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## **Influence of Cargo flows on Sustainable Development of East Mediterranean “Motorways of the sea”**

### **Abstract**

An integrated approach to redirecting traffic from roads to more efficient and environmentally friendly forms of transport implies the definition of strategic guidelines for combining comparative advantages of intermodal transport and development of land, port, railroad and other traffic infrastructure. This concept of development of east-Mediterranean “motorways of the sea” enables the development of shipping and intermodality in the entire region. The European transport policy, in the context of affirmation of a sustainable and efficient traffic and particularly important potential of “motorways of the sea” in environment protection, enables the achievement of a sustainable economic development of the countries in the region.

The aim of the paper is to study the influence of cargo flows on the sustainable development of the “motorways of the sea” in the east Mediterranean and the applicability of the general framework of MoS policy. The paper emphasizes the advantages and significance of coastal traffic connections and the “motorways of the sea” and identifies the limitations. It analyses the corridors in the Mediterranean countries relevant for the traffic development of the region. Among other things, the aim of the paper is to provide support to decision makers in establishing a successful MoS network.

**Key words:** “motorways of the sea”; cargo flow; sustainable development; Adriatic MoS project.

### **1. Introduction**

Market globalization and liberalization have a considerable influence on the world cargo flows, and thus consequently on the traffic and transport system, generating economic and particularly traffic development. Economic development and investment potential of a country, as well as the supra-goals of traffic development dictate the principle of intermodality in the concept of traffic network development and the possibilities of integration of east European countries’ traffic systems into trans-European intermodal transport networks. As opposed to the competitive road traffic, a series of

measures in the traffic and transport system are to contribute to the implementation of an efficient integrated system of intermodal transport by sea, rail and internal waterways. The concept of east Mediterranean “Motorways of the Sea” (MoS) introduces new integrated intermodal maritime bases with logistic chains capable to connect to a limited number of selected ports located in strategic places on European coasts. Such concept of the “Motorways of the Sea” as one of the most cost-effective and environmentally friendly ways of transport should contribute to the change in the basic structures of the European transport system, thus achieving such organizational and financial simplicity and efficiency in the traffic system to become the logical choice of transport operators. Owing to that, the value of results obtained by analysing the indicators of cargo flows, both sea and land, are of general interest (Atlantic and Mediterranean), which shows the purposefulness of monitoring them with the direct objective of extending new intermodal sea-oriented logistic chains in Europe which would improve the approach to markets throughout Europe.

This paper provides an overview of preliminary authors’ results on the basis of an ongoing research, which results in a proposal of a concept of an Adriatic “motorway of the sea” as a significant part of the east Mediterranean corridor, in the function of intermodal transport, indicating the importance in optimizing cargo flows in the European Union, especially the east Mediterranean region. Authors’ research is directed towards defining the advantages of coastal traffic connection and the “motorways of the sea” concept, as well as the characteristics of this corridor in the context of the trans-European network and pan-European transport corridors. By defining the strategic guidelines for the integration of comparative advantages of geo-traffic location of the countries in the region and the corresponding transport corridor, by conducting an analysis of cargo flows structure, and conforming with the organizational concepts of the European transport network with the tendency of achieving a sustainable economic development of the countries in the region, the aim of the paper is to emphasize the potential effects of implementing the concept, its optimization and possible limitations.

## **2. Materials and methods of MoS project analysis**

The paper uses a critical approach to analyse and synthesize the general political framework related to MoS. Furthermore, it analyses the main geographic, functional, operative and other specific traits of the east Mediterranean traffic system in relation to the given political framework. These analyses establish and explain the reasons underlying the comparative advantages of such traffic concept on the one hand, and its limitations and inconsistencies in the implementation of the European policy framework in the MoS development on the other hand. By identifying the advantages and limitations, a series of possible recommendations may be offered, with the purpose to overcome the obstacles and promote an efficient and sustainable “motorways of the sea” concept into a trans-European transport network. In the realization of this aim, a

combination of a “top-down” (from umbrella European policy and national priorities) and a “bottom-up” approach (transport market demands) is applied. Furthermore, two mutually related methodological approaches of cost-benefit analysis have been applied. Thorough insight into the current condition of the maritime transport system in the east Mediterranean region is beyond the scope of this paper. A detailed presentation of this transport network has been elaborated within the project Elaboration of the East Mediterranean Motorways of the Sea Master Plan (EMR MOS) [7].

### **3. Conceptual framework of coastal traffic connection in the EU through “motorways of the sea” project**

Recently, owing to the intensification of economic growth and cargo flow dynamics between Central Europe and pre-Asian areas, i.e. the zone between the European north and south, a more progressive development trend in both zones has been made possible [2]. The development of a multimodal transport network and its connection to Trans-European Road Network (TEN-T) corridors in land traffic sectors (road and rail), internal waterways, sea ports and airports, are a prerequisite for strengthening national economies of the countries in the region. Marking a direct multimodal Baltic-Adriatic-Mediterranean corridor would connect the European north and south and intensify the economic growth of the Baltic and central European countries. Reviving the dynamics of cargo flows and the growth trend in port and rail traffic within and between the Baltic and the Mediterranean create the foundations for land traffic connection of all countries gravitating towards the Baltic, or the Mediterranean, through the existing European traffic network corridors. The concept of Baltic-Adriatic-Mediterranean traffic connection should reintegrate the Danube waterways and stimulate the construction of canals for connecting river basins [12].

Motorways of the Sea represent existing or new maritime services integrated into a logistic door-to-door chain using sustainable, regular, frequent, high quality and reliable short sea shipping connections [9]. It is a new concept which promotes coastal traffic connection and intermodal transport on the initiative of the European Commission and the EU member states. The tendency of this concept is to redirect road network to ecologically acceptable seaways, by establishing frequent and high quality maritime logistic services. Considering the above, it can be concluded that the Motorways of the Sea represent a wider concept than the short sea shipping and, as opposed to short sea shipping (SSS), it includes the land section of the route (only road and/or rail), but the sea section of the route is organized according to the short sea shipping concept, whereby the technology used (RO-RO, LO-LO, etc.) does not present a defining element. This concept enables the reorganization of the existing sustainable transport policy and improves the quality and efficiency of European transport, with the purpose of avoiding economic losses incurred by bottlenecks, pollution and accidents, and it also achieves the balance between different transport modes in the region and the EU.

### 3.1. Overview of MoS Legislative Framework

The EU traffic infrastructure policy and the European transport policy are defined in the “White Book”, which emphasizes the balance between the economic growth, qualitative and safety requirements and sustainable transport system as the basic goal. The European Commission has prepared general development guidelines, entitled Transport and Energy Infrastructure in South Eastern Europe, whereby it insists on the regional dimension and establishing links in the observed region, i.e. among Albania, Bosnia and Herzegovina, Macedonia, Serbia and Montenegro. The EU has provided Croatia with guidelines for intermodal transport development, which is underdeveloped in Croatia, as well as many funds and programmes for co-financing intermodal transport development. In accordance with these guidelines, the EU emphasizes the need for developing a transport network in Croatia in complete harmony with the development of trans-European network and the South East Europe Core Regional Network. In that sense, Croatia and the European Commission reached an agreement about the future (TEN-T) in accordance with the Decision no 1692/96/EC, as amended, and about the priority project of European interest in the context of TEN-T in the EU Common Position (CONF-HR 31/07) [6]. Therefore, the European Commission issued the Directive 2004/54/EC referring to TEN-T, bounding for all EU member states from 19 November 2011. Therefore, it should be pointed out that the EU, on the basis of performed development projects from the sector of international public transportation, industry, energetics, economy, finances, IT and other sectors, redefined the pan-European corridors and gave up on the strategy of connecting the North Sea and the Black Sea through the corridor North Sea-Rhine-Main-Danube-Black Sea and adopted a new strategy Baltic-Adriatic.

In the framework of the EU development strategy, the European Commission brought and adopted a series of long-term development plans and projects extremely important for the Croatian economy, such as Freight Transport Logistic Action Plan<sup>1</sup>, which supports the development of intermodal transport as one of the main priorities of European transport policy [6]. In the context of this plan [5], the European Commission provided a framework and guidelines to ensure the modernization of European ports and thus raise the level of competitiveness of maritime transport, attract investors and analyse the progress in the development of sustainable mobility, as well as the development and stimulation of competitiveness of the intermodal transport system. Regional transport organization SEETO - South East Europe Transport Observatory [21], founded in 2004, issued a Memorandum of Understanding and Development of

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<sup>1</sup> Freight transport logistic action plan – in 2007 the European Commission made a plan suggesting a series of measures to stimulate competitiveness of the intermodal transport system, raise the level of competitiveness of maritime transport, create a framework which will ensure the modernization of European ports, promote transport logistics and attract investors, as well as analyse the progress of sustainable mobility.

Core Regional Transport Network. The Memorandum was signed by Albania, Bosnia and Herzegovina, Montenegro, Croatia, former Yugoslavian Republic Macedonia, Serbia, UN Mission in Kosovo and the European Commission. SEETO was founded to promote cooperation on the development of the main and auxiliary infrastructure on multimodal South East Europe Core Regional Transport Network, promote and increase local capacities for the implementation of investment programmes, managing and collecting data and analysis of Core Regional Transport Network [21]. When the verification and evaluation of the EU transport needs was made in the framework of TINA<sup>2</sup>, Croatia was not an EU member, so the appropriate complementary Croatian transport network was not defined in the pan-European corridor network.<sup>3</sup> In the context of South East Europe Core Regional Network, the EU addressed the issue of Croatian transport infrastructure and its potential priority projects on several occasions. In that sense, the European Investment Bank published a study Inventory of West Balkan Transport Infrastructure in 2000, referring to the core transport network in this part of the European southeast, which was the basis for the Traffic and Energy Infrastructure in South East Europe. This document expresses the need for a regional connection between Croatia, Bosnia and Herzegovina, Serbia and Montenegro, Macedonia and Albania [17]. In the sense of a wider approach, or adopting the programme of TEN-T development and the Common Transport Policy programme, the emphasis was placed on considering the environmental and safety aspects, efficiency of managing traffic flows supported by the application of intelligent transport systems and the interoperability of transport modes. The East Europe traffic system development project, conducted by Cyprus, Greece, Italy, Malta and Slovenia, within the TEN-T programme, resulted in the Master Plan with detailed analysis and plans for necessary modifications and investments in infrastructure, while Croatian ports were also taken into consideration. The European Commission will use this document to make development strategies and plan the connected financial programmes which would stimulate investments and transport infrastructure development.

By insight and analysis of databases, using the most up-to-date methods and technologies for evaluating the economic effects, the European Commission has conducted a research of cargo and transport-industrial flows through international projects IMONODE, NADOK-X, ECO4LOG and INTERIM. Imonode and Interreg IIIb projects proved the strategic justifiability of integrating north Adriatic ports Rijeka, Kopar and Trieste into a system that would strengthen the European corridor V, as well as directly include the junctions Rijeka and Zagreb. In that sense, it would be

<sup>2</sup> TINA – Transport Infrastructure Needs Assessment.

<sup>3</sup> Multimodal Pan-European Network includes 10 corridors with 75,000 km of roads and railroads, 20,000 km of internal waterways and 300 seaports and airports. According to the Decision 1692/96/EC by the European Parliament and the Council of Ministers, about the partnership position for the development of Trans-European transport network, defined by the so called “common interest partnerships“ for the EU, the amount of investment into the projects was evaluated to be up to 400 billion euros until 2010.

necessary to construct a double-track lowland electrified railroad Rijeka-Kopar-Trieste, a railroad from Rijeka over Pivka to Austria, as well as along the Adriatic coast from the northern Italian ports to Greek ports with branch lines towards Zagreb and Hungary (Rijeka-Zagreb-Botovo), all at a maximum elevation of 200 m above sea. This modern railroad would connect Croatia with the European railroad network, thus becoming a key factor for connecting the EU with the Adriatic-Mediterranean sea transport route, or with the overseas areas of Africa and the Near and Far East. Furthermore, with this railroad, the EU plans to integrate the north Adriatic ports into a key intermodal centre which would strategically connect the EU and Asia [16]. Owing to that, in March 2010, the ports of Trieste, Rijeka, Venice, Ravenna and Kopar founded the North Adriatic Ports Association – NAPA. The EU evaluated the NAPA project “ITS Adriatic Multi-Port Gateway” as extremely significant for the port infrastructure potential and European market services, whereby NAPA ports were granted the funds in the amount of € 1,442,500 on the public tender by the EU for co-financing development projects within TEN-T fund. In the future, cooperation and competitiveness shall facilitate the creation of a unique information platform that will manage the services intended for the markets of the Far East, central and east Europe [13].

ECO4LOG project designed logistic goods services in international public transportation as a value added service or economic multipliers, bringing significant value to the countries through which these cargo flows pass. There are as many as 6 international transport corridors [14] passing through the area of the Republic of Croatia (Figure 1). INTERIM project designed a modern intermodal transport system, which ensures the share of maritime, rail and river traffic of up to 85%, and road traffic up to 15% to achieve the “3E” goal (Ecology, Energy and Economy) [18].



Figure 1. Potential routes of the “Motorways of the Sea” in the Republic of Croatia and in the East Mediterranean. Source: [15].

### 3.2. Cargo Flow Analysis

The European Commission divided the European transport system into four main areas, providing a Master Plan of Development for each of them, defining the basic goals of the project. Development and financing of the European “motorways of the sea” are contained in the European Commission guidelines for Trans-European Transport Networks, defining the legal framework for their creation. Four corridors have been defined as a part of the TEN-T priority project No. 21 for realizing European interests [8]:

- “*motorway of the sea*“ *on the Baltic Sea* – the aim is to connect the Baltic countries with EU members in the central and west Europe,
- “*motorway of the sea*“ *of the western Europe* – the aim is to connect Portugal and Spain over the Atlantic ports with the North Sea and the Irish Sea,
- “*motorway of the sea*“ *of the southwest Europe (western Mediterranean)* – the aim is to connect Spain, France, Italy and Malta with southeast Europe, including the Black Sea,
- “*motorway of the sea*“ *of the southeast Europe (eastern Mediterranean)* – the aim is to connect the Adriatic Sea with the Ionian Sea and east Mediterranean, including Cyprus.

The East Mediterranean Motorways of the Sea Master Plan as a proposal for east Mediterranean development was issued in 2006. It was conducted by Slovenia, Greece, Italy, Cyprus and Malta. On the basis of the assessment of potential future cargo flows and project feasibility defined in the Master Plan proposal, nine potential “motorways of the sea” corridors have been defined:

*corridor 1* (Igoumenitsa - Taranto), *corridor 2* (Kavala - Limassol), *corridor 3* (Igoumenitsa - Koper), *corridor 4* (Venice - (Igoumenitsa) - Patra -(Korinthos)), *corridor 5* (Igoumenitsa - Ancona - Koper), *corridor 6* (Limassol - Pireus), *corridor 7* (Venice - (Koper) - Ploče), *corridor 8* (Patra - Catania), *corridor 9* (Malta - Venecija) (EMR MOS, 2009).

By correcting its long-term development strategy and adopting a new strategy Baltic-Adriatic, with the Port of Rijeka as the main intermodal centre and traffic way, the EU wanted to ensure a maximum compliance with the EU strategic interests. A total of 90% of the EU external trade is directed to the sea, which is why the European Commission believes that significant economies can be achieved by the new, considerably shorter corridor passing through Croatia. This EU’s strategic interest should be recognized in Croatia and used as a possibility of economic recovery and growth. The assessment by the European Commission that traffic in the countries of that region (Croatia, Italy, Slovenia, etc.) will grow by 50% up to 2020, speaks in favour of that. Only 10% of more than 700 million tons of cargo passing through the Suez annually arrives to northwestern Adriatic ports [20] although this transport corridor would reduce the transport time for about five to seven days in relation to northern European ports (Figure 2). The Adriatic transport corridor has become the focus of interest of Euro-



pean, but also world shipping companies, which base their selection of this transport route on the reduction of transport costs and travelling time. As the basic advantage of its favourable geostrategic and geo-traffic position, Croatia should take advantage of current trends of the EU traffic policy and world shippers, and ensure the necessary transport logistics and capacities along the mainland, sea and inland waterway routes. Therefore, the obvious challenge in Croatia lies in necessary investments into the development of transport infrastructure and trans-shipment capacities in the Port of Rijeka and other Adriatic ports to realize long-term national interests, along with the strategic interests of the EU.



*Figure 2. Illustration of the length of sailing route from the east Mediterranean (Suez Canal) to the North Sea through the Adriatic corridor in relation to the longer route through Gibraltar. Source: EMR MOS (2009).*

Croatia and the Port of Rijeka may become an important strategic transport-industrial corridor and intermodal centre and junction of the EU and Asian countries. The suggested Adriatic MoS project represents a continuation of the South East Europe Motorway of the Sea Master Plan with the aim to develop a MoS Master Plan for the Adriatic transport system. The Adriatic MoS project would ensure the availability of financial means for investment and development of maritime and intermodal transport system on the east Adriatic coast, thus stimulating the development of coastal traffic connections and intermodality in the entire region. In the long term, the Adriatic MoS project aims to achieve a balance of transport routes with the reduction of costs and inclusion of ports closer to the cargo destinations [3]. As Mediterranean ports represent a shorter and thus a more cost-effective way of connecting Europe with Asia and the Far East, there is no doubt in the justifiability and the significance of the concept in the eastern Mediterranean region.

#### 4. Methodology of evaluating MoS project

The cost-benefit analysis is a procedure for evaluating social and economic benefits and losses which might appear in the implementation of a project. The method is based on determining the existing value of expected costs and benefits of investment into a project with the aim to evaluate the justifiability of its realization. Cost-benefit analysis is directed towards a comprehensive social assessment, while some other analytical methods deal with evaluating individual benefits of a project. The procedure of cost-benefit analysis consists of [4]:

- defining a project, establishing the expected costs and benefits, their measurement and discounting,
- comparing the present value of costs and benefits to make a decision about accepting or declining the project.

Cost-benefit analysis is a suitable and objective method, enabling unbiased evaluation of the costs and benefits of a project which is the subject of this paper, based on the principle of the so called potential Pareto superiority, whereby any project with benefits greater than costs is worthwhile. The basic goal of cost-benefit analysis is to prove that a project is useful to society as a whole, thus facilitating decision makers to decide whether the society is prepared to take the risk of costs incurred by the project. In order to be justified, each project must satisfy the conditions of sustainable development. Therefore, in defining possible costs and benefits of the implementation of the Adriatic MoS project, it should be born in mind that benefits should refer not only to the economy and society, but also to human health and the ecosystem. Care should be taken to encompass all relevant factors related to the project, as well as their particular influence on project implementation. "Motorways of the Sea" project implies a combination of water and land transport, which includes the construction of new or the existence of suitable capacities of land infrastructure which should provide a good competitive connection of ports with their gravity areas or hinterland.

Having that in mind, the following basic costs in forming and realization of "motorways of the sea" have been established [15, 20]:

- costs of construction, reconstruction and/or modernization of ports, roads and railroad infrastructure to connect the pan-European traffic corridors with the ultimate destinations of cargo flows,
- costs of infrastructure maintenance, which should comply with the European and world standards,
- costs of ecological consequences for the ecosystem and population (soil pollution, noise, danger, ballast water discharge, other harmful discharge, ship pollution...) in the areas of increased traffic intensity,
- costs of negative influence on tourism (possible pollution of the sea and coast, reduced attraction of the sea environment),
- costs of marketing in the European and world market,

- costs of possible negative effect on fisheries,
- costs of sea routes system development and development and implementation of maritime traffic control and surveillance system with the aim to increase the safety of maritime traffic and environment protection,
- and other unforeseen costs.

As opposed to the mentioned costs, positive effects or benefits of the implementation of the “motorways of the sea” project may be the following:

- economic and social growth and development,
- employment,
- promotion of maritime and railroad traffic as environmentally more acceptable modes of transport and the reduction of road traffic, to reduce pollution, congestion, bottlenecks, accidents, etc.,
- increased safety of land traffic as a consequence of modernization, restoration and development of land infrastructure,
- increased competitiveness and quality of the entire traffic service on new intermodal routes and logistic chains.

As these are only the basic potential costs and benefits, a deeper analysis should be carried out to cover all positive and negative effects. This is also the reason why the application of cost-benefit analysis is justified in this case, as it enables us to study the big picture of an economic operation, taking into consideration the interaction with other interventions, the consequences of the project and its effects on the environment. The key stage in the evaluation of a project by means of the cost-benefit analysis includes:

- determining tangible costs and benefits (expressed in monetary units),
- determining the intangible costs and benefits of a project (using various scales to compare the values).

This procedure is extremely important, as the result of the analysis depends on it. One of the issues to be resolved is how to express in monetary units the costs that cannot be directly assessed. In this case, there are several methods available such as [20]: readiness to pay, the value of assets, expenses of replacement, travel expenses, transfer of benefits, etc.

Besides this, the cost-benefit analysis has certain other limitations, including the possible conflict of project goals. Therefore, some researchers believe that this method is unsuitable for project evaluation, as it is relatively static [1]. Still, this does not question its usefulness, as the efficient resolving the problem of its application depends on a number of factors, such as: political atmosphere, decision-making system, motivation of organization, the activity of users participating in the evaluation. As the feasibility of MoS project is interdependent with capital public and infrastructural objects, which requires a deeper analysis and research, the use of cost-benefit analysis is suggested in the evaluation of the MoS project. This method could provide valuable information and objective standpoints in the evaluation of costs and benefits generated by the implementation of the project.

## 5. Comparative advantages and possible limitations of the MoS project

This following chapter attempts to identify and specify the advantages and limitations for MoS, in order to establish the feasibility and sustainability of MoS project, taking into consideration its specificities, characteristics, goals and implications. We analyse the main effects of MoS development in the east Mediterranean, which seem to be mostly positive due to reduction of costs and environmental influence of transport. On the other hand, these are counterbalanced by the construction of new infrastructure necessary for the development of maritime traffic in the area. Furthermore, these new projects have not been developed in sufficient detail so they require further elaboration.

### 5.1. Comparative Advantages

The “motorways of the sea” aim for unburdening the congested roads, offering maritime transport as an alternative, without being limited only to connecting ports, but also including services of various modes of transport, promoting intermodal transport as a part of the logistic chain. In that sense, in 2004, the European Parliament set guidelines to define the legal framework for creating MoS, whereby they defined the three main goals of the project to realize European interests (EC, 2015):

- reduce the congestion of roads by redistribution of cargo,
- increase traffic cohesion,
- redirect cargo flows to the sea.

MoS project enables the connection of the EU and in the geo-traffic sense it encompasses northern and the Baltic Sea ports (including islands, with the Barents Sea and Scandinavia), all to the Mediterranean (and some northern African ports) and the Black Sea [11]. Such wide geo-traffic area offers potential cargo flows for the development of the “motorways of the sea” with advantages over other forms of transport. MoS concept reduces the number of vehicles on roads, as well as the level of energy consumption. It also reduces air pollution, as well as the number of accidents. Furthermore, the transport of dangerous goods is removed from the road and social expenses are reduced. In addition, the implementation of the MoS project should contribute to the further development of shipbuilding in the EU. MoS project establishes one of the most advanced regulatory frameworks for safety and pollution prevention (energy efficiency is much greater than in other transport modes) and accidents at sea in the EU maritime sector.

### 5.2. Possible Limitations

The geo-traffic position of the eastern Mediterranean region creates certain limitations in the development of MoS project as a large number of cargo flows (transport connections) is realized between island countries of the region and between the islands

and mainland, without expecting any significant increase in the transport volume. On the other hand, the corridors between the EU member countries in the eastern Mediterranean and other non-member countries have significant potential. However, MoS financial framework does not include instruments for such maritime traffic connections. Furthermore, MoS is faced with the existing competition on the internal maritime market in the Mediterranean [11]. While short sea shipping services basically do not represent a significant competition owing to the different type of cargo, Ro-Ro and Ro-Pax routes are a competition and a limitation to the MoS project. However, real competition is expected from the road transport which, due to its specific traits, is more flexible, simpler in organizational terms, but less environmentally friendly. The cooperation of the participants in maritime transport of the EU MoS project is unreliable, as the financial incentives for the operators, especially shipowners are small in comparison with the risks they have to assume. At the same time, shipowners and operators have to take over a lot of commitments, although they do not have any guarantee that the “motorway of the sea” will be sustainable. There is also a series of technical limitations, such as non-standardized loading units, the lack of suitable cargo-handling equipment, the lack of connection of ports with the hinterland, outdated and/or non-uniform information-communication systems [19]. Besides that, there are various commercial limitations, such as difference in ship speed, as well as in haulage and shipping prices, and the questionable connection between peripheral ports in the EU, which are not efficient enough to be a part of the MoS, with logistic chains [10]. Another limiting factor is the lack of transparency on the market which includes a large number of intermediaries.

## 6. Conclusion

Considering its potential, the current transport system in the region is underdeveloped, and depending on the economic and investment possibilities of the countries in the region, it is characterized by development strategies of individual countries and individual ports. The development of traffic network with an obviously inhomogeneous level of development of various transport modes, emphasizes the concept of intermodality as a significant traffic and economic resource which incorporates all principles of the European transport strategy, as well as complementary transport policies, the principles of integration, interoperability and sustainability of regional transport systems. The realization and development of “motorways of the sea” represents the future of the European transport system because it would significantly contribute to the cargo flow optimization. The “motorways of the sea” concept is a viable project contributing to the intensification of a desirable cargo flow structure through a cost-efficient and ecologically sustainable transport mode, which reduces the intensity and restructures the road cargo flows. An integrated and coordinated approach to redirecting traffic from roads to energetically more efficient and environmentally friendly forms of transport

implies the simultaneous development of land, port, railroad and other infrastructure, connecting ports with the hinterland and other ports. In that context, Croatia and other Adriatic countries may establish integration with the wider European area through the Adriatic MoS project.

The comparative geo-traffic cargo flow analysis in the EU and the Mediterranean indicates the lack of Ro-Ro and container traffic in maritime transport, as opposed to road transport, and the need for developing a long-term sustainable policy for southeastern Europe to stimulate a mode shift of cargo flows from roads to the sea. MoS project without doubt has a definite possibility of development in southeastern Europe and the Adriatic. Therefore, MoS project should ensure:

- a) modernization and development of the traffic system by improving the quality of port services and the current condition of infrastructure,
- b) consolidating cargo flows by achieving a critical cargo volume for the sustainability of the service, c) standardization of high quality of door-to-door service with the aim to increase the speed of delivery and thus achieve competitiveness against road traffic,
- d) standardization of IT system, thus achieving suitable flexibility and better connection of all participants (such as shippers, operators, freight forwarders, agents...),
- e) avoiding a monopolistic approach in offering services, especially in the maritime transport section.

As the level of feasibility of MoS project requires a thorough analysis because its implementation is directly connected with capital public investments into infrastructure, this paper provides a proposal of a methodology for evaluating the “motorways of the sea” project using cost-benefit analysis. The application of the cost-benefit analysis of the Adriatic MoS and MoS projects provides valuable and objective initial information in the evaluation of social cost and benefit generated by their implementation.

In the overall planning of MoS implementation, it should be detected which cargos can be redirected from road to maritime transport. All interested users from the public and the private sector should be actively involved in the implementation under equal market conditions, without questioning the transparency of the process. MoS project implementation should be based on the combination of a bottom-up and top-down approach in order to satisfy all demands and needs of the participants on the one hand and national and EU policies on the other.

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## Utjecaj robnih tokova na održivi razvoj istočnog Mediterana

### Sažetak

Integrirani pristup preusmjeravanju prometa s cestovnog na energetski učinkovitije i za okoliš povoljnije oblike prijevoza, podrazumijeva definiranje stratejskih smjernica integracije komparativnih prednosti intermodalnog transportnog sustava, te razvoj prometne kopnene, lučke, željezničke. Takav koncept razvoja „morskih autocesta“ istočnog Mediterana omogućuje razvitak pomorstva i intermodalnosti u cijeloj regiji. Uvažavajući smjernice europske prometne politike koje, u sklopu afirmacije održivog i učinkovitijeg prometa i posebnog značajnog potencijala u zaštiti okoliša „morskih autocesta“ omogućavaju postizanje održivog gospodarskog razvitka kako država regije.

Cilj rada je istražiti utjecaj robnih tokova na održivi razvoj „morskih autocesta“ istočnog Mediterana i primjenjivost općeg okvira MOS politike. Također, radom se ističu objektivne prednosti i značaj priobalnog prometnog povezivanja i „morskih autocesta“ s jedne strane i identificiraju ograničenja s druge strane. Analiziraju se koridori u državama Mediterana relevantni za prometni razvitak regije. Između ostaloga, cilj ovog rada je dati podršku donositeljima odluka u uspostavljanju uspješne MOS mreže.

**Ključne riječi:** „morske autoceste“, robni tokovi, održivi razvoj, Adriatic MoS.