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INDIVISIBILITY OF GOODS-TRANSPORT CENTRES, SEAPORTS, CONTAINER TERMINALS AND FREE ZONES IN CROATIA IN THE MULTIMODAL TRAFFIC DEVELOPMENT

FUNKCIONALNA POVEZANOST ROBOTRANSPORTNIH CENTARA, MORSKIH LUKA, KONTEJNERSKIH TERMINALA I SLOBODNIH ZONA U HRVATSKOJ U RAZVOJU MULTIMODALNOG PROMETA

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Review

Pregledni rad

Summary

The authors concisely elaborate the factors of influence and traffic-economic connection of goods-transport centres, seaports, container and multimodal terminals, as well as free zones and river landing-places. The purpose of mentioned connection lies in the integrated and multimodal transport development in Croatia at the beginning of 21st century, and in faster essential and formal connection to Europe.

Special accent is given to the goods-transport centres' development in Croatia and their connection with container terminals, with railway and highway traffic, seaports, landing-places etc., and with the purpose of uninterrupted functioning of the transport chains in multimodal goods transport. In that way the Republic of Croatia at the beginning of 21st century would connect trafficly and in foreign trade with the integrated Europe in a united modern traffic system.

Key-words: goods-transport centres, seaports, container terminals, free zones, multimodal transport, euro-traffic system.

Sažetak

Autor sažeto elaborira čimbenike utjecaja i prometno ekonomsku povezanost robotransportnih centara, luka kontejnerskih i multimodalnih terminala kao i slobodnih zona i riječnih luka. Svrha spomenute povezanosti je u razvoju integriranog i multimodalnog prijevoza u Hrvatskoj na početku 21. stoljeća i u bržoj osnovnoj i formalnoj vezi sa Europom.

Poseban naglasak je dan na razvoj robotransportnih centara u Hrvatskoj i njihovu povezanost s kontejnerskim terminalima, željezničkim i cestovnim prometom, morskim i riječnim lukama i sl. i sa svrhom neprekinutog funkcioniranja transportnih lanaca u multimodalnom prijevozu robe. Na taj način Republika Hrvatska na početku 21. stoljeća bi u prometno i u stranoj trgovini bila povezana sa integriranom Europom u jedinstveni suvremeni prometni sustav.

Ključne riječi: robotransportni centri, morske luke, kontejnerski terminali, slobodne zone, multimodalni prijevoz, europrometni sustav

1. Introduction

Uvod

Two modern transport technologies - containerisation and RO-RO technology - are the most deserving for improvement and promotion of the transport service, goods manipulation, transport rationalization, as well as for the merchandise centres establishment. Containerisation makes possible the use of same units in terrestrial, maritime, river-canal-lake and air traffic. For goods storage and safe-keeping, for their manipulation and transport, containers have, so to speak, ideal conditions and presumptions.

Shipowners,¹ who have first developed the container technology, had to offer their clients a guarantee of uninterrupted merchandise distribution. However, to insure that, logistical services had to be formed, in order to follow distribution container courses throughout the transport chain. Uninterrupted transport chains operate inside one continent, although more often between the continents divided by oceans and seas.

The containerisation and the RO-RO technology system have significantly influenced the world combined and multimodal transport development, as well as the maritime and terrestrial (railway and highway)

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traffic branches connection. Observation of containers' distribution courses and of information in maritime and terrestrial traffic makes possible to know the merchandise position in any moment, which makes the stage of technical-technological rationalisation and of economical effects became the basic element of international transport development. All that stimulated shipowners not to limit on the closed maritime-harbour system, but to assist in the inland as well by the centres for merchandise assembling from a specific gravity territory. Those centres are, in fact, collective-distribution points, merchandise-commercial and traffic points and modern goods-transport centres. Today, they significantly contribute to the multimodal merchandise transport development.

Rationalization and optimization of the transport system have become the imperative of the present time. Modern transport technologies' solutions intercede for the so called intermodality and integrality of single traffic branches of united traffic system. By integration and combination of single transport methods and instruments, that system would provide optimal effects in mastering of complex traffic courses and directions, and of intensive merchandise courses. Merchandise courses concentration, by direction and intensity, demands an intermodal synchronization of traffic nodes, which would have storehouse goods collective-distribution centres. Those centres would really be: seaports, river ports, containers and multimodal terminals, railway stations, storehouses.

In the article is being elaborated the purpose and the function of those centres.

2. The purpose of the goods-transport centres' existence

Svrha postojanja robnotransportnih centara

A common using of the existing infrastructure and suprastructure, as well as reciprocal cooperation in functioning of single goods-transport centres' under-systems make optimal presumptions for homogeneous logistic services' offer. As a French logistics and transport expert, professor Colin emphasizes, "merchandise centre allows relying on multimodal transport operations, as wider on complex logistic operations, which basic characteristics are inclusion in global logistic procedures of organisation and manipulation of physical merchandise circulation in undivisible logistic sequences."

Merchandise-transport centre allows technologically purposeful, operational efficiency and economically justified, synchronized transit between single incumbents of merchandise transport. Such centres make possible a successful cooperation between railway and highway transporters on long-distance, as well as more economically and better organised merchandise transport. From ecological aspect those centres allow a long-term nature and life environment protection. What is more, functioning of merchandise-transport centres' net insures indispensable and other assumptions for realization of technological-economic

and long-term ecological aims of so-called macro and micro merchandise distribution, for transport and logistic sequences optimisation.

In macro distribution of goods, the merchandise-transport centres' net development stipulates an organized undertaking of exactly determined measures and tasks, that is:

1. goods concentration on the points, terminals (port and terrestrial), railway, highway and duty-free hubs (junctions),
2. space and time diving of merchandise courses following the characteristics of technological-economic demands of merchandise in transport and characteristics of traffic incumbents (of traffic branches in integrated and multimodal transport),
3. cooperation in undisturbed transport sequences functioning, and of all three business parties (sender, transporter and receiver of the merchandise),
4. uniformity of mechanization, work, merchandise operations technology and complex informatics in every link of transport chain's functioning,
5. state's interest in traffic policy measures execution.

Observed from the micro aspect of merchandise distribution, the development of merchandise-transport centres net demands an immaculate provision of industrial, harbour and urban regions, as well as their connection on national and wider plan.

The purpose of goods-transport centres is unification of the most important logistic activities in merchandise distribution and transport.² To realize that, it is necessary for the transport services' offerer and for the merchandise-transport centres services' users, to be physically present as well on a specific location. That means that all the forms of transport, forwarding agents, accompanying services... have to be present.

Functioning of logistical centres means merchandise courses concentration, cooperation and rationalization. These logistical centres are merchandise centres which merchandise courses of all transport incumbents flow into.

With cooperation, coordination and rationalization of the work, using modern technological procedures in transport, all traffic incumbents realize significant economic-transport effects. Transport cycle's shortening has a direct influence on the rapidity of the reproduction process in general.

Cargo traffic distribution centre was an initial stage of merchandise centres' rising. That represented a specific conglomerate of independent companies from different activities, companies that have grouped around one business and location centre. All these participants were connected by a common goal. It could be realized only by goods-transport centre's expansion into a logistic centre. In them today is being performed the correlation of the whole merchandise flowing, its accumulation and distribution, with adequate supplementary and accessory functions. In them forward agents have a significant place in the merchandise distribution, information collecting and their despatching to the transport users.

In the European Union countries³, in the eighties and nineties a lot has been done in construction and

functioning of goods-transport and logistic centres. In Germany, Holland and France the most progress has been achieved on this field. There has been formed a particular nets' organisation of these centres, which synchronously connect commercial techniques and marketing-managing activity (management) with logistics and information system. Extra-ordinary results have been achieved in cooperation of harbour and terrestrial cooperation of duty-free zones and similary. Logistic centres have great savings in commercial and transport function, which completely meet the wishes and the needs of the users, and above all directly contribute their interests.

Modern logistic centres take over three important functions at the same time, that is: supply, transport and rationalization (merchandise maintenance, its transport and distribution at the most economical way). Those centres really dispose of four activity fields: merchandise reloading, merchandise storage, transport services and supply. Therefore it's of no surprise that they attain maximal positive effects, and that without them there is no modern merchandise transport development.

In the ex SFRJ goods collective-distribution centres included the members of Group for berths (18 berths, from that four in Croatia: Osijek, Sisak, Slavonski Brod and Vukovar), continental merchandise terminals (totally 8 terminals, from which two in Croatia: Vara'din and Zagreb) and members of the seaports Group (10 ports, from that 8 in Croatia: Dubrovnik, Metković, Pula, Ploče (Kardeljevo), Rijeka, Split, [ibenik and Zadar). In the analyzed period since 1986 to 1990, the biggest volume of goods traffic inside these three groups of merchandise-transport centres in SFRJ, realized seaports (on an average 47% in five years) and river quays (on an average 39%), while continental merchandise terminals realized relatively modest merchandise traffic volume (on an average 14%). Considering the sort of cargo, very different structure has been realized in the analyzed period at a merchandise transport centres' group. For liquid cargo the greatest share in traffic is realized in river berths, for bulk freight approximately the same in seaports and river berths, while for general cargo the greatest share is noted at continental merchandise terminals. Otherwise, in the structure of the analyzed microlocations merchandise courses (hubbes) by the cargo sort, prevail bulk freights (60%), while the smallest part have liquid freights (10%).

The cargo traffic differentiation on goods-transport centres groups and according to the sort of cargo (the basic groups according to the mannar of packing the goods) in SFRJ, for the period since 1986 to 1990, is given in the table 1.

From the tabelar statement derives that continental goods terminals' nodes have a modest share in cargo traffic analysis according to the goods-transport centres groups. That share on the level of SFRJ, in the period 1986-1990, amounted approximately to 14%. The real, or better, the presumed share of merchandise (continental-transport) terminals, following their real possibilities, in Croatia during nineties should figure between 25% and 35%, i.e. from 1/4 to 1/3 of the total cargo traffic of all the points. However, for chang-

Table 1. The relative share of goods-transport centres in SFRJ since 1986 to 1990 according to the sort of cargo (the mannar of packing the goods)
Tablica 1. Relativni udjela robotransportnih centara u SFRJ od 1986. - 1990. prema vrsti tereta (način pakiranja roba)

Ord. No.	The group of the goods-transport centre	The sort of cargo			Structure (%)	
		Liquid Cargo	Bulk freight	General cargo	Totally	Share of single group
1.	River ports	15,0	63,1	21,9	100,0	39,1
2.	Continental goods terminals	1,1	13,4	85,5	100,0	14,2
3.	Seaports	8,8	62,2	30,0	100,0	46,7
4.	Total share of cargo	10,1	59,7	30,2	100,0	100,0

Source:

Calculation of the author on the basis of "Analysis of business operations and economic position of the berths, storehouses and goods-terminals of Yugoslavia, for 1986, 1987, 1988, 1989 and 1990", General Traffic Association Yugoslavia, Chamber of Economy of Yugoslavia, Belgrade and "Analysis of business operations and economic position of harbour working organisations", Seaport Group of SFRJ, Rijeka, 1987, 1988, 1989, 1990 and 1991.

ing that structure, that is for changing the continental goods terminals as locational nodes of the goods traffic, it is also necessary the cargo reloading structure change. That really means that today and tomorrow general cargo as a dominant sort of cargo which is reloaded on continental goods terminals in Croatia and Slovenia, should allow a wider presence of liquid freights, and specially of massive bulk (loosely) freights on the terminals.

Towards the end of the 20th century the mentioned 14 merchandise-transport centres in Croatia (8 seaports, 4 river ports and 2 continental terminals) should systematically be included in the combined and integrated traffic of Croatia and of entire Europe. The concept of goods-transport centres net's forming, in Croatia as in other transition countries, which wish to join, at the beginning of the 21st century, the international transport - integrated and multimodal (combined), but also the international goods and services traffic (specially with the European Union), has to:

- be completely coordinated with the development goals of international, and specially european goods traffic and within the multimodal transport,
- be coordinated with the development goals of national economy, traffic and foreign trade, traffic policy in total and its branches,
- be coordinated with the goals of Adriatic-continental orientation of general development and appearance of Croatia, which would valorize the advantages of "littoral economy" in the Croatian economy and traffic system development, and which would programmatical direct the goods traffic (transport and foreign trade), as well as the production (agricultural, industrial, craft) and services (catering and turism, inland trade, financial-credit system, information and communication system), because of the realization of the goal: entering in european developed countries,

- be coordinated with the goals of the regional economy development in Croatia, where two macroregions (Adriatic and continental) would have economic-developmental advantage over restricted county and microregions interests,
- be coordinated with the goals of nature protection, i.e. human environment.

3. The purpose of the containers' and multimodal terminals' existence

Svrha postojanja kontejnerskih i multimodalnih terminala

A fact is that today without the containers and multimodal terminals, and collection-distribution and merchandise-transport centres' development, there is no development of integrated, combined and multimodal transport in new transition countries, which enter the field of market economy and of a free game. Therefore, particular attention should be given to the mentioned terminals and merchandise-transport centres.

The beginning and the end points in goods transport with modern technologies, really are containers and multimodal terminals. That are specially adapted places for dispatching and acceptance of goods and passengers, independently if it's a beginning, destination or transit point in traffic. Container terminal is an important link in the integrated transport chain. It's a place where containers are accepted, gathered, reloaded, ordered and lied away, by the means of transport and reloading mechanization. These terminals dispose of a containers acceptance place, storehouses, different services and a workroom for maintenance and repair of transport means, reloading mechanization and containers themselves as manipulate-transport units. They also have at their disposal the office, the commercial rooms for forwarding agents, agents, different transporters and the catering area. It's often that they have customs and other services (terminals on the frontiers).

According to the geographical position, usually are distinguished port and continental container terminals. According to the traffic dimension and the volume, they are divided into: big (over 100 containers daily), middle (from 20 to 100 containers daily) and small (under 20 containers daily). According to the location container terminals can be categorized into: port-berth terminals, railway terminals, highway terminals and combined terminals.

In the world containers traffic the most important are port terminals. Container terminals from year to year increase their capacity, and the traffic volume as well. Technology and organization of work with containers are continually being developed. Today in port terminals exist silos for containers after Hausman, container terminal after Leidenburg, after the Rosander system or after the Meeusen system. These new systems demand a berth increasing and arrangement and new container terminals forms. In fact, according to these systems, container ships types are being built and terminals which dispose with modern reloading

mechanization, portal cranes of 500 KN, lateral transporters...⁴ Modern container terminals have automatized all the operations at containers loading, reloading and unloading, with centralized computer manipulation from one operative centre.

Continental and river port terminals are of considerably smaller size than port terminals, with less containers' manipulations. They are more destined to the collective traffic and to connecting of industrial centres with seaports in a specific gravity territory. Continental terminal is organized as a multimodal terminal near industrial zones and lines of communication, with the purpose of satisfying the traffic and the production and consumption spheres of goods manipulation.

Experiences in port and continental container terminals functioning in most of the developed countries, have showed that the best solution is to construct, accept in the case of containers manipulation, buildings for different types of goods unloading and reloading as well. For the transition countries that construction would depend on the needs, as on the substratums sort in the transport process of modern traffic itself.

Multimodal terminal is regularly placed on the nodes where at the same time are executed manipulations of containers and vehicles, which with the loading into bigger means of transport become cargo themselves, then manipulations of bulk (massive, loosely) freights, as liquid freights and pallets. Such a terminal is called multimodal terminal because of the multitude of manipulations of different cargo at the same time. Functioning of multimodal terminal needs a special unloading and reloading equipment on specialized places, that is:⁵

- for containers (universal - common and particular; special according to the goods),
- for reloading RO-RO system (vehicles, trucks, automobiles, trains),
- for reloading LO-LO system (containers' vertical loading-unloading),
- for reloading LASH, BACAT and SEABEE system (only port terminals),
- liquid freights hydraulic reloading system (the so-called pipe-line system),
- loosely, i.e. dusty cargo pneumatic system,
- tipper reloading systems for waggons and road vehicles (transporters),
- reloading system for HUCKEPACK technology (vehicle on 'waggon),
- reloading system for BIMODAL technology (road-railway cargo semi-trailers of new technology).

For transition countries is important to undertake the construction of multimodal terminals' reloading places gradually. For that, the number and types of reloading places for mentioned reloading systems will depend on the services users' needs and demands on every multimodal container terminal. It's important for every terminal to be located in the way that in the same node can function more traffic branches and different modern transport systems. However, their construction and optimal technical-technological solutions introduction require great investment resources. Since with the

multimodal terminals are connected locationally and operatively different activities of production, trade, forwarding, agency, financial and leasing intercession, there is a real possibility of common investment in construction and equipping of such terminal.

Such multimodal container terminals for determined location and its economy would really represent a kind of goods-transport centre. As the intention and the perspective of new transport technologies' development connecting different transport systems and traffic branches with the entire economy at one place - through different forms of goods-transport centres - since their founding, construction and functioning, the transition countries would have unimagined economic and development benefits. Therefore it should strongly act with all means, measures and instruments on their "objective popularization".

Goods traffic rationalization demands maximal synchronization of all traffic undersystems, as well as synchronization of all participants' acting in integrated and multimodal traffic. Only then comes to modern integrated traffic, which as like attains maximal economic effects.

Important points in complex transport chains - port terminals, i.e. coast container terminals and goods-transport inland centres - allow the elimination of the so-called "idle speed" or their standstill. Port terminals on the sea coast, container terminals on the sea coast and the inland, as the inland goods-transport centres, send necessary information in goods traffic. Those information make possible:

- coordination and harmonizing of containers' dispatching, delivery and preparation,
- maximal ships' employing in transport and distribution of the same,
- railway-transport companies' employing in transport of the same,
- road transporters' employing and development of modern units transport technologies (HUCKEPACK system and BIMODAL system) in the highway-railway traffic, which attain maximal economic-transport effects,
- faster ships' tack of sea-going ships for containers transport, as of different combined and bulk carrier-containers ships, RO-RO, LO-LO and their combinations, as other systems in maritime and maritime-terrestrial cargo transport, which again allows optimal goods gathering from narrower and wider gravity territory,
- continuously logistic goods distribution and completely information of all traffic participants, and all with the purpose of transport services users' marketing satisfying.

In that coordinated work, an important part is given to the international forwarding agent, as a dispatcher, or as a complex multimodal goods transport entrepreneur. International information system makes possible to forwarding agents, maritime ship operators, railway-transport firms, highway transporters, container and multimodal terminals and modern goods-transport centres to determine an optimal function of global containers distribution expences and of other manipulate-transport units.⁶

Logistic services' dimension is optimally determined by functioning of goods-transport centres, which form productive-technological and organizational junctions of coherent logistic services. Their developed net and total reciprocal connection are a solid guarantee for irreproachably logistic services' functioning. Integrated transport, and specially combined and multimodal traffic, permanently use goods-transport centres for transport chains forming and their undisturbed functioning in the practice.

4. Merchandise-transport centres', berths', terminals' and duty-free zones' connection in the integrated and multimodal transport *Povezanost robno transportnih centara, morskih luka pristaništa, terminala i slobodnih carinskih zona u integralnom i multimodalnom prijevozu*

Connection of seaports, river ports and continental goods terminals is an unavoidability which exists in the Western Europe already for three decades. Seaports are naturally directed on their backing. As often professor Jelinović accentuated, narrower and wider inland represents their gravity territory. Goods and container terminals in the Croatian inland have to be traffically-technologically and developmental-economically connected by common economic interests. It is inconceivable that Croatia has only two continental goods terminals - Vara'din and Zagreb, since for at least some ten economic centres in the inland have all the predispositions for forming of modern goods (containers) terminals: Osijek, Vinkovci, Slavonski Brod, Karlovac, Koprivnica, Čakovec, Bjelovar, Po'ega, Nova Gradiška, and even Pazin (Buzet). All these economy centres are connected by the railway and highway net with Zagreb, Rijeka, Split and with surroundings - abroad. Goods terminals should be built here because of the creation of uninterrupted transport chains with seaports, Zagreb as central point and with foreign countries.

Customs zones, free zones, ON SHORE and OFF SHORE centres, can be founded in seaports, airports, river ports, as well as in goods-transport centres (container and goods terminals). It is important to locate them by ports, main roads and railway lines, over which the greatest part of national and international goods traffic takes place, i.e. traffic of goods which are destined to the transit. Goods terminals and free zones connection, not only in Croatian inland, but also on the sea coast, should become an economic-traffic orientation on a long term. By other assumptions, there are human potentials, energy, lines of communication, and also forward capital would find here its interest.

Modern OF SHORE centre is a special free-zone version in which final processing of domestic origin goods for abroad is made. Croatia today is mature for huge dimensions zones' construction (OF SHORE and ON SHORE centres), in which great forward capital would be invested. Container terminals, seaports, river ports and goods-transport centres should be located

immediately next to these zones, which would maximally accelerate technical-technological, as economical-traffic country developments' possibilities and of its macro and micro regions. The classic type of customs zones in conditions of today aren't so profitable.

Since 1963 in Croatia existed duty-free zones in seaports (Rijeka, Ploče, Pula, Zadar and Split) but their status wasn't favourable,⁷ specially when in 1973 was abolished the possibility of equipment and material duty-free import.

That connection of goods-transport centres and free zones (OF SHORE⁸centres) would find its economic valorization in the uninterrupted cycles of delivery, storage, production-final processing, dispatching and transport of goods to their users. The majority of traffic systems (branches) would include in a business sense, because they would find their economic interest in integrated and multimodal transport. All that would lead to activation of all traffic and production development factors, connecting into international productive-traffic system and a faster country's development.

ON SHORE centre as a duty-free zone, is usually located on the coast, and possesses certain differences (greater control in final processing export, import) in its purposes.

The customs zones law from 1985 was very liberal, because accept the ports, that status have received Zagreb, Vara'din, Osijek, Vukovar... as well, and bigger economic nodes would be considered subzones. Production and traffic development from the end of the eighties should continue faster by the end of the nineties. With that is closely connected the construction of main communication lines and railway tracks (lowlands and Adriatic), as the Danube-Sava navigable canal in Croatia as well.

Container terminals are built exactly where at least two traffic systems are met, i.e. connected. The most favourable for container terminals construction are:

1.) railway stations where are the road and railway traffic junctions, 2.) airports, that connect terrestrial and air traffic, 3.) seaports, that unite terrestrial and maritime, and often river-canal-lake traffic with maritime traffic.

Railway is present at every container terminal and with seaports is the most important factor of uninterrupted continuity of multimodal transport functioning. It is considered that railway is a rigid system in the constructive-locational view, therefore it's necessary to adapt the container terminal's location to the possibilities of the most favourable connection with railway station. The ideal solution is the container terminal's location in extension of the station's gauges. In the case that container terminal is located by the gauges, it's necessary to build the so-called railway drawer-out, because of the departure-return drive of the train, that transports containers, boxes or similar units.

It is recommended that the container terminal's location, in relation to the gauge direction at the railway station, should be under an angle, since the vertical direction is extremely unfavourable.⁹ In fact, if the terminal is located vertically on the gauge, the equipment will have to occupy more space, the manipulations will be more expensive, the contacts between

traffic systems will be more difficult, and the train drive longer.

Reloading bridge crane should be installed upon the railway gauge, which makes the goods manipulation easier. The bridge crane is further more suitable for goods reloading between the waggons and trucks, than the road-reloader is. The latest is particularly unsuitable for containers' transport at a more distanced depository. Container terminal generally has to be provided by high-mechanized and automatized equipment for goods reloading from one transport system to the other. Optimal solution is that under the bridge crane can arrive both the traffic systems - road and railway. Since the train transports more containers than road vehicles, it's necessary to provide, next to the bridge crane, an area large enough for their laying off.

Railway transports goods by trains, which can weight up to 2000 t. It is economical for these trains to stop in stronger production or consumption centres, which are connected by railway lines and lines of communication. Trucks, with the trailer, transport smaller mass of goods in relation to the train. As everybody has an approach to the roads, in traffic are included more types of vehicles, that disturb one another. For reduction of traffic and of traffic jams, the more as possible cargo has to be reoriented to the railway traffic. After all, railway transport is much cheaper in relation to the road one. French and German traffic institutes have estimated that the most economical way is to transport the goods to the centres by road, and between the centres by railway. In that way, road and railway traffic don't compete reciprocally, but complete each other.

The Social agreement decisions about the integrated transport development, about criteria elaboration and determination of minimal technical-technological conditions,¹⁰ which have to be satisfied by Yugoslavian (SFRJ) merchandise-transport centres, has "spoken" about the conditions and criteria, which those centres have to satisfy in order to be registered and so that they could function in traffic. These conditions and criteria are actual even today, and the demand fields refer to:

1. confrontation of at least two traffic branches, i.e. two heterogeneous traffic nets on microlocation,
2. minimal aquarium's depth by the worst hydrological conditions during the year,
3. disposal of container vessels' berth, container terminal and special manipulation (loading-unloading) ramp,
4. manipulation-transport mechanization and storage equipment of adequate capacities,
5. possessing of road and railway transport means weighing machines,
6. possessing of electrical connections and generators for special cooling containers and auto-caravans,
7. possessing of one's own managing-informational operative system and
8. personnel (human) potential of the employed.

Complex integrated and multimodal goods-transport chains in Croatia, have to rely on a permanent

exploitation of merchandise-transport centres' services, which, unfortunately, today are scarce. Those centres allow the existing of transport chains in multimodal goods-transport and they are the connection factor of traffic branches. Transport of goods according to the "from door - to door" principle is impossible to be realized without functioning of those centres. Therefore the international forwarding agent as a multimodal transport entrepreneur is as well directly interested in their construction and undisturbed functioning, and he is ready to invest his own means in them.

Goods substratum concentration in those centres, with the possibility of maximal use of modern transport systems' means, is the presumption of multimodal transport functioning today and tomorrow. Existing of those centres as functional points accelerates the traffic in the whole transport chain to a maximal degree, makes the transport cheaper and significantly shortens beginning-final operations in the transport process. The obligation of standard units use in traffic, insures its internationalization and national traffic system integration with the international traffic system. That is again in a direct connection with the multimodal goods transport traffic system, which suggests indivisibility of all traffic performers, and common interests of all participants of its complex development.

5. Conclusion

Zaključak

Developed world, and specially West-European countries, North America, Extreme Orient and Pacific countries, for many years past are intensively developing integrated and multimodal goods-transport, using modern transport technologies. Croatia, however, in the times of SFR Yugoslavia, as today as an independent country is significantly backwards in the modern transport technologies use, and specially in introduction of intensive use of integrated and multimodal transport (chains).

In order that Republic of Croatia essentially, and not only declaratively realizes economic and social development, it's necessary the economic and the traffic policy and the development strategy. By that, functioning of the economic and social-economic country's development is not possible to conduct without modern traffic development, above all integrated and multimodal goods transport application.

The first prerequisite for integrated and multimodal transport functioning is building of merchandise-transport centres (earlier merchandise-distribution centres, and today logistic centres), modern seaports, container and multimodal terminals, free zones, modern river ports, railway and highway stations and the like. Only with the existence of such a traffic net, integrated goods transport, i.e. complex multimodal transport chains can function freely (without being disturbed).

With that Croatia would really enter the United Europe modern traffic system of 21st century.

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Note: The bibliography units have been translated in English.

Bilješke

Notes

- ¹ Referred to maritime operators, and to river-canal-maritime operators
- ² Jean Colin and others: La logistique au service de Enterprise, "Dunod Enterprise" Paris, Paris, novembre 1983., p. 49.
- ³ According to the figures of the Institute of Traffic sciences Zagreb, for the period 1985-1991 and Chamber of Economics of Yugoslavia-General Traffic Association of Yugoslavia Belgrade, since 1986 to 1991.
- ⁴ In addition, bridge cranes are used, smaller portal cranes, "riders", lateral loaders, frontal loaders, different fork lifters and the like.
- ⁵ Ratko Zelenika - Livij Jakomin: Suvremeni transportni sustavi, Ekonomski fakultet Rijeka, Sveučilište u Rijeci, Rijeka, 1995., str. 131-141.
- ⁶ Many authors erroneously call these units "cargo units", because they have a double function: they are used for loading of goods (reloading, unloading) and for transport.
- ⁷ Ivo Jarković: Integralni transportni sustavi i robni rokovi, Fakultet prometnih znanosti Zagreb, zagreb, 1990., str. 125.
- ⁸ It is of great significance that taxes, dues and contributions on produced goods or goods with OF SHORE centres origin, should not surpass the rate of 5%, by which foreign producers and other interested parties from the traffic sphere would be attracted.
- ⁹ Petar Kačić. Odnos željeznički koldvor-kontejnerski terminal, Zbornik radova IV susreta SSIJ na temu: Integralni transport u saobraćajnom sistemu Jugoslavije, Bled-zagreb, Fakultet prometnih znanosti Zagreb, Zagreb, 1987., str. 81.
- ¹⁰ The document has been adopted in 1986, and published in "Glasnik PKJ i općih udru'enja"; br. 45/1986, Beograd, 1986.