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**ROAD NETWORK LINKING THE SEA  
PORT AS A VITAL TRANSPORT FACTOR  
DETERMINING ITS SUCCESSFUL  
HINTERLAND INTERCONNECTION.  
FACTORS DETERMINING THEIR PRIMARY  
AND SECONDARY ROLE IN THE CASE OF  
THE PORT OF PLOČE**

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**Abstract.** This paper represents part of the research conducted in order to provide solid framework for proper consideration of importance of road infrastructures linking to port. Those road links are identified as primarily or secondarily factor of successful hinterland interconnection. Should they be perceived as primarily or secondarily factor of successful hinterland interconnection depends mostly on the level of development of port hinterland in the context of road vs rail infrastructure. Also, it is highly important to take into account the current situation in the port, and especially the share of total traffic which is drawn from the port by rail or road. This paper examines the importance and all aspects of road infrastructures linking to port in order to provide measurable basis for assessing the port hinterland as a competitiveness determinant of the port. From a methodological point of view, the authors systematize the key road infrastructure and superstructure factors of success. The authors also elaborate on possible outcomes regarding the prominent question: what to target as a short term port development factor when there is potential to quickly achieve higher levels of traffic – road or rail. The authors conclude that the road infrastructure linking to port is of great importance even when there is largely accepted concept that rail is of great importance for port development, and especially when there is a short term potential to relatively quickly achieve higher levels of traffic. This road linking is largely dependent on political factors and hinterland development as it is demonstrated in the paper on the example of Port of Ploče and this is also a significant determinant of port competitiveness. The objective of this paper is to highlight the significance of road infrastructure linking to port and to present its importance for the Port of Ploče development.

**Key words:** road, port, infrastructure, hinterland interconnection

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## 1 INTRODUCTION

Port development has been widely elaborated from multiple aspects in the literature. Generally it is accepted that rail infrastructure has prominent role in the development of port systems but there are multiple examples that also road infrastructure is of great importance, especially when there is a need to bridge some short term discrepancies regarding development level of rail infrastructure in port hinterland. Those road links can be identified as primarily or secondary factor of successful hinterland interconnection in the same time providing solid framework for proper consideration of importance of road infrastructures linking to port. In the following part this is elaborated on the example of Port of Ploče as one of the most important Croatian cargo ports.

## 2 ROAD INFRASTRUCTURES LINKING TO PORT

The port of Ploče is situated in the middle of the eastern coast of the Adriatic Sea. The majority of cargo from port of Ploče is pulled out through rail but at present situation there are multiple limitations and barriers (physical and nonphysical) on railroad [12], so it is therefore valuable to analyze additional opportunities to pull out the cargo, especially in the short term through road infrastructure linking to port, in order to potentiate higher level of output. The backbones of road links that connect the port of Ploče with its hinterland are:

- the “Adriatic highway” (“Jadranska magistrala”) that stretches from Trieste and passes through Rijeka and Split to the end point of the Republic of Croatia passing right near the town and the port of Ploče. This transport route is a part of the European road network and it is marked as E 65.
- the transport corridor Vc that stretches from Budapest and includes the road connection: Hungarian border – Osijek – Bosanski Šamac – Zenica – Sarajevo – Mostar – Metković – Ploče (code E-73). It presents the shortest and most fitting traffic link between the Middle Europe and the Adriatic Sea. Also, by this link the port of Ploče is connected with its natural hinterland.

The road from Budapest – Osijek – Slavonski Šamac – Sarajevo – Mostar – Ploče became a part of the corridor V, branch C on the third assembly for the former Pan-European corridors in Helsinki in 1997. Thus the Port of Ploče has become a land and sea routes junction of the Pan-European Corridor V, branch C passing through Hungary, Croatia and Bosnia and Herzegovina, due to its geographical location. Beside a very important role in the transport system of the Republic of Bosnia and Herzegovina, this corridor is significant as well as in

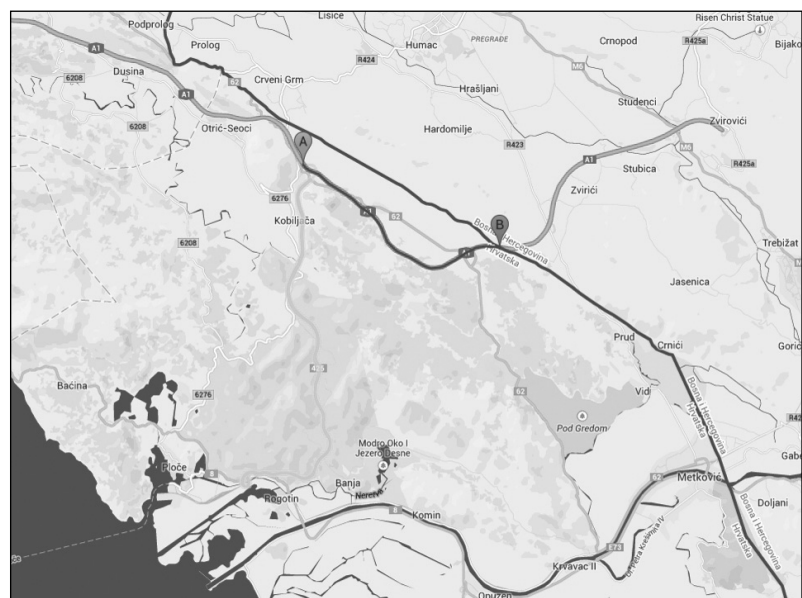
the transport system of the Republic of Croatia since it connects the Danube region and the Adriatic. In respect to the position of Croatia as a country which is situated in Central Europe, in the Danube region, on the Adriatic and on the Mediterranean, that corridor is important also as a link between Central European countries, the Adriatic and the Mediterranean.

The Pan – European Corridor V – Vc branch connects the central parts of the European continent and the western Balkans. The overall length of the road corridor is 702 km of which approximately 379 km passes through Bosnia and Herzegovina.[9]

The Port of Ploče as the starting point of the Corridor Vc from the south is connected to the Ploče interchange at the A1 motorway by a system of roads represented by the D425 Croatian state road. The state road D425 is 17.6 km long and connects as well the outskirts of Ploče with the D62 state road.

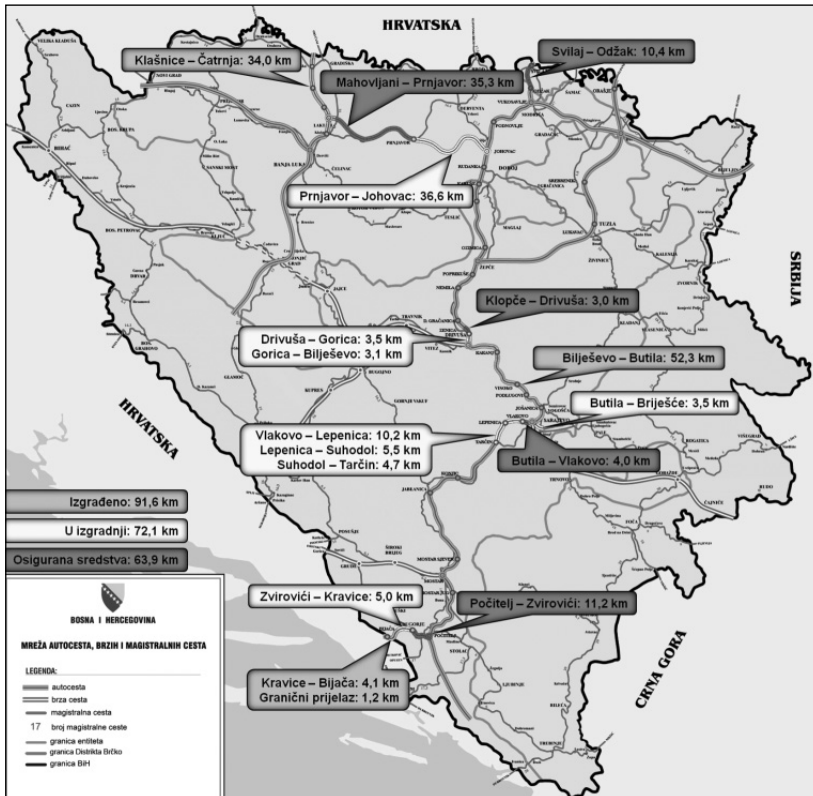
The Ploče interchange together with the slip road connects the motorway A1 with the port of Ploče and from the state road D8 enables the connection to motorways A10 and A1. The junction of the highway track on the Corridor Vc (motorway A10) as an important traffic interchange enables the contact with the motorway A1, Zagreb – Split – Dubrovnik, and the port of Ploče.[8]

For the development of the Port of Ploče besides the main access roads other national, regional and local roads connecting to these traffic routes are essential, particularly in Bosnia and Herzegovina as the main catchment market of the Port of Ploče. On the following figures the state of road network in Bosnia & Herzegovina is presented.



**Figure 1** Connecting roads from port of Ploče to the state border (D425, A1 and A10 section) and furthermore to corridor Vc in Bosnia and Herzegovina

Source: www.hac.hr



**Figure 2** The network of motorways, express and trunk roads in Bosnia & Herzegovina (green – in operation, yellow – in construction, red – financial resources guaranteed) – 2013.

\* Sections Zvirovići – Kravice, Vlakovo – Tarčin and Drivuša – Bilješevo has been finished in 2014.

**Source:** [http://wiki.openstreetmap.org/wiki/WikiProject\\_Bosnia\\_and\\_Herzegovina](http://wiki.openstreetmap.org/wiki/WikiProject_Bosnia_and_Herzegovina)



**Figure 3** The network of highways, state and regional roads in Bosnia and Herzegovina

**Source:** Projekat: Autoceste na koridoru Vc u Federaciji BiH; Izvještaj o dinamici projekta Br. 17 (completed with 30.06.2014.), Mostar, 2014.

The state road M17 (international code E73) that follows the Corridor Vc route through Bosnia and Herzegovina begins at the Croatian/BiH international state border Metković and consists of the following route: Čapljina – Počitelj – Mostar – Jablanica – Konjic – Hadžoći – Sarajevo – Zenica – Žepče – Maglaj – Dobož – Odžak – Bosanski Šamac. The total length of the state road M17 from Čapljina to Bosanski Šamac is 400 kilometres. Along this state road 17 counting sites are allocated on 13 sections. The section between Bilješevo and Jošanica southward to the town of Sarajevo comprises the dual carriageway part of the route respectively the section of the highway A1 of the total length of 46.6 kilometres.[2]

The route of the Pan – European Corridor V – Vc branch continues through the Republic of Croatia by the motorway A5 with the total planned length of 88 km. The motorway A5 stretches by the following sections: BiH/Croatia border – Svilaj – Sredanci – Đakovo – Osijek – Beli Manastir – Croatia/Hungary border. Currently 53,5 km of the motorway is constructed, i.e. the section Sredanci – Đakovo (21 kilometres) and the section Đakovo – Osijek (32.5 kilometres).[8]

The construction of the motorway Sredanci – Đakovo – Osijek included Osijek in the Croatian motorway network creating better connectivity with all transport and economic centres. In addition, the new highway opened the revitalization process of the large south route and the central part of Pannonia region.

After the border crossing Duboševica/Udvar the Corridor Vc continues throughout the Republic of Hungary, whose territory passes 196 km of the route. The route consists of the following sections: Udvar – Boly – Szekszard Dunaujvaros – Erd – Budapest. The Motorway M6 (E73), was built as full profile from the interchange Boly to Budapest of the total length of 183 km. For the completion of the Hungarian section of the motorway it is necessary the construction of the section between Boly and the border with the Republic of Croatia.

### 3 CONCLUSION

An important prerequisite for the efficient operation of port of Ploče as a transit port for the Bosnia and Herzegovina but also for Central European countries and for further economic development of the areas in its hinterland is the appropriate, efficient and high-capacity road transport links between the hinterland and the port. The importance of quality road infrastructure

could be proved by the fact that about 80% of the containerised cargo use road transport. Beside that, internal road infrastructure should be developed as well as access roads to the motorway network.

The transport corridor Vc (Ploče – Sarajevo – Osijek – Budapest) should have adequate modern transportation infrastructure that would enable the expansion of the port of Ploče and the entire transport route. Corridor Vc is a link North – Central and Southern Europe, and represents excellent value in the context of economic and trade integration of Central Europe. The road infrastructure linking to port is of great importance even when there is largely accepted concept that rail is of great importance for port development, and especially when there is a short term potential to relatively quickly achieve higher levels of traffic. It can also be stated that this road linking is largely dependent on political factors and hinterland development and this is also a significant determinant of port competitiveness in general.

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