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Structural analysis of development capabilities of the Port of Ploče as a potential container port within MoS services

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ABSTRACT

The paper aims at presenting a thorough analysis of the present technological state of the Port of Ploče in the context of its development capabilities in terms of MoS service as a modern approach toward the port potential strengthening. Pre-determinants for modern container ports are in-depth examined and on the basis of the performed SWOT analysis the conclusions have been reached emphasizing development potentials and further growth directions that, all combined, shade a new light on the port of Ploče as a part of integrated MoS services. Such structural analysis also suggests new development dimensions that are available for port development in the South Adriatic region.

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1. Introduction

The European transport policy is basically oriented towards relieving the pressure on inland roads, especially highways and redirection of cargo on the waterway: river and sea. Most freight traffic is concentrated in North Eastern Europe, as the largest ports are situated there (Rotterdam, Antwerp, Hamburg), but it also determines the distribution of the concentration of traffic on the inland roads. Motorways of the sea represent a project that supports the basic guidelines of the European transport policy: balanced distribution of traffic avoiding congestion and reducing the negative environmental effects, as well as the efficiency of transport services. The concept of the marine highway is naturally associated with inland transport corridors given that they are directly conditioned. Redirection of freight on maritime transport means requires also an efficient land transport logistics that provide an integral quality of the "door to door" service.

The port of Ploče, by its position, existing infrastructure and development opportunities is a good potential for involvement into European traffic flows and carrying out the main aims as determined by the EU transport policy. An essential prerequisite is, however, improving logistics transport chains to allow the development of the port of Ploče as a hub not only for Bosnia and Herzegovina, but also for Central and Eastern Europe. Container traffic is one of the types of freight transport in the port of Ploče. Given the current low level of turnover and growth trend, this is an example that shows the possibility of a significant increase in the growth providing the competitiveness of numerous factors within the port system but also on the entire transport route.

2. The most important MoS characteristics

The Motorways of the Seas project, within the Trans-European road network, is designed to increase the efficiency of the European transport routes. Efforts under this comprehensive and long-term project are focused on developing intermodal maritime-oriented logistics chains to facilitate the access to European markets. MoS project tends to balance traffic flows in Europe, promote green, viable, attractive and efficient sea-based transport links integrated in the entire transport chain. The implementation of this concept should help to rebalance the EU transport system. It is based on the EU's goal of achieving a clean, safe and efficient transport system by transforming shipping into a genuine alternative to overcrowded

land transport. MoS project aims at introducing new intermodal maritime-based logistics chains and to promote the transport organisation: door-to-door integrated transport chains. It is designed to remove bottlenecks in the EU's transport system through the establishment of more efficient and frequent, high-quality maritime-based logistics services between the Member States [4].

2.1 Main MoS principles

Reorientation of freight on maritime based transport must be based on a frequent, efficient and high – quality service in all modes that all together represent the alternative to road transport. The main goals of the MoS project are:

- Provide an efficient transport service;
- Reduce ecological problems using ecologically acceptable modes of transport;
- Remove the bottlenecks in the European transport system;
- Maritime based freight transport.

2.2 Proposed MoS Services on the Adriatic

The pre-access maritime strategy of the Republic of Croatia, elaborated in 2005, established a long-term development policy for sea transport and Croatian ports. The Strategy pointed out the importance of including Croatia in the network of "motorways of the sea of south-east Europe", a maritime and infrastructure corridor that passes through the Adriatic area that is of special interest to the Republic of Croatia.

Since a quality communication among European countries is a basic prerequisite for the European integrations process, in order to estimate its favourable geographical position, obtain an adequate traffic role in the European area, achieve complete integration with modern Europe as well as an economic benefit from the expansion on the European market, the Republic of Croatia needs to act towards a quality traffic connection with Europe.

The basis for the development of Croatian ports is the increase of freight transport from and to countries in the hinterland. This service represents an export product. The existing port infrastructure does not satisfy the requirements set by the common European market. The necessary prerequisite for the enhancement of the traffic, especially the container and Ro/Ro share, is the development of the sea-traffic network in the Republic of Croatia. It is also important for to development of the land infrastructure network within the Croatian territory, but also in south-east Europe, and in the entire European Union as well.

The "Motorway of the Sea of the Eastern Mediterranean" project within the EU TEN-T programme was implemented by Slovenia, Italy, Malta, Cyprus and Greece. While Croatia was not a member of the EU, it could not benefit from the TEN-T programme funds. Therefore, Croatia and other Adriatic countries established the project "AdriaticMoS" ("Adriatic Motorways of the Sea"), designed as an addition to the Master Plan of the "Motorway of the Sea of the Eastern Mediterranean". The implementation of the "AdraticMoS" project implies the development of a common development strategy of all Adriatic countries in terms of traffic, integrating the transport network of the eastern Adriatic coast area into the European development programmes.

Besides road corridors and inland waterway corridors that transit through the Croatian territory, as stated in the 2009 "Master Plan of the Motorway of the Sea of the Eastern Mediterranean", nine new potential corridors were established in this part of Europe, among which four are important for the Republic of Croatia [14]:

- Corridor III, connecting the western ports of the Ionian Sea/Greek (Igoumenitsa, Patras) with the eastern part of the North-Adriatic ports (Koper, Rijeka, Zadar, Trieste, Monfalcone);
- Corridor V, connecting the eastern part of the North-Adriatic ports (Koper, Rijeka, Zadar, Trieste, Monfalcone) with the western part of the North-Adriatic ports (Ancona, Ravenna);
- Corridor VII, connecting the eastern part of the North-Adriatic ports (Koper, Rijeka, Zadar, Trieste, Monfalcone) with the western part of the North-Adriatic ports (Venice, Chioggia) and with the northern part of the South-Adriatic ports (Split, Ploče);
- Corridor IX, connecting the western part of the North-Adriatic ports (Venice, Chioggia) to the southern part of the Central Mediterranean ports (Marsaxlokk, Valletta).

The application of the MoS concept in the Adriatic area tends to integrate stronger the main Croatian ports of Rijeka, Zadar, Split, Šibenik, Ploče and Dubrovnik into the European trade market. This requires the modernisation of the port and road infrastructure.

3. Analysis and evaluation of the situation in the Port of Ploče

The port of Ploče has a very favourable geostrategic position. It is situated in a bay surrounded by the peninsula of Pelješac at south and southwest, creating a natural breakwater. It is about 3 km away from the delta of the Neretva river in the north-west direction. The valley of Neretva and the port of Ploče are a natural exit to the sea for the continental Croatia, Bosnia and Hercegovina, Montenegro, Middle and Eastern Europe. The port is connected by road in tree directions. The motorway A1 from Zagreb reached Ploče and the last section was opened to traffic in 2013 and it is now connected to all main city centres in Croatia.

In the north-south direction, it is connected by railway through one of the branches of the Vc corridor. The position of the port potentiates good maritime connections, especially with Croatian and Italian cities bordering on the Adriatic.

At the beginning of the '90s, the activities started on the affirmation of the port as a strategic transport hub of the Pan-European Corridor. Development activities were related mainly to the modernization of the existing facilities and equipment as well as to the construction of new facilities. In 1997 began the intensive restoration, in 1999 the new coastline No. 5 was constructed, in 2000 the construction of the Ro-Ro terminal was completed, and in 2001 the pear 3 and the construction of a terminal for liquid cargo and trailers for citrus fruit was completed. Since 2005, a planned and organized access to the modernization and development of the port has started by preparing an overall Project of the Integration of Trade and Transport. The carrying out of the project components started in 2006. The project is intended to provide facilities that would turn the port into one of the medium level Mediterranean freight ports with the capacity of about 10 million tons. Bulk cargo terminal, liquid cargo terminal and container terminal are envisaged. The infrastructure is in the majority provided by public funds, while the superstructure is developed by private operators. Besides facilities, a very important component of the project is enhancing marketing of the port and positioning it at the market. This includes a better organisation and coordination within the port as well as enhancing logistics in the gravitation area. The accent has to be put on providing a quality train transport service on overall logistics chains, as well as increasing competitiveness of all other elements.

3.1 Infra and suprastructure

The total annual cargo handling capacity of the port is estimated at more than 5 million tons of general and bulk cargo. The total storage capacity of liquid cargo is about 600,000 million tons and the terminals are directly connected by rail with the hinterland.

By the decision of the establishment of the Ploče Port Authority, the area is determined under the jurisdiction of the institution. It consists of the port of Ploče area and of the Metković area, located about 20 km upstream the Neretva river and is specialized in cement, slag and granulated stone. The port of Ploče has 7 wharfs with a draught up to 13 m that can provide berths for ships up to the Panamax size. Transhipment, storage and other services are done at terminals for general, liquid and bulk cargoes, timber, containers, alumina and petrol coke. The terminals are located at all of the 7 wharfs and are directly connected to the hinterland by railways that go all along the wharfs. The whole area of the port of Ploče is a free zone and, besides port services, there is a large range of services available in the port, so it is possible to produce, finalize, wholesale goods within the port.

The total annual cargo handling capacity of the port is estimated at more than 5 million tons of general and bulk cargo. The total storage capacity of liquid cargo is about 600,000 million tons. Within this project, the new container terminal was introduced in 2010. The transhipment capacity of the terminal is 60,000 TEU. It is operated by the stevadore company Luka Ploče Ltd., under the concession agreement which is due in 2055. Table 1 provides the main information on the infrastructure and suprastructure of the container terminal in the port of Ploče.

The container terminal is equipped with two container cranes: the STS container crane type Terex and the mobile crane type Liebherr. The STS container crane has a maximum outreach of 46.6 which allows transhipment of ships with 17 rows of the container dock. The maximum operational lifting height of the crane is 35.5 m from the waterline and the spreader maximum capacity is 40 tons.

The mobile container crane Liebherr LHM500 is equipped with twin – lift spreader with a capacity for lifting 40`container of a maximum capacity of 41 tons, or two 20` containers of a maximum capacity of 50 tons.

For the movement of a container at the terminal, the following facilities are provided:

– 3 reach stackers each with a lifting capacity of 45 tons and a possibility of stacking 5 high cubes;
– 5 trucks;
– 3 forklifts.

The terminal average productivity is 17 ctns/hour, the maximum productivity being 20 ctns/hour.

The existing terminal is the first phase of the development that is planned to be expanded, depending on the quantity of traffic, as follows:

– Phase Ia – increasing the stacking area for an additional 40.000 m^2 after reaching the container traffic of 90.000 TEU;
– Phase II – increasing the stacking area for an additional 70.000 m^2 after reaching the container traffic of 150.000 TEU;
– Phase III – increasing the stacking area for additional 80.000 m^2 after reaching the container traffic of 250.000 TEU.

At the end of phase III, the total capacity should be 500.000 TEU with 230.000 m^2 of the total terminal area.

3.2 SSS lines

The container traffic in the port of Ploče is a part of the regular feeder services operated by major global container operators. Presently, there are two feeder lines calling the port of Ploče and connecting the major Mediterranean hub ports which are particularly important for the container traffic in the port of Ploče, as this is a reference port within their itinerary. These are the following feeder services:

– Feeder service to the Adriatic, operated by MSC: Gioia Tauro – Rijeka – Ploče – Bar – Gioia Tauro; depending on the customer needs, it can be adjusted as follows: Gioia Tauro – Rijeka – Bar – Ploče – Pireaus – Gioia Tauro ;
– FAS Upper Adria Feeder (operated by CMA CGM) – Marsaxlokk – Rijeka – Koper – Ancona – Ravenna – Venice – Trieste – Koper – Split – Ploče – Marsaxlokk.

Feeder services significantly contribute to the intensity of the container traffic in the port and imply the integration into the global container flows. The frequency of the existing schedule is two ships per week that can be berthed at the container terminal without waiting at anchorage at almost any time.

3.3 Traffic statistics

In the period from 1999 to 2013, container traffic in the port of Ploče generally increased with a slight decrease in the few years, which started with a significant fall in 2009. In 2008, after reaching the maximum of 34.346 TEU, it was reduced to 18.530 TEU in 2013.

Table 1 Container traffic in the Port of Ploče in the period from 1999 to 2013 (TEU, tons)

Year	Container traffic	
	TEU	Tons
1999	1,440	-
2000	2,930	-
2001	4,471	-
2002	7,298	-
2003	13,300	-
2004	14,520	-
2005	17,065	132,246
2006	18,150	147,233
2007	29,385	282,200
2008	34,346	336,870
2009	18,530	240,244
2010	20,420	230,153
2011	22,333	217,060
2012	21,745	198,805
2013	18,752	132,246

Source: Report of the container flows

4. Container flows and gravitational area of the Port of Ploče

Corridor Vc is a branch of the Pan-European corridor V, on the route Budapest – Osijek – Sarajevo – Ploče. It links Northern, Central and Southern Europe and represents the main transport route for Bosnia and Hercegovina. Vc is of a great importance for Croatia because it efficiently connects Southern, Eastern and Northern Croatia. In addition, it is the shortest way for connecting Hungary to the sea, as well as connecting the Baltic Sea with the South Adriatic Region and South Italy.

The gravitational area of the port of Ploče is conditioned by many factors: geographical position, positioning within the traffic routes, economic conditions, the price of services and dues in the port and on the transport route, availability of cargo transport centres and many others.

According to the data in table 10, it can be seen that the total turnover of the transit traffic of the port of Ploče in 2013 amounts to about 87% for Bosnia and Herzegovina. The mentioned data confirm that the port of Ploče, through the corridor Vc, is fully servicing that market, while the remaining part relates to other Central European countries in the hinterland (Serbia and Montenegro, Hungary and other Central European countries such as the Czech Republic, Slovakia, Romania and Poland). The rest of the cargo refers to the transport between the port of Ploče and the industrial towns, and to the domestic cargo intended for the hinterland.

According to the data in Table 2, the majority of the cargo origin of the port of Ploče hinterland is Bosnia & Herzegovina. Therefore, it could be assumed that the main and the most important hinterland of the port of Ploče in this moment are Bosnia & Herzegovina.

5. Guidelines for the development of the Port as a container port in the regular SSS service

During the last century, as the consequences of the industrial development became evident, the short sea shipping is recognized as the future of the European transport system. The aim of the coastal transport connection assumes relieving overburdened road routes offer to multimodal maritime based transport as an alternative. In most cases it is a combination of the coastal shipping and road transport, but the combination of water and rail transport is also frequent. Instead of the competition between the various modes of transport, the complementarity is tended in order to achieve a full intermodal transport service and to organize the most efficient combination of the transport modes. Coastal transport is not limited only to

Table 2 The traffic of the Port of Ploče by major transit partners states (2006-2013)

States/years	Contribution of transit partners in the traffic of the Port of Ploče (in %)							
	2006	2007	2008	2009	2010	2011	2012	2013
Bosnia i Herzegovina	60.73	54.23	64.56	65.40	61.81	57.52	79.54	86.74
Croatia	19.05	15.63	8.43	12.64	10.78	10.40	11.56	9.63
Italy	13.36	28.65	23.88	21.96	27.43	32.08	6.98	-
Slovakia	3.37	1.50	2.38	0.00	0.00	0.00	0.00	0.00
Other	3.49	-	0.75	-	-	-	1.92	3.63
Total	**100.00**	**100.00**	100.00	100.00	100.00	100.00	100.00	100.00

Note: The overall container traffic is assigned to Bosnia and Herzegovina
Source: the Ploče Port Authority

connecting ports. It makes up one of the integral parts of the logistics chains.

The development strategy of Port of Ploče envisages diversifying of the traffic structure as well as the expansion of the existing gravitational area of the port of Ploče on Serbia and the on countries of Central and Eastern Europe. A particular emphasis will be on improving the flow of container traffic which would evaluate the investment of public and private sector in the construction of a new container terminal. In the port of Ploče, the feeder service currently provides the major world container shipping companies (CMA CGM and MSC), and the whole port capacity is not in use. Furthermore, the further expansion is envisaged in the near future.

There are also some factors that are unfavourable for the positioning at the market and reduce the competitiveness of the port of Ploče: the possibility of operating the only feeder vessels, and smaller ships with smaller capacities, unfavourable transit time for delivery and shipping containers as compared to the competing ports in which large ships berth, a low level of traffic turnover preventing stronger competition and lower prices, a relatively small container potential within the Bosnia and Herzegovina's economy that is dominating as the origin of the container traffic of the port of Ploče. The important influence of the road and railway infrastructure must be considered, evaluating the existing poor quality of the facilities through Bosnia, the lack of integral management in the railway segment.

Instead of the competition between ports, today, we rather speak of the competition between transport routes. Equipped, organized and efficient port system, with adequate range, quality and prices of services is a very important factor of competitiveness for the port of Ploče. However, a full integration of the port into efficient logistics and transport chains is crucial. It is therefore necessary to provide efficient, operational and cost-effective transport service all over the gravitational area, widening the market from Bosnia and Herzegovina to Serbia, the countries of Central and Eastern Europe, Italy, Turkey.

Short-sea shipping involves domestic and international maritime transport, including feeder services. In many cases SSS is more energy efficient and more environmentally friendly. It also provides better safety conditions than other types of transport. Besides being alternative for road transport, additional advantages of SSS, either for the port or for the economy of the whole region, are the expansion of transportation network capacities, port productivity improvement, revival of the maritime sector, intermodal integration, door-to-door, just-in-time practices, modern logistics and allowing a better integration of the islands. SSS generates also work for European shipyards. A successful SSS programme offers an opportunity to add value to a national and international transportation network and thus improve the economic efficiency as well as the standard of living. The Republic of Croatia has an enormous potential to benefit from developing this mode of transport.

By its transport function, a port is a part of the national transport system. This is the classic function of the cargo port which includes basic port operations as the basis for the development of other functions and it implies that the demand in the port is conditioned by its hinterland.

Prerequisites for the development of short sea shipping are upgrading the quality of transport service and upgrading the rail transport. This would be achieved by simplifying border customs procedures, and enhancing loading / unloading operations. It is also necessary to use IT technology in the exchange of transport data, tracking wagons along the entire route, preparation of customs procedures and the handover of wagons. The price policy is also an important factor for the positioning of the port in the market.

The price of the port call and the use of port facilities is a collection of fees and charges paid by the ship during the stay in a port. This amount represents an obligation

Table 3 SWOT analysis

Strength • The geographic position • Wide gravitational area • Characteristics of the port area suitable berthing, performance of port operations, and the organization of intermodal transport and connections with the hinterland	**Weakness** • Outdated technology • Insufficient port loading and storage capacities • Poor quality of port services • Poor condition of port facilities • Lack of road, rail and energy infrastructure
Opportunities • Development of the port as a logistics hub for the wider hinterland • International cooperation and partnerships in the wider European area • Development of a hub for foreign trade for Central European countries that do not have access to the sea • Incensement in traffic demand by creating long-term partnerships • Partnerships between all stakeholders within the intermodal route – Joint marketing appearances of all stakeholders with a comprehensive package of services controlled price and quality – Increasing the competitiveness of the port and customer satisfaction through better organization of the port system and management of the quality of services	**Threats** • Inconsistency of investment and market demand • Lack of standardizing services • Lack of coordination and cooperation with operators and service operators within the intermodal transport corridor • Inadequate marketing mix • Lack of mechanisms for managing and directing the behaviour of port operators • Inability to meet safety standards • The lack of improvement of the system in terms of competence, professionalism, organization, responsibilities and information flows

and for ship companies. The above categories consist of a number of elements: the port fee, mooring and unmooring fee, light, pilotage, towing charges, agent fees, customs fees, solid waste removal and handling cargo fees. In the process of the ship acceptance, many subjects are included: port services and port operators and they are also holders of the income. The tariff policy is one of the important mechanisms for the implementation of the strategy. The prerequisite for managing pricing policies is the possibility of a unified marketing approach, and common decision making level for all stakeholders. The next assumption is to manage the integral price policy that is an understanding of the theoretical settings, and knowledge of the characteristics of the market (competitive environment, price elasticity of demand, etc.). Local development strategies and the parameters of sustainable development must also be considered. Having at disposal these elements, the pricing policy can be used as a mechanism to control development.

When determining the amount of the port dues and fees, the following objectives must be considered:

– achievement of the maximum income, provided that the tariff policy does not adversely affect the level of demand,
– using the price policy as a mechanism of demand-side management.

Table 3 shows, through the SWOT analysis, that there is a great potential in the port of Ploče to develop it as a container traffic hub for a much wider area that now is in practice. It depends, however, on many elements that are the matter of different decision making levels and it is crucial to make an integral development strategy and coordinate all elements and stakeholders. This is the only way to enhance the competitiveness of the port.

6. Conclusion

In the global dynamic modern environment, the traffic function of the port overgrows and ports have become the centre of the national and international trade. In addition to being strategic points in the process of transport, they have become a sales and distribution centre. Additional facilities, equipment, range of services, price policy and the quality of services have become factors of competitiveness. The development of the port as a distribution and logistics centre implies the implementation of the multimodal transport routes high technological quality in all elements of the transport chains. Controlled and properly directed sustainable development of the port in terms of modernization and construction of port facilities must be based on an integrated strategic orientation and a common policy of all participants and stakeholders that are active in the business environment. The container traffic in the port of Ploče is presently at a very low level. However, there is a large potential for widening the market as the potential gravitational area and the demand is much wider than presently met. The basis for enhancing the container traffic in the port of Ploče is improving in all the factors of competitiveness. Short sea shipping within the MoS concept represents a favourable concept for developing the port of Ploče as a container port.

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