 and its legs

Corridor K10 is 2,360km long but 874km or 37% goes through Serbia. The idea of EU is that railway traffic improves its availability, speed and reliability. It is to expect that maximum speed on the railways that belong to the European corridors reach 250 km/h by the year 2020. Intentions are that the transport of goods has to use railway traffic. It is more economical way of transport for the industry. Rails are now in rather bad condition and it is estimated that for finishing the Belgrade node only it is necessary to spend additional 200 millions of EUR. On the other side, on the highways, there is also a lot to do. It is necessary to finish the highway as well as to build a number of concomitant objects. Just this segment of new highway through Serbia is the most interesting for the foreign investors in Serbia's Government officials' opinion. It is anticipated that from Hungarian border to Belgrade there will be 25 motels, 32 gas stations, 25 stops and loops in the near future. On the highway E75 from Belgrade to Niš will be 21 motels, 41 gas stations, 36 stops and 28 loops (6 new planned). On the most difficult part from Niš to the Macedonian border there will be 9 motels, 12 gas stations and 36 stops.

Table 2. Average daily traffic on the corridor K10

Track	On the base of counting			Estimation
	1990	2001	2005	2010
Croatian Border - Belgrade (Surčin)	13,973 to 16,225	1,224 to 10,498	3,100 to 15,400	3,800 to 19,000
Belgrade (Bubanj Potok) - Niš	22,140 to 11,586	21,430 to 8,239	30,200 to 13,900	37,200 to 17,000
Niš - Leskovac	6,464 to 9,566	4,568 to 5,239	7,500 to 8,700	9,200 to 10,700
Leskovac – Macedonian border	8,672 to 8,328	5,054 to 3,660	8,300 to 6,800	10,100 to 8,300
Hungary border - Novi Sad	12,343 to 4,890	4,420 to 5,864	7,900 to 9,700	9,700 to 11,900
Novi Sad - Beograd (Batajnica)	7,506 to 12,562	5,270 to 13,040	9,000 to 18,700	11,000 to 23,000
Niš – Bulgarian border	6,350 to 8,098	5,590 to 2,264	8,700 to 4,300	10,700 to 5,300

Source: Ministry for transport and telecommunications of the Republic of Serbia

Corridor K7, the Danubian corridor, covers the Danube River and its confluents Sava and Tisa rivers, as well as the Danube – Tisa – Danube Canal System, with 1,300 to 1,561km of the navigable flow, depending from the ship tonnage. There are in average 302 navigable days per year. The nova days the new intermodal line is established from Belgrade to Constanta (Romania)



Fig. 4 Corridor K7

The analyses of the regional traffic show that the brunt of traffic scene moves toward Black Sea and the Constanta harbor. Intermodal container "from door to door" shipment could be fully applied. Water transport is the most economical way of transportation of goods, especially in the case of containers.

Such organized service manages the full control of the motion and tracking containers. Critical points of transport are reduced to the minimum. Corridor K7 gives chance to the Belgrade harbor to become a regional center for the container transport and the very important actor in the intermodal transport of the region. About the importance of the corridor K7 tells the fact that this is one and only water flow, which took this status.

IT applying toward logistic system improving

Information technology (IT), as defined by the *Information Technology Association of America (ITAA)*, is "the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware." In short, IT deals with the use of electronic *computers* and *computer software* to *convert, store, protect, process, transmit* and *retrieve* information, securely.

Companies working in logistics need data about merchandnise, production capabilities, trade, business partners, demand etc. Logistics include strong mutual connections within the company, but also connections with market. Development in the field of transportation dictates continuous increase in demand in the field of information. Chain of information should always be ahead of merchandise flows in order to increase productivity. That way the information chain becomes administrative. Application of informational and communicational systems in this field allows cooperation of companies involved in production and transportation companies, creating a good basis for performance of joint tasks. If it is possible, it is best to integrate new information and communication technologies into processes of production, logistics and distribution. One of the most important potentials for increase in quality of the service is rational use of resources: transportation devices, infrastructure (terminals, logistic centers, roads, railroads, computer systems etc.) and personnel. Therefore, the optimization of this factor is of strategic importance. Rational use of resources is related to planning. Planning can be improved by standardization and more efficient use of information. Because of that, "simplification" and "information" are the keywords in modern transportation business. Several IT projects, such as "FUTURA" and "CIEL" by Scansped group, have been done in Europe. FUTURA is aimed towards more efficient standardization, while CIEL is an IT project which works with administrative information necessary for realization of the FUTURA programme. FUTURA concept is based on new organization of business operation, HUB-AND-SPOKE transportation network and EDI communications. FUTURA system uses terminals in different parts of Europe, and there are daily departures between most destinations in Europe, all within one integrated network. The services are sold to clients with agreement that merchandise will be taken in hand and delivered at certain time. In a particular network, different routes can be used. According to the research, the frequency of the transport can be increased by 50-250% by switching to HUB-AND-SPOKE network. At the same time, the efficiency of the resource allocation can reach 20%.

CIEL (Computer Integrated External Logistics System) is the basic system and the first freight forwarding system which processes and saves data related to contracting, transportation and clients.

Information software for Rail Freight Transport ERIC, made by Czech company JERID, has been used in Serbia during the last few years. It allows a choice of the optimal route based on some of the criteria. The software package contains information modules:

- NHM list of goods
- RID list of dangerous goods
- ETSNG list of goods

- List of stations - 14 railways
- TR4 list of stations
- International list of stations according to DUIM
- RIV II/3 track classes
- Wagon catalogues
- With library of : National and international tariffs and different legal regulations
- MAP (RailMap) modul with: electronic maps, specified railway network, search option (station, border crossings etc.), wagon tracking option, infrastructure...
- For calculations concerning transportation of merchandise with possibility of price optimization
- For transportation documents (national and international) with printing and archivation options

A software package ISDL (Informační Systém Dopravy a Logistiky), which supports planning, tracking and managing of processes on a higher level, will be available to users in future. This software package can be applied to different means of transportation (railway, ground and water).

Along with software packages, informatization makes tracking of the vehicles more precise. Strategy is based on "intelligent" and always available logistics. Bar codes allow precise tracking of particular shipments while preventing any mistakes from being made. This is especially used at starting points, at packing lines, warehouses and at the delivery. Application of automatized identification with bar codes results in a high level of quality of the service also because the labels are standardized. EAN label is widely used. It contains information about:

- unit, which includes mandatory, conditional and optional elements
- transport, which includes mandatory elements and optional elements
- buyer, according to buyers request (for example, the number of his order).

An example of the label is presented on picture number 5 .

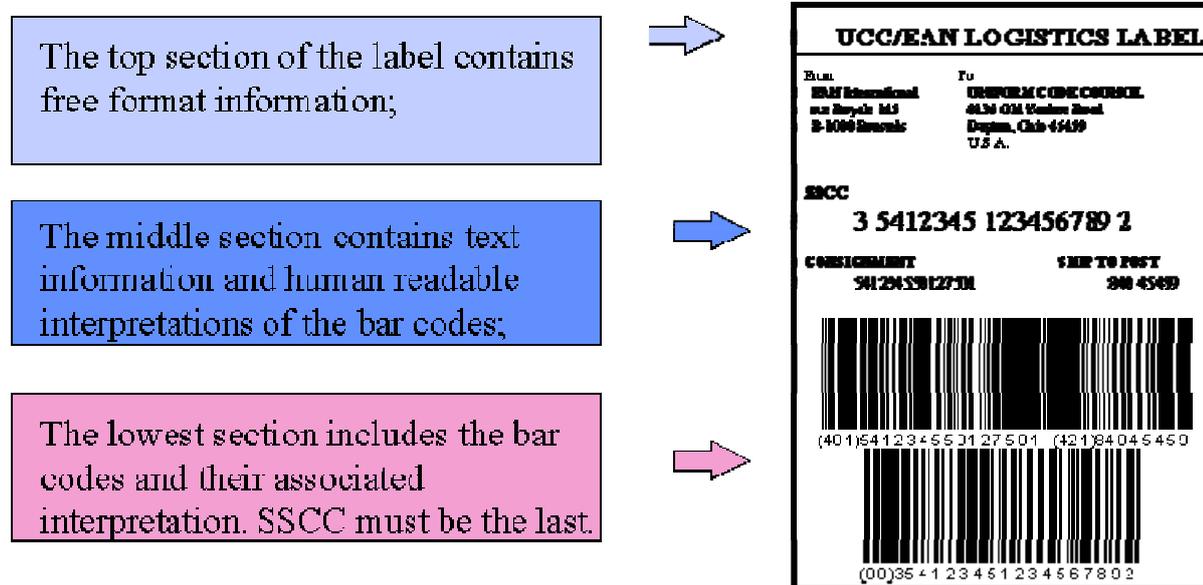


Fig. 5 EAN-UCC Standard Logistic Label

Labels and barcodes allow unambiguous differentiation of units. Unfortunately, that is all that this technology has to offer. There is no possibility of active update of data with information that can be of interest to the customer. Technologies based on RFID, on the other hand, make this possible. Tags which this technology uses can memorize bigger amount of data, and do not require optical visibility, which makes the whole process more comfortable. Depending

on the used technology, reading can be performed from a distance between 0.1m to 1m. This offers a range of advantages during the transportation and handling of the shipment.

Another important question are the communications. High quality telecommunications are essential for successful informatization of the logistic processes. Serbia suffers from the telecommunication connections. Different kinds of telecommunications can be applied to different corridors. It was planned and partly realized that more than thousand kilometers of optical cable with 96 filaments would be along the corridor K10. Corridor K7 is rear populated with small towns and it is better to use wireless connections.

Conclusion

According to the plans for the integration of Serbia into EU there are numerous efforts for rising of the quality of transport services, including intermodal transport, which is in Serbia practically in the first phase of its development. A lot of difficulties of political and economical nature, influence it, mainly in negative connotation. Geographically, potentials are big, and it is sure that with a reasonable policy, government's help and with the foreign investments things could be changed relatively fast. On the other side, territory is small, partly mountainous, with tunnels and it is sure that the scene from the figure 6 will never be seen in Serbia, but there is a real chance to see containers on the train more frequently than now.

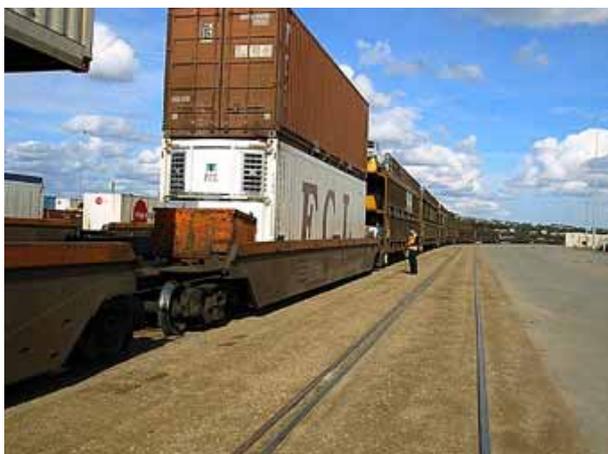


Fig. 6 Intermodal transport in Australia

It could be done through bilateral or multilateral agreements with the bordering and other countries, through the commandments, e.g. solving the ecology problems, but, first of all, it is necessary to provide conditions for quality, secure and fast transport and services. The biggest stimulating factor could be knowing that intermodal transport is the best for the seller and for the customer.

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