

D.3.2.3-4 Analysis of the physical and non-physical bottlenecks in Italy and Croatia

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INTRODUCTION

In this part briefly explain about document, which work package is it part, what is the main goal off the document, and why is it important. A few words about project, work package and deliverable. Explain what is your role and what information you will provide in this report.

This report presents the analysis of the physical and non-physical bottlenecks in the port of Ploče and its Bosnian link. The report is carried out for the purpose of the elaboration of activities defined in the WP3 of the CHARGE project related to bottleneck analysis.

Report is based on the bottleneck analysis of port of Ploče and its hinterland, according to approved methodology in WP3 of the CHARGE project, collected data and through and comprehensive research.

Report represents analysis of port of Ploče itself, including its location, port facilities, processes, current situation of the port and competition analysis. Also, the whole hinterland bottlenecks were also examined, evaluated and presented, including road and rail border crossings. The report includes quantitative as well as qualitative description and explanation of the outputs.

ABSTRACT

The Analysis of the physical and non-physical bottlenecks for project partner Port of Ploče Authority covers defining and characterising the area of study, the list of all the bottlenecks and undesirable effects present in the area, analysis of those bottlenecks and proposed solutions for resolving the bottlenecks.

EXECUTIVE SUMMARY

This report defines the Port of Ploče as the area under study. The report lists all the main infrastructural, supply chain and regulatory bottlenecks. The main infrastructural bottlenecks are a lack in terminal capacity, no existing direct access to motorway, and the road that connects the terminal gates and motorway has only two intersections with the city road network. Supply chain bottlenecks problems mostly lay in a lack of available bottleneck management system and existing system of electronic exchange of documents and communications between the driver unit and the terminal that should be improved. Regarding regulatory bottlenecks, there is no exemption in obligations for ships pilots and tugs services which regularly enter the port. The proposed solutions for these bottlenecks are: New entrance to terminal in the port of Ploče; New clearly marked parking lots; Enabling clearly marked parking space; Improving the lack of available bottleneck management system and existing system of electronic exchange of documents and communications between the driver unit and the terminal; Reducing the ships pilots and tugs services obligations for only necessary and not every entry in the port

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DEFINING THE SCOPE OF STUDY

This part is necessary in correct understanding of what exactly should be researched. So, in this step scope of study will be defined and characterized in order to help us reach next step of research process. The scope of study, covers what, how, when and where the study was done including what data's were taken as inputs, what criteria were used for comparing the data, what was the outcome of the comparison. In this case, main objective of the document investigates traffic flows and bottlenecks in intermodal transportation.

Based on knowledge gained within CARICA project, CHARGE will implement action plan on the development of specific missing link or service for the development of the MoS. CHARGE projects main goal is to foster traffic flows and sustainable connectivity between Adriatic ports involved, to contribute to competitiveness of territories served by the existing maritime links with a common approach. The aim is to increase the perceived value of shared intermodal transport solutions.

This document main purpose is to give partners an easy-to-use methodology for bottleneck collection and harmonization which will be made visible on all partners web pages CHARGE projects activity 3.1

Shared methodology for the harmonization of collected data in the Adriatic Ports consist of two parts: 1) Identification of all the subjects that will be involved in the bottleneck collection in order to gather necessary up-to-date data. A detailed list of all stakeholders (port authorities, freight forwarders, agents etc.) will be created which will result in procedure that will be used for bottleneck identification and solution. All partners will be involved in this process. 2) Methodology for bottleneck collection and harmonization. An easy-to-use methodology will be created in order to help partners in the collection of bottlenecks.

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DEFINING THE AREA UNDER STUDY AND CHARACTERIZING RESPECTIVE AREA

It is important to define the geographical area where analysis will be conducted in order to determinate volume of data that need to be collected. Also, by characterizing area under study, we can determine the current situation of the area. That enables us to focus our analysis on current problems and help us in finding all potential bottlenecks, as well as proposing solutions for said bottlenecks to enable freight flow system to work efficiently.

Port of Ploče

Port of Ploče is one of the main Croatian ports and it is considered as a strategic port by the Croatian Government. The port of Ploče is international commercial port with special economic interest for the Republic of Croatia. As part of maritime links in the Adriatic Sea, it represents the main cargo port in the southern part of Croatia.

The port is managed by the Port of Ploče Authority which is a public non-profit legal entity established by the decision of the Government of the Republic of Croatia on 13th February 1997, as a port authority with national significance. The port services are operated by the private companies which act as concessionaires of the PPA. The main operator/concessionaire in the port is stevedoring company Port of Ploče (Luka Ploče d.d.¹).

The port is located on the eastern Adriatic coast at mid-distance between Croatian ports Split and Dubrovnik and is the relevant point of the Pan European corridor V - branch VC (Budapest-Osijek-Sarajevo-Ploče). From the port there is road connection to the A1 highway and railway communication to neighboring Bosnia & Herzegovina. Ploče is the start/endpoint of the

¹<https://www.ppa.hr/hr/o-ustanovi/>

aforementioned corridor and due to that the port is the most important maritime gateway for Bosnia & Herzegovina. The port is in the list of 328 TENT Maritime ports published by the European Commission (REF).

Port of Ploče has potentially large gravitational area that includes the northeast part of Croatia, part of Serbia, Montenegro, Bosnia and Herzegovina, part of Austria, Hungary, Czech Republic, Slovakia, Romania and Poland.

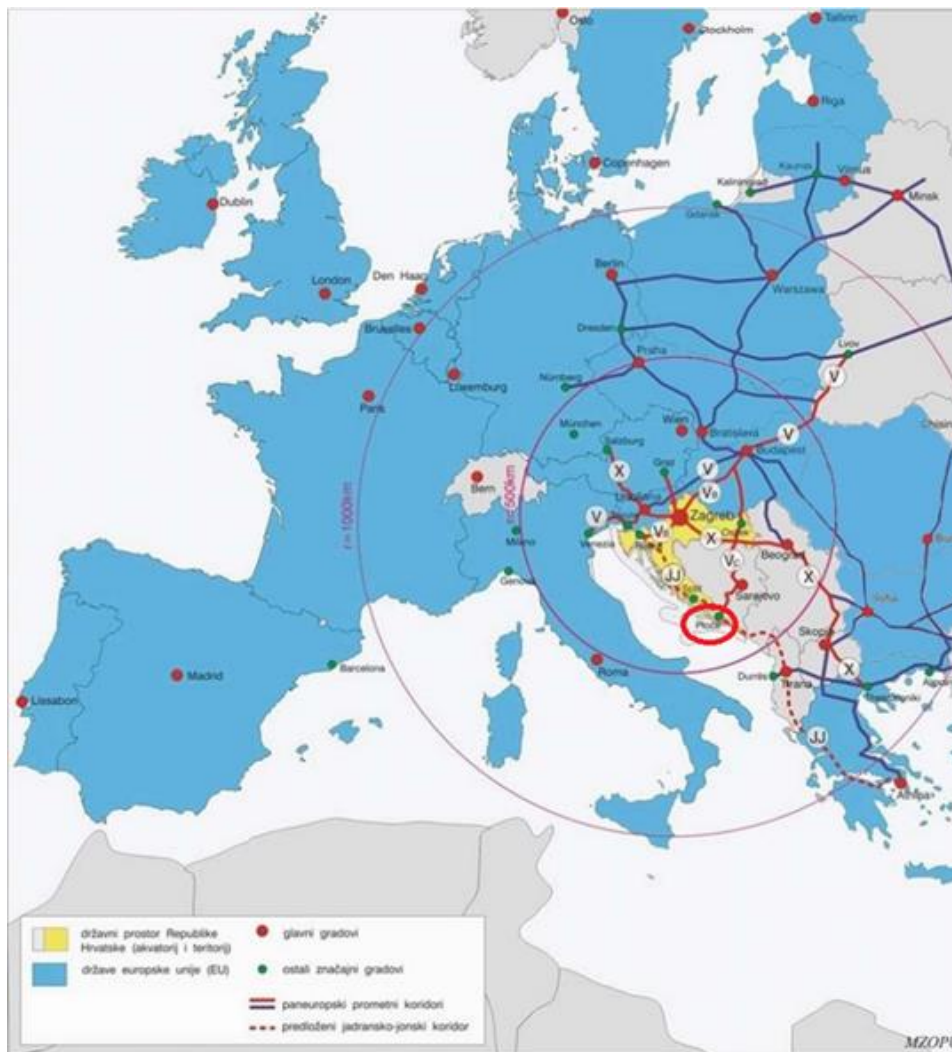


Figure 1 Source: <https://strukturnifondovi.hr>

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Location of the port of Ploče

The Port of Ploče is situated at the Central Adriatic coast line, approximately 120 km south from the city of Split and 100 km North from Dubrovnik. The ports central-Adriatic location, as well as its position in the south of Croatia (HR) leads to an international hinterland, covering the Dalmatian coastline, as well as Bosnia and Herzegovina (BiH), Serbia (SR), Montenegro (MNE) and Hungary (HU).

Through a 24 km railway line and road, the port is linked with its immediate hinterland of BiH and further to the North-East of Croatia and Central Europe. Further, it is the end/starting point of the Corridor Vc (Budapest-Osijek-Sarajevo-Ploče). Through the Adriatic Highway (as part of the European route E65), it is connected to the Northern cities of Split, Rijeka and Trieste; and to Montenegro in the South.

The Pelješac peninsula to the South and West of the port provides for a natural breakwater.

Equally important is the connection to Corridor X via Corridor Vc, connecting the Port of Ploče also with Serbia to the East and even Austria to the North-West.

The nearest international airports are located in Dubrovnik (120 km) and Split (150 km).

The port is an EU port and open to domestic and international traffic.

Other ports in the eastern Adriatic region and with similar catchment areas, in particular landlocked Serbia, and therefore potential competitors are:

- Port of Durres (Albania)
- Port of Bar (Montenegro)
- Port of Rijeka (Croatia)

- Port of Koper (Slovenia)

Outside the Adriatic regions, the Greek and Black sea ports can also be considered competitors when it comes to markets of the land-locked Serbia and Macedonia.

An integral part of the Port of Ploče is the Port of Metković. Situated 25 km upstream on the banks of river Neretva in the town of Metković, situated along the BiH-HR border. The terminal disposes of a connections to the rail and road systems and provides facilities for the transshipment of cement (silo), cinder and granulized stone.

The following figure gives a schematic overview of the location of the port along the Adriatic coast and a more detailed view of the location of the port facilities and the major transport connections.

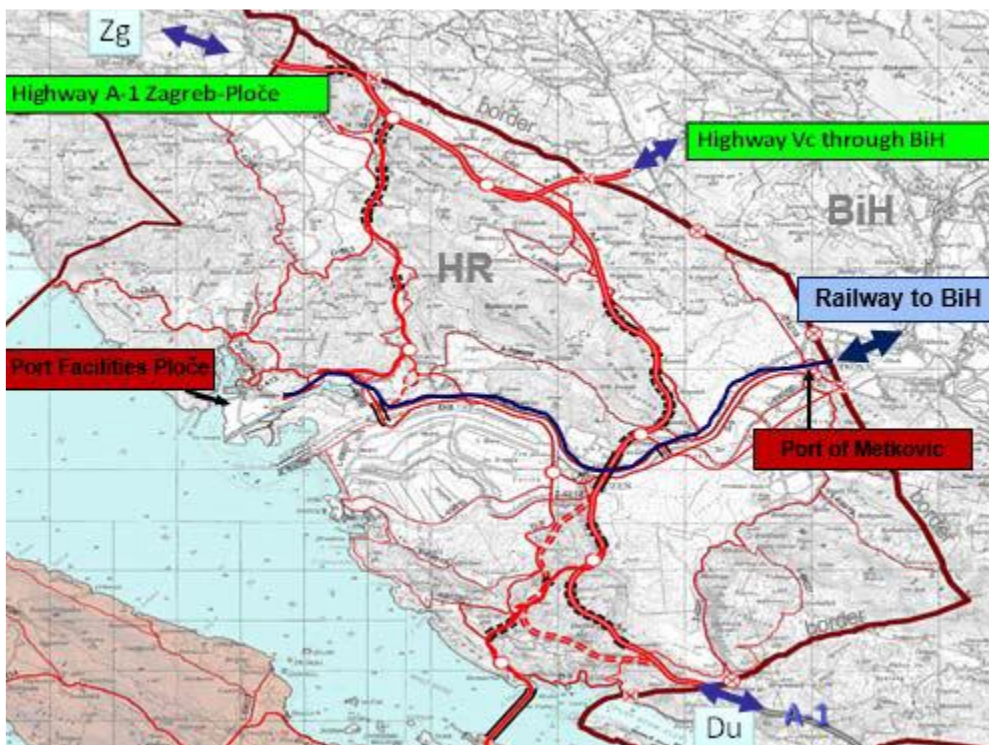


Figure 2 - Location of the Port and major rail and road connections

Port facilities and related processes

Port of Ploče is the second largest port in Croatia, after Rijeka. Port of Ploče total annual transshipment capacity is estimated at 6.2 million tonnes of bulk and general cargo, while the total annual storage capacity for the liquid cargo is 1.2 million tons. Container traffic capacity is estimated at 60.000 TEU per year. In 2017 there was transhipped 418.000 tons of general cargo, 1.973.000 tons of bulk cargo and 804.000 tons of liquid cargo. There was also 24.307 TEUs².

The most container's origin is Far East, and 95% of containers is in transit to Bosnia and Herzegovina. From this statistical data, it could be seen that Port of Ploče is not using its full capacity. Since Port of Ploče is situated as a main cargo port for the Bosnia and Herzegovina, as well as very favourable port for Serbia, Montenegro, part of Austria, Hungary, Czech Republic, Slovakia, Romania and Poland, it is obviously that port have potential, but it is not utilized.

The following table gives an overview on the general capacities of the port.

Area (land part)	2.340.000 m²
Area (sea part)	1.406.430 m²
Area of external anchorage	23.000.000 m²
Open storage area	315.000 m²
Sheltered storage area	9.400 m²
Indoor storage area	50.540 m²
Total number of quays	7
Length of quays	1.815 m
Depth	5-13,5 m
The length of rails within the port area	19.944 m
Length of crane tracks	1.545 m

Table 1 - general capacities of the port

² <http://www.luka-ploce.hr/hr/o-luci/statistika/statistika-dokumenti/>

The major concessionaire is Luka Ploče d.d., which has undergone a privatization in recent years. Luka Ploče d.d. operates several facilities for reloading and storage of various types of cargo located on seven shores with a draught of up to 14m. These are:

General cargo terminal:

- Quay with a length of 705 m and a draught of 9.2 m,
- Warehouses with an area of about 300,000 m³,
- Equipped with:
 - 8 shore cranes,
 - 9 auto cranes with capacity of 15-60 tons,
 - 100 fork lifters with a capacity of 2-28 tons,
 - 16 electric fork lifters of a capacity of 1,2-2,5 tons,
 - Floating crane with a 100 tons capacity,
 - Railway tracks with a length of 5,600 m.

Dry bulk cargo warehouse:

- Quay with a length of 510m and a draught of 14 m,
- Storage capacity of 300,000 tons,
- Mooring possible for ships of up to 75.000 DWT,
- Reloading capacity 15.000 tons/ day,
- Equipment with:
 - 14 loaders,
 - 2 bulldozers,

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- 5 Shore cranes with a capacity of 10 tons,
- 1 mobile crane with a capacity of 63 tons,
- 1 mobile crane with a capacity of 140 tons.

Alumina and petrol coke terminal:

- Quay with a length of 180m and a draught of 9,8m,
- Alumina silo with a storage capacity of 20,000 tons,
- Petrol coke storage of 10,000 tons.

Timber transit terminal:

- Quay with a length of 110m,
- Covered warehouse of 2000 m²,
- Open storage area of 153,925 m²,
- Equipped with 10 fork lifters.

Two liquid cargo terminals:

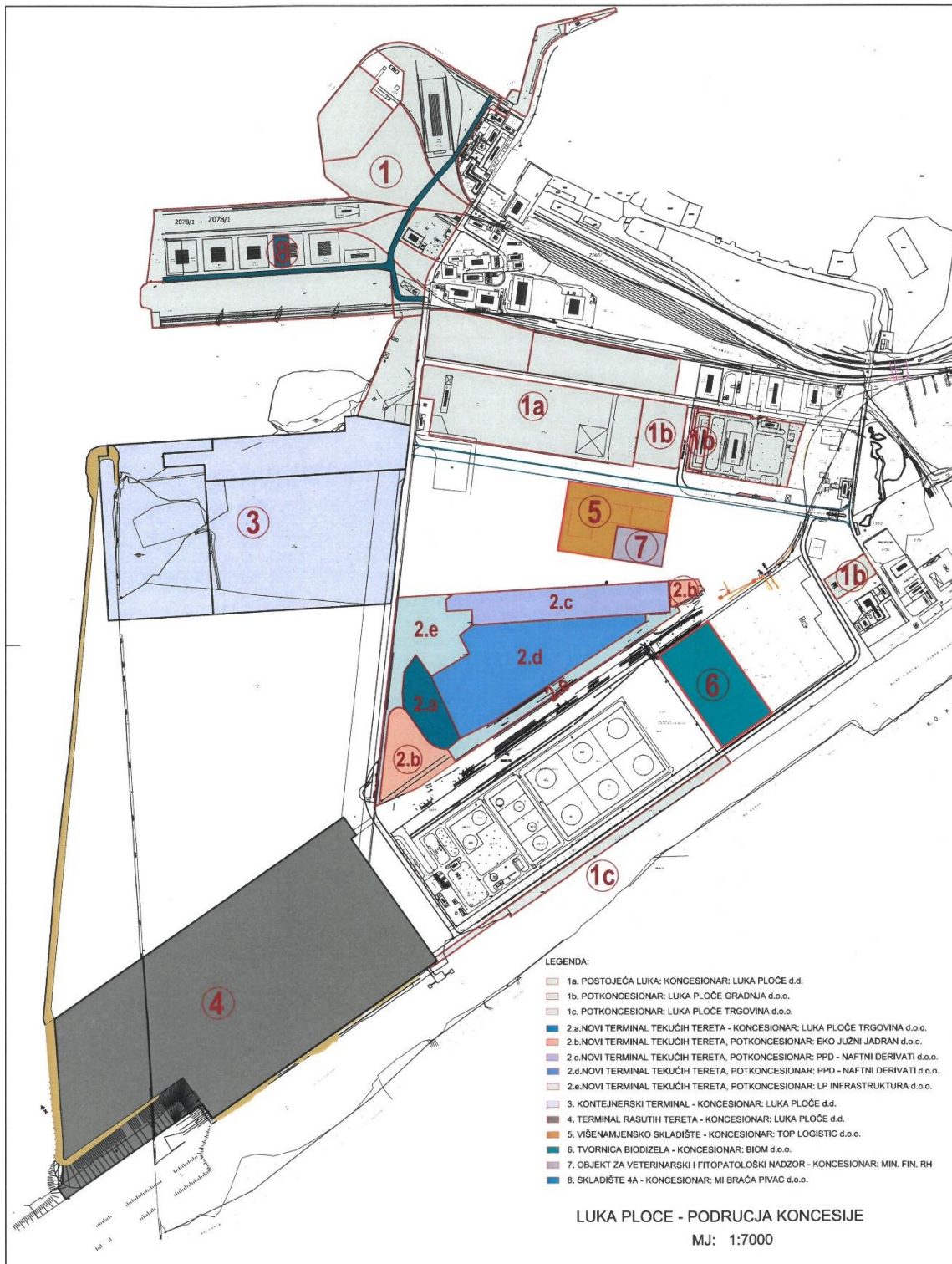
- Storage capacity of 160,000 tons in total separated for different kinds of liquid bulk.

Cold store and other phytosanitary equipment

New container terminal

New dry bulk cargo terminal

The following figure gives an overview of the port, the concessionaires and sub-concessionaires and the facilities operated by them.



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The Port of Ploče geographical location leads to the fact that it has a rather small immediate inland catchment area along the Dalmatian Coast line. It is only connected to the larger northern regions of Slavonia and Croatia properly via Bosnia and Herzegovina or lengthy detours. Thus, the international hinterland is of an even greater importance with BiH, Serbia, Montenegro, Hungary, Slovakia and Slovenia. The hinterland countries are only to a small extend congruent with the markets. The Port of Ploče is currently active in BiH, HR and SRB. To a bigger extent, they constitute the potential catchment area.



Figure 3 - Port of Ploče's hinterland

While not even 1% of the goods leaving the port are directed towards the southern neighboring state of Montenegro (MNE) and roughly 8% are distributed directly to the Croatian surroundings (HR), 91% of the goods are heading towards BiH.

This is not to say that BiH constitutes the final destination of these goods in their entirety. However, it underlines the importance of the transport route along Corridor Vc through BiH.

Since exact numbers on the final destinations of goods leaving the port are not available, a comparison with the ports of similar catchment/destination areas and thus posing as competitors to the Port of Ploče deems to be wise – always keeping in mind the slightly different geographical positions. Looking at the destinations of goods handled by the Port of Rijeka for example, it becomes clear that of the 70% of the total throughput of Rijeka nearly all goes to Hungary and Slovakia, countries of destination which the Port of Ploče can claim to be its hinterland as well.

LISTING OF ALL BOTTLENECKS AND UNDESIRABLE EFFECTS

Please, use a table that is provided in excel file to identify current state of the art in the ports. A bottleneck is emerging when answers on questions in a table are unsatisfactory for the stakeholders. Please, explain why answers are unsatisfactory and how it is creating bottlenecks. After bottlenecks are found, they should be listed by priority.

Bottleneck		Question		Answer	Relevance
infrastructural bottlenecks	road	safety	Is the connection between the terminal and highway network at a satisfactory safety level?	yes	
			Is there a regular maintenance of the terminal roads and connection between the terminal and highway network?	yes	
			Are there clearly marked routes for accessing the terminal and leaving the terminal in order to reach the highway network?	yes	
			Is there adequate (satisfactory) lighting on the terminal roads and connection between the terminal and highway network?	yes	
			Are there clearly marked routes to get to the terminal and to the highway network?	yes	
		flow capacity	Is there a direct access to the highway network?	yes	
			Is the current capacity of the road infrastructure sufficient?	yes	
			Is there a sufficient number of lanes on terminal roads and connection between the terminal and highway network?	yes	
			Is the width of the lanes on the terminal roads and connection between the terminal and highway network appropriate (satisfactory)?	yes	
			Is the connection between the terminal and highway network passing through the urban and inhabited area?	no	
	rail	safety	Is there a road and pedestrian crossing on the railway?	no	
			Is the signalization on a satisfactory level?	yes	
			Is there adequate (satisfactory) lighting on the terminal railway infrastructure?	yes	
		flow capacity	Is there a regular maintenance of infrastructures relevant for the satisfactory level of security?	yes	
			Is there a road and pedestrian crossing on the railway?	yes	not important
			Are the crossings satisfactory marked?	yes	
	inland waterways	safety	Is the current capacity of railway infrastructure satisfying?	yes	
			Is it the connection of railway and road infrastructure at a satisfactory level?	yes	
		flow capacity	Is it possible to dispatch the maximum allowed quantities of the train at once?	yes	
			Is there a ramp for the loading/unloading of the trucks on the railway?	yes	
terminal	safety	Is the safety level of the port access satisfactory?	yes		
		Is the area of the port basin sufficient?	yes		
	capacity	Is the capacity of the access to the terminal sufficient so the barges shouldn't be separated?	yes		
		Is there a RO-RO ramp on the terminal?	yes		
		Are the parking spaces adequately signposted for identification?	yes		
		Is the capacity of a parking lot sufficient?	yes		
		Is parking space able to accommodate all dimensions of the vehicles / units?	no	not important	
		Are the roads at the terminal separated from waiting areas for the loading / unloading cargo?	no	not important	
		Is the number of berths for mooring ships sufficient?	yes		
		Are the lengths of berths sufficient for mooring the largest vessels?	yes		
		Are the sea depth/draft berths enough for the biggest ships?	yes		
		Is the sea depth in the driveway shore/terminal satisfactory for the biggest ships?	yes		
	Is there a storage space near the berth?	yes			
	safety	Does the space for storage of goods have sufficient capacity?	yes		
Does the terminal (individual bindings) have conditions of secure mooring?		yes			
weather	Is the sea access to the terminal sufficient (maritime safety requirements)?	yes			
	How much time a year is the terminal out of function for bad weather?	n/a	not important		
a supply chain bottlenecks	work shifts	Is it guaranteed cargo handling 24 hours a day every day of the year?	yes		
		Is there a guaranteed flexibility in the composition of stevedoring crews and handling equipment to absorb demand peaks in loading / unloading services?	yes		
	information exchange	Is there a system which allows the electronic exchange of documents and communications between the driver unit and the terminal?	yes		
		PILOTS - Is it the time required from the request to reaction at a satisfactory level?	yes		
	time response	TUGS - Is it the time required from the request to reaction at a satisfactory level?	yes		
		Is the cooperation between the terminal and the agent at a satisfactory level?	yes		
	cooperation	Is the administrative co-operation of the terminal and Ship at a satisfactory level?	yes		
Is the cargo handling capacity of the terminal sufficient?		yes			
Does the shore cranes terminal have sufficient performance /capacity?		yes			
technology	Does the mobile cranes terminal have sufficient performance /capacity?	yes			
	Is there in the function the VTMIS system?	yes			
	Is the cooperation between the Customs Authority and Ships at a satisfactory level?	yes			
	Is the time required for inspection (veterinary, phytosanitary, etc.) at a satisfactory level?	yes			
regulatory bottlenecks	inspections	Are there any cabotage restrictions?	no		
		Is there an exemption obligations pilots for ships in service, which regularly touch the port?	no		
	other	Is there an exemption obligations pilots for ships in service, which regularly touch the port?	no		

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An infrastructural bottlenecks:

Bottleneck		Question	Answer	Relevance	
infrastructural bottlenecks	road	safety	Is the connection between the terminal and highway network at a satisfactory safety level?	yes	
			Is there a regular maintenance of the terminal roads and connection between the terminal and highway network?	yes	
			Are there clearly marked routes for accessing the terminal and leaving the terminal in order to reach the highway network?	yes	
		flow capacity	Is there adequate (satisfactory) lighting on the terminal roads and connection between the terminal and highway network?	yes	
			Are there clearly marked routes to get to the terminal and to the highway network?	yes	
			Is there a direct access to the highway network?	yes	
	Is the current capacity of the road infrastructure sufficient?		yes		
	Is there a sufficient number of lanes on terminal roads and connection between the terminal and highway network?		yes		
	Is the width of the lanes on the terminal roads and connection between the terminal and highway network appropriate (satisfactory)?		yes		
	rail	safety	Is the connection between the terminal and highway network passing through the urban and inhabited area?	no	
			Is there a road and pedestrian crossing on the railway?	no	
			Is the signalization on a satisfactory level?	yes	
		flow capacity	Is there adequate (satisfactory) lighting on the terminal railway infrastructure?	yes	
			Is there a regular maintenance of infrastructures relevant for the satisfactory level of security?	yes	
			Is there a road and pedestrian crossing on the railway?	yes	not relevant
	inland waterways	safety	Are the crossings satisfactory marked?	yes	
			Is the current capacity of railway infrastructure satisfying?	yes	
		flow capacity	Is it the connection of railway and road infrastructure at a satisfactory level?	yes	
			Is it possible to dispatch the maximum allowed quantities of the train at once?	yes	
			Is there a ramp for the loading/unloading of the trucks on the railway?	no	not relevant
Is the safety level of the port access satisfactory?			yes		
Is the area of the port basin sufficient?			yes		
Is the capacity of the access to the terminal sufficient so the barges shouldn't be separated?			yes		
Is there a RO-RO ramp on the terminal?			yes		
Are the parking spaces adequately signposted for identification?			yes		
terminal	capacity	Is the capacity of a parking lot sufficient?	no	not relevant	
		Is parking space able to accommodate all dimensions of the vehicles / units?	no	not relevant	
		Are the roads at the terminal separated from waiting areas for the loading / unloading cargo?	no	not relevant	
		Is the number of berths for mooring ships sufficient?	yes		
		Are the lengths of berths sufficient for mooring the largest vessels?	yes		
		Are the sea depth/draft berths enough for the biggest ships?	yes		
	safety	Is the sea depth in the driveway shore/terminal satisfactory for the biggest ships?	yes		
		Is there a storage space near the berth?	yes		
		Does the space for storage of goods have sufficient capacity?	yes		
		Does the terminal (individual bindings) have conditions of secure mooring?	yes		
a supply chain bottlenecks	weather	Is the sea access to the terminal sufficient (maritime safety requirements)?	yes		
		How much time a year is the terminal out of function for bad weather?	n/a	not relevant	
	work shifts	Is it guaranteed cargo handling 24 hours a day every day of the year?	yes	could be improved	
		Is there a guaranteed flexibility in the composition of stevedoring crews and handling equipment to absorb demand peaks in loading / unloading services?	yes		
	information exchange	Is there a system which allows the electronic exchange of documents and communications between the driver unit and the terminal?	yes	in further development	
		PILOTS - Is it the time required from the request to reaction at a satisfactory level?	yes		
	time response	TUGS - Is it the time required from the request to reaction at a satisfactory level?	yes		
		Is the cooperation between the terminal and the agent at a satisfactory level?	yes		
	cooperation	Is the administrative co-operation of the terminal and Ship at a satisfactory level?	yes		
		Is the cargo handling capacity of the terminal sufficient?	yes		
technology	Does the shore cranes terminal have sufficient performance /capacity?	no	could be faster		
	Does the mobile cranes terminal have sufficient performance /capacity?	yes			
	Is there in the function the VTMS system?	yes			
	Is the cooperation between the Customs Authority and Ships at a satisfactory level?	yes			
regulatory bottlenecks	inspections	Is the time required for inspection (veterinary, phytosanitary, etc.) at a satisfactory level?	yes		
		Are there any cabotage restrictions?	no		
	other	Is there an exemption obligations pilots for ships in service, which regularly touch the port?	no	could be avoided	
		Is there an exemption obligations tugs for ships in service, which regularly touch the port?	no	could be avoided	

- In the port of Ploče related to rail one an safety shortcoming is existing road and pedestrian crossing on the railway. There is one intersection with roads and pedestrian lines which, although satisfactory marked and thus meeting safety requirements, can still be seen as a bottleneck because pedestrians always represent safety risk.
- There is a lack in terminal capacity because parking spaces are not able to accommodate all dimensions of the vehicles. There are no provided parking lots for trucks, nor available facilities for drivers. This is one of main problems in the

Port of Ploče. Port of Ploče has enough surface which should soon be organised as a parking space.

- The roads and the terminals are not separated from waiting areas for the loading/unloading cargo.
- There is no ramp for the loading/unloading of the trucks on the railway.
- Railway line Ploče-Sarajevo-Doboj does not have full interoperability. All companies which operate certain parts of the line change their locomotives in Čapljina and Doboj even though they use same types of locomotives. The change of locomotives is imposed by political will which is backed by legislative issues. Changing locomotives increases costs, uses time and therefore additionally limits the lines already very limited capacity.
- There is no direct access to road motorway, and the road that connects the terminal gates and motorway has two intersections with the city road network. Following reasons makes this bottleneck problem; congestion on the road infrastructure in the area of the Port of Ploče and the road is passing through the urban and inhabited area.
- The congestion is present only in summer months with influx of tourists, since city of Ploče is not big touristic destination, congestion is a minor problem.

A supply chain bottlenecks:

- Cargo handling is guaranteed 24 hours a day every day of the year but it could be improved.
- Regarding to information exchange the existing system of electronic exchange of documents and communications between the driver unit and the terminal is in phase of development and improving in order to achieve more satisfactory level.

The shore crane terminal should have faster performance and sufficient capacity.

- There is no available bottleneck management system so Port of Ploče is involved in a lot of project that deals with the problem of improving capacity of entire system.
- There is no available waste management system – the ports should have plans for effective means of minimising ship pollutions and avoiding operational and illegal discharges of oil and garbage from ships into the marine environment.

Regulatory bottlenecks:

- There is no exemption in obligations for ships pilots service which regularly enter the port.
- There is no exemption in obligations for ships tugs service which regularly enter the port.
- At the railway line Ploče-Sarajevo-Doboj all companies which operate certain parts of the line change their locomotives in Čapljina and Doboj even though they use same types of locomotives. The change of locomotives is imposed by political will which is backed by legislative issues. This increases costs, uses time and limits the lines with already very limited capacity.

ANALYSING OF LISTED BOTTLENECKS AND THEIR CAUSATIVE RELATIONS

This step help us understand real problems in freight transportation chains, and how one bottleneck can cause more than one problem, and can affect one another. In this step, all bottlenecks should be divided in categories to help us in better understanding. Also, relations between bottlenecks should be drawn, so we can see how solving of one bottleneck can help us solve the other.

In the Port of Ploče three types of bottlenecks can be find: infrastructural, supply chain and regulatory bottlenecks.

Main infrastructural bottlenecks are a lack in terminal capacity, no existing direct access to motorway, and the road that connect the terminal gates and motorway has two intersections with the city road network.

The construction of an enter terminal will solve all infrastructure problems and part of the supply chain bottlenecks as well, as all operations will be connected and all documents will be exchanged electronically which will improve communication.

A supply chain bottlenecks problems mostly lay in a lack of available bottleneck management system and existing system of electronic exchange of documents and communications between the driver unit and the terminal that should be improved.

Regarding the regulatory bottlenecks there is no exemption in obligations for ships pilots and tugs services which regularly enter the port.

One more bottleneck is of operational nature – railway line Ploče-Sarajevo-Doboj does not have full interoperability. All companies which operate certain parts of the line change their locomotives in Čapljina and Doboj even though they use same types of locomotives. The change of locomotives is imposed by political will which is backed by legislative issues. Changing locomotives increases costs, uses time and therefore additionally limits the lines already very limited capacity.

PROPOSING SOLUTIONS OF BOTTLENECKS AND ANALYSING HOW IT WILL AFFECT FUTURE FREIGHT FLOWS

Once all bottlenecks are listed and analysed, it is time for proposing solutions and analysing how it will affect future freight flows. There should be proposed solutions for all bottlenecks. For some bottlenecks, more than one solutions could be proposed. Then, the one that have the most desirable outcome should be chosen. Also, all solutions should be analysed to show us if proposed activity actually eliminate bottleneck and how it affect freight flow in whole.

New entrance to terminal in the port of Ploče should provide a direct access from main port gate to motorway. It will include an overpass above rail tracks so the intersections will be avoided.

New clearly marked parking lots are planned in the parking that is currently in the construction. New parking lots will offer drivers different facilities for example restaurants, rest rooms and showers, bars which could minimise sleeping in the trucks.

Enabling clearly marked parking space should avoid irregularly trucks parking in the city and on the streets.

Lack of available bottleneck management system and existing system of electronic exchange of documents and communications between the driver unit and the terminal is currently in phase of improving.

The regulatory bottlenecks could be avoided by reducing the ships pilots and tugs services obligations for only necessary and not every enter in the port. The employees of Port of Ploče expect opening the new terminal and improving information management system will increase the port transport in following few years.

CONCLUSION

This chapter should be summary of all that is already said and conclusions that are reached during the research should be elaborated.

In the Port of Ploče three types of bottlenecks can be find: infrastructural, supply chain and regulatory bottlenecks.

The main physical infrastructural bottleneck of the Port of Ploče is lack of direct access to motorway. Also, at the moment, the road that connect the terminal gates and motorway have two intersections with the city road network, which is safety bottleneck. This problem is being solved with the construction of the new Entrance terminal. This terminal will provide direct access from main port gate to motorway. It will also include an overpass above rail tracks so there will be no more intersections.

Also, the problem is at the border with Bosnia and Herzegovina, where congestion manifested, especially in peak touristic season. This problem cannot be easily solved, but one of the possible solutions is to send as much goods as possible using the railway mode of transport.

Second physical bottleneck is lack of parking space, as well as unavailability of facilities for drivers. Port of Ploče has enough surface for parking lot, but it is still not exploited. This problem is in the process of solving.

The main non-physical bottleneck is lack of information exchange between all stakeholders.

The non-physical bottlenecks of Port of Ploče are the unavailability of the bottleneck management and waste management system.

Port of Ploče has a PCS information system for information exchange. The main operator (concessionaire) – Luka Ploče d.d did not integrate its system into PCS. Other operators are integrated and data exchange is satisfactory. Finally it could be concluded that the most of the bottlenecks are not infrastructural nature, nor they occurred in the port isolated from the other bottlenecks. They are in areas where port and port authority does not have any impact and cannot do anything. Port of Ploče is mostly oriented to area of Bosnia and Hercegovina where bottlenecks origin from. The problem of information exchange of all involved stakeholders and operators exist as well as a gap caused by no exchange of information between sea part and port part of the systems in port areas. Inadequate connectivity and data exchange have impact on transport of cargo and port positioning in world of modern technological ports.