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**MANAGING AND ORGANIZATIONAL CHANGES OF INTERMODAL
NETWORK IN TRANSITION REGIONS: THE CASE OF SOUTH-EAST
EUROPE**

Summary. This article presents managing changes, challenges and possibilities of intermodal nodes and network in a still transitional region of South-East Europe in order to assure sustainable cargo mobility in this part of Europe. The main thesis that transport and logistics sector in Northern and Southern European regions are completely different, using different infrastructure and the degree of automation, and with completely different managing philosophies has been persecuted. Consequently a research of sixteen main port systems in the region has been performed. According to obtained analyses, national states and economies have strong impacts on the development of national infrastructure and managing it. In addition, traditional managing philosophies are still very important, where the state has the power to decide when and how organizational and structural changes will occur. The private capital did not enter the intermodal infrastructure significantly over the last twenty years of transition. This is reflected in scarce competition and slow development. Intermodal nodes must cooperate between each other and develop possible synergies because according to the results obtained almost 90% of all traffic going through ports in South-East Europe is for local economies. The concept of nodal distribution is not present; therefore, logistics optimization is possible and inevitable. For this reason a model of port classification has been worked-out, where all sixteen ports have been classified according to their actual position and regional role.

**УПРАВЛЕНИЕ И ОРГАНИЗАЦИОННЫЕ ИЗМЕНЕНИЯ ИНТЕРМОДАЛЬНОЙ
СЕТИ В ТРАНЗИТНЫХ РЕГИОНАХ: ЮГО-ВОСТОЧНАЯ ЕВРОПА**

Аннотация. Статья представляет изменения в управлении, проблемы и возможности интермодальных узлов и сетей в транзитной области Юго-Восточной Европы, призванные гарантировать устойчивую мобильность грузоперевозок в этой части Европы. Представляется основной тезис, что транспорт и сектор логистики в Северных и Южных Европейских регионах полностью отличаются, используют различную инфраструктуру и степень автоматизации, и имеют совершенно различную руководящими идеологию. Было выполнено исследование шестнадцати основных портовых систем в рассматриваемом регионе. Согласно проведенным исследованиям, у национальных правительств и экономических систем есть сильные средства воздействия на развитие национальной инфраструктуры и управление этим комплексом. Кроме того, традиционная идеология управления все еще очень важна там, где у государства есть власть решать, когда и как произойдут организационные и структурные изменения. Частный капитал не участвовал в значительно степени в интермодальной

инфраструктуре за последние переходные двадцать лет. Это отражается в недостаточной конкуренции и медленном развитии. Интермодальные узлы должны сотрудничать друг с другом и развивать возможные совместные действия, поскольку почти 90% перевозок для местных экономических систем проходит через порты в Юго-Восточной Европе. Концепция распределения узлов отсутствует, поэтому оптимизация логистики возможна и неизбежна. По этой причине разработана модель классификации портов, где все шестнадцать портов были классифицированы согласно их фактическому положению и региональной роли.

1. INTRODUCTION

Today, Intermodality is an important topic of European common policy and a subject to detailed analysis during the last ten years. Establishing intermodality and managing intermodal nodes to obtain sustainable cargo and passenger mobility is an essential goal for the EU member states and other European countries. Such a policy represents an important challenge especially for the underdeveloped European regions, like the territory of South-East and Eastern Europe.

Developed national economies are investing in infrastructure, modernization of suprastructure and knowledge of managerial personal. Only the well-educated and professional management can establish a strong intermodal network of well-linked intermodal nodes, which can bring benefits to local and wider economy. Such an intermodal node can be described as maritime or inland intermodal terminal, which manages different cargo flows using different means of transport. An intermodal node is a part of the business environment and it is in constant interaction with different systems from the surrounding. With the development of supply chain management concept, these nodes became more and more important international link and have gained a substantial attention in economics and transport literature and specialized researches performed by van Klin and van den Berg, Slack, Juhel, Noteboom [1, 2, 3, 4].

The idea of intermodal nodes and necessity of intermodality is certainly not a new approach, and has been subject of different additional researches. Robinson places the role of port as a completely new element in value driven supply chains [5]. Noteboom and Winkelmanns and Heaver et al. were primarily focused on the integration and the changing role of port authorities in the new logistic systems [6, 7]. As a result, several significant trends in management of intermodal traffic and development of ports as intermodal nodes have been proposed during last years. They are in a close relation to the historical adopted managing philosophies in the European territory. It is very often accentuated that private investments are crucial for further network expansion. According to Verhoeven the privatization is an already adopted standard in western and northern economies. Consequently, a strong competition of different specialized logistics platforms is already present, but the role of port authorities in this respect must be additionally incorporated [8].

New managing concepts are drastically changing the underdeveloped intermodal network in Eastern and South-East Europe, with countries still in the middle of a difficult transition period. Important changes have occurred in this territory during the last twenty years with new borders, new states, liberalisation of national railways, privatization of hinterland rail or river terminals and, on the other hand, with EU enlargement and simplification of documentation and other procedures. These significant changes have a direct impact on the development of local and regional economies and vice versa. Consequently intermodal system of South East Europe is defined as important element of additional in-depth researches and analysis.

2. INTERMODAL NODES IN EUROPE

2.1. The importance of international and national economies

The national economy has huge impacts on development of national intermodal network, especially on intermodal points. International and national economies determine the size and structure of the flow of raw materials and the already produced goods. Higher value of import and export flows is key factor for the development of supply chain management and consequently for the necessary use of modern intermodal points. Strategic position of intermodal node is the additional element that has huge impact on the development of local economy and hinterland infrastructure.

Table 1

GDP per capita on northern and southern European countries in 2008
(in USD, Source: Eurostat, 2009)

N. EU Countries	GDP per capita	SE EU Countries	GDP per capita
Switzerland	67,385	Greece	32,005
Denmark	62,626	Slovenia	27,149
Ireland	61,810	Croatia	15,628
Nederland	52,019	Romania	9,292
Austria	50,098	Bulgaria	6,857
Belgium	47,400	Serbia	6,782
France	46,016	Macedonia	4,657
Germany	44,660	Bosnia & Herceg.	4,625
Average	54,001	Average	13,374

Thus intermodal node and regional economy constantly influence each other. Dvorski closely analysed the interdependence between traffic and economy [9]. With stronger economy, the intermodal node has important role in the region, and with well-developed and positioned intermodal node, the local and regional economy can gain stronger development.

According to the research the GDP comparison between Northern Europe and South-east Europe clearly shows that the region of Southern Europe is much more economically underdeveloped (Table 1). An average GDP per capita in Northern Europe is even four times higher compared with an average GDP per capita of southern countries. Consequently the main thesis is that transport and logistics sector in Northern and Southern European regions are completely different, using different infrastructure and the degree of automation, and with completely different managing philosophies.

2.2. The influence of external and internal factors

According to the previous researches there are a lot of different external and internal factors influencing ports, specialized terminals and intermodal nodes on the one hand and local economy on the other [10]. The management of intermodal terminal must be cognizant of already influencing internal and external factors and of the potential ones as well. Internal factors are not in the direct connection with the economy, as they more or less depend on developed infrastructure and used suprastructure. The five main factors are:

- Managing philosophy and ownership share,
- Internal organization and internal processes,
- Human resources and manpower,
- The degree of developed infrastructure,
- Modernization of handling equipment.

The managing philosophy, ownership share and relations between the owners are on the top of this list because they determine managing policy. Higher possibilities of unproductive system activities are usually in places where the managing policy is not clearly defined. Such circumstances can lead to intensive development or to retro-gradation of the entire system and they have direct impacts on internal organization, internal processes and human resources.

External factors are directly connected to the national and regional economies, and local, national and regional traffic policy. This results in well-developed or underdeveloped land or maritime connections, which determine the role of an intermodal node and its gravitational region. In addition, intermodal nodes are very often limited with expansion due to the land unavailability or financial problems.

2.3. Network development

The modern logistics are made up of many small but important components, including intermodal nodes and developed network between them. Port regionalization hastens the development of such networks. The transition towards the port regionalization phase is a gradual and market-driven process, imposed on ports, that mirrors the increased focus of market players on logistics integration [11].

This was realized in straitened extent by the West European economy a decade ago. For this reason, an intermodal network has been intensively developed in the Western and Northern Europe. Consequently, intermodal nodes in that part of Europe handle more than 80% of all cargo in export or import to or from Europe [12]. Moreover, these intermodal points are equipped with sophisticated machinery and well-educated and trained human resources. The main entrance points are situated on the coast of the Netherlands and Germany. These ports evolved in international hub points, managing global supply chains with direct cargo delivery to hub intermodal nodes and with final delivery directly to the consignees all around Europe. They are serving also the Eastern and South-East part of Europe with this concept, enabling them to reduce additional stops and manipulations on the entire route.

Of course, their development and expansion over the last decades is connected with a well-developed economy and step-by-step emerging eastern economy. A wide gravitational region gains intensive cargo flows in import and export as well. Underdeveloped intermodal infrastructure and scarcity of funds in the Southern and Eastern Europe rendered a possibly strong development of North European intermodal network.

The main nodes are still maritime terminals and they connect maritime and land transport systems. Their function evolved from basic ports just two or three decades ago to intermodal node [11]. Today they are focused on managing global supply chains, eliminating all wastes on the door-to-door logistics chains. Managing such a system became a challenge on the global market, especially now, when private companies entered the shipping industry. They are building independent specialized terminals, based on new market positions and new managing philosophies. Such systems are not acting on the market just as important local players. They have wider strategy; to act as a global intermodal operator, securing fluent cargo and information flows, and to be efficient in the economic aspect as well.

3. MANAGING INTERMODAL NODES

3.1. Different port governance philosophies in Europe

During the last hundred years, the European maritime industry went through different ideologies and different market situations. Consequently, different managing philosophies were developed and used in different regional environments. The most common and extreme managerial ideologies are the Continental and Peninsular philosophies. They are also called the European and Anglo-Saxon

philosophies. The difference between them is in the approach of acting on the market. The Anglo-Saxon approach manages the intermodal node as a commercial activity with an aim to obtain a profit, meanwhile on the opposite side is the European or Continental managing philosophy [13].

Continental philosophy sees an intermodal node just as an important part of the regional infrastructure without special consideration of its commercial activity. Such terminals are managed as public service and such a philosophy is reflected in management ethos. This kind of an intermodal node is managed to secure a support for national market and industry. The development and investments are always restricted to a certain circle, managed by the Port Authority, which is an extended arm of local or national state authority. In addition, the state has the power to decide about investments, modernization and system's organizational changes [8]. The described organizational approach is present in the South European region, like Greece, countries on the east coast of the Adriatic basin and in the Black sea region.

The Anglo-Saxon system is based on commercial services. The private company or capital nominates the management. The objective should be to earn appropriate profits or avoid unnecessary commercial losses. The public intervention in organizational or managing policy is minor or even inexistent. Such a node acts on the market according to competition principles, which stimulate commercial selection in the region. These intermodal points are present in the Northern Europe and in the United Kingdom [8].

Both managing models are useful; especially with an adoption in the regions where they are actually used. In any case, pure described models do not exist. Intermodal systems are managed more or less according to the one or other philosophy, but the private sector is entering in logistics sector even in traditionally much closed and hardly accessible markets. This is especially true for the South and East Europe.

3.2. Organizational changes

In late eighties, the participation of private sector in the management and operation of port and inland terminal facilities in the developing countries was minimal. It was present only in the developing countries outside Europe. Such points were Malaysian Port Klang and a port in Manila, the Philippines, or a port in Kingston, Jamaica. The developing countries in Europe had a traditional Continental approach, without a private capital investments and the widest commercial behaviour. Huge changes have occurred in shipping sector all around the world in last twenty years. The reform of port sector was significant in the developing countries. The port authorities gave an opportunity to the private sector for investments and left them managerial responsibilities of port facilities. This was the first step, which enabled private sector to enter also in hinterland points, to develop the already existing terminals, or to establish completely new sophisticated intermodal nodes [14].

Managing intermodal terminals has become a global activity. The main turning point was caused by globalisation and by a new approach of the shipping companies creating global service network. New trends in shipping philosophy and evolution of supply chain management stimulated specialized companies to act as port or terminal operators on a global market. These companies are nowadays present on all continents and in all of the important economical basins. International enterprises, such as Hutchinson Port Holdings, PSA Corporation, DP World Dubai, International Container Terminal Services Inc. (ICTSI) and Stevedoring Services of America (SSA), control the majority of world's container and produced cargo flows. Global shipping lines are also intensively entering in port sector. A.P. Moeller, MSC and CMA, the world's three leading shipping lines operate several owned container terminals all around the world. Hutchinson Port Holdings (HPH) is considered the largest among the major private container terminal operators in the world. In addition, HPH operates five of seven busiest container ports in the world.

New challenges were created by the new private players that emerged in last twenty to thirty years. Furthermore, the rail operators also have interests in well-developed intermodal nodes, enabling them to operate more efficiently and service a greater number of users. They not only search

higher import or export volumes of cargo to specific locations, but also want to offer final delivery by rail within one logistics and one transport mean [15].

All these positive changes are going to satisfy increased client's expectations in lowering logistics costs and providing shorter transit times. Modern logistics concepts can function perfectly in such environment; therefore just-in-time and door-to-door services can secure expected functionalities.

4. THE CASE OF SOUTH-EAST EUROPE

According to the research of ports, maritime terminals and inland rail terminals the infrastructure of South-East Europe is underdeveloped compared to Western and Northern Europe. This is related to inland rail and road infrastructure between intermodal points as well. In addition, according to the research performed by Šakalys and Palšatis in the South-East Europe there is a very small quantity of inland terminals, operating with limited handling equipment and limited space of land [16]. This is in the direct connection with underdeveloped regional economy after the Second World War, and even more with the economy transition during the last twenty years.

Intermodal nodes were not managed as important supply chain links. The management of maritime terminals was focused exclusively on handling of goods, without a general logistics view. This kind of management creates a lot of waste in the entire logistics process. It is expressed through additional time spent in stuffing and un-stuffing operations, additional costs and minor safety. Efficient intermodal network requires specialized staff with strong management. It is very important to have a vision, especially in the South-East Europe, where the intermodal network still has to be built [17]. Intelligent managers and infrastructure planners must be present in every node across the South-East Europe in order to establish coherent network of efficient transfer points [18].

4.1. Managing maritime systems

According to the research performed on maritime points all around the coast of South-East Europe, the management of these systems had no strong commercial vision during last three decades. Ports and specialized terminals were developed with government's decisions and just to cover needs of national economies. Every port had only one or two specialized terminals; therefore, national production or import was concentrated on a specific terminal only. There was no direct competition, especially because hinterland states and economies had a governmental agreement which port or terminal to use for import and export of raw materials and produced cargo. This is especially true for the countries of ex-Yugoslavia, with ports and terminals in the eastern Adriatic Sea, serving also hinterland states as Hungary and Slovakia. Albania was a closed state for over fifty years with undeveloped port infrastructure.

The case of Greece is somewhat different, as this country has long tradition and rich maritime history. Therefore, their ports had a strategic role in the Mediterranean Sea. Due to underdeveloped hinterland economy, those systems did not play an important role in the world scene. The ports of Bulgaria and Romania were also underdeveloped for quite long time, but port of Constanza made a step forward with important investments in infrastructure. Nowadays, it is one of the ten most important intermodal maritime points in Europe with special function to manage sea, river and land transport. Consequently its gravitational area is the biggest in the region of South East Europe (Fig. 1).

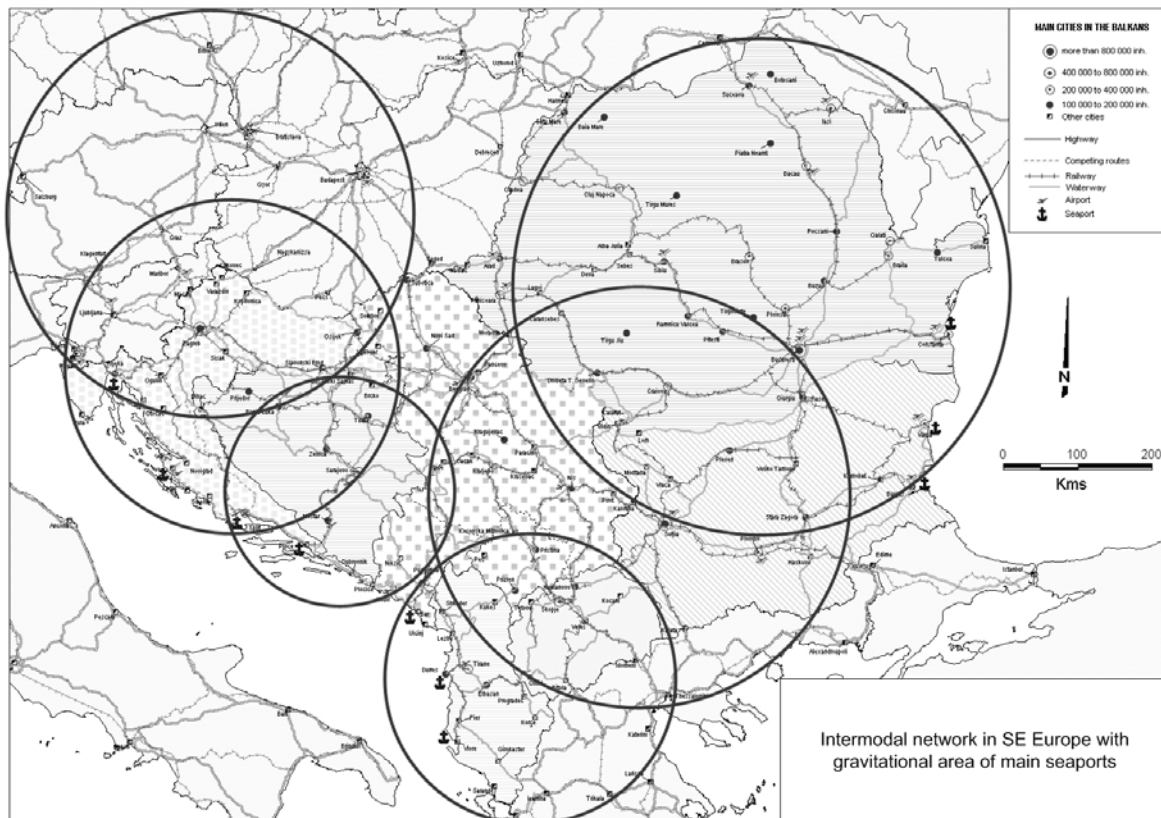


Fig. 1. Intermodal network and gravitational area of main seaport in South-East Europe

Рис. 1. Интермодальная сеть и область «притяжения» главных морских портов в Юго-Восточной Европе

Today all maritime points in the South-East Europe are still more or less state owned enterprises, where the state has a strong impact on port development and investment strategy. Twelve main ports are Piraeus, Thessaloniki, Iraklion, Varna, Burgas, Constanza, Koper, Rijeka, Ploce, Split, Bar and Durres. The states possess at least 51% of ownership in all these ports. The four ports which are significantly ahead of the remaining eight are Constanza, Piraeus, Thessaloniki and Koper because their infrastructure was modernized significantly and the management philosophy changed drastically, especially in Romanian and Slovenian ports. However, due to shortage of financial investments and still limited access of the private entities, those ports cannot compete with well-positioned northern or western systems. Of course, the management of those ports can find a niche logistics segments to cover, but as a whole they are not in a position to directly compete with the western and northern competitors.

The increasing involvement of the private sector in port projects should have immediate impacts, like the case of two wharfs for containers in Piraeus, which is presently managed by COSCO Pacific, a container terminal operator under China Ocean Shipping (Group) Company. COSCO signed a financial agreement with Piraeus Port of Greece on investing over 4 billion Euros. Pier I will remain under direct control of the Piraeus Port Authority, a stock listed entity in which the Greek state retains a direct 74% stake.

4.2. Managing inland systems

Inland distribution and accessibility is becoming a very important dimension in eastern economies. According to the research performed in the last three years cargo flow using intermodal transport units increased drastically with an average of more than 25% on a yearly basis. Actual transportation system

faces a massive shortfall in capacity to move and absorb increased flows of goods. Those flows are still in a one-way direction, which means import through maritime intermodal points. Data in Table 2 clearly shows that throughput of intermodal units increased significantly (except Piraeus, which lost hub port function in 2008), and that almost the entire produced cargo flow is generated and absorbed by local economy of South-East Europe.

Table 2

The throughput of intermodal units in 2008 and cargo share generated by South-East economies

Port	Throughput TEU	Change 08/07	To SE market
Constanza	1,380,935	- 2 %	50 %
Piraeus	431,000	- 70 %	90 %
Thessaloniki	238,940	- 46 %	100 %
Koper	353,880	+ 16 %	40 %
Rijeka	168,777	+ 14 %	90 %
Ploce	35,124	+ 20 %	100 %
Varna	155,326	+ 56 %	100 %
Bar	46,400	+ 72 %	100 %

This growth cannot be attributed to the management of intermodal points. Actually, logistics companies have greater merit as they inverted cargo flows from the northern ports to the southern ones. On the other hand, shipping lines reduced ocean rates to the South-East ports and for some ports, they even equalized them with the leading North European ports, as Rotterdam, Hamburg and Antwerp.

The intermodal transportation infrastructure is very poor, especially the rail connection from all maritime systems up to railway stations. The railway infrastructure is old and does not render the possibility to use it for timely delivery as transit on a 1,000 km route can last for more than one week and the return time can be over 14 days. Consequently, the road transport is used for transport of more than 80 % of intermodal units from ports up to final destinations, although the road infrastructure is also underdeveloped compared to central and Northern Europe.

It has to be emphasized that modern intermodal terminals practically do not exist. These are old railway stations situated in the centre of the oldest part of town, but partially modernized with some new handling equipment. This is true for main economical basins as Belgrade, Sofia, Sarajevo, Skopje, Zagreb, etc. The situation is changing gradually. The inland transportation system in Southern-East Europe continues to evolve, however slowly, compared to the demand of the local economy.

4.3. Managing challenges and possibilities

The management of a single intermodal node must define its strategy on the market to act as an important hub intermodal node or just to operate as a local distribution centre. Organizational changes are therefore inevitable. The management or, in some cases, the state must attract private capital to invest in actually poor infrastructure. This can be achieved by direct selling of the complete infrastructure or to enter as an important shareholder. The second possibility is the concession for a longer period, generally over thirty years. Consequently a model of port function and intermodal integration has been developed to classify South-East European ports (Fig. 2).

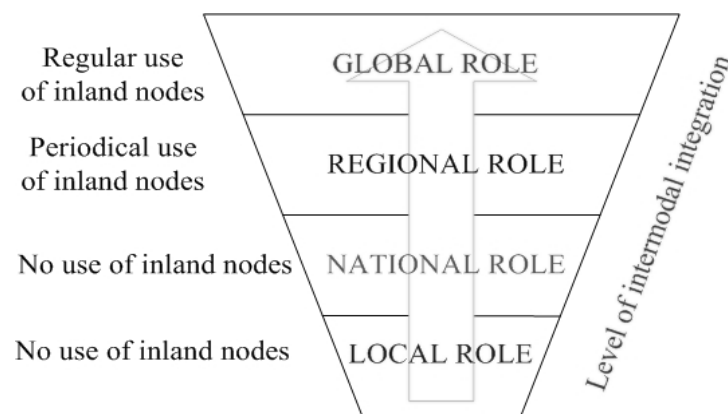


Fig. 2. Model of port function and intermodal integration

Рис. 2. Модель функционирования порта функционирует и интермодальная интеграция

Actually, port systems are mainly classified in the last two groups; meanwhile just Port of Costanza, Piraeus port and Port of Koper can secure structure and processes valid for 1st group of ports, playing also a global role. According to the research of 16 main ports in the region, each has been classified as follows:

- Local role: Split, Iraklion, Burgas, Zadar, Igoumenitsa, Vlore, Chalkida,
- National role: Varna, Rijeka, Ploce, Bar,
- Regional role: Thessaloniki, Durres,
- Global role: Constanza, Piraeus, Koper.

It is difficult to make progress into the next group classification. It can be done just with the stimulation of the development and the competition inside the port, as it is in the case of COSCO terminal in Piraeus port or in the case of Constanza port. In Slovenia and Croatia, the state and the port authority already gave a concession to a single entity. Such strategy does not bring commercial competition, and to some extent, the management is not forced to produce innovative solutions of structural improvement and improvement in managing processes. In such a way, the traditional Continental philosophy will stay in force for the next thirty years and the pressure to build and develop the hinterland connections will not be as aggressive as in the case of private capital investments. This is also true in the case of hinterland intermodal nodes as it is hardly likely that port operators will invest in the nodes which are just 200 to 400 km away from the sea. To some extent it is hardly believable that ports can change their actual position in described model.

This can happen only when the intermodal network will increase drastically in efficiency and only when the hinterland connections are completed. Such an intermodal system will provide faster and safer transportation and will increase transportation efficiencies from the economical point of view. Globally, inland transportation contributes 18% of logistics costs and can be lowered up to one third with appropriate development strategy [19]. As per research performed in the South-Eastern region these costs are even over 25%. An appropriate infrastructure and simplified documentation and administrative procedures can reduce the costs really even by one third. The total logistics costs consist of logistic costs at shipper and consignees side, and of ocean freight with inland delivery. Northern inland network contributes 18% of total costs. Meanwhile, the southern intermodal network contributes the additional 10%. Considering that ocean rates are on the same level and logistics costs at shipper's and consignee's side also, the difference is therefore gained just from inland dispatch. Those at least 10% are a significant reason, why the cargo still arrives in South-East Europe through the northern network. The difference is even higher where the ocean freight is not at the same level, like for ports in the southern part of eastern Adriatic coast and ports on the Black sea.

Moreover, the developed intermodal network provides additional security for cargo, as it is loaded and sealed at the loading points, and opened and un-stuffed just at the consignee's premises. Cargo

security and transport safety is certainly the weak point of the southern intermodal system. With the infrastructure development, this important logistics topic could be adequately solved.

5. CONCLUSION

Developing intermodality in the entire European territory is a part of the European development policy. Intermodal network is well developed in Western and Northern Europe. Meanwhile, according to the research performed on 16 main ports in the region of South-East Europe these systems are still underdeveloped. With this the main thesis that transport and logistics sector in Northern and Southern European regions are completely different and are using different infrastructure and the degree of automation can be confirmed.

The South-East Europe is still in vice of continental philosophy of managing intermodal nodes. This makes a faster privatization of maritime or hinterland infrastructure and a more commercial oriented market approach impossible. In spite of this, the management of a single intermodal point must be aggressive on the local and wider market and open for new organizational and structural changes. Establishing intermodality and managing intermodal nodes is therefore a necessity for South-East European region.

According to the model worked out for a classification of ports in the region of South-East Europe just three ports in the region can be classified as global ports. On the other side over 70% of all main ports are classified in last two groups, where over half of them are in the last group of ports with just local role. Moreover, the hinterland infrastructure is underdeveloped therefore a further progress of these ports and inland intermodal terminals is quite impossible.

The solution is in the smart privatization and liberalization of railways. The management must attract global private companies to enter a specific field of port services. In this respect the total logistics costs are very important to invert cargo flow from the existing northern logistics platform and to attract private capital for direct investments. This can be achieved with reorganization of inland delivery concepts and with cuts in inland transportation costs. These challenges must be at the top of the management priorities of a single intermodal node in the region in order to develop synergies between them.

This is an important challenge because states are still the main shareholders in all important maritime points and through national rail companies also of hinterland intermodal nodes. In addition, all states are still in the economical transition process, and they do not have financial funds for investments in developing highways, national rail networks and for modernization of superannuated infrastructure of sea and hinterland intermodal nodes.

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