ADRIPASS

This report has been prepared to capitalize the information collected through surveys and desktop research regarding different types of nodes identified along the TEN-T corridor related to the area covered by ADRIPASS project and also to present the results of the analysis of their performance using Multi Criteria Analyses, developed and customized to fit to their different characteristics. This report has been prepared by Aristotle University of Thessaloniki with contribution of the ADRIPASS project partners.

1 DATA COLLECTION AT BCPS AT CORRIDOR LEVEL IN THE ADRION REGION

DELIVERABLE D.T1.2.3 Version 1.0 June 2019

The project ADRIPASS is funded by the European transnational Programme Interreg Adriatic-Ionian and it aims at integrating multimodal connections in the ADRION region, from both a strategic and operational perspective.

ADRIPASS envisages to increase the capacity of ADRION transport stakeholders (port authorities, terminal/logistic operators, freight forwarders) and policy makers at national and European level (ADRION national Ministries of Transport, European Commission – DG MOVE, DG REGIO and DG NEAR – European Transport Corridor Coordinators) to plan and implement transport facilitation measures on the TEN-T Corridors of the ADRION region, with a special focus on the recently extended ones to the Western Balkans.

ARISTOTLE UNIVERSITY OF THESSALONIKI

Interreg ADRION ADRIATIC-IONIAN
EUROPEAN UNION
European Regional Development Fund - Instrument for Pre-Accession II Fund

ADRIPASS

Disclaimer

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Glossary of abbreviations

ACROSSEE	SEE/D/0093/3.3/X_ACROSSEE project, Transnational Cooperation Programme South East Europe
AIS	Automatic Identification System
ALB/ AL	Albania
BCP	Border Crossing Point
BG	Bulgaria
BIH/ BA	Bosnia and Herzegovina
BPA	Bar Port Authority
CCTV	Closed-Circuit Television
CEF	Connecting Europe Facility
CEI	Central European Initiative
CEN	European Committee for Standardization
CNC	Core Network Corridor
CONNECTA	Technical Assistance to Connectivity in the Western Balkans
CRM	Connectivity Reform Measures
CPMM	Corridor Performance Measurement and Monitoring
DG MOVE	Directorate-General for Mobility and Transport
DPA	Durrës Port Authority
EC	European Commission
EL/ GR	Greece
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
EU	European Union
FTCBH	Foreign Trade Chamber of Bosnia and Herzegovina
GSM-R	Global System for Mobile Communications - Rail
IPA	Instrument for Pre-accession Assistance
IT/ ICT	Information and Communication Technologies
ITL	Institute for Transport and Logistics (ADRIPASS partner)
ITS	Intelligent Transport Systems
IWW	Inland Waterways
KOS/ XK *	Kosovo* (hereinafter referred to as Kosovo)

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence

LK	Port of Koper
LP	(ADRIPASS) Lead Partner - CEI
MCA	Multi-Criteria Analysis
MED	Mediterranean (corridor)
MK/ NMK	North Macedonia
MNE/ ME	Montenegro
MoTC/ MoI/ MoCTI/ MoTI/ MoIT/ MoTMA/ MoEI	Ministry related to Transport and Infrastructure
NTCIP	National Transport Communication for ITS Protocol
NCTS	New Computerised Transit System (Customs related)
OEM	Orient East Mediterranean (corridor)
OLIG	Igoumenitsa Port Organisation
PP	(ADRIPASS) Project Partner
PPA	Ploče Port Authority
RIS	River Information Services
RRT	Road-Rail Terminal
RUTH	Regional Unit of Thesprotia
SEE	South East Europe
SEETO	South East Europe Transport Observatory
SRB/ SR	Serbia
TA	Technical Assistance
TAF - TAP	Telematics Applications for Freight/Passenger services
TCT	Transport Community Treaty
TEN-T	Trans-European Network – Transport
TR	Turkey
TSI	Technical Specifications for Interoperability
UIC	Union Internationale des Chemins de Fer
VMS	Variable Message Sign
VTMIS	Vessels Traffic Management and Information System
WB6	Western Balkans 6 Regional Participants
WB (G)	World Bank (Group)
WP	(ADRIPASS) Work Package
WPL	(ADRIPASS) Work Package Leader

2 Introduction

2.1 Scope and objectives

The ADRIPASS project deals with the commonly recognised lack of efficient maritime – hinterland connections, which are mainly caused by the existence of various bottlenecks at borders. For this to be achieved, it is necessary to identify and analyse these – physical and non-physical – bottlenecks along the Trans-European Transport Networks (**TEN-T**) corridor sections in the ADRION region, with specific attention paid to those corridors (Orient/ East-Med and Mediterranean) that have been indicatively extended to the Western Balkans region, where the issue of border crossings is quite relevant.

This is subject of Work Package T1 (**WPT1**) and, in order to achieve its objective, two main actions were required:

1. The preparation and organization of data collection surveys for seaports, logistic facilities/ Inland Terminals/ freight villages, IWW ports, road and rail Border Crossing Points (hereinafter mentioned as **BCPs**).
2. The development of the necessary tools (Database, multicriteria analysis), used for the aggregated analysis of the collected data in order to evaluate the performance of the transport corridors and ultimately to propose measures and ICT tools for improving multimodal transport.

The steps followed for the development of the Final Report were the following:

1. Definition of a transnational joint methodology for the data collection of BCPs at corridor level was defined (DT1.2.1).
2. Data Collection: Based on the joint data collection methodology and its tools, the first phase of data collection was launched. The data collection was focused on physical and non-physical obstacles at BCPs and on transport flows, from ports to hinterlands. It was implemented through various means (e.g. direct surveys, desktop research and partners' input).
3. Interim Report on Data Collection: The project partners submitted the collected data to the WPT1 Leader (AUTH) and after the analysis of the consolidated data, an interim report was produced (DT1.2.2), reviewing the progress of data collection and identifying lack of data, problems and alleviation measures.
4. Development of a draft pre-final report (DT1.2.3) to facilitate the initiation of activity T1.2.4 by ITL.
5. Development of the Final Report (DT1.2.3 – current report), which will be the basis for the definition of the Transnational Action Plan (DT1.2.4). This action plan will establish priority measures to be taken at corridor level and also will complement the results already achieved in past experiences.

The final report capitalizes the information collected through the questionnaire-based surveys addressed to different types of nodes identified along the TEN-T corridors related to area covered by the project. The report, although based on the interim report that in October 2018 presented the data collection progress and a preliminary corridors analysis, it is enriched with information collected by the questionnaires and alternative sources. The different types of nodes are described (qualitative analysis) providing insights regarding their organizational and operational structures. Furthermore, in order to implement the corridor analysis and thus evaluate their performance, Multi Criteria Analyses were developed, covering the different types of nodes (maritime ports, inland waterways ports, road and rail BCPs). Logistic facilities are evaluated independently, using the data collected through the respective questionnaire-based survey, but without taking into consideration their performance in the corridors' evaluation process.

2.2 Structure of the Report

The present report entitled "DT1.2.3: Final report on the results of data collection at BCPs at corridor level in the ADRION Region", is a deliverable foreseen in the Application Form of the ADRIPASS project, as a basic outcome of WPT1 "Integrated Multimodal Transport".

The report presents a) the collected data through extensive questionnaire-based surveys addressed to the authorities of different types of nodes (maritime ports, IWW ports, road and rail BCPs) and desktop research, as well as its in house analysis and b) the developed for the scope and objective of ADRIPASS project, Multi Criteria Analyses (each one customized to fit to the characteristics and needs of the different types of nodes, i.e. maritime ports, road BCPs and rail BCPs) and their results. Based on these results, along with the data collected through alternative sources and mainly the international literature related to the extension of the TEN-T Corridors in the Western Balkan (WB) area, interesting conclusions are presented regarding not only the performance of the corridors in the WB area but also by describing the general attributes of ICT solutions and tools on how to improve their performance. This way, the report contributes to the achievement of the next deliverable of WPT1 (Transnational action plan for transport facilitation in the Adriatic-Ionian region) and to the activities of the other WPs of the project.

The report is structured in six chapters:

The **first chapter** introduces the reader to the ADRIPASS project, by describing the objective of the project as well as the necessity of the present report as foreseen in the Application Form.

The **second chapter** presents the rationale of the report and the purpose of the Corridor Analysis and the importance of data collection for other project activities, mainly the development of ICT pilot actions and ICT Action Plans of WP2. In the same are presented in a summarized way the activities planned and performed as well as the progress achieved concerning the collection of the necessary data through desktop research and questionnaire-based surveys, including insights at Project Partner (**PP**) level about the stakeholders' identification and involvement in the project activities related to data collection, and about the problems met and the solutions found.

The **third chapter** presents the pre-identified transport corridors in the study area (TEN-T Core Network Corridors - **CNC**s) in terms of their geographical position and their general technical and operational characteristics, per type of infrastructure: ports-gateways, road and rail networks, inland waterways networks, road and rail BCPs, logistic facilities/ Inland Terminals, auxiliary facilities and urban nodes.

Chapter four is dedicated to the detailed presentation of the analysis of the corridors. An insight to the organizational and operational structures of the different types of nodes in the ADRION region. Also, the Multi Criteria Analyses are presented (rationale, structure and attributes used) as well as the results of the corridors' evaluation process. Finally, ICT and ITS tools used at nodes and links of the transport corridors are analysed and ICT measures at Ports and BCPs are proposed based on general attributes, in order to improve their performance and Ports' connection with hinterlands.

The **fifth chapter** presents measures and actions for freight transport facilitation and the improvement of corridor performance through the use of ICT and the **sixth and last chapter** presents the conclusions of the report, regarding the main findings through the surveys and the analysis of the collected data as well as the evaluation of the corridors' performance.

3 Rationale of the Final Report and purpose of the Corridor Analysis within ADRIPASS

3.1 Rationale of the Final Report

As per the project's Application Form (**AF**):

- "…After the analysis of the consolidated data, two reports (interim, final) will be produced…"
- "BCPs reports at corridor level will be the basis for the definition, by ILT, of the Transnational action plan (DT1.2.4). The action plan will establish priority measures to be taken at corridor level on the above-mentioned sections, and will complement the results already achieved in past experience…"

Based on the above, an Interim Report was delivered in October 2018, focused on the progress of data collection process at that time, the assessment of completeness and quality of collected data and shortfalls and a preliminary analysis of the Corridors, with remedial actions proposals for acquiring all the data required and with preliminary recommendations for transport facilitation. Since the report is linked with WPT2 (the pilot actions implementation and the ICT action plan for improving multimodal transport in ADRION region), reference was made to those selected pilots, among (any) other proposed measures.

This Final Report builds on the data presentation and preliminary analysis of the Interim Report and it is enriched with data for those nodes (road & rail BCPs, maritime ports, inland terminals and logistic facilities) for which the data collection had not been completed until the submission of the Interim Report.

All BCPs (road and rail), maritime and IWW ports and logistic facilities are presented thoroughly per corridor. Emphasis is given to the problems reported, the ICT solutions and tools already in place or envisaged to be implemented, the processes and procedures implemented at each node and procedural and waiting times.

For nodes that the data collection is not yet completed[1], alternative data sources were investigated, mainly the ACROSSEE project and the project on Road BCPs elaborated by CONNECTA[2].

[1] On 31 December 2018, SEETO ceased operations and thus its participation in the project was ended. Until then, SEETO had contributed in data collection activities, however a large volume of data is still missing.

[2] TA to Connectivity in the Western Balkans, EuropeAid/137850/IH/SER/MULTI, CONNECTA-TRA-CRM-REG-04, Study for border crossing facilitation and improvement of the cross-border road transport on the indicative extension of TEN-T Road Core/ Comprehensive Network in the Western Balkans.

Furthermore, the Final Report presents the developed Multi – Criteria Analyses for the road BCPs, rail BCPs and ports as well as the achieved scores for those nodes that data was available. Finally, in order to improve Corridors' performance, measures are proposed, including ICT solutions and tools for the ports, road and rail networks as well as the Inland Waterways.

3.2 Purpose of the Corridor Analysis within the ADRIPASS project

A - trade and transport - Corridor is a coordinated bundle of transport and logistics infrastructure and services that facilitates trade and transport flows between major centers of economic activity. Analysing the international literature, it is revealed that there is a realization that poor performance of trade and transport corridors can affect the economic prospects, especially of land-locked developing economies, by impacting small and medium enterprises. According to a toolkit developed by the World Bank[3] "*there are several compelling reasons why the corridor approach is widely used:*

- *It is critical to providing landlocked countries in particular with basic access to maritime ports for their overseas trade.*
- *Regional integration improves the growth prospects of middle- and low- income countries, especially landlocked countries. Transport corridors provide a visible and direct opportunity to bring about regional integration.*
- *Regulatory and other constraints to trade facilitation attain practical relevance at the corridor level, enabling the design of appropriate interventions.*
- *Corridors provide a spatial framework for organizing cooperation and collaboration between countries and public and private sector agencies involved in providing trade and transport infrastructure and services*".

As already mentioned, in order to improve multimodal freight transport in the study area (Adriatic – Ionian, including Western Balkans) it is crucial to identify the transport corridors (nodes and links, transport modes and interfaces) and their problems and impediments. An important first step towards this objective is to determine the operational performance by collecting quantitative and qualitative data. The next step concerns the identification of potential improvement measures, which in this case are focused on "soft" interventions and primarily on the exploitation of ICT and implementation of related tools and applications.

Table 2.1 presents where the region's countries (except Kosovo) stand on a range of cross-country indicators, based on the widely used World Economic Forum's Global Competitiveness Index[4] for the year 2018, related to the nature, scope and objective of the ADRIPASS project, aiming to understand the profile of each country of the Western

[3] Kunaka C. & Carrutherd R., "Trade and Transport Corridor Management Toolkit", International Bank for Reconstructing and Development/ The World Bank, 2014, Available under Creative Commons Attribution 3.0 IGO license (CC BY 3.0), ISBN (paper): 978-1-4648-0143-3, ISBN (electronic): 978-1-4648-0144-0.
[4] The Global Competitiveness Report 2018, Interim Report, World Economic Forum, 2018, ISBN-13:978-92-95044-76-0 reports.weforum.org/global-competitiveness-report-2018.

Balkans area, as well as the countries of the ADRION region participating to the project (Greece, Croatia, Slovenia and Italy).

Table 2. 1. Global Competitiveness Index of the World Economic Forum, 2018

		ALB	GR	IT	HR	SI	BIH	NMK	MNE	SRB
Enabling environment component	1st pillar: Institutions	54	87	56	74	35	46	51	55	52
	2nd pillar: Infrastructure	57	38	21	36	35	61	65	62	73
	3rd pillar: ICT adoption	52	57	52	53	43	46	54	57	57
Markets component	7th pillar: Product market	57	63	30	71	27	52	52	61	57
	8th pillar: Labour market	65	107	79	96	43	51	58	68	62
	10th pillar: Market size	39	58	12	78	82	42	39	28	51
Global Competitiveness Index		**76**	**57**	**31**	**68**	**35**	**91**	**84**	**71**	**65**

During this corridor analysis process, it must be mentioned that this assessment is usually implemented at national or regional level, the key data collected for a corridor analysis concern the involvement of many and different entities (stakeholders), making the process time consuming and difficult. Furthermore, the necessity for various and different types of data is also a factor affecting the analysis, especially regarding technical information for corridor infrastructure.

In recent years, the World Bank as well as other international institutions and bodies have received several requests for a method for measuring trade corridor performance. There are three main uses of a corridor performance measures (Kunaka C. & Carrutherd R., 2014):

- Assessing how well a corridor is performing and where are the main deficiencies.
- Tracking changes in corridor's performance over time and determining whether changes made to improve performance have had measurable impact.
- Determining performance relative to other corridors serving the same or different origins and destinations of traded goods.

For the ADRIPASS needs, the corridor analysis performed aims to assess how well a corridor (in practice, many corridors) is (are) performing so that the deficiencies identified will be reduced through implementation of targeted ICT tools and applications.

The corridor analysis anticipates to provide the necessary knowledge to the stakeholders of the logistic chain regarding the deficiencies and the problems so that action plans will be developed based on the implementation of ICT tools and applications (WPT2 "ICT tools for improving multimodal transport"), aiming to reduce bottlenecks and to optimize the performance of the logistic chain in the Western Balkans area.

3.3 Planned activities

The Data Collection Methodology was presented in D.T1.2.1 “Transnational methodology for the data collection of BCPs at Corridor level”. Specifically, the PPs and the country(-ies) they were responsible for are summarized in Tables 2.2 and 2.3.

Table 2. 2. Responsibilities of PPs in WPT1 data collection per country

Responsible PP	ADRIPASS field of survey (Country-ies)	Supporting PP - AP
CEI	SL-HR	LK, PPA - MoTI
ITL	IT	- IB SpA, RER, MoIT
SEETO	SR, MK, XK, AL	DPA - MoEI, MoCTI
FTCBH	BH, ME	BPA - MoCT, MoTMA
AUTH	EL	- MoTI
RUTH	EL	- MoTI, OLIG

The allocation of tasks and responsibilities among the PPs for data collection and WPT1 activities has been agreed based on the Methodology for data collection (D.T1.2.1) and further specialized during the nodes definition process, as presented in detail in Table 2.3. The network of the selected road and rail BCPs as well as the maritime ports are presented in Figures 2.1-2.7.

Table 2. 3. Allocation of tasks and responsibilities of PPs in WPT1

Project Partner	Countries responsible for	Data collection for Road/ Rail Corridors	Data collection for BCPs	Data collection for Ports	Data collection for IWW	Data collection for Inland Terminals	Input to WP/ deliverables preparation
CEI	SI, HR	Desktop research for Corridors in SI and HR: SI: Ministry/ TENtec (support from LK) HR: Ministry/ TENtec (support from PPA)	Questionnaire/ Direct surveys/ Desktop research for the updates: **Road:** SI: Obrezje (upd) HR: Bregana (upd), Lipovac/ Bajakovo (upd), Gorican (upd), Metkovic, Klek, Karasovici, Zadon Doli, Zupanja/ Slavonski Samac (upd) **Rail:** SI: Dobova (upd) HR: Savski Marof (upd), Tovarnik (upd), Koprivnica (upd), Capljina	Desktop research/ Questionnaire surveys: Rijeka	Desktop research/ Questionnaire surveys: Sava River ports (Slavonski Brod, Vukovar)	Desktop research/ Questionnaire surveys: Container Terminal Ljubljana-Moste, Terminal Maribor Tezno, Adria Terminali in Sežana, AGIT Vrapce - Zagreb, AGIT Slavonski Brod	Study on streamlining freight flows (BCPs) in the extended TEN-T Corridors to the WB - with SEETO and FTCBH
ITL	IT	Desktop research for Corridors in IT: Ministry/ TENtec	-	Desktop research/ Questionnaire surveys: Trieste, Venice, Ancona, Bari Ravenna	Desktop research/ Questionnaire surveys: Venezia - Ravenna/ Trieste	Desktop research/ Questionnaire surveys: Bari FV, Bologna FV, Trieste FV,	Study on streamlining freight flows in the ADRION Mediterranean/ Baltic-Adriatic/ Scandinavian-Med Corridor sections (+Report D T1.2.4)

Project Partner	Countries responsible for	Data collection for Road/ Rail Corridors	Data collection for BCPs	Data collection for Ports	Data collection for IWW	Data collection for Inland Terminals	Input to WP/ deliverables preparation
						Padova FV, Verona FV	
SEETO	AL, RS, XK, MK	Desktop research for OEM and MED Corridors: AL: SEETIS RS: SEETIS XK: SEETIS MK: SEETIS Provision of European Coordinators reports for all Core Corridors	Provision of data for all Road BCPs in WB6 from Connecta sub-project Questionnaire/ Direct surveys/ Desktop research for the updates: **Road:** AL: ~~Muriqan~~*, Hani i Hotit (upd), Kakavija (upd) RS: Horgos (upd), Batrovci (upd), Gostun (upd), Presevo (upd) RS/XK: Merdare, Hani i Elezit MK: Blace, Tabanovce, Bogorodica **Rail:** AL: Bajza (upd) RS: Sid (upd), Vrbnica (upd), Presevo (upd), Subotica (upd), Rudnica XK: Hani I Elezit MK: Blace, Tabanovce, Gevgelija	Desktop research/ Provision of data from Intermodal study in WB6: Durrës, Bar, Vlore	Desktop research/ Provision of data from Intermodal study in WB6/ Questionnaire surveys: Port of Belgrade, Port of Novi Sad, Pancevo port, Smederevo port	Desktop research/ Provision of data from Intermodal study in WB6/ Questionnaire surveys: Batajnica terminal, Nis terminal, Logistic Centre ZIT, Terminal Tovarna, Terminal Pristina	Study on streamlining freight flows in the extended TEN-T Corridors to the WB - with CEI and FTCBH

* Muriqan BCP is along the MED Core Network Corridor but currently is not used for international freight transport due to the undeveloped road infrastructure.

Project Partner	Countries responsible for	Data collection for Road/ Rail Corridors	Data collection for BCPs	Data collection for Ports	Data collection for IWW	Data collection for Inland Terminals	Input to WP/ deliverables preparation
AUTH	EL (GR)	Desktop research for Corridors in GR: EL: Ministry/ TENtec Support to all PPs with different sources	Support all PPs for update of information - Support to RUTH for data collection in Greece	Desktop research/ Questionnaire survey: Thessaloniki, Patras, Piraeus	-	Desktop research/ Questionnaire survey: Kuehne + Nagel A.E. Thessaloniki Warehousing & Logistics, Schenker SA Thessaloniki, Goldair Cargo, Makios Logistics, Lidl Logistics Center	Reports D T1.1.1, D T1.2.1, D T1.2.2, D T1.2.3 with support from LK for analysis and all PPs for data/ reports provision
RUTH	EL (GR)	Desktop research for Corridors in GR: EL: Ministry/ TENtec	Questionnaire/ Direct surveys/ Desktop research for the updates: **Road:** Kakavia (upd), Evzoni (upd), Promachonas (upd) **Rail:** Idomeni (upd), Promachonas (upd)	Desktop research/ Questionnaire survey: Igoumenitsa	-	-	-
LK	SI	Support for obtaining data from	Support to update of data on BCPs in Slovenia	Koper	-	Support to data	Analysis of corridors' level and elaboration

Project Partner	Countries responsible for	Data collection for Road/ Rail Corridors	Data collection for BCPs	Data collection for Ports	Data collection for IWW	Data collection for Inland Terminals	Input to WP/ deliverables preparation
		Ministry/ TENtec for Slovenia				collection in Slovenia	of data, with outlining of possible solutions
DPA	AL	Support to SEETO, if needed	Support to data collection and update of data on BCPs in Albania	Durrës	-	Support to data collection in Albania	-
PPA	HR	Support for obtaining data from Ministry/ TENtec for Croatia	Support to data collection and update of data on BCPs in Croatia	Ploče	Support to data collection in Croatia	Support to data collection in Croatia	-
BPA	ME	Support to SEETO, if needed	Support to data collection and update of data on BCPs in Montenegro	Bar	-	Support to data collection in Montenegro	-
FTCBH	BA, ME	Support to SEETO for data on MED Corridor, if needed	Questionnaire/ Direct surveys/ Desktop research for the updates: **Road:** BA: Neum NW, Neum SE, Bosanski Samac, Bijaca ME: Debeli Brijeg, Dobrakovo (upd), ~~Sukobin~~* **Rail:** BA: Capljina, Bosanski Samac ME: Tuzi (upd), Bijelo Polje (upd)	-	Desktop research/ Questionnair e surveys: Sava River ports (Brcko)	-	Research on streamlining freight flows in the extended TEN-T Corridors to the WB (support to CEI and SEETO for the Study on streamlining freight flows)

Highlighted in yellow: BCPs not to be surveyed in ADRIPASS (have been surveyed in ACROSSEE), for which information shall be updated.

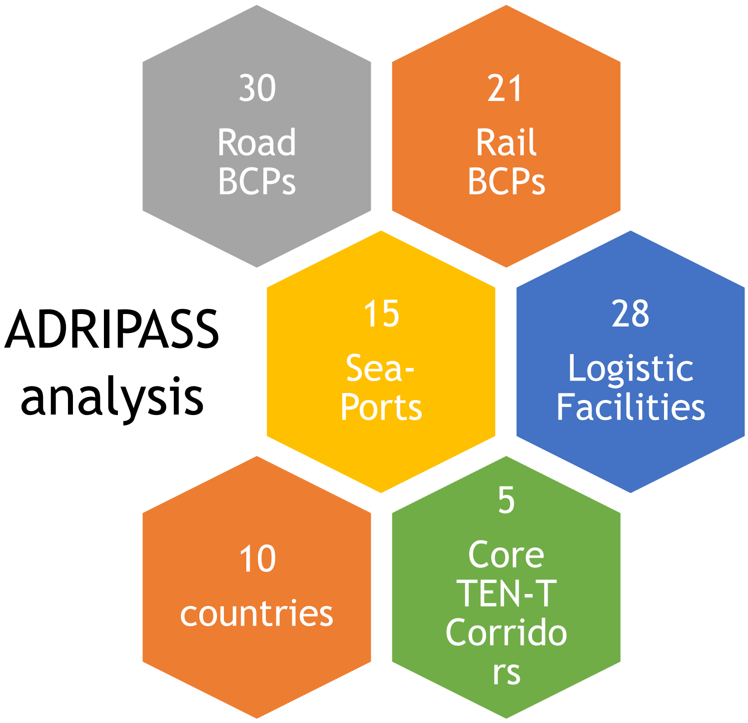
* Sukobin BCP is along the MED Core Network Corridor but currently is not used for international freight transport due to the undeveloped road infrastructure.

3.4 Data collection through questionnaire-based surveys

The assigned data collection process per partner and per type of node is presented in Table 2.4.

Table 2. 4. Data collection assignment per partner and per type of node

	Road BCPs	Rail BCPs	Ports	IWW Ports	Logistic Facilities
RUTH	3	2	1	0	0
AUTH	0	0	3	0	5
CEI	10	5	1	2	5
ITL	0	0	5	2	5
SEETO	11	10	1	4	10
FTCBH	6	4	0	1	1
LK	0	0	1	0	0
DPA	0	0	1	0	0
BPA	0	0	1	0	0
PPA	0	0	1	0	0



Figures 2.1 – 2.7 present the network of ports, road and rail BCPs per corridor.

Figure 2. 1. Network of ports and road BCPs participating the ADRIPASS questionnaire-based survey along Orient East-Med Corridor in relation to Adrion-WB6 area

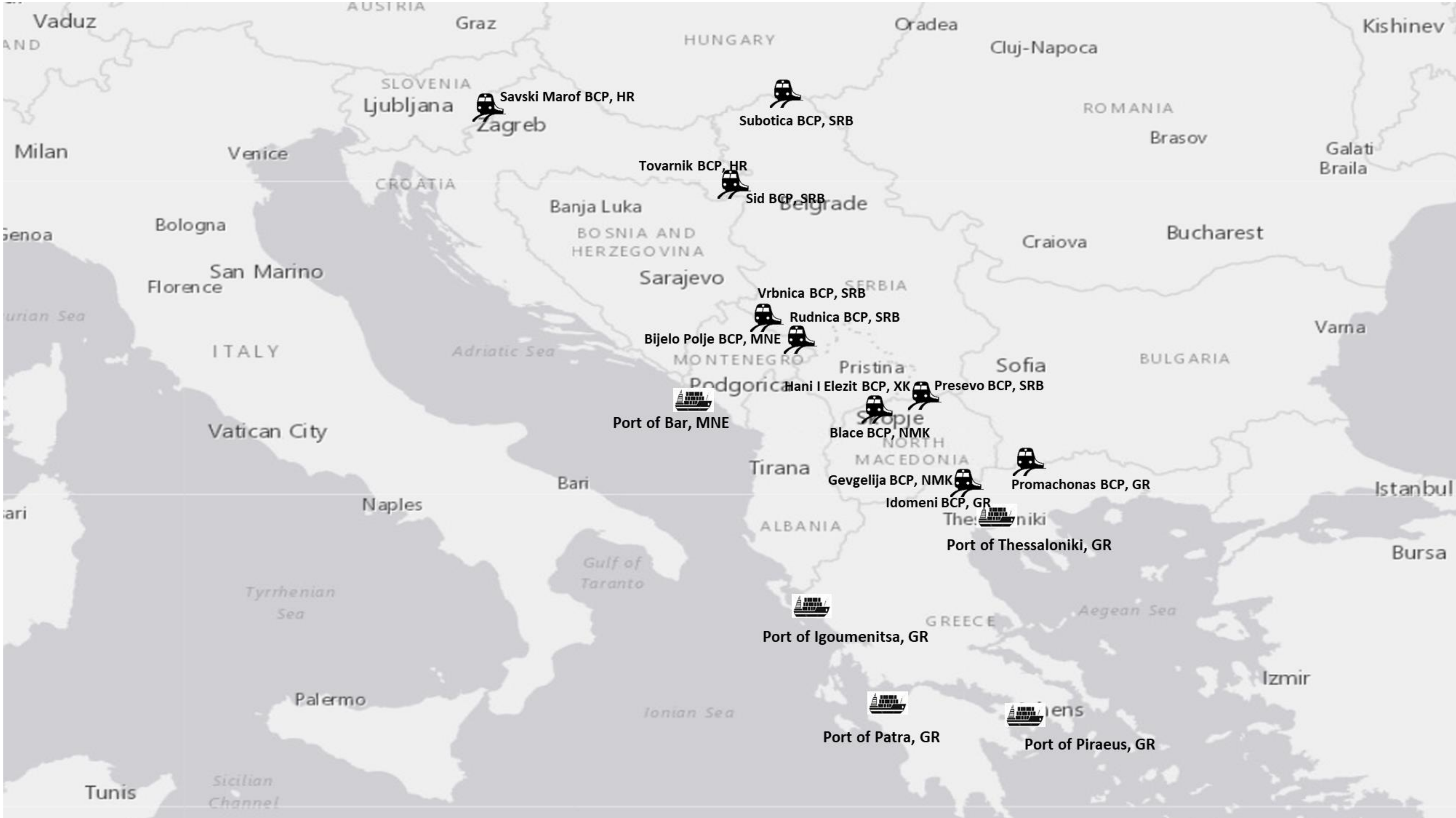


Figure 2. 2. Network of ports and rail BCPs participating the ADRIPASS questionnaire-based survey along Orient East-Med Corridor in relation to Adrion-WB6 area

Figure 2. 3. Network of ports and road BCPs participating the ADRIPASS questionnaire-based survey along Mediterranean Corridor in relation to Adrion-WB6 are

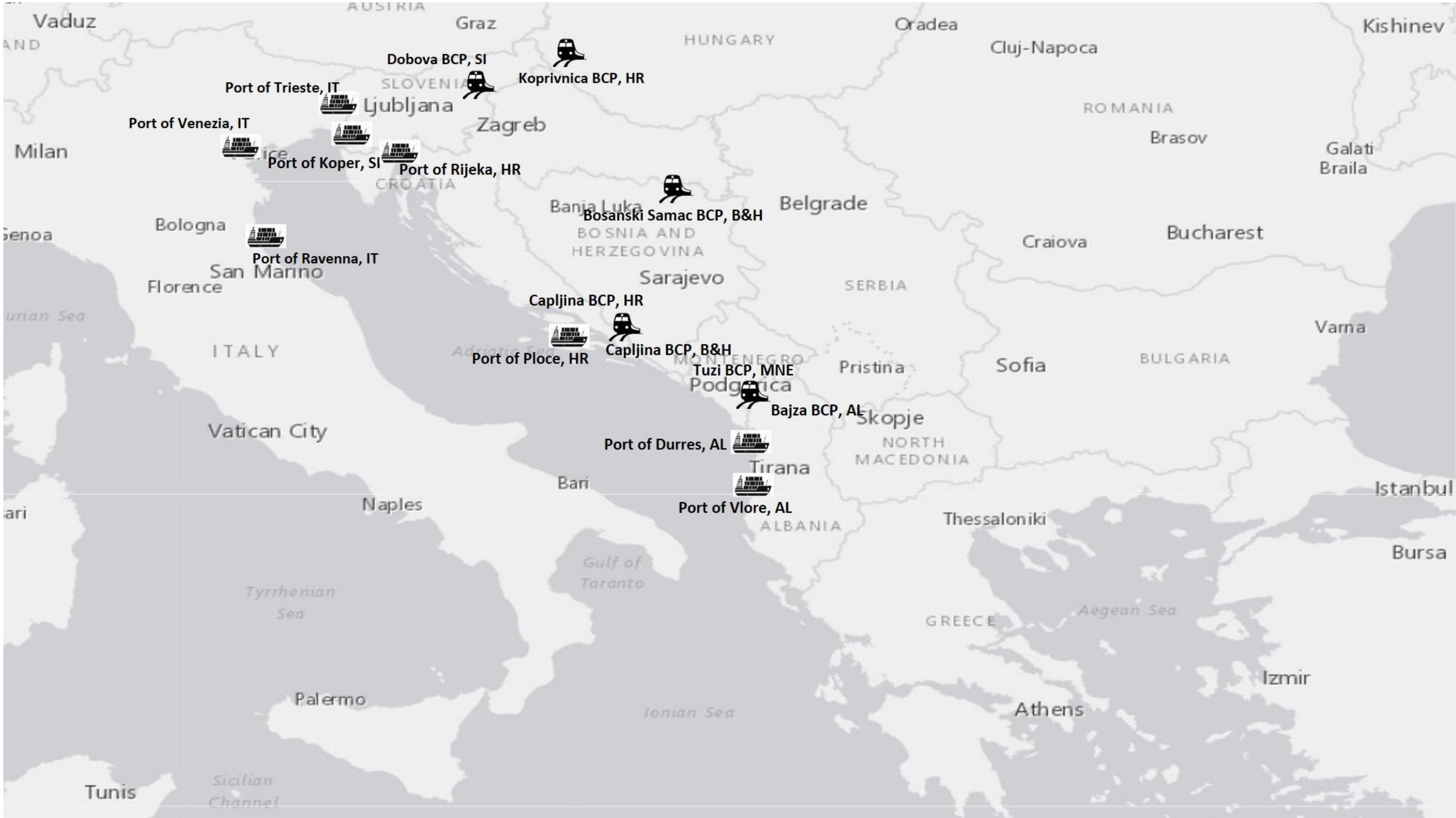


Figure 2. 4. Network of ports and rail BCPs participating the ADRIPASS questionnaire-based survey along Mediterranean Corridor in relation to Adrion-WB6 area

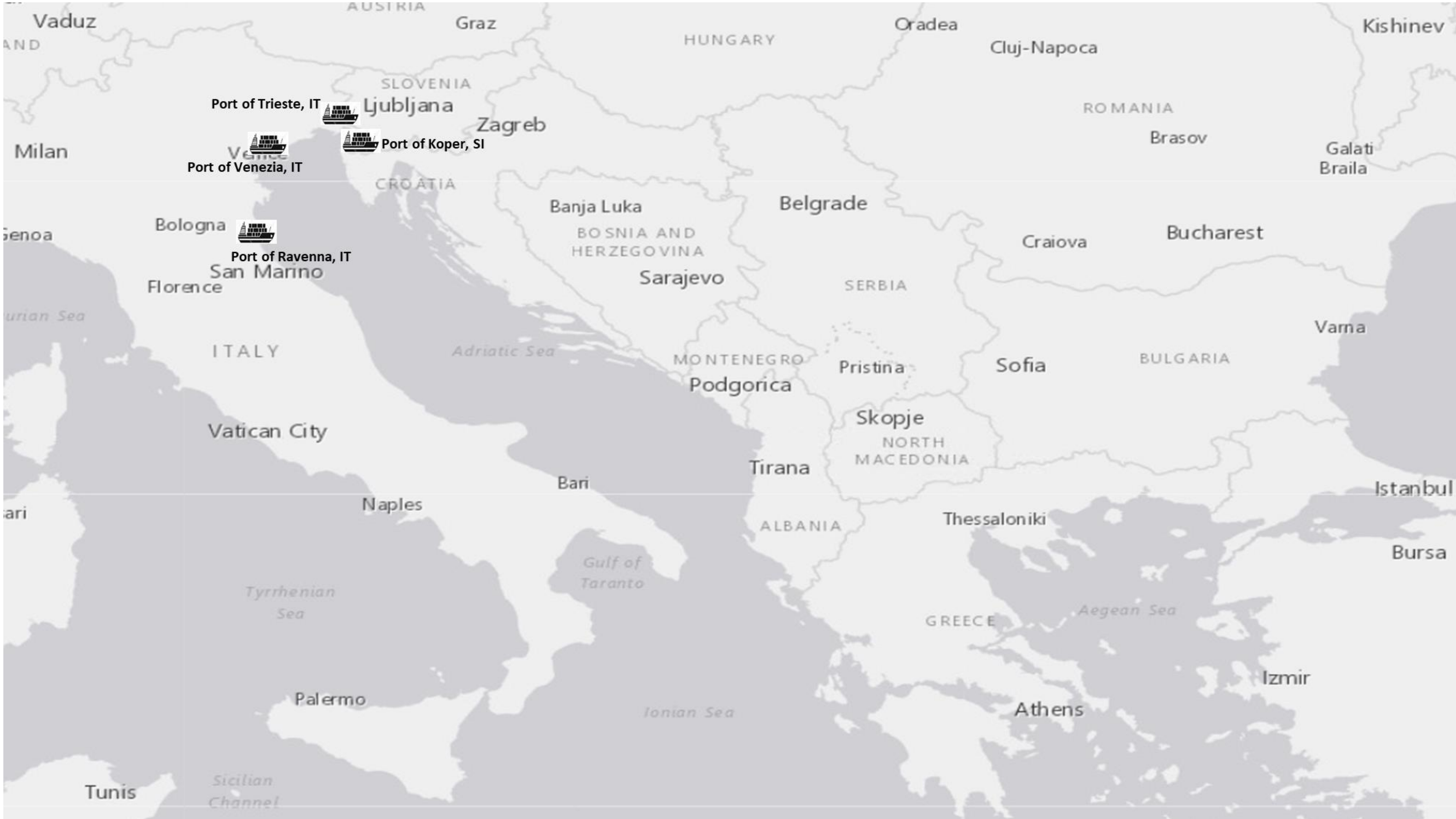


Figure 2. 5. Network of ports participating the ADRIPASS questionnaire-based survey along Baltic - Adriatic Corridor in relation to Adrion-WB6 area

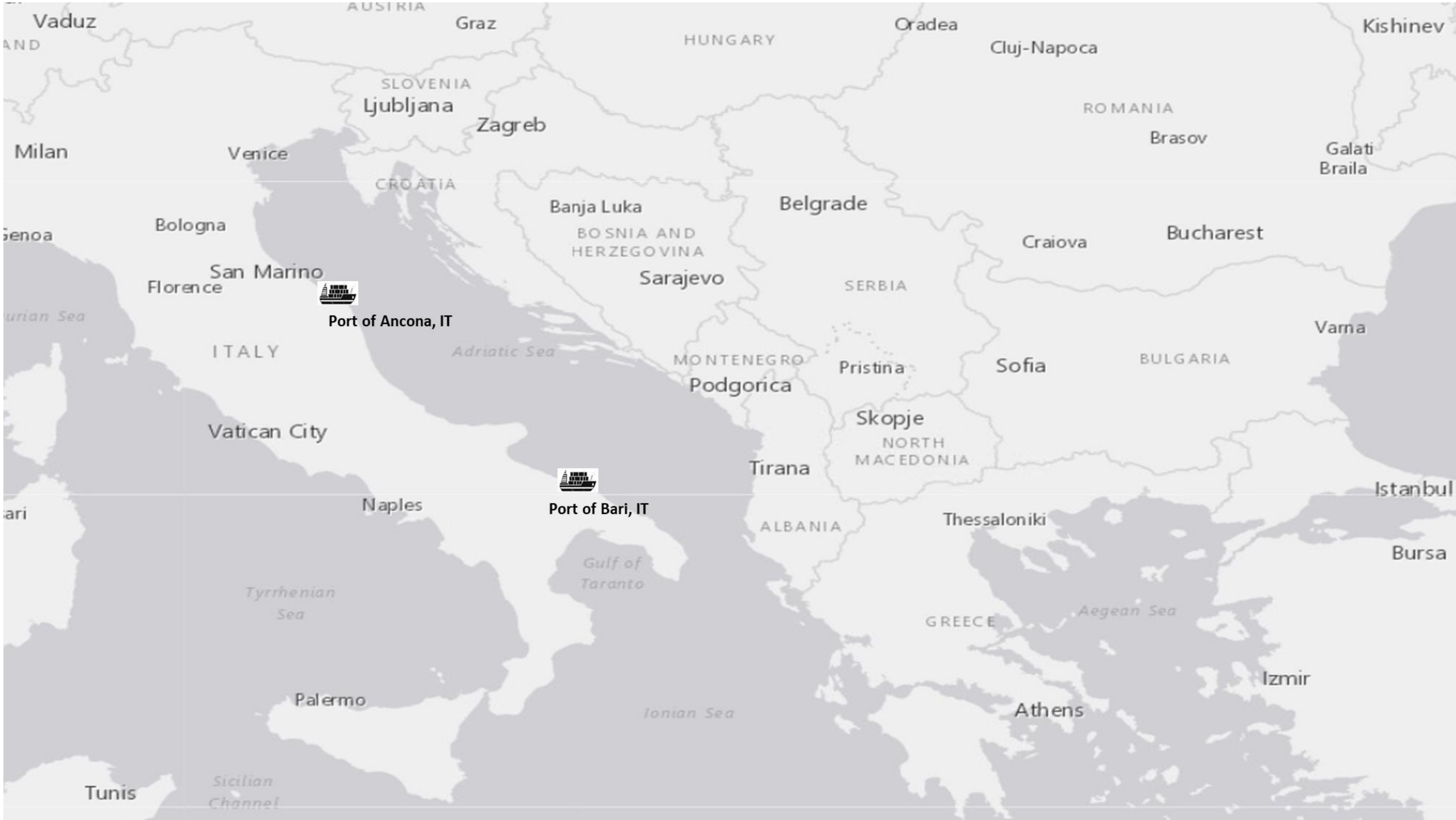


Figure 2. 6. Network of ports participating the ADRIPASS *questionnaire-based* survey along *Scandinavian - Mediterranean* Corridor in relation to Adrion-WB6 area

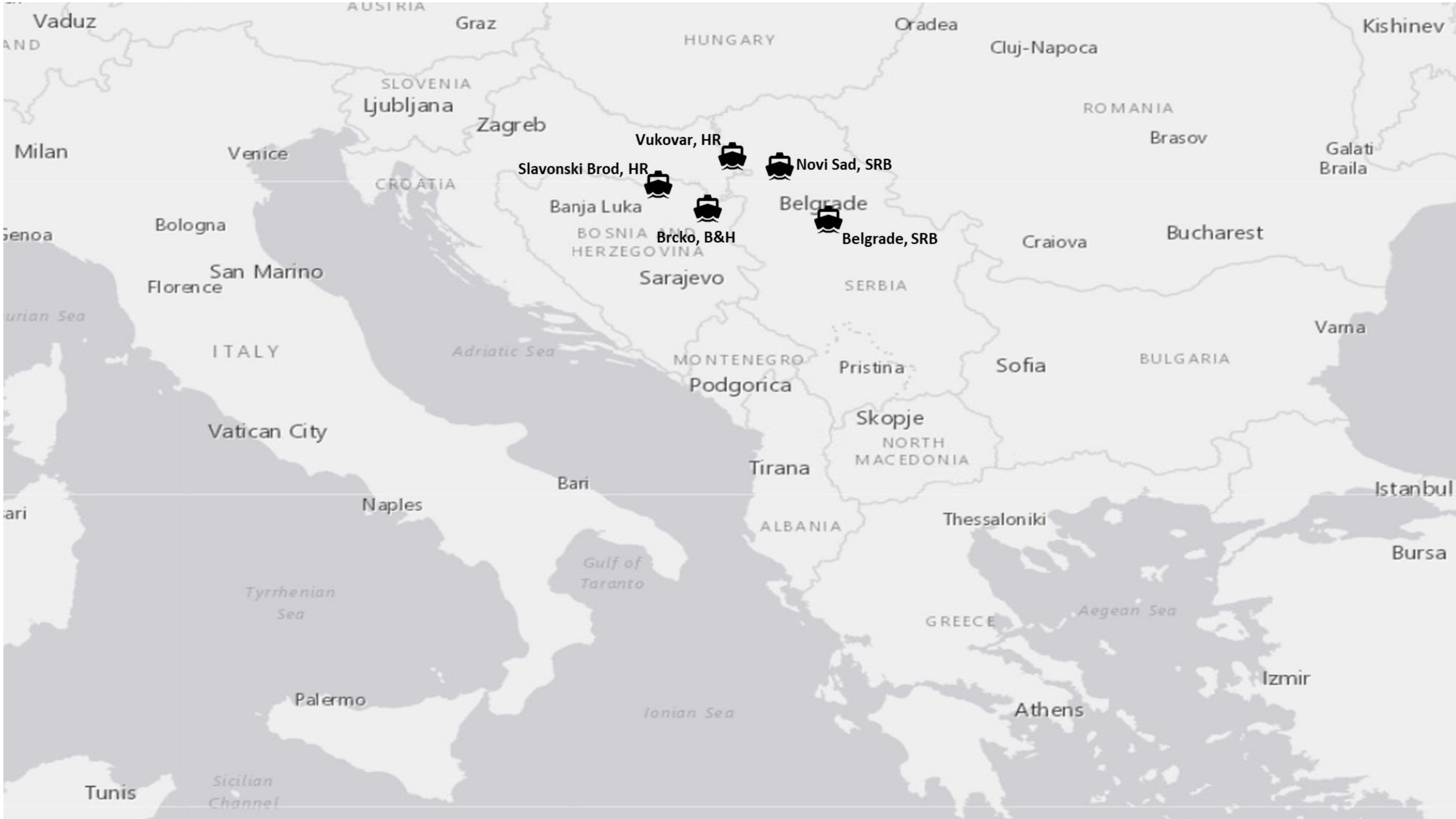


Figure 2. 7. Network of IWW ports participating the ADRIPASS questionnaire-based survey along Rhine - Danube Corridor in relation to Adrion-WB6 are

3.5 Data collection status – Problems and solutions

The overall fulfilment of data collection and database population for analysis purposes is summarized in the following figure:

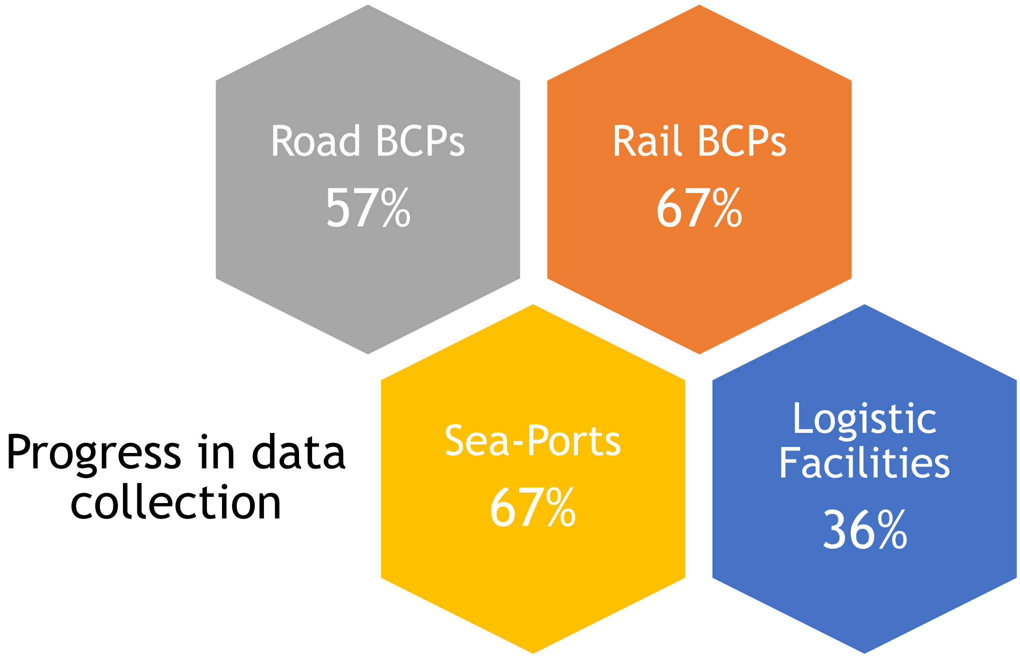


Figure 2. 8. Return ratio per type of node participating to the ADRIPASS questionnaire-based surveys (31 May 2019)

The questionnaire-based surveys addressed to ports (maritime and IWW), road and rail BCPs faced several problems, the most significant of which being the following:

- The willingness to participate and the feedback from the identified stakeholders was poor.
- Although all partners made significant efforts to collect the required data through the questionnaire-based surveys, there are cases that the quantity and quality of data create problems to the implementation of a solid evaluation methodology regarding their performance. This is particularly relevant for the case of maritime ports.
- Based on the foreseen timeline of the project, the data collection process should have been completed by the end of 2018. However, due to several problems, the most important of which was the fact that SEETO completed its mandate on 31 December 2018, the quantity and quality of data collected so far is considerably less than planned. Data collection for ports, road and rail BCPs assigned to SEETO are still missing, although an effort to collect as many as possible data through alternative sources was made.

At the time of delivery of this report, there is an ongoing process concerning the substitution of SEETO by another eligible new partner in order to collect the necessary data so that the evaluation process can be considered completed. This is important especially when considering that the majority of the missing data concerns road and rail BCPs that are located in WB and were surveyed in the framework of the ACROSSEE project and thus a comparison between the situation in 2014 and the current situation could be extremely helpful to understand how their performance evolved over this 5-years period.

4 General Components and Functions of the Corridor(s)

4.1 Description of the Corridors and pre-identified bottlenecks

Considering that ADRIPASS has to address the extensions of Core TEN-T Corridors in the ADRION region (including - as said - the entire WB6), the multimodal Corridors under survey and analysis are the following:

- **Orient East-Med:** crossing Greece, the former Yugoslav Republic of Macedonia, Kosovo, Montenegro and Serbia
- **Mediterranean:** crossing Italy, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro and Serbia, Albania and Greece
- **Baltic - Adriatic:** crossing Italy and Slovenia
- **Scandinavian - Mediterranean:** crossing Italy
- **Rhine - Danube inland waterway network:** crossing Serbia, Bosnia and Herzegovina and Croatia

Therefore, the hinterland connections (road-rail-IWW) and nodal points (inland road-rail and other multimodal terminals) selected for inclusion in the ADRIPASS surveys are located along these Corridors. Detailed description of each Corridor's sections in the ADRION region, with indication of their alignments, road and rail BCPs and other nodal points of interest are provided in the following series of tables and figures (3.1 - 3.5).

Table 3. 1. Description of Orient East - Med Corridor in ADRION region

Country	Roads	Railways	IWW	Inland terminals (incl. IWW ports)	Maritime Ports
EL	MK border - Evzoni/ Bulgarian border Promachonas - Thessaloniki - Athens - Piraeus/ Patras	Sofia/ Skopje - Idomeni border - Thessaloniki - Athína - Piraeus/ Patras	-	Kuehne + Nagel A.E. Thessaloniki Warehousing & Logistics, Schenker SA Thessaloniki, Goldair Cargo, Makios Logistics, Lidl Logistics Center	Thessaloniki, Patras, Piraeus
MK	SRB border/ Tabanovce - Kumanovo - Veles - Bogorodica/ GRE border KOS border/ Blace - Skopje	SRB border/ Tabanovci - Skopje - Veles - Gevgelija/ GRE border KOS border/ Blace - Skopje	-	Terminal Tovarna	-
RS	HUN border/ Horgos - Novi Sad - Belgrade Belgrade - Nis Nis/ Doljevac - Merdare common crossing point Nis - Presevo/ MK border Belgrade - Gostun/ MNE border	HUN border/ Subotica - Novi Sad - Belgrade Belgrade - Nis - Ristovac - Presevo/ MK border Stalac - Kraljevo - Jarinje (link towards Kosovo) Belgrade - Vrbnica/ MNE border	-	Batajnica terminal, Nis terminal, Logistic Centre ZIT, Port of Belgrade, Port of Novi Sad, Pancevo port, Smederevo port	-
XK	Common crossing point Merdare - Pristina - Hani i Elezit/ MK border	Donji Jarinje - Pristina - Hani i Elezit/ MK border	-	Terminal Pristina	-
ME	SRB border/ Dobrakovo - Podgorica - Bar	SRB border/ Vrbnica - Podgorica - Bar	-	-	Bar

Table 3.2. Description of Mediterranean Corridor in ADRION region

Country	Roads	Railways	IWW	Inland terminals (incl. IWW ports)	Maritime Ports
IT	Milano - Verona - Padova - Venezia - Ravenna/ Trieste/ Koper - Ljubljana (-Budapest)	Milano - Brescia Brescia - Venezia - Trieste	Milano - Cremona - Mantova - Porto Levante/ Venezia - Ravenna/ Trieste	Freight village of Bologna, Freight village of Padova, Freight village of Trieste, Freight village of Verona	Trieste, Venice, Ravenna
SI	Ljubljana - Zagreb Ljubljana node Pragersko - Zalalövö Lendava - Letenye	Trieste - Divaca Koper - Divaca - Ljubljana - Pragersko Rijeka - Zagreb - Budapest	-	Container Terminal Ljubljana-Moste, Terminal Maribor Tezno, Adria Terminali in Sežana	Koper
RS	CRO border/ Batrovci - Belgrade	CRO border/ Sid - Belgrade	-	-	-
HR	Rijeka - Zagreb (-Budapest - UA border) Rijeka - Ploče - Metkovic and Neum/ BIH borders and Neum - Dubrovnik - Karasovici/ MNE borders Zagreb - Bajakovo/ SRB border	Ploče - BIH border Zagreb - Tovarnik/ SRB border	-	AGIT Vrapce - Zagreb, AGIT Slavonski Brod	Rijeka, Ploče
BA	CRO border/ Bosanski Samac - Sarajevo - Mostar - Bijaca/ CRO border	Bosanski Samac/ Samac - Sarajevo	-	-	-
ME	CRO border/ Debelj Brijeg - Bar - Sukobin/ ALB border	Podgorica - Tuzi/ ALB border	-	-	Bar
AL	MNE border/ Muriqan - Lezhe - Vore - Tirana/ Durrës - Fier -	MNE border/ Bajza - Shkoder - Vore - Tirana/ Durrës - Rrogozine	-	-	Durrës, Vlore

	Kakavija/ GRE border				
EL	ALB border/ Kakavia - Igoumenitsa	-	-	-	Igoumenitsa

Table 3.3. Description of Baltic - Adriatic Corridor in ADRION region

Country	Roads	Railways	IWW	Inland terminals (incl. IWW ports)	Maritime Ports
IT	(Wien - Graz - Villach -) Udine - Trieste Udine - Venezia - Padova - Bologna - Ravenna	(Wien - Graz - Villach -) Udine - Trieste Udine - Venezia - Padova - Bologna - Ravenna	-	Freight village of Bologna, Freight village of Padova, Freight village of Trieste, Freight village of Verona	Venice, Trieste, Ravenna
SI	(Graz -) Maribor - Ljubljana - Koper/ Trieste	(Graz -) Maribor - Ljubljana - Koper/ Trieste	-	Container Terminal Ljubljana-Moste, Terminal Maribor Tezno, Adria Terminali in Sežana	Koper

Table 3.4. Description of Scandinavian - Mediterranean Corridor in ADRION region

Country	Roads	Railways	IWW	Inland terminals (incl. IWW ports)	Maritime Ports
IT	(Innsbruck -) Verona - Bologna - Ancona/ Firenze Livorno/ La Spezia - Firenze - Roma - Napoli - Bari - Taranto Napoli - Gioia Tauro - Palermo/ Augusta (- Valletta)	Fortezza - Verona Napoli - Bari Napoli - Reggio Calabria Verona - Bologna Messina - Catania - Augusta/ Palermo Bologna - Ancona	-	Bologna Freight Village, Freight village of Bari	Ancona, Bari

Table 3.5. Description of Rhine - Danube Corridor in ADRION region

Country	Roads	Railways	IWW	Inland terminals (incl. IWW ports)	Maritime Ports

HR	-	-	Sava	Slavonski Brod, Vukovar	-
BA	-	-	Sava	Brčko	-
RS	-	-	(Wien/ Bratislava - Budapest -) Novi Sad - Belgrade (- ROM/ BUL)	Novi Sad, Belgrade	-

"Other sections" of the CEF Regulation No 1316/2013, which are not considered parts of the Corridors, since they were not incorporated in the CNCs extensions, are:

- Sofia to the former Yugoslav Republic of Macedonia border
- Sofia to Serbian border
- Serres – Promahonas – EL/BG border
- Alexandroupoli – Kipoi EL/TR border
- Rail Egnatia

The network and points of interest are presented in Figure 3.1.

Figure 3. 1. Map of Core Network Corridors, Ports and BCPs of interest in ADRION region

Especially regarding WB6, where BCPs exist and it is the main region of interest with the extended Core TEN-T Corridors in the region, the Road and Rail BCPs and Ports of interest are indicated in Figures 3.2 to 3.5.

Figure 3. 2. Map of Road BCPs and ports of interest along the Trans-European Core Network Corridors extension in WB6

Figure 3. 3. Trans-European Road Core Network Corridors extensions in the Western Balkans[5]

[5] Mott MacDonald – IPF Consortium, Connectivity Networks Gap Analysis, 2016.

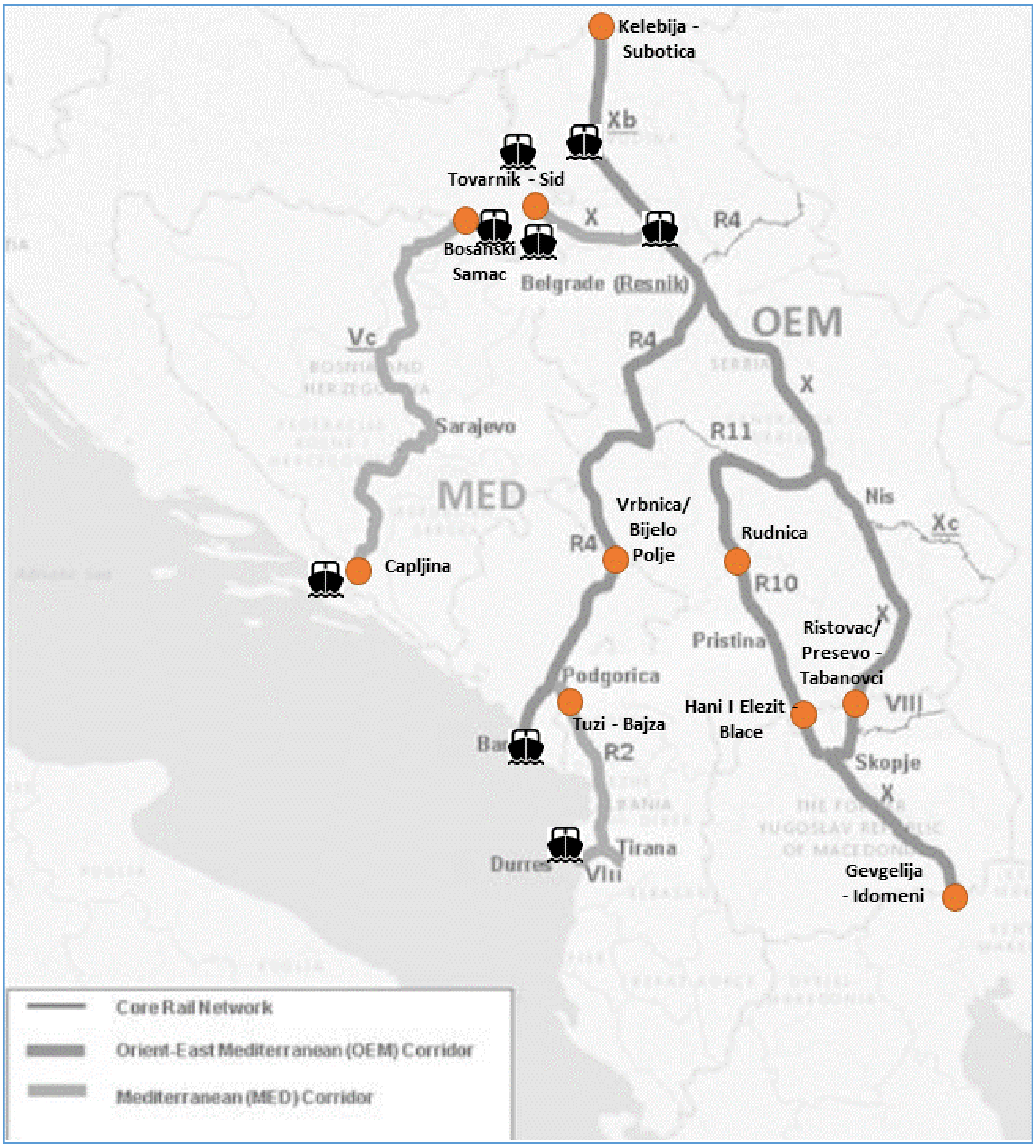


Figure 3. 4. Map of Rail BCPs and ports of interest along the Trans-European Core Network Corridors extension in WB6

Figure 3. 5. Trans-European Rail Core Network Corridors extensions in the Western Balkans[2]

Tables 3.6 and 3.7 present the entire road and rail networks of TEN-T extensions in the WB countries as presented by the Strategic Framework for implementation of ITS in the region[6].

[6] "Strategic Framework for implementation of ITS on TEN-T Core/ Comprehensive Network on the WB6", TA to Connectivity in the Western Balkans EuropeAid/ 137850/IH/SER/MULTI, CONNECTA-TRA-CRM-REG-03, Mott MacDonald CONNECTA Consortium, 2018.

Table 3. 6. Road network of TEN-T extension in the WB countries (Source: CONNECTA, 2018)

Section	Road length (km)						
	ALB	BIH	NMK	MNE	SER	KOS	Total
Corridor Vc	0	400	0	0	0	0	**400**
Corridor VIII	359	0	312	0	0	0	**671**
Corridor X	0	0	195	0	531	0	**726**
Corridor Xb	0	0	0	0	185	0	**185**
Corridor Xc	0	0	0	0	110	0	**110**
Corridor Xd	0	0	117	0	0	0	**117**
Route 1	13	7	0	86	0	0	**106**
Route 2a	0	228	0	0	0	0	**228**
Route 2b	173	104	0	160	0	0	**437**
Route 2c	125	0	0	0	0	0	**125**
Route 3	0	131	0	0	54	0	**185**
Route 4	0	0	0	180	421	0	**601**
Route 5	0	0	0	0	213	0	**213**
Route 6a	0	0	20	79	25	135	**259**
Route 6b	0	0	0	101	0	104	**205**
Route 7	114	0	0	0	85	107	**306**
Route 8	0	0	78	0	0	0	**78**
Route 9a	0	214	0	0	134	0	**348**
Route 10	0	0	170	0	0	0	**170**
Total	**784**	**1,084**	**892**	**606**	**1,758**	**346**	**5,470**
Percentage	*14%*	*20%*	*16%*	*11%*	*32%*	*6%*	*100%*

Table 3. 7. Rail network of TEN-T extension in the WB countries (Source: CONNECTA, 2018)

Section	Rail length (km)						
	ALB	BIH	NMK	MNE	SER	KOS	Total
Corridor Vc	0	428	0	0	0	0	**428**
Corridor VIII	357	0	244	0	0	0	**601**
Corridor X	0	0	215	0	515	0	**730**
Corridor Xb	0	0	0	0	151	0	**151**
Corridor Xc	0	0	0	0	104	0	**104**
Corridor Xd	0	0	146	0	0	0	**146**
Route 2	119	0	0	25	0	0	**144**
Route 4	0	0	0	159	421	0	**580**
Route 7	0	0	0	0	84	50	**134**
Route 9a	0	383	0	0	108	0	**491**
Route 10	0	0	17	0	174	151	**342**
Route 11	0	0	0	0	138	0	**138**
Route 13	0	0	0	0	28	0	**28**
Total	**476**	**811**	**622**	**184**	**1,723**	**201**	**4,017**
Percentage	*12%*	*20%*	*15%*	*5%*	*43%*	*5%*	*100%*

4.1.1 Orient East-Med corridor

The Orient/East-Med Corridor is running from the German ports of Wilhelmshaven, Bremerhaven, Bremen, Hamburg and Rostock via Czechia and Slovakia, with a branch through Austria, further via Hungary and Romania to the Bulgarian port of Burgas, with a link to Turkey, to the Greek ports of Thessaloniki and Piraeus and a "Motorway of the Sea" link to Cyprus. The Corridor's parts in the EU part of the ADRION region consists of the following multimodal sections:

- Sofia – Thessaloniki – Athina – Pireas
- Athina – Patra / Igoumenitsa
- Thessaloniki / Palaiofarsalos – Igoumenitsa
- (Pireaus / Heraklion – Lemesos – Lefkosia – Larnaka)

The length of the Corridor infrastructure sums up to approximately 5,800 km of rail, 5,400 km of road and 1,700 km of IWW. It is expected that the Corridor length will further adapt, e.g. with the construction of new by-pass roads, for instance, the length will increase.

The OEM Corridor is tangent to 15 urban nodes and 15 core airports of the core network, from which 6 are main airports to be connected with high-ranking rail and road links until 2050. Furthermore, 10 Inland ports and 12 Maritime ports are assigned to the Corridor, as well as 25 Road-Rail terminals (RRTs).

In Cyprus, no rail infrastructure is deployed. Maritime infrastructure exists in 4 countries, namely Bulgaria, Cyprus, Germany and Greece. The Danube IWW and its ports were not analysed in the study of the OEM EU Coordinator[7] being under jurisdiction of another EU Coordinator.

Up until 2016, the rail alignment of the corridor showed barriers and bottlenecks, of which the most important were the following:

- ERTMS was non-compliant on 4,944km of the network (87%).
- Along 2,815km of the network a train length of 740m was not allowed.
- For Greece, Minimum Axle load of 225kN was major problem for two segments: Thessaloniki – Old Freight Station[8] and Piraeus – Rentis, Rentis – Rouf, Rouf - Athens[9].
- In Greece, segments of the rail network that are not electrified are: Thessaloniki – Thessaloniki port segment and Tithorea – Domokos segment[9].

[7] Study on Orient/ East – Med TEN-T Core Network Corridor, 2nd Phase, Final Report, European Commission, 2017.
[8] The OEM Corridor Study: Overview & Barriers to Corridor Implementation, DG MOVE, European Commission, 2016.
[9] Network Statement 2019, Hellenic Railways Organisation S.A., Available online: http://www.ose.gr/en/o-s-e/network

For the maritime ports, Ports of Piraeus and Igoumenitsa in Greece were not linked to the country's railway network (at least so far). Furthermore, all ports along the Corridor lack the facilities to provide alternative fuel for maritime transport. However, the most significant problem is that Greece has not yet implemented the National Single Window in accordance with Directive 2010/65/EU. For the Port of Thessaloniki, a VTMI System is planned to be deployed, while for the Ports of Igoumenitsa and Patras the respective system is to be repaired in order to resume operation. The projects that Greece will focus on until 2030 include the cross border link between Kulata (BG) – Promachonas (EL) – Thessaloniki, the acceleration of ERTMS implementation, the rail connections of the Ports of Igoumenitsa and Patras, the construction of alternative fuels facilities at seaports and the use of new technologies. Finally, construction of sufficient parking areas and promotion of interoperability of electronic toll collections systems on the road network are envisaged.

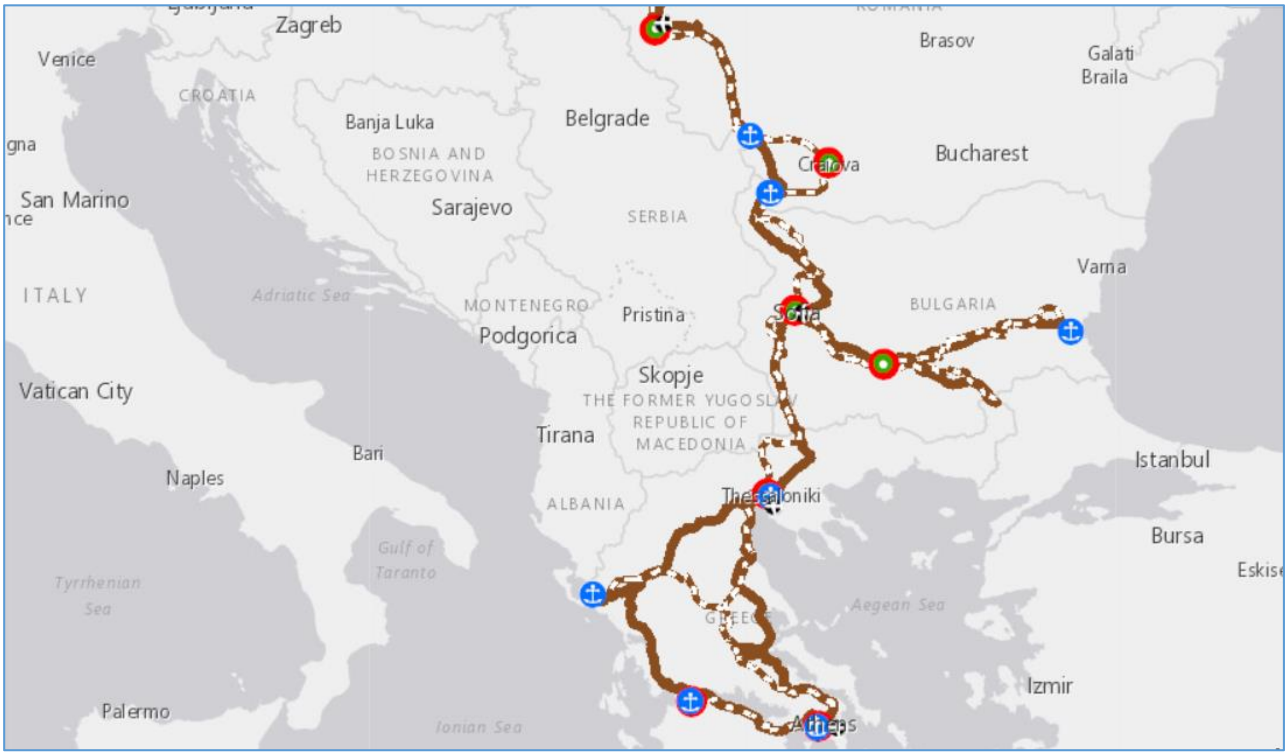


Figure 3. 6. Orient – East Mediterranean Corridor alignment in EU member states in Southeast Europe and ADRIPASS region[10]

In the WB6 region, the extension of the Corridor consists of the following sections:

- Budapest – Belgrade – Pristina – Skopje – Thessaloniki
- Belgrade – Podgorica - Bar

[10] INEA/ TENtec system

Overall, the road network of the corridor in 2016 complies with Regulation No. 1315/2013, as 88% is consisted by Express roads/ Motorways. However, there is no information regarding the availability of alternative clean fuels facilities along the corridor.

For the same year, 89% of the rail corridor was electrified but only along 13% of the corridor, ERTMS was implemented. The track gauge of the rail corridor is equal to 1435mm (normal gauge) in its entire length, but the line speed was allowed to exceed 100km/h only along 78% of its total length. Finally, the permissible axle load over 225kN was allowed along 82% of its length and only 50% of the corridor's length supports train length over or equal to 740m.

Concerning IWW, almost the entire corridor met the requirements for Class IV (98%). The RIS implementation were met at 98% of the IWW corridor but the permissible height under bridges as a minimum value of 5.25m was met only at 60% of the corridor. Furthermore, the permissible draught as a minimum value of 2.5m was met at only 40% and the availability of over one (1) freight terminal open to all operators was met along 80% of the corridor.

The availability of connection of seaports to the rail network was up to 80% while the connection to Class IV IWW was absolute as was the availability of at least one freight terminal open to all operators in a non – discriminatory way and application of transparent charges and the availability of facilities for ship generated waste.

Only 89% of the inland ports are connected to the railway network. Finally, for Road Rail Terminals (RRT) the capability for intermodal (utilized) transhipment was up to 79%, the 740m train terminal accessibility was low (25%), the electrified train terminal accessibility was just in half (46%) and the availability of at least one (1) freight terminal open to all operators in a non-discriminatory way and application of transparent charges was up to 71%.

The analysis of RRTs revealed that the nominated RRT in Patras does not exist and also the port was lacking connection to the country's railway network as it happens in the case of the port of Igoumenitsa. Another important issue is that there were still long sections along the Greek road network without any suitable facilities concerning safe and secure parking areas (although the situation seems to be improved along the highways which are modernized).

Concerning the railway network, the corridor includes sections of two rail freight corridors: Rail Freight Corridors No. 7 and No. 8. A strategic goal was set for these corridors aiming to significantly reduce the freight trains border waiting times and achieving the so called "Two-Hour Goal".

In June 2016, in Rotterdam, at the initiative of the CNC OEM Coordinator, a Joint Ministerial Declaration "On effective improvements to eliminate bottlenecks and facilitate international traffic on the Orient/East-Med Rail Freight Corridor" was signed by representatives of the Transport Ministries of Germany, Austria, Czechia, Slovakia, Hungary, Romania, Bulgaria and Greece. These 8 EU Member States officially committed to set measures in order to reduce (each) rail border transit time to a maximum of 2 hours by mid-2018. The overall aim is to simplify the cross border technical and administrative operations, to enhance and harmonise coordination of infrastructure work, capacity and path arrangements and to improve governance and communication.

In the WB6 region, the OEM Corridor extends from the borders of Greece with North Macedonia (Bogorodica/ Gevgelija) to Skopje – Pristina/ Nis – Belgrade to the Serbian borders with Hungary, and from Belgrade to Podgorica and the Port of Bar in Montenegro.

The overall compliance with the TEN-T standards of the road sections of the OEM in the WB6 is 79.36%, which is a percentage that will be increased soon. Along the entire length from the Greek borders with North Macedonia to the Serbian borders with Hungary, a full motorway is in operation; only a missing motorway section near Vladicin Han is yet to be completed within 2019. Also, part of this Corridor is the Belgrade bypass, which is partly constructed.

On the section between Skopje and Pristina to Merdare, the Skopje – Blace motorway construction is under preparation, whilst the motorway between the border (Blace/ Hani i Elezit) to Pristina has been very recently put in operation. Therefore, a missing section according to TEN-T standards is between Pristina to Doljevac/ Nis, that this loop connects to Corridor X.

On the section Bar – Belgrade, construction is ongoing in several parts in Serbia and in Montenegro, but still many sections of this corridor (Route 4) requires preparation of the necessary documentation and financing for implementation.

Regarding railways, 78% of the MED CNC length in WB6 is compliant regarding electrification and only 45% regarding maximum operating speed. ERTMS has not been deployed on any section of the CNC extension in WB region.

4.1.2 Mediterranean corridor

The Mediterranean Corridor is the main east-west axis in the TEN-T Network south of the Alps. It runs between the south-western Mediterranean region of Spain and the Ukrainian border with Hungary, following the coastlines of Spain and France and crossing the Alps towards the east through Italy, Slovenia and Croatia and continuing through Hungary up to its eastern border with Ukraine. The corridor primarily consists of road and rail sections, aside from the Po River, several canals in Northern Italy and the Rhone River from Lyon to Marseille. The corridor is approximately 3,000 km long; it will provide a multimodal link for the ports of the Western Mediterranean with the center of the EU. It will also create an east-west link through the southern part of the EU, contribute to a modal shift from road to rail in sensitive areas such as the Pyrenees and the Alps, and connect some of the major urban areas of the EU with high-speed trains[11].

The Mediterranean Rail Corridor crosses six EU countries (Spain, France, Italy, Slovenia, Croatia and Hungary), over more than 6,000 km along the route: Algeciras – Bobadilla – Madrid – Zaragoza – Tarragona – Sevilla – Bobadilla – Murcia – Cartagena – Murcia – Valencia – Tarragona – Barcelona – Perpignan – Marseille/ Lyon – Torino – Novara – Milano – Verona – Padova – Venezia – Ravenna/ Trieste/ Koper – Ljubljana – Budapest – Ljubljana/ Rijeka – Zagreb – Budapest – Ukrainian border. Figure 3.7 presents the Mediterranean Rail Freight Corridor.

According to CEF data[12] significant funds are invested into addressing 3 bottlenecks along the Northern Italy waterway system. This is where, according to the report published in February 2018, the *"20% non-complying IWW network of the Corridor is mainly located. It also presents problems of accessibility and navigability reliability"*. The Northern Italy Waterway System is supported to reach standards of the inland waterway Class V. "*Ongoing works to construct the Isola Serafini new navigation lock, Port Levante new embankment and to upgrade the Boicelli Canal are expected to allow the regulation of the Po river and waterway connecting the Adriatic Sea to the upper basin of the river and improve the link with the rest of the Northern Italy Waterway System"*.

[11] https://ec.europa.eu/transport/themes/infrastructure/mediterranean_en
[12] CEF support ot Mediterranean Corridor, Innovation and Networks Executive Agency, European Commission, February 2018

Figure 3. 7. Mediterranean Corridor alignment in EU member states in ADRIPASS region[13]

Concerning Maritime Ports, the EU Coordinator's report notes that 5 actions are implemented in Croatia. Specifically, "*Ongoing works at the Port of Rijeka include Brajdica new intermodal terminal of containers, Zagreb pier container terminal and General cargo terminal at the Rasa basin, are expected to improve railway connection of the Port and ultimately to support North Adriatic Ports association (NAPS) which can bring together Croatian, Italian and Slovenian ports (Rijeka, Venice, Trieste and Koper) as a multimodal gateway to the markets of Central Europe*".

For multimodal transport, the report noted that "*investments are made to improve rail-road terminals in Genova and Padova. Specifically, ongoing works to improve the efficiency of the new large container terminal of Interport Padova SpA, ICT infrastructure, gate automation, rail tracks and safety and security upgrading are expected to further develop the multimodal logistics platform of Padova. In the Port of Vado Ligure, works for installing 4 railway tracks with a length of 450m, an automated Railway Gate and a bridge allowing road and rail access to the terminal are expected to improve last mile connection and interconnection with Short Sea Shipment services*".

Concerning railway network, actions are implemented in Hungary to modernize the railway network and to eliminate critical bottlenecks identified which ultimately contribute towards the improvement of the cross-border connection with Croatia.

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[13] INEA/ TENtec system

Actions are implemented in Slovenia to address major bottlenecks, improve the rail network to TEN-T standards and ultimately contribute towards the improvement of the cross-border connection with Italy and Croatia. Specifically:

- Upgrade of the Zidani Most–Celje railway section and of the three railway stations (Rimske Toplice, Laško, Celje).
- Upgrade the Koper-Divača single-track railway line.
- Upgrade the Poljčane-Slovenska Bistrica double-track section.
- Remove a current single-track bottleneck and provide an important hinterland connection to the Port of Koper.
- Deployment of ERTMS/ ETCS on the Dobova – Zidani Most and Pragersko – Maribor – Sentilj railway lines.

Regarding the Croatian railway network, the following sections along which no ERTMS is in place are identified:

- Ostarije – Rijeka. The specific rail section concerns an electrified line of 127.93km length, as part of the MED Corridor. The section serves the needs of Rijeka maritime port, although the development of railway infrastructure in the hinterland if Rijeka is unsatisfactory. The maintenance of the existing infrastructure could lead to future bottlenecks. According to the collected data either through desktop research or questionnaire based surveys, suggest that in the near future it is possible only 45.6% of total rail Croatian length to be maintained and for the rest will need to carry out investment works or major repairs as part of the maintenance.
- Zagreb – Botovo. The specific rail section concerns an electrified line of 98.32km length, as part of the MED Corridor. Along this section, no ERTM system is in place but however it is foreseen to be implemented (Level 1) by 2023. The line is single-tracked and needs infrastructural investments. The railway fleet does not correspond to the current traffic requirements and moreover, the investments in railway infrastructure are not accompanied by the modernization of the fleet, and the operating characteristics of the old fleet have a negative impact on infrastructure in the form of faster decay of the upper track layout, and also inadequate maintenance of the track affects the lower tier and towed vehicles. One of the main problems is the lack of compatibility between the fleet and railway infrastructure. All projects that encourage the use of railways can alleviate minor bottlenecks - projects dealing with harmonization of timetables, use of ICT tools and promotion of intermodality.
- Zagreb – Karlovac. The specific rail section concerns an electrified line of 54km length, as part of the MED Corridor and Core Network Corridor. Along this section, no ERTMS is in place. The railway fleet does not correspond to the current traffic requirements and moreover, the investments in railway infrastructure are not accompanied by the modernization of the fleet, and the operating characteristics of the old fleet have a negative impact on infrastructure in the form of faster decay of the upper track layout, and also inadequate maintenance of the track affects

the lower tier and towed vehicles. One of the main problems is the lack of compatibility between the fleet and railway infrastructure.

- Zagreb – Sutla. The specific rail section concerns an electrified line of 31km length, as part of the MED Corridor. Along this section, no ERTMS is in place. This part of the railway line is double tracked and electrified, and as such, there are not many infrastructural problems. But, the rest of the line that leads to Hungary is single track, and is bottleneck of the whole line. The main problem that can be seen in the future is the train station Dugo Selo. Freight trains stay for a long time on this station, but there is no freight gauge. This investment would help freight trains to depart as soon as possible from this station, and it would increase the capacity of the station. This is important because, if traffic on this corridor increased for 25%, then the station would reach its maximum capacity.

Regarding the road network, actions are implemented focused on fostering the development of secure parking, the availability of clean fuels as well as the deployment of intelligent transport system. Built on previous TEN-T Actions, MedTIS II and III as well as Crocodile 2 and 3 Actions focus on Road Safety solutions, Traffic Management and Traveller Information Services. Crocodile Actions ensure an efficient cross-border communication among the various Traffic Management Centres, the implementation of National Access Points and the use of DATEX II.

In the WB6 area the extension of the Corridor consists of the following sections:

- Zagreb - Belgrade
- Ploče – Bar – Durrës/Tirana – Igoumenitsa
- Bosanski Samac – Sarajevo - Ploče

Non-compliant with TEN-T standards sections of the road MED CNC in WB6 reach 65.5% of its total length in the region. A motorway is only constructed on the section Belgrade – Batrovci (borders with Croatia) and partly in Bosnia and Herzegovina Corridor Vc between Zenica – Sarajevo and Tarcin and a small section near the southwestern borders with Croatia between Medugorje and Bijaca.

Regarding railways, 74% of the MED CNC length in WB6 is compliant regarding electrification and only 12% regarding maximum operating speed. ERTMS has not been deployed on any section of the CNC extension in WB region.

4.1.3 Baltic – Adriatic corridor

This Corridor runs in the North-South direction on the European Continent, and constitutes a European axis backbone between the Baltic and the Adriatic seas, linking their relevant ports (Trieste, Venice, Ravenna, Koper, Gdansk/ Gdynia), with primary hinterland cities (Vienna, Graz, Klagenfurt, Villach, Udine) between Poland and Italy[14]. It crosses only EU Member States.

The railway network will be electrified by the year 2023 and any missing links will be completed by 2026. However, ERTMS and 740 meters' train length as important operational elements of railway networks are not fully defined.

The length of the road network is 3,600km approximately of which 84% compliances with standards of express road/ motorway. Up until April 2018, 2 border crossing connections did not meet the required standards: Brno (CZ) – Wien (AT) and Katowice (PL) – Zilina (SK), i.e. not in ADRION region. Overall, the corridor operates in good capacity level (except few urban nodes) and the network is expected to meet the required standards by the year 2030.

Along the network there are 10 core ports, 8 maritime and 2 for IWW. The most important developments expected by the year 2030 are the following:

- Improvements foreseen at all seaports for rail and road interconnections.
- LNG being under development at Bratislava, Gdynia, Swinoujscie, Venezia and Ravenna.
- Clean fuel availability strategy to be defined for Wien, Gdansk, Trieste and Koper.

[14] https://ec.europa.eu/transport/modes/rail/ertms/corridors/baltic-adriatic-corridor_en

Figure 3. 8. The Baltic - Adriatic corridor[15]

The identified bottlenecks at the critical rail and road cross – border sections in the ADRIPASS study area are:

- Graz (AT) – Maribor (SI) Rail
- Trieste (IT) – Divaca (SI) Rail

According to the Final Report of Baltic – Adriatic Core Network Corridor Study of 2014[16], the corridor railway infrastructure is already continuous and in operation. The railway infrastructure along the Corridor is almost entirely electrified. Different power systems are however in use, which constitutes an obstacle for interoperability on the Corridor. This is only partially mitigated by the use of multisystem locomotives. Concerning axle load, in 2014 there were sections non-compliant with the Regulation (225kN) and some of them concerned sections between Zidani Most – Sentilj. Furthermore, the study underlined that the prevailing maximum train length along the corridor was 600m, with more severe restrictions on specific sections on the Slovenian network. The road network was fully compliant with the specific Regulation in Italy and Slovenia.

According to the report, in Italy, major critical issues existed on the Venezia – Trieste railway line (improvement of headway system signalling and need for removal of level crossings); the Venezia/Mestre and Udine nodes also required upgrading works. Works to increase train length and gauge standards in favour of freight traffic were required on more sections along the corridor. In Slovenia, major deficiencies existed compared to the requirements of the TEN-T standards. The upgrading of the existing line Divača – Koper was under implementation/modernization and was concluded by the end of 2015.

[15] http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html
[16] Baltic – Adriatic Core Network Corridor Study, Final Report, Europan Commission, 2014.

4.1.4 Scandinavian - Mediterranean corridor

The Scandinavian-Mediterranean Corridor represents a crucial north-south axis for the European economy. The corridor stretches from Finland and Sweden in the North, to the island of Malta in the South, taking in Denmark, Northern, Central and Southern Germany, the industrial heartlands of Northern Italy and the southern Italian ports.

It is the longest of the TEN-Core Network Corridors and starts at the Finnish-Russian border, and goes via Helsinki, Stockholm and Malmö to the European mainland (via Berlin, Munich, Naples up to) Italy and Malta. It continues the major transport flows of the seaports Hamburg and Rostock via Hannover, Berlin, Leipzig. Further sections go via Nuremburg, Munich, Brenner Corridor to Verona and further via Bologna, Rome, Naples, Genoa to Palermo. The last section connects Sicily with Malta via the Motorways of the Sea[17]. Figure 3.9 presents the alignment of the Scan – Med Corridor.

The Scan-Med Corridor is the largest in terms of core network length of rail (> 9,300 km), road (> 6,300 km) and number of core ports, airports and rail-road terminals (in total about 90 locations). In 2016, across Italy the rail network length of the corridor was equal to 3,053km and the respective length of the road network was equal to 2,401km, with 4 airports, 8 maritime ports, 4 urban nodes and 13 Rail Road Terminals (RRT) along the corridor’s alignment.

Concerning the railway network, the Final Report of the Scandinavian – Mediterranean Core Network Corridor Study of the European Commission in 2014[18], revealed that at that time axle loads were below the standard parameter on 25% of the sections in Italy.

[17] https://www.scandria-corridor.eu/index.php/en/corridor/scand-med
[18] Scadinavian – Mediterranean Core Network Corridor Study, Final Report, European Commission, 2014

Figure 3. 9. Alignment of the Scan-Med Corridor[19]

4.1.5 Rhine - Danube corridor

The Rhine-Danube Corridor provides the main east-west link across Continental Europe. Tracing its route along the Danube River, it connects Strasbourg and Southern Germany with the Central European cities of Vienna, Bratislava and Budapest, before passing through the Romanian capital Bucharest to culminate at the Black Sea port of Constanta. A second branch of the corridor tracks a path from Frankfurt to the Slovakian/Ukrainian border, linking Munich, Prague, Zilina and Kosice. Key projects situated along the corridor include improvements to the Good navigation status of the Danube River in all the riparian countries.

Besides the main connections, the alignment of the corridor includes the Sisak - Slavonski Brod – Belgrade segment of Sector C, an inland waterway that passes through Croatia,

[19] http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html

Bosnia and Herzegovina, and Serbia[20]. Figure 3.10 presents the alignment of the Rhine – Danube Corridor in SEE region.

Figure 3. 10. Alignment of the Rhine - Danube Corridor[21]

According to the Study on Rhine – Danube TEN-T Core Network Corridor Final Report of the European Commission in 2017[22], 91% of rail lines were electrified, the entire rail infrastructure provides for standard gauge, an operating speed of at least 100km/h is enabled at more than 90% of the corridor's length. A maximum train length of 740m is permitted at 47% of the rail infrastructure.

Administrative and operational barriers mostly consist of changing infrastructure standards at borders, extensive border waiting times and diverging and non-transparent charging systems.

For IWW, 85% of the inland waterway network, including Serbia, is classified as a Class IV waterway or higher, only the Sava River is assigned to a lower class. A draught of 2.50m is permissible at 77% of the inland waterways. Four bridges offered a clearance below 5.25m, 89% of the sections length does comply with the requirement. River Information Services are available along the entire Corridor (100%) but to a different extent and quality.

[20] TEN-T Rhine – Danube International Waterway Corridor Assessment, SEETO – South East Europe Transport Observatory, Available online: http://documents.rec.org/projects/Annex2_Rhine-DanubeInternationalWaterwayAssessment.pdf
[21] http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html
[22] Study on Rhine – Danube TEN-T Core Network Corridor, 2nd Phase, Final Report, European Commission, 2017

The majority of the Corridor core ports comply with the requirements set by Regulation 1315/2013. The Slavonski Brod port in Croatia reported in 2017 incompliances in terms of lacking intermodal facilities, although plans for significant modernization including the infrastructure and related facilities which would facilitate intermodality were announced in March 2017.

About 78% of the total length of roads is classified as motorways (express ways) and 22% are conventional roads. The majority of conventional roads are still in the eastern part of the corridor, in Slovakia and in Romania.

As underlined in the above-mentioned report, "*Continuity of passenger and freight flows by rail is jeopardized at cross-border sections, due to changing technical parameters. Full exploitation of train capacities is particularly impacted for long-haul train runs, as they have to cope with frequent changes and multi-system locomotives are needed. Border control procedures influence transport/travel times, costs and resource efficiency of rail transport negatively. Also deviating infrastructure parameters at last mile connections or missing interconnections hamper the increase of rail transport.*

Inland waterway transport might be improved by providing waterway infrastructure managers with adequate budget to fulfil their national maintenance duties. Also, the well qualified human resources for the preparation and implementation of complex, integrated waterway management and engineering projects is not sufficiently available in some countries.

Ports set their charges autonomously and may differ substantially in line with the applied organisational scheme. Increased transparency, e.g. by an obligation to publish tariffs on the ports websites would support inland waterway transport. Non-harmonized administrative procedures in ports delay or prolong transports significantly. Harmonization of requirements for vessel, crew and cargo related documents for vessels' calling in ports is highly recommended.

Interoperability of ITS and road tolling systems between Member States is an obstacle and burden for the hauliers and freight forwarders on long distance transport" (Study on Rhine – Danube TEN-T Core Network Corridor, 2017).

4.2 Maritime Ports-Gateways

The maritime ports included in ADRIPASS survey are presented in Table 3.8 in summary. Specifically, the information presented describes the available infrastructure, the provided services, the trade flows served, the transport modes supporting multimodality, the main problems performing as bottlenecks to their performance and the ICT tools and applications implemented.

Table 3.8. Maritime ports of the ADRIPASS project

Port	Location (country)	Terminals	Provided services	Total tonnage (tons) per year		Transport modes supported for transhipment	Main problems	ICT Tools and applications
				In	Out			
Durrës	Albania	Container, General cargo, Dry Bulk, Cruise	Pilotage, Tugs, Quarantine, Longshore, Electrical repair	n.a.	n.a.	Road, Rail	No Vessel Traffic Management Information System	n.a.
Igoumenitsa	Greece	Car Ro-Ro, Cruise	Tugs, Electrical, Navigation Equipment	402,066	482,635	Road	n.a.	PCS, Wireless communication Technologies,
Patras	Greece	n.a.	n.a.	n.a.	n.a.	Road	n.a.	PCS, Cyber-Security for advanced technology networks
Piraeus	Greece	Container, Car Ro-Ro, General Cargo	n.a.	5.5mo TEUs		Road, Rail	n.a.	PCS, Cloud Computing, Wireless Communication Tehcnologies, Big Data Analysis, Cyber-Security for advanced technology network
Rijeka	Croatia	Container, Car Ro-Ro, General Cargo, Container, Timber, Silo, Liquid Cargoes, Livestock, Cruise	Pilotage, Tugs, Quarantine, Electrical repair, Electrical, Navigation Equipment	12,615,066 tons (all cargo)	n.a.	Road, Rail	Long vessel waiting times re-scheduling due to port congestion, Insufficient mooring space, Not flexible Infrastructure to Increasing ship size, Low level of Information integration Among port community, Lack of common	Wireless Communication Technologies, Cyber-Security for advanced technology network

							Integrated development Strategy of the Seaports and atomized market	
Thessaloniki	Greece	Containers, Car Ro-Ro, General Cargo, Reefer, Timber, Dry Bulk, Alumina, Iron Cole-Coal-Petroleum Coke, Liquid Cargoes and Cruise	n.a.	9,200/ day	9,600/day	Road	n.a.	PCS, Big Data Analysis, Robotics and Autonomy, Cyber-Security for advanced technology networks
Trieste	Italy	Container, Car Ro-Ro, General cargo, Reefer, Timber, Dry Bulk, Silo, Alumina, Iron Ore-Coal-Petroleum Coke, Liquid, Livestock, Cruise	Pilotage, Tugs, Quarantine, Longshore, Electrical repair, Electrical, Navigation Equipment	53,508,264	8,447,141	Road, Rail	Last mile by rail: Congestion due to infrastructure Bottleneck and operating agreements	Single Window, PCS, Cloud Computing, Wireless communication Technologies, Internet of Things, Big Data Analysis,
Venezia	Italy	Container, Car Ro-Ro, General cargo, Reefer, Dry Bulk, Silo, Iron Ore-Coal-Petroleum Coke, Liquid, Cruise	Pilotage, Tugs, Quarantine, Longshore, Electrical	19,680,836	5,453,788	Road, IWW, Rail	Low depth, Future railway Capacity	Single Window, PCS, Cloud Computing, Wireless communication Technologies, Internet of Things, Big Data Analysis, Cyber-Security
Ploče	Croatia	Container, General cargo, Reefer, Timber, Dry Bulk, Silo, Iron Ore-Coal-Petroleum Coke, Liquid Cargoes	Pilotage, Tugs, Electrical Repair	-	-	Road, Rail, Sea	Poor state of road and railway connection between the port and the hinterland	Single Window, PCS, Cloud Computing, Cyber - Security for advanced technology networks

Bar	Montenegro	Car Ro-Ro, General cargo, Reefer, Dry Bulk, Silo, Liquid Cargoes	Pilotage*, Tugs*, Longshore	2.3mo (Year 2017)		Road, Rail, Sea	Low quality of hinterland connections	PCS, Single Window, Wireless communication Technologies
Ravenna	Italy	Container, Car - Ro-Ro, General Cargo, Reefer, Ownership, Timber, Ownership, Dry Bulk, Silo, Alumina, Iron Ore - Coal - Petroleum, Liquid Cargoes, Ownership, Cruise	Pilotage, Tugs, Quarantine, Longshore	22.644.555	3.863.930	Road, Rail	Low depth of the port canal; Last mile connections by rail; improvement of accessibility to terminals and elimination of road-rail crossings; last mile connections by road; Improvement/ upgrading of road infrastructure to rationalize/ optimize traffic management and flows; Undersize of administrative offices involved in health and safety checks; health and safety labs not located at the port	PCS, Cloud Computing, Wireless communication technologies (smart mobile phones, QR codes, RFID, telematics tracking), Cyber - security for advanced technology networks
Vlore	Albania	Car Ro-Ro, General Cargo	Electrical, Navigation Equipment	n.a.	n.a.	Road	Aged infrastructure	Port Community System. Cloud Computing, Big Data Analysis, Cyber - Security

n.a. : not available information
- : nothing reported

4.3 Road Border Crossings

The Road BCPs covered by ADRIPASS can be categorized in two groups:

1. Those been surveyed in the framework of the ACROSSEE project (Accessibility improved at border CROSsings for the integration of South East Europe), and
2. Those being surveyed for the first time in the framework of the ADRIPASS project.

For the needs of the ADRIPASS project, a template was developed so that critical information for the project is collected or updated for the BCPs of the first group, although relatively recent data exist concerning their organizational and operational level.

The BCPs of the second group for the needs of the project were surveyed using a questionnaire developed specifically for this task.

For the needs of the final report, the collected data is summarized with emphasis given to their noted, by their authorities, problems and the ICT tools and applications implemented (if any).

The most important elements of the BCPs infrastructure as well as the provided services, level of demand, capacity, problems and ITS tools and applications implemented are presented in Table 3.9 for the Orient East-Med Corridor and in Table 3.10 for the Mediterranean Corridor. Those cells that are highlighted in yellow concern the BCPs of the first group (surveyed in ACROSSEE project) while the rest concern those being surveyed for the first time, i.e. in the framework of ADRIPASS. Furthermore, comments followed by (*) concern data from the CONNECTA sub-project[23].

[23] TA to Connectivity in the Western Balkans, EuropeAid/137850/IH/SER/MULTI, CONNECTA-TRA-CRM-REG-04, Study for border crossing facilitation and improvement of the cross-border road transport on the indicative extension of TEN-T Road Core/ Comprehensive Network in the Western Balkans, Fact Findings & SWOT Analysis for One Stop Shop & EQMS - Interim Report (Final), June 2018, Mott MacDonald CONNECTA Consortium.

Table 3.9. Road BCPs along the Orient East - Med corridor

BCP Name	Location (country)	Neighbouring country	Main problems	ICT Tools and applications
Bogorodica	North Macedonia	Greece	Lack of truck and bus scanners, No ICT facility to allow use of Advanced Notification*	n.a.
Blace	North Macedonia	Kosovo	-	-
Dobrakovo	Montenegro	Serbia	-	-
Evzonoi	Greece	North Macedonia	Many problems concerning the management of the BCS, toilettes, lack of adequate staff and technological infrastructure. Insufficient number of working staff 24/7, No X-Ray machine	Weighbridge
Promachonas	Greece	Bulgaria	No telephone connection, Bad level of internet connection, The BCP is not operational, The Greek Agents have to work on the Bulgarian BCP at Kulata, No equipment for phyto-sanitary controls	X-Ray machine, Weighbridge
Gostun	Serbia	Montenegro	Facilities, way of the controls are performed (Based on commercial drivers opinion)	n.a.
Horgos	Hungary	Serbia	No drinkable water supply, bad condition of the weighbridge	Mobile X – Ray machine, constant internet connection with Central Custom Offices
Hani i Hotit	Albania	Montenegro	No X-Ray scanner, No auxiliary facilities for the drivers	n.a.
Merdare	Serbia/ Kosovo		n.a.	n.a.
Presevo	Serbia	North Macedonia	Insufficient number of staff (custom agents, police, phytosanitary and veterinary agents), bad level of installed CCTV, no cargo handling equipment and thus the commercial vehicles cannot be properly inspected, Lack of passive non -intrusive technology to shorten processing times*	X-Ray machine, weighbridge, equipment for phytosanitary control
Tabanovce	North Macedonia	Serbia	No import clearing, Lack of passive non -intrusive technology to shorten processing times*	n.a.
Lipovac/ Bajakovo	Croatia	Serbia	Police with insufficient number of working staff working 24/7, Lighting in bad level especially for some lanes, Internet connection is problematic, There is CCTV system but there are problems on reading vehicles' licensing plates during sunny days,	License Plate Recognition system,

			Parking areas in bad level, No constant internet connection with Central Custom Offices	Enhanced ICT facility to allow use of Advance Notification*

Table 3.10. Road BCPs along the Mediterranean corridor

BCP Name	Location (country)	Neighbouring country	Main problems	ICT Tools and applications
Obrezje	Slovenia	Croatia	It is foreseen an increase in border crossing time by 2020. More HR needed	n.a.
Batrovci	Serbia	Croatia	Insufficient number of custom agents and police officers working 24/7, Installed CCTV does not cover the entire BCP, Lack of phytosanitary equipment, Insufficient number of parking places, Inexistence of terminal for Custom Agency, No separate areas for detailed inspections, Insufficient number of lanes per directions serving the vehicles	X-Ray machine, weighbridge
Bosanski Samac	Bosnia and Herzegovina	Croatia	Present layout not ideal with the Customs Terminal located on the western side, No Phytosanitary and Veterinary staff stationed*	-
Bregana	Croatia	Slovenia	Insufficient number of personnel and equipment	n.a.
Debeli Brijeg	Montenegro	Croatia	-	-
Gorican	Croatia	Hungary	Police insufficient number of staff working 24/7, No surveillance (CCTV) are installed	n.a.
Kakavia	Greece	Albania	Insufficient number of staff, Low level of training, Bad level of existing facilities	n.a.
Karasovici	Croatia	Montenegro	Insufficient number of officers and lack of x-ray scanners	All Customs Declarations are submitted electronically
Klek	Croatia	Bosnia and Herzegovina	High frequency of passenger vehicles in the summer period and lack of parking spaces for vehicles.	All Customs Declarations are submitted electronically
Metkovic	Bosnia and Herzegovina	Croatia	-	-
Muriqan/ Sukobin	Albania/ Montenegro *(not used for freight traffic)*		Low level of English knowledge from the staff	All Customs Declarations are submitted electronically
Neum I NW	Bosnia and Herzegovina	Croatia	n.a.	Weighbridge
Neum II SE	Bosnia and Herzegovina	Croatia	Lack of infrastructure, lack of communication, insufficient equipment for transitions, insufficient number of employees	Weighbridge
Zupanja	Croatia	Bosnia and Herzegovina	Often technical failures of the equipment, Traffic congestion due to	Weighbridge

			the position of the BCP near Sava's river bridge which performs as bottleneck, No X-Ray machine, Facilities in bad level	

n.a. : not available information
 - : nothing reported

Along the Baltic – Adriatic corridor there are no BCPs because the corridor runs only through EU Member States. The same applies in the case of the Scandinavian – Mediterranean corridor.

4.4 Rail Border Crossings

Similar to the Road BCPs, Rail BCPs can be categorized in two groups:

1. Those that have been surveyed in the framework of the ACROSSEE project (Accessibility improved at border CROSsings for the integration of South East Europe), and
2. Those being surveyed for the first time in the framework of the ADRIPASS project.

As already said, for the BCPs of the first group, for the needs of the ADRIPASS project a template was developed in order critical information for the project to be collected/ updated and the BCPs of the second group for the needs of the project were surveyed using a questionnaire developed specifically for this task.

For the needs of the report, the collected data is summarized and emphasis given to their noted, by their authorities, problems and the ICT tools and applications implemented (if any).

The most important elements of their infrastructure as well as the provided services, level of demand, capacity, problems and ICT tools and applications implemented are presented in Table 3.11 and Table 3.12 for the Orient East-Med and Mediterranean Corridors respectively. Those cells that are highlighted in yellow concern the BCPs of the first group (surveyed in ACROSSEE project) while the rest concern those been surveyed for the first time within ADRIPASS.

Table 3.11. Rail BCPs along the Orient East - Med Corridor

BCP Name	Location (country)	Neighbouring country	Main problems	ICT Tools and applications
Blace	North Macedonia	Kosovo	-	-
Gevgelija	North Macedonia	Greece	-	-
Hani I Elezit	Albania	Montenegro	n.a.	n.a.
Idomeni	Greece	North Macedonia	Inexistence of appropriate and needed equipment, Insufficiency of working staff, No connection through internet with the Central Custom Agencies	n.a.
Ristovac/ Presevo	Serbia	North Macedonia	Insufficient number of Custom Agents and Police Officers, No knowledge of the English language / Inexistence of a terminal for commercial vehicles	Constant internet connection with Central Custom Offices/ X-Ray machine, Weighbridge, Phytosanitary controlling equipment
Rudnica	Serbia	Kosovo	-	-
Sid	Serbia	Croatia	n.a.	No connection with the Central Custom Offices
Savski Marof	Croatia	Slovenia	From the 1st of June 2013 Dobova is a common train station for inspections of train for state and railway bodies of Slovenia and Croatia. This way the custom procedures are reduced and trains do not stop at Savski Marof at all	n.a.
Tovarnik	Croatia	Serbia	No police and customs inspections, Not enough tracks, Veterinary and phytosanitary inspectors not constantly available but come when asked and also not working night shifts or weekends	n.a.
Vrbnica	Serbia	Montenegro	n.a.	n.a.

Table 3.12. Rail BCPs along the Mediterranean Corridor

BCP Name	Location (country)	Neighbouring country	Main problems	ICT Tools and applications
Bajza	Albania	Montenegro	1. CCC cross border commission as in art 14 of the Agreement not established and called in at least twice a year stipulated by law 128/2012 2. Protocols derived by the Agreement not published and lack of knowhow on regulatory provisions arranged already. 3. Modus Operandi not known at satisfactory level by personnel in duty - at managerial levels 4. Rules of procedure incl. manoeuvring has got an issue for the decision making of ZiCG all these kinds of operation manoeuvres shall be done by our Montenegrin partners (RU). 5. Guideline of the MIE on mutual actions in Tuzi and in the Zone are not signed, the old decision is related to the old agreement repealed by 2012. 6. Alb IM is not accommodated in Tuzi so that decision making level of IMs according to the Recast directive. 7. Alb broker agency has not office in Tuzi he causes delays when brought accompanying docs of trains to Hani i Hotit road border point to be completed and back to Tuzi 8. Lack of bank affiliate especially needed in holidays 9. Lack of installing ITS for railways or ERTMS, and CCS in the Zone. 10. EDI networks for IMs not yet in place 11. RAILDATA, RNE for RUs and CoReDA 12. Official communication between IMs and RUs should be improved as in EU recommendations in alignment to Decision of the Commission on OPE TSI 13. Training of capacity on system maintenance upon installation 14. Lack of land line for telephony in Bajza border station - the zone as per the Agreement	- internet connection is already provided by ZICG infrastructure - SEED + of customs system is operational between them both - despite EDI approved for programming it is not incorporated in MTBF 1st rev - finalization of CONNECTA sub-project on establishing the ICT for the WB6 - in OCT 2018 for 135,000 might apply through IPA
Tuzi (Railway Station)	Montenegro	Albania	Major problem at the border crossing point is the lack of IT infrastructure (no internet connection)	n.a.
Bosanski Samac	Bosnia and Herzegovina	Croatia	-	-

Capljina	Bosnia and Herzegovina	Croatia	Failure of border crossings, toilets, maintenance of border crossing and equipment and modernization of the border crossing	Radioactivity control equipment
Koprivnica	Croatia	Hungary	No CCTV system installed, Technical with insufficient staff working 24/7 Better station building and better offices are needed and more railway trackside	n.a.
Dobova	Slovenia	Croatia	Train speed for freight (<100km/h), Train length limitations (400-500m)	n.a.

n.a. : not available information
- : nothing reported

Along the Baltic – Adriatic corridor there are no Rail BCPs, based on the fact that the corridor runs through EU Member States. The same applies in the case of the Scandinavian – Mediterranean corridor.

4.5 Logistic facilities/ Inland Terminals

Many logistic facilities/ Inland Terminals are located along the transport corridors (mainly near urban nodes). These facilities are of different types: freight villages, logistic centers, hinterland ports serving inland waterway transport, etc., such as those of along the Rhine - Danube as well as several hinterland ports in Northern Italy. These are presented, in summary, in the next paragraphs.

It is beyond the scope of this analysis to assess the significance of these facilities in the supply chain, not only regional or national but of the entire area of Western Balkans. However, it is important to be noted that those facilities interact with the transport corridors in a two-way: they affect the operation of the corridors through the traffic flows that they attract and generate while at the same time, they are affected by the performance of the infrastructure of the corridors, i.e. maritime and inland waterways ports, rail stations, road and rail networks, road and rail BCPs.

In the framework of the ADRIPASS project, specially developed questionnaires were addressed to such nodes/ facilities located along the transport corridors to collect data that could help to identify any bottlenecks at these facilities. In addition, the questionnaire-based survey will help to identify bottlenecks along the corridors (both in nodes and in links) that negatively affect the supply chain in the entire area of Western Balkans while there is room for their improvement.

A summary of the collected data and reported problems is presented in Tables 3.13 and 3.14. It should be noted, that the information presented is coming from the questionnaire-based surveys and partly from interviews with stakeholders, and more information that could contribute to the strategic planning that ADRIPASS will formulate is foreseen to be collected during meetings with stakeholders in the framework of WPT3 as well as the Local Dissemination events in the framework of the WPC.

Table 3.13. Logistic facilities/ Inland Terminals of the ADRIPASS project

Logistic facility name	Type	Location (country)	Transport modes supported for transhipment	Main problems	ICT Tools and applications
Padova	Freight village	Italy	Road, Rail, IWW (Planned)	No specific problems. Security problems related to entrance, exit and presence of trucks in the logistic areas outside the terminal	Wireless communication Technologies, Cloud Computing, Internet of Things. Gate automation and traffic management within the port to optimise intermodal loading and unloading of containers, Implemented with disaster recovery and business continuity projects
Trieste	Freight village	Italy	Road, Rail	n.a.	Port Community System, Free circulation by rail between free zones (Manifesto Merci Treno (CH30), Free circulation by road between free zones and Gate Automation, Deployment of cooperative intelligent transport systems applied to logistics, especially multimodal cargo, AEOLIX: Optimization of the custom procedures
Bologna	Freight village	Italy	Road, Rail	The competition of the rail terminal of the so called “gronda nord” (north drainpipe, composed of the rail terminals located in the northern Italy: Novara, Busto Arsizio, Melzo, Segrete, Verona, Padua) together with the rail terminals of the Emilia Romagna Region. The lack of the infrastructures referred to in the previous question would allow to lower that line (gronda) till Bologna	Cloud computing, Wireless communication technologies, Internet of Things
Maribor Tezno	Intermodal terminal	Slovenia	Road, Rail	No problems	n.a.
Ljubljana - Moste	Container terminal	Slovenia	Road, Rail	No problems	n.a.
Vrapče, Zagreb	Intermodal terminal	Croatia	Road, Rail	Delays due to a track maintenance, lack of wagons, lack of shunting locomotives.	n.a.

Agit d.o.o.	n.a.	Croatia	Road, Rail, IWW	The worst bottleneck is the railway operator's uncertain delivery dates	n.a.
Adria Terminali Sežana	n.a.	Slovenia	Road, Rail	Currently the financial crisis is the main problem. No payments from some of the costumers. High prices of the service in comparison to road transport Infrastructure bottlenecks – warehouse, lack of production in Italy to find cargo bring back to east EU by train	n.a.
JP Luka Brčko	n.a.	Bosnia and Herzegov ina	Road, Rail, IWW	Limited navigation and launch period for commercial vessels of more than 2 meters. It is estimated that the wider community shows little interest in the only BH river port when it comes to development plans, port modernization, investment in the same, exploitation of the same.	n.a.

n.a. : not available information

According to the Report "Western Balkans Intermodal Study, Support to the Transport Dimension of the SEE 2020 strategy, Final Report"[24], in the SEETO region, 42 locations had been identified, with a total of 46 multimodal facilities. Fifteen facilities had attributes of intermodal terminals. Eleven intermodal terminals had been identified as the main holders of intermodal services:

- Three terminals - type "SEA-RAIL-ROAD TERMINALS": The Port of Durrës in Albania, the Port of Bar in Montenegro, the Port of Ploče in Croatia (the Port of Ploče was identified as of major importance for the economy of the neighbouring state of Bosnia and Herzegovina);
- Two-terminals - type "RIVER-ROAD-RAIL TERMINALS": The Port of Belgrade and the Port of Novi Sad in Serbia;
- Six terminals - type "RAIL-ROAD TERMINALS": "Intereuropa RTC" - Alipasin most in Bosnia and Herzegovina, Logistic Centre Tuzla in Bosnia and Herzegovina, Logistic Centre Banja Luka in Bosnia and Herzegovina, Container terminal Tovarna Skopje in North Macedonia, Container terminal Donje Dobrevo (Miradi) in Kosovo and Logistics Centre Belgrade ZIT in Serbia.

[24] Western Balkans Intermodal Study, Support to the Transport Dimension of the SEE 2020 strategy, Final Report, 2016, City Net Scientific Research Center.

Table 3.14. IWW Ports

Port	Location (country)	Terminals	Provided services	Total tonnage (tons) per year		Transport modes supported for transhipment	Main problems	ICT Tools and applications
				In	Out			
Slavonski Brod	Croatia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Vukovar	Croatia	General cargo (Luka Vukovar)	n.a.	n.a.	n.a.	n.a.	Potentially problematic sectors for navigation due to bank erosion or problems with sediment deposition	n.a.
Brcko	Bosnia and Herzegovina	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Northern Italy Waterway System consisting of the river PO and its connecting canals (Section Milano-Cremona-Mantova-Venezia-Ravenna-Trieste along	Italy	IWW Ports of Cremona, Mantua, Rovigo (Freight Village), Boretto and Porto Nogaro and other private and public docks; Seaports of Ravenna, Chioggia, Venice, and Trieste	Transport of goods is possible along stretches of the canal. The main IWW ports (i.e. Cremona, Mantua and Rovigo) are tri-modal nodes interconnecting road, rail and IWW infrastructure.	Over the last decade, freight traffic on the waterway system has fluctuated between 500 000 and 1 000 000 t / year	n.a.	Limitations exist relating to physical bottlenecks hampering class V standard navigability along several stretches of the system. Projects i.e. INIWAS AWATRAIN, PO RIVER NAVIGATION NETWORK, are contributing improving navigability along the system and the interconnection of IWW transport infrastructure with Motorways of the Sea, Maritime and Rail Transport. Efforts are still required to improve both class V standard navigability on the existing and		

the Mediterranean Core Network Corridor)						planned IWW system in line with the Master Plan defined for the development of the Northern Italy Waterway System. Yet the lack of financial resources represents a major obstacle for the development of IWW transport that under the market standpoint is also suffering from lack of competitiveness compared to other modes of transport. The location of the IWW ports and terminals far or relatively far from production sites, represents a barrier to the development of IWW transport as this requires the involvement of more transport modes, increasing travel times and transport costs. Adequate interconnection between the IWW ports and docks with road and rail infrastructure is another barrier in this regard. These elements together result in the lack of interest from the private sector in co-financing and/or subsequently operate this type of infrastructure. On the other hand the passenger navigation along the system seem to have increased in recent times, IWW representing an attraction particularly for tourists.		

n.a. : not available information

4.6 Urban Nodes Connections

4.6.1 Orient East-Med Corridor

The Road Corridor transits 13 out of 15 urban core nodes (except Prague and Thessaloniki). These urban core nodes perform as hubs connecting them with the hinterland but most importantly for the interconnections between different transport modes.

In many of these urban core nodes by-pass arterial roads are either under construction or planned to be constructed in order to achieve in the near future an uninterrupted flow level along the Corridor. The Rail Corridor passes through all urban nodes, however, there are many issues of non-compliant parameters and capacity bottlenecks with regard to rail infrastructure, as it is the axle load issue in Thessaloniki. Furthermore, the last-mile connections of rail, seaport and airport nodes in Thessaloniki is feasible only through the use of congested urban arterial roads.

The urban nodes identified along the OEM related to the WB area are the following:

- Belgrade, Serbia;
- Podgorica, Montenegro;
- Pristine/ Pristina, Kosovo, and
- Skopje, North Macedonia.

According to the "Study on Orient/ East – Med TEN –T Core Network Corridor, 2nd Phase, Final Report on the related Core Network in the Western Balkan countries, December 2017" of the European Commission, the following information were reported.

Belgrade, Serbia

The OEM related road network in Belgrade is not fully compliant with the TEN-T requirements, as sections between Dobanovci and Bubanj Potok (part of Belgrade bypass) are neither motorway nor expressway. The completion of the Belgrade bypass is one of the planned projects included in the Serbian SPP (Single Project Pipeline) for which financing is secured.

Furthermore, Belgrade is a rail node connecting passenger and freight flows in the north-south and west-east directions. The OEM related rail network within the urban node of Belgrade is not compliant with the TEN-T requirements, as it does not allow for 740m trains. Furthermore, the section between Belgrade and Resnik allows for rail speed lower than 100 km/h. The reconstruction and modernisation of the railway line Belgrade-Novi Sad-Subotica-Kelebija, part of which is in the Belgrade urban node is the most significant project.

Podgorica, Montenegro

The OEM related road network within the urban node of Podgorica is not compliant with the TEN-T requirements. The construction of the Bar – Boljare motorway is one of the most significant planned projects in Montenegro. Part of the motorway is the construction of the Podgorica bypass (Podgorica – Smokovac – Farmaci). Financing is yet to be secured for this road section.

The OEM related rail network within the urban node of Podgorica is not compliant with the TEN-T requirements, as it does not allow for 740 m. trains nor for 100 km/h train speed. Furthermore, the railway section Podgorica – Tuzi (part of the Mediterranean Corridor) is not electrified. The rehabilitation and modernisation of the railway line Vrbnica – Bar (Route 4), part of which crosses the city of Podgorica is already planned. The project is in a mature phase and also included in Connectivity Agenda 2015 (Vienna Summit).

Prishtine/ Pristina, Kosovo

The OEM related road network within the urban node of Pristina is compliant with the TEN-T requirements.

The OEM related rail network within the urban node of Pristina is not compliant with the TEN-T requirements, as it does not allow for 740 m. trains nor for 100 km/h train speed and it is also not electrified. The general rehabilitation of the railway route 10, part of which crosses the city of Pristina is already planned. The project is in preparation phase and has been included in Connectivity Agenda 2015 and 2016 (Vienna and Paris Summits, respectively).

Skopje, North Macedonia

The OEM related road network is not fully compliant with the TEN-T requirements, as section between Skopje (junction Stenkovec) and Blace (Border with Kosovo) is neither motorway nor expressway. The construction of a new motorway for this road section is planned (under detailed design), but financing is yet to be secured.

The OEM related rail network within the urban node of Skopje is not compliant with the TEN-T requirements, as it does not allow for 740 m. trains nor for 100 km/h train speed. Furthermore, part of the railway line within the Skopje urban node is not electrified. The rehabilitation and modernisation of the railway section Blace-Gjorce Petrov (Skopje) is planned, however, with level low of maturity.

4.6.2 Mediterranean Corridor

There is no relative information in the recent study of 2018 regarding urban nodes.

4.6.3 Scandinavian - Mediterranean Corridor

The Rail Corridor inside the territory of Italy passes through 4 urban nodes: Verona, Bologna, Firenze and Ancona. In 2014, along the majority of the Italian rail network no ERTMS was in operation. Concerning Road Corridor there are significant congestion problems on the road network around most of the large cities during peak-periods.

4.6.4 Baltic – Adriatic Corridor

The most recent implemented study on the corridor is back in 2014 and no references are made regarding urban nodes along the corridor. However, based on the map of the corridor's alignment, the urban nodes identified that concern the ADRION countries are: Ljubljana (SLO), Venezia (IT) and Bologna (IT).

4.6.5 Rhine – Danube Corridor

The most recent implemented study on the corridor is back in 2014 and several urban nodes are identified and presented. However, none of them concerns the countries of Western Balkans and thus presenting them is beyond the scope of the project and the present report.

5 Corridor Diagnostics

5.1 Setting the objective

The corridor analysis within ADRIPASS aims to assess how well a corridor (in practice, many corridors) is (are) performing so that the deficiencies identified will be reduced through implementation of targeted ICT tools and applications. Moreover, given that there are many transport corridors competing each other within the study area, the corridor analysis should also take this into consideration although it is not the project's objective and scope to classify the corridors based on their performance, neither to qualify and promote any Corridor's development against others.

The corridor analysis provides the necessary knowledge to the stakeholders of the logistic chain regarding the deficiencies and the problems so that action plans will be developed based on the implementation of ICT tools and applications (WPT2 "ICT tools for improving multimodal transport"), aiming to reduce bottlenecks and to optimize the performance of the logistic chain in the Western Balkans area.

Figure 4.1 presents the major road and railway corridors in the WB area as well as major road and railway routes as described in the report published in 2018 by The World Bank under the title "The Western Balkans, Corridor Performance Measurement and Monitoring (CPMM) System, Developing a Digital Platform for Pilot Corridor Vc in Bosnia and Herzegovina and a Roadmap for Regional Scale-Up"[25].

[25] The Western Balkans, Corridor Performance Measurement and Monitoring (CPMM) System, Developing a Digital Platform for Pilot Corridor Vc in Bosnia and Herzegovina and a Roadmap for Regional Scale-Up, Report No: AUS0000445, The World Bank, 2018.

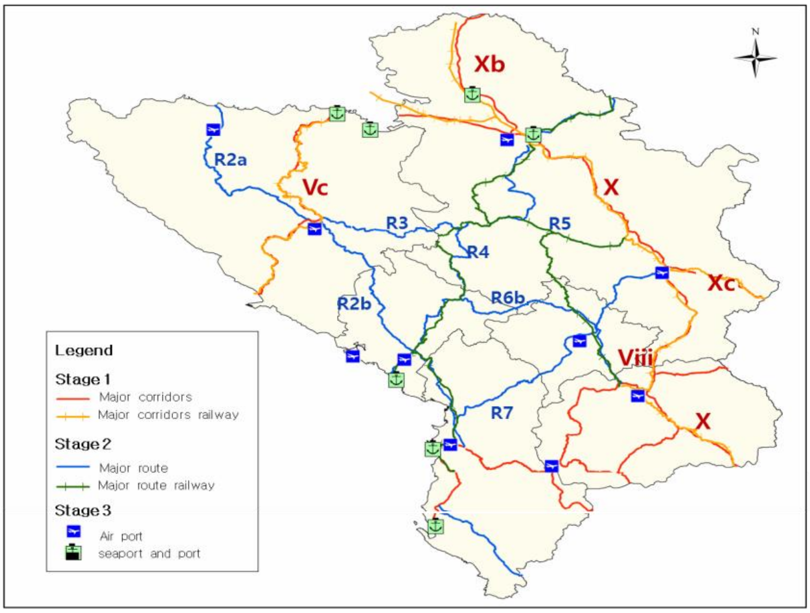


Figure 4. 1. Map of major road and railway corridor and routes at the WB area (Source: Figure 255, World Bank, 2018)

5.2 Key Data collected

The data collection methodology was based on two axes: a) in house desktop research and b) mainly the questionnaire-based surveys addressed to different types of nodes as previously described. The data collected are used for the Corridor Analyses providing the necessary values for the evaluation of the performance of the different types of nodes as inputs in the Multi Criteria Analyses developed for the needs of ADRIPASS project.

The collected data provide an insight to the infrastructural, physical and operational structure of the different types of nodes. The pre-draft version of the Final Report will be based on evaluating the performance of the different type of nodes using qualitative data due to pending information from several Road and Rail BCPs. In this framework, the nodes located along the corridors will be described focusing however on problems that they face and the ICT tools and applications implemented.

In this point, it must be mentioned that the recently concluded "Study for border crossing facilitation and improvement of the cross-border road transport on the indicative extension of TEN-T Road Core/ Comprehensive Network in the Western Balkans"[26] presents valuable information in alignment with the scope and objective of the ADRIPASS project, and therefore part of them are considered in the present report. The study is

[26] TA to Connectivity in the Western Balkans, EuropeAId/ 137850/ IH/SER/ MULTI, CONNECTA-TRA-CRM-REG-04, Studey for border crossing facilitation and improvement of the cross-border road transport on the indicative extension of TEN-T Road Core/ Comprehensive Network in the Western Balkans, Mott MacDonald CONNECTA Consortium, April 2019.

focused on implementing "*an institutional, technical, economic and financial assessment of all Border Crossing Points (BCPs) and Common Crossing Points (CCPs) on the Core and Comprehensive Road Network in the Western Balkans*".

Furthermore, the CONNECTA report came to the following conclusions regarding those road BCPs surveyed:

a. Freight traffic at the WB area is being substantially growing the last five years.
b. The existing and even newer BCPs are based on an outdated arrangement and layout for which in most cases, Heavy Goods Vehicles (HGVs) and buses (which are typically in the adjacent lane) are processed in a linear first-in, first-out (Fi-Fo) manner. As a result, as the report mentions, if the first truck is being examined more thoroughly there is no opportunity to remove the vehicle from the through lane and therefore all downstream trucks will have to wait in line for their turn and consequently delayed.
c. The need for additional features and ancillary facilities has been recognized for many BCPs in order to improve their efficiency (i.e. non-intrusive scanning technologies, parking facilities for the vehicles of the BCPs' working staff, Automatic Number Plate Recognition (ANPR) systems, etc.).
d. Non-physical measures aiming to improve Institutional Frameworks could be beneficial for the performance and efficiency of BCPs (i.e. revised mandate to remove burden on BCPs from any and all controls/ activities that are not strictly related to the border crossing, elimination of system-wide repetitive weighing of trucks, uninterruptible power supply and local data backup, World Trade Organizations' Trade Facilitation Agreement (WTO FTA) must be implemented in a better that the current way, inland clearance depots (ICDs) can be constructed and operated in order to relieve the pressure from the BCPs, Joint Border Controls can be performed with the respective measures concerning facilities changes and adjustments).

Furthermore, the CONNECTA report presents several cross-cutting/ soft measures in order to reduce procedural and waiting times for the participating to the report BCPs.

In this framework, for those BCPs common in ADRIPASS and CONNECTA surveys, information concerning the implementation of one-stop-shops and eQMS (electronic Queue Management System) are presented.

5.3 Orient East-Med corridor

The Orient East-Med Corridor is running from the German ports of Wilhelmshaven, Bremerhaven, Bremen, Hamburg and Rostock via Czechia and Slovakia, with a branch through Austria, further via Hungary and Romania to the Bulgarian port of Burgas, with a link to Turkey, to the Greek ports of Thessaloniki and Piraeus and a "Motorway of the Sea" link to Cyprus.

In the WB area the different types of nodes located along the Orient East-Med Corridor are the following:

- Seaports
  - Port of Bar, Montenegro
  - Port of Thessaloniki, Greece
  - Port of Piraeus, Greece
  - Port of Patra, Greece
- Road BCPs
  - Bogorodica, North Macedonia
  - Blace, North Macedonia
  - Dobrakovo, Montenegro
  - Evzonoi, Greece
  - Promachonas, Greece
  - Gostun, Serbia
  - Horgos, Serbia
  - Hani i Hotit, Albania
  - Merdare, Serbia/ Kosovo
  - Presevo, Serbia
  - Tabanovce, North Macedonia
  - Bajakovo, Croatia
- Rail BCPs
  - Blace, North Macedonia
  - Gevgelija, North Macedonia
  - Bijelo Polje, Montenegro
  - Hani i Elezit, Albania
  - Idomeni, Greece
  - Presevo, Serbia
  - Sid, Serbia
  - Rudnica, Serbia
  - Savski Marof, Croatia
  - Tovarnik, Croatia
  - Vrbnica, Serbia

Ports:

5.3.1 Port of Patra, Greece

The Port of Patra is located at the Region of Western Greece. The port was constructed in its current condition in 1956. The port is state owned and is managed by the central government.

The port serves road transport as well as transhipping transport. The port is not currently connected to the railway network; this is planned to be achieved by 2022.

At the port a Port Community System is implemented as well as Cyber-Security for advanced technology networks. The port's authorities are investigating the possibility of adopting and implementing in the future other policies and technologies, such as the Single Window policy, wireless communication technologies (smart mobile phones, QR codes, RFID and telematics tracking), Internet of Things and Big Data Analysis.

5.3.2 Port of Piraeus, Greece

The Port of Piraeus is located near the capital city of Athens in Greece. The port was constructed in 1924 (related to its current condition). The port was privatized in 2016.

The existing communication systems and equipment are in good level. The port is equipped with several cranes and lifts of different sizes and lifting abilities.

The port serves road transport as well as transhipping transport. Currently the port of Piraeus is connected via railway with the newly constructed but not yet fully operational Logistics Park in Thriasio.

The existing terminal provide transport services regarding: containers, Car Ro-Ro and General Cargo.

The overall inbound and outbound traffic for the year 2018 was approximately 5.5mo TEUs. At the port a Port Community System is implemented as well as cloud computing, wireless communication technologies (smart mobile phones, QR codes, RFID and telematics tracking), Big Data Analysis which however is limited and focused on specific data analysis and finally Cyber-Security for advanced technology networks. The port's authorities are investigating the possibility of adopting and implementing in the future other policies and technologies, such as the Single Window policy and Internet of Things.

5.3.3 Port of Thessaloniki, Greece

The Port of Thessaloniki is located at the Region of Central Macedonia. The modern history of the port commences during the last decade of the 19th century. The port has been recently privatized.

The existing communication systems and equipment are in good level. The port is equipped with several cranes and lifts of different sizes and lifting abilities.

The port serves road transport as well as transhipping transport. However, there is rail network connecting the port with the Central Railway Station, located approximately 1km from the port.

The existing terminal provide transport services regarding: containers, Car Ro-Ro, General Cargo, Reefer, Timber, Dry Bulk, Alumina, Iron Cole-Coal-Petroleum Coke, Liquid Cargoes and Cruise.

The overall outbound traffic exceeds 9.600tons/ day and the inbound traffic exceeds 9.200tons/ day. At the port a Port Community System is implemented as well as wireless communication technologies (smart mobile phones, QR codes, RFID and telematics tracking), Big Data Analysis which however limited and focused on specific data analysis, Robotics and Autonomy (pilot actions) and finally Cyber-Security for advanced technology networks. The port's authorities are investigating the possibility of adopting and implementing in the future other policies and technologies, such as the Single Window policy, cloud computing and Internet of Things.

The results of an evaluation of Greece as a Logistic Hub, implemented by Ernst & Young in 2018, based on a questionnaire based survey (implemented during April 2018) addressed to stakeholders/ private companies (122 respondents representing several and different important sectors, such as transport and 3rd Party Logistics, shipping, port operations, consumer products among others) are presented in the following:

- The Piraeus port' freight infrastructure and operations were evaluated as low by the majority of the respondents in terms of intermodal connectivity with other transport modes.
- The Thessaloniki ports' freight infrastructure and operations were evaluated as low, in terms of: a) availability/ capacity by 1 out of 4 respondents, b) intermodal connectivity with other transport modes by 1 out of 4 respondents, c) quality of infrastructures by 1 out of 3 respondents and d) quality and reliability of services by 1 out of 5 respondents.
- Regarding further development of the ports' infrastructure and services, the respondents reported among others, the following:
    - Better cooperation between ports, in order to share best practices, emphasizing the necessity of implementing Single Window, and
    - Synchronizing all operations in a 24/7 mode (including customs) in order to avoid port warehousing fees and minimizing loading time.

5.3.4 Port of Igoumenitsa, Greece

The Port of Igoumenitsa is located at the Regional Unit of Thesprotia, Region of Epirus. It was constructed in 2003 and the latest interventions were implemented in 2016. The port is state owned and is managed by the central government. The existing terminals (1 & 2) serve Ro-Ro car transport as well as cruise.

The existing communication systems and equipment are in good level. The port serves road transport as well as transhipping transport. There is no rail connection to the port since there is no railway connection of the Region of Epirus with the railway network of Greece. There are several plans of developing the port mainly concerning new infrastructure.

At the port a Port Community System is implemented as well as wireless communication technologies (smart mobile phones, QR codes, RFID and telematics tracking). The port's authorities expressed their willingness on adopting and implementing in the future other policies and technologies, such as the Single Window policy, cloud computing, Internet of Things, Big Data Analysis and Cyber-Security for advanced technology networks.

Concerning the existing Port Community System, the stakeholders participating are the shipping agents, for exchanging information regarding departure & arrivals, booking and shipping instructions with the port authority and also regarding port operations (port calls management and loading and discharge orders). Moreover, the official bodies are connected to the PCS of the port regarding custom procedures, goods declaration and in general custom information.

5.3.5 Port of Bar, Montenegro

The Port of Bar is located in Montenegro and it was constructed in 1906, although in 1952 a major part of the port was completed, and the latest interventions were made in 2002 concerning the construction of a new main breakwater. The port is owned by the state and is controlled by the central government, as a part of Ministry of Transport and Maritime Affairs of Montenegro.

The port provides services for Car Ro-Ro traffic, General cargo transportation, Reefer, Dry Bulk transportation, Container transport and Silo as well as Liquid Cargoes. The port is equipped with different types of lifts and cranes. The communication is possible through several ways (telephone, radio, internet, radio telephone and post).

The turnaround time for a vessel is almost 51 hours and the average vessel call size is 10,000 tonnes. The number of trucks served per day is 20 trucks as outbound traffic and 12 trucks as inbound traffic.
According to the port's authorities, the low quality of hinterland connections is recognized as a main bottleneck to the development of the port. In order to reduce bottlenecks from road connections, the definitive priority is development of the Montenegrin Highway Network (building the highway Bar – Belgrade and building the Adriatic – Ionian highway). In addition, rehabilitation of Vrbnica-Bar railway (part of Belgrade-Bar railway) is an ongoing project and one of the priorities for the state of Montenegro as well as for the EU (most of the IPA funds dedicated to the Montenegro traffic system are used for the rehabilitation of the railway system in Montenegro). This railroad is the most important infrastructure facility in Montenegro and improving the state and its passage would naturally contribute to its greater international attractiveness and bring the importance of the TEN-T corridors closer. Regarding the port infrastructure, the Volujica quay is the largest quay/pier in the Port of Bar.

The port's authorities provided information regarding future plans for the development of the port. In any case, the group of projects connected to growth of Port capacities is determined by basic criteria: one of them is that specific location for completion of a project is earmarked in the spatial-planning documentation for the Port area and that specific projects have reasonable justification in terms of current and expected demands by port users. It is emphasized that before these projects are launched, detailed analysis of feasibility pursuant to relevant methodologies must be conducted, and it is implying necessity of continuous scrutiny of priorities (and possibly, expansion of group of projects) taking into account principles of port development and key criteria of evaluation of projects (development, economic, financial, technical and impact to environment). One of the main documents for the future port infrastructure development is Spatial plan for special purpose for coastal area of Montenegro (which was put in force on 1st October 2018) where all infrastructure development projects are listed. Regarding the infrastructure, the Port of Bar have its own development plans, not only for the infrastructure. Moreover, further development of the PCS and stronger connection with the stakeholders (in particular with Customs) can be a main goal for the future.

A Port Community System is implemented, and the authorities expressed their willingness to adopt and implement further ICT solutions and tools, such as the Single Window policy and wireless communication technologies, without ignoring the necessity of further developing the existing PCS. The main priority for the above-mentioned choices of the port's authorities is to strengthen the connection between the port and stakeholders and this can be achieved with better use of available data in the PCS and with development of new functionalities in the PCS. In addition, with development of new wireless communication technologies (e.g. QR codes, RFID, etc.) new improvements can be achieved (automatization of the entrance/exit from the port) and new services can be provided (tracking cargo, etc.).

The existing PCS at the port of Bar provides the ability to several stakeholders to exchange critical information. However, there are several services that are already operational and some that they are not yet completed, as presented in the following:

- Shipping agents: The PCS supports the shipping agents in exchanging information regarding departures and arrivals, Port Call Management, loading and discharge orders and further support will be provided after the completion of the necessary upgrades, information regarding shipping instructions, inland transport, road transport management and customs procedures.
- Terminal operators: The PCS supports the terminal operators in exchanging information regarding departures and arrivals, Port Call Management, loading and discharge orders and will support after the completion of the necessary upgrades information regarding shipping instructions, inland transport, road transport management and customs procedures.
- Freight forwarders: The PCS supports the freight forwarders in exchanging information regarding departures and arrivals, Port Call Management, loading and

discharge orders and will support after the completion of the necessary upgrades information regarding shipping instructions, inland transport, road transport management and customs procedures.

- Harbor Master Office: The PCS supports the Harbor Master Office in exchanging information regarding departures and arrivals and Port Call Management.

Beside the Port of Bar, there is also the Port of Adria, which in fact is a private port operator. The operating rights were acquired through privatization in 2013. The port covers a total area of 518,790 m^2 with nine berths and annual handling capacity of 150,000TEU and 2.3 million tons of general cargoes.

The port provides services for container transport, Car Ro-Ro traffic, general cargo, reefer, timber, alumina transportation and cruise. The port is equipped with medium and small lifts as well as with cranes (fixed and mobile). The average number of cranes per vessel on quay is 1.5 and the average movements per hour are up to 50.

Road BCPs

5.3.6 Evzonoi Road BCP, Greece

The Evzonoi Road BCP is located in Greece at the borders with North Macedonia. It was constructed in 1970 and renovated in 2003, mainly concerning the infrastructure of the station. There are Custom agents, Police officers and veterinary agents providing services 24 hours per day and phyto-sanitary agents providing services 16 hours per day. The number of working staff for all present agencies is considered insufficient as well as the available infrastructure. The station is equipped with a weighbridge in satisfactory level and the computer equipment is considered to be in good level. Furthermore, the communicating means (telephone and internet) are in good level and the CCTV as well as the tracing means are considered to be in satisfactory level.

The commercial vehicles (TIR trucks) entering and exiting Greece can be served in terms of the necessary procedures and processes to be implemented from 3’ to 60’ (average/ median time = 6’). Moreover, the waiting times before the border controls for the commercial vehicles both entering and exiting the country varies from 5’ to 120’ (average/ median time =30’).

Selective controls are performed at a percentage of 5% of the traffic. Also, specific types of border controls can be performed simultaneously at separate areas. There is no regular communication or exchange of information with the neighbouring BCP in North Macedonia although the neighbouring country is one of the most popular destination countries for the commercial vehicles. During July and August, the traffic reaches its peak. The daily capacity of the station at both directions (entering and exiting) is 500 commercial vehicles per direction. At the station all customs declarations are submitted electronically but not the supporting documents.

The main problems of the station are the building infrastructure, the lack of staff and the lack of X-Ray installations. Suggestions made by the station's authorities are towards solving the mentioned problems.

5.3.7 Promachonas Road BCP, Greece

The Promachonas Road BCP is located in Greece at the borders with Bulgaria. The station was constructed in 1969 and the most recent interventions concerned the construction of a building for the operation of the Department of Agriculture (phytosanitary controls) in 1996. At the stations there are only custom agents and police officers serving 24 hours. However, the number of the current staff is not considered sufficient.

The level of the existing infrastructure was not mentioned through the survey. The station is equipped with a mobile X-Ray machine. The time needed for the implementation of the necessary controls concerning both entering and exiting commercial vehicles (both trucks and TIR trucks) varies from 5' to 30'. However, the time needed for the vehicles to wait in queue before any controls are implemented were not mentioned. At the station, simultaneously controls are performed for both passenger and commercial vehicles and the percentage of selective controls is 90%. The problems of the station were not mentioned, however there are plans for upgrading and maintaining the existing building facilities.

5.3.8 Dobrakovo Road BCP (R4 branch), Montenegro

The Dobrakovo Road BCP is located in Montenegro at the borders with Serbia and it has been recently (2013) renovated by extending the number of lanes serving entering and exiting traffic. According to the BCP's authorities, there are no recorded problems leading to excessive crossing times. At the BCP a customs information system is installed and operating along with the required hardware and communication equipment.

5.3.9 Gostun Road BCP (R4 branch), Serbia

The Gostun Road BCP is located in Serbia at the borders with Montenegro. The station was constructed in 2007 and the latest interventions were implemented in 2010. At the station there are custom agents and police officers serving 24 hours. There are also phytosanitary and veterinary agents serving 12 hours per day.

Regarding the condition of existing facilities, it is considered satisfactory, although the water supply is in bad condition and thus the water is not drinkable. One of the issues the station faces is that there are no X-Ray machine and weighbridge. Communication equipment (telephone and internet) condition is satisfactory.

The time needed for the controls to be implemented regarding both the entering and exiting commercial vehicles varies from 15' to 35'. Furthermore, commercial vehicles

must wait a time period from 10' to 60' before any controls are implemented at both directions (entering and exiting the country).
No selective or simultaneous controls are implemented at the station. The communication with the neighbouring BCP is regular and it is considered to be fruitful. The traffic at the station is heavier during summer and specifically during July and August.

All the required documentation is submitted electronically and as the most important problem was mentioned that there are not closed lanes for the inspection of the vehicles. Moreover, the number of the staff must be increased in order the provided services to be upgraded.

According to the CONNECTA report, the total average/ median time to complete all the activities per truck is 30'-35' for inbound traffic and 20'-25' for outbound traffic. Moreover, an additional waiting time before the implementation of any controls is required which varies as average/ median value from 10' to 15' for inbound and outbound traffic as well. The BCP according to the CONNECTA report cannot be considered as an eQMS candidate site. Furthermore, the report highlights the fact that both sides (Montenegrin and Serbian. concerning the neighbouring Gostun BCP) "*have earmarked this site for the development of a joint BCP but the timescales remain uncertain*". The CONNECTA report emphasizes through a SWOT analysis for the Dobrakovo-Gostun pair of BCPs the following:

- As strengths (among others), the design and construction of a new BCP started in 2010 and the rollout of SEED/ SEED+ system for electronic declaration is ongoing in Serbia and Montenegro.
- As weaknesses, the lengthy queues of trucks in peak periods.
- As opportunities (among others), the installation of joint Custom and Border Police booth and the fact that there is the opportunity to construct a one-stop-shop on the Serbian (Gostun BCP) side.
- As threat, the fact that freight traffic has been growing over the past five years.

5.3.10 Bogorodica Road BCP, North Macedonia

The specific BCP was assigned to SEETO and due to the fact SEETO completed its mandate in 31 December 2018, available data is limited. Therefore, information was extracted from the CONNECTA report.

The station is equipped with a weighbridge, phytosanitary inspection, veterinary inspection, plate recognition system, radiological inspection equipment and garage for physical inspection.

The total average/ median time to complete all the activities per truck for inbound traffic is 67' and for outbound traffic is 16'. The additional average/ median waiting time for inbound traffic is 60' and for outbound traffic is 5'.

The CONNECTA report mentions that the staffing levels are appropriate for the size of the facility and the level of traffic passing though. Also, at the BCP both Customs and Border Police have their own, separate information systems including internet and intranet connections and supporting equipment. Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Bogorodica-Evzonoi BCPs the following:

- As strengths (among others), the fact that at the Bogorodica BCP the existing facilities are relatively new.
- As weakness, the fact that the BCP currently lacks non-intrusive inspection equipment therefore only physical inspections are implemented, resulting to labour-intensive and time-consuming processes.
- As opportunities (among others), the fact that in order to relief pressure on this BCP, all import and export trucks can be moved to an inland clearance deport (ICD) given the relatively short distance from this BCP to nearby conurbations on both sides of the border, the construction of a one-stop-shop especially now that legal and institutional hurdles between the two countries are overcame.
- As threat (among others), the fact that freight traffic has been growing over the last years.

5.3.11 Hani i Hotit Road BCP (R6 branch), Albania

The specific BCP was assigned to SEETO and due to the fact SEETO completed its mandate in 31 December 2018, available data is limited. Therefore, information was extracted from the CONNECTA report.

The station is equipped with a weighbridge, mobile devices for radiological inspection and garage for physical inspection.

The total average/ median time to complete all the activities per truck for inbound traffic varies from 48’ to 53’, plus the time for inspections and for outbound traffic from 38’ to 43’, plus the time for inspections. The additional average/ median waiting time varies for inbound traffic from 60’ to 120’ and for outbound traffic from 30’ to 40’.

The CONNECTA report describes several works regarding infrastructural improvements at the BCP. Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Hani i Hotit-Bajza BCPs the following:

- As strengths (among others), the on-going constructions indicate the desire to improve capacity and provided services.
- As weaknesses (among others), the fact that the BCP currently lacks non-intrusive inspection equipment therefore only physical inspections are implemented, resulting to labour-intensive and time-consuming processes.
- As opportunities (among others), the fact that in order to relief pressure on this BCP, all import and export trucks can be moved to an inland clearance deport (ICD), the construction of a one-stop-shop (more likely on the Albanian side) to allow

higher rates of physical inspections whilst achieving against quicker processing times.

- As threat, the fact that freight traffic has been growing over the last years suggesting that capacity will be constrained in less than five years if no action is taken.

5.3.12 Blace Road BCP (R6 branch), North Macedonia

The specific BCP was assigned to SEETO and due to the fact SEETO completed its mandate in 31 December 2018, available data is limited. Therefore, information was extracted from the CONNECTA report.

The station is equipped with a weighbridge, phytosanitary inspection, veterinary inspection, radiological inspection equipment and garage for physical inspection.

The total average/ median time to complete all the activities per truck for inbound traffic is 30' plus the time for veterinary and/ or phytosanitary inspections as needed, and for outbound traffic is 18' plus the time for veterinary and/ or phytosanitary inspections as needed. The additional average/ median waiting time for inbound traffic is 30' and for outbound traffic is 30'.

The CONNECTA report mentions that the staffing levels are sufficient concerning the current level of traffic. Also, the report emphasizes the fact that given the general absence of physical constraints at the location of the Blace-Hani i Elezit pair of BCPs, this site would appear to be an ideal candidate site for a joint BCP or one-stop shop. Another issue mentioned is that at the Blace BCP the agents are already familiar using EXIM to manage custom procedures electronically and thus the BCP could be a potential test site to examine the future viability of a National Single Window. Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Blace-Hani i Elezit BCPs the following:

- As strengths (among others), the usage of EXIM system for administration of custom processes.
- As weaknesses, the fact that the BCP currently lacks non-intrusive inspection equipment therefore only physical inspections are implemented, resulting to labour-intensive and time-consuming processes and also that the facility functions in the traditional linear way according to which the vehicles are effectively processed in the lanes for the most part.
- As opportunities (among others), the fact that in order to relief pressure on this BCP, all import and export trucks can be moved to an inland clearance deport (ICD), the construction of a one-stop-shop assuming that legal and institutional obstacles can be confronted, particularly on the side of North Macedonia.
- No threats were identified.

5.3.13 Presevo Road BCP (X branch), Serbia

The Presevo Road BCP is located in Serbia at the borders with North Macedonia. The station was constructed in 2006 and since then no interventions were made. The agencies present at the BCP are: Customs with insufficient number of staff working 24/7, Police with insufficient number of staff working 24/7, Phytosanitary and Veterinary with insufficient number of staff working 24/7. No other Agencies are present at the BCP.

The facilities of the BCP are at good level and the electric power and water supply are also. The lighting is at good level and the existing equipment (X-Rays machine, weighbridge and equipment for phytosanitary controls) also. There are telephone and internet connections both at good level. The CCTV installed is in bad level, since the cameras cannot zoom and their resolution is low. Finally, there is a disinfection area which is at good level.

The time needed for the controls to be implemented concerning entering commercial vehicles varies from 10’ to 30’ while for the exiting vehicles varies from 5’ to 10’. Furthermore, before and controls are implemented the entering vehicles must wait for a time period from 10’ to 30’ and those exiting for 5’ to 15’. Selective controls are performed at the 10% of the total traffic. In case of a suspicious vehicle there is no separate area for the controls to be performed. The main problems the Authorities face are the inexistence of a terminal for the commercial vehicles and especially the fact that there is no cargo handling equipment to use in order to load and unload the commodities in order to be properly inspected. Although there are plans for the development of the BCP, there are technical issues to be solved. Moreover, the Authorities suggest that beside the construction of a terminal for the commercial vehicles, the BCP must be equipped with different types of equipment for the inspections to be performed properly.

5.3.14 Tabanovce Road BCP (X branch), North Macedonia

The specific BCP was assigned to SEETO and due to the fact SEETO completed its mandate in 31 December 2018, available data is limited. Therefore, information was extracted from the CONNECTA report.

The station is equipped with a weighbridge, phytosanitary inspection, veterinary inspection and radiological inspection equipment, plate recognition system and garage for physical inspection.

The total average/ median time to complete all the activities per truck for inbound traffic is 47’ and for outbound traffic is 15’. The additional average/ median waiting time for inbound traffic is 30’ and for outbound traffic is 10’.

The CONNECTA report mentions that the staffing levels are completely adequate for the regular traffic levels, but however during peak season the increase in staffing could be helpful to overcome the problems created by the higher numbers of trucks passing through. Also, the report emphasizes the fact both customs and border police have their own separate information systems including internet and intranet connections as well as supporting equipment. Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Presevo – Tabanovce BCPs the following:

- As strengths (among others), the on-going testing of new technology such as ANPR indicates the desire to improve capacity and provided services, the fact that there are separate lanes for TIR and empty trucks is very helpful to facilitate faster processing and finally that all import is cleared at inland clearance depots (ICDs).
- As weakness (among others), the fact that the BCP currently lacks non-intrusive inspection equipment therefore only physical inspections are implemented, resulting to labour-intensive and time-consuming processes.
- As opportunities (among others), the construction of a one-stop-shop assuming that legal and institutional obstacles can be overcome.
- As threat, the fact that freight traffic has been growing over the last years.

5.3.15 Merdare Road BCP (R7 branch), Serbia

The specific BCP was assigned to SEETO and due to the fact SEETO completed its mandate in 31 December 2018, available data is limited. Therefore, information was extracted from the CONNECTA report.

The station is equipped with phytosanitary inspection, veterinary inspection and radiological inspection equipment.

The total average/ median time to complete all the activities per truck for inbound traffic is 42’ and for outbound traffic is 5’. The additional average/ median waiting time for inbound traffic is 15’ and for outbound traffic is 10’.

According to the CONNECTA report, all traffic is cleared inland and therefore the workload is substantially reduced. Furthermore, the absence of a weighbridge reduces the need for personnel, resulting the working staff to be considered as adequate in relation to the current workload. The report emphasizes the fact both customs and border police have their own separate information systems including internet and intranet connections as well as supporting equipment.

Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Merdare border crossing the following:

- As strengths (among others), the existing facilities are being expanded and new facilities will be constructed.
- As weaknesses, the lack of sufficient traffic lanes in the present configuration and the general absence of technology to facilitate processing of vehicles.
- As opportunities (among others), the fact that brokers could use Advance Notification of import trucks to help process imports faster and reduce congestion during peak periods.

- As threat, the fact that freight traffic has been growing over the last years.

5.3.16 Bajakovo Road BCP, Croatia

The Bajakovo Road BCP is located in Croatia at the borders with Serbia. The station was constructed in 2007 and the latest interventions were implemented in 2017 regarding the construction of a building for the Border Police.

At the station there are many custom agents as well as police officers serving 24 hours per day. There are also phytosanitary agents serving 8 hours per day from Monday to Friday, while the existing veterinary agents serve 17 hours per day all week. The existing weighbridge is in satisfactory level. The communication equipment (telephones and internet) is in good level but the monitoring equipment (CCTV) is considered outdated.

The time needed for the controls to be implemented concerning entering commercial vehicles varies from 10’ to 60’, while for those exiting the time varies from 5’ to 120’. Moreover, before and controls are implemented those vehicles must wait at queue both entering and exiting for 15’. There is the ability for simultaneous controls at separate areas for those vehicles selected by the Border Police. The station is lined with the Central Custom Offices via internet and the communication with the neighbouring station is limited to meetings few times per year. The traffic at the station is heavier during August. All inbound commercial vehicles are weighed while the percentage for the outbound commercial vehicles varies from 10-15%. The existing X-Ray machine needs 1’-5’ for checking the selected vehicles (3%). The station has adopted the electronic custom policy, through which all custom declarations are submitted electronically.

Since Croatia joined EU, there were significant interventions at the Croatian Road BCPs (mainly related to the custom procedures) without any adaptation by the Serbian BCPs in terms of the infrastructure related to truck traffic. Moreover, the number of working staff is considered insufficient given the scope and the amount of the traffic.

The CONNECTA report mentions that due to the fact that the Bajakovo-Batrovci BCPs process significant traffic volumes, increasing working staff and constructing additional control lanes, must be augmented with electronic pre-clearance and the usage of technologies, for example National Single Window and eQMS, to support operation and therefore relief the current pressure.

The report emphasizes the fact both customs and border police have their own separate information systems including internet and intranet connections as well as supporting equipment.
Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Bajakovo-Batrovci BCPs the following:

- As strengths (among others), the usage of tidal lanes allows operational flexibility to add capacity as and when needed and that inbound and outbound trucks are

organized by type of cargo or priority cargo such as perishable or hazardous material so as to give them priority for processing.
- As weaknesses (among others), the fact that there are visual checks instead of 100% selected examinations based on risk profiles, that not all traffic lanes are staffed during peak periods and that there are no designated traffic lanes for NCTS, TIR (transit) or AEO.
- As opportunities (among others), the construction of extra traffic lanes for trucks as well as a lane for when the NCTS system gets implemented and the construction of a one-stop-shop assuming that legal and institutional obstacles can be overcome.
- As threat (among others), the fact that the current facilities are near the end of their useful life.

5.3.17 Horgos Road BCP, Serbia

The Horgos Road BCP is located in Serbia at the borders with Hungary. The station as constructed in 2006. The agencies present at the BCP are: Customs working 24/7 with insufficient number of staff using facilities at good level, Police (no information concerning the sufficiency of the number of staff or the level of the facilities used), Phytosanitary (no information concerning the sufficiency of the number of the staff or the level of the facilities used) and Veterinary (no information concerning the sufficiency of the number of the staff or the level of the facilities used).

The facilities of the BCP overall are in good condition. Concerning the available equipment there is a mobile X-Ray machine in good condition, but the existing weighbridge is not and must be replaced. The telephone and internet connections are at good level and there is a CCTV installed. The available cargo handling equipment is also at good level. Information regarding the condition of equipment for the phytosanitary controls has not been provided.

The time needed for the controls to be implemented regarding the entering to Serbia commercial vehicles varies from 30’ to 120’ (TIR vehicles from 5’ to 20’) while for those exiting the respective time needed varies from 2’ to 6’ (TIR vehicles from 1’ to 3’). Furthermore, the waiting time before any controls are implemented varies for the commercial vehicles from 2’ to 20’ (TIR vehicles from 2’ to 15’).

According to the Authorities the capacity usage of the BCP reaches 100% and they consider the BCP as not functional and thus the level of discipline of the users and of the working staff should be increased.

The CONNECTA report mentions that the working staff can be considered as adequate on both sides of the border and that in order the staff to be supported the usage of technology will be increasingly needed in order to mitigate alongside inland custom clearance. The report emphasizes the fact both customs and border police have their own separate information systems including internet and intranet connections as well as supporting equipment.

Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Horgos-Roszke BCPs the following:

- As strength (among others), the fact that there are separate lanes for TIR and empty trucks helping to facilitate faster processing.
- As weakness (among others), the fact that there are redundancies in the system which unnecessarily create delays.
- As opportunities (among others), in order to further relieve the pressure on these BCPs all import and export trucks could be moved to an inland clearance depot (ICD) and the construction of a one-stop-shop assuming that legal and institutional obstacles can be overcome.
- As threat (Among others), the fact that freight traffic has been growing over the last years.

Rail BCPs

5.3.18 Idomeni Rail BCP, Greece

The Idomeni Rail BCP is located in Greece at the borders with North Macedonia. The station was recently innovated, in 2018, regarding the configuration and maintenance of the surrounding area of the station. There are custom agents at the station serving 16 hours per day, the number of which is considered insufficient. There are also police officers, but no further information was given. The facilities are in bad level, although the communication equipment (telephone and internet) are considered to be in good level.

The time needed for the implementation of the controls regarding both entering and exiting freight trains varies from 60’ to 120’. Moreover, those trains must wait before any controls are implemented for a time period of 45’ at both directions. There are specific controls implemented on board simultaneously. At the station, there is the need of engine change for reasons not specifying since the custom authorities are not responsible for this issue. The station is linked to the Central Custom Offices via internet, although the custom authorities have no communication of any kind with the authorities of the neighbouring station.

No problems or suggestions were mentioned by the authorities during the survey.

5.3.19 Promachonas Rail BCP, Greece

The Promachonas Rail BCP is located in Greece at the border with Bulgaria. The Promachonas BCP is not functional. The Greek personnel has to work at the other side of the borders and specifically at the Bulgarian BCP at Kulata.

5.3.20 Gevgelija Rail BCP, North Macedonia
No data was submitted.

5.3.21 Hani i Elezit Rail BCP (R10 branch), Kosovo
No data was submitted.

5.3.22 Blace Rail BCP (R10 branch), North Macedonia
No data was submitted.

5.3.23 Rudnica Rail BCP (R10 branch), Serbia
No data was submitted.

5.3.24 Presevo Rail BCP, Serbia
The Presevo Rail BCP is located in Serbia at the borders with North Macedonia. The station was constructed in 1988 and the latest interventions were made in 2003. There are Custom agents, Police officers and immigration agents providing services 24 hours per day.

The facilities are in bad level as it is the communication equipment. There are no tracing means available for the working staff, although the existing radioactivity control equipment is in satisfactory level. The time needed for the controls to be implemented regarding both entering and exiting freight trains varies from 15' to 30'. The waiting time for those trains before any controls are implemented is considered low (5'). The station is not linked with the Central Custom Offices and also no controls are implemented on board or/ and simultaneously. The communication with the neighbouring station is regular through meetings and telephone.

The main problems the authorities face concern the fact that all incoming freight trains must be checked for immigrants by the Ministry of Interior by opening each empty wagon individually. Moreover, along the railway line Belgrade – Nis – Presevo and near the Presevo station there is a crossing point with state road V1 (Corridor X) in which congestion phenomena occur for both the freight trains and the vehicles.

The authorities of the BCP suggest that the Tabanovci BCP model should be followed so that a common BCP with the neighbouring country (North Macedonia) should be constructed in order to perform Joint Border Control by the respective authorities of the two countries mainly because the Tabanovci BCP has reached its capacity.

5.3.25 Subotica Rail BCP (Xb branch), Serbia
The Subotica Rail BCP is located in Serbia at the borders with Hungary. The station was constructed in 1982 and the most recent interventions were made in 1998 concerning the electrification of 4 rail tracks. There are Custom agents and Police officers serving 24

hours per day and phyto-sanitary agents serving 10 hours per day. The facilities are in bad level, although the communication equipment is considered to be in satisfactory level. There are no tracing means available although there is radioactivity control equipment but its condition is unknown. The existing supporting facilities (marshalling yards, ramps and platforms) are in satisfactory level.

The time needed for the controls to be performed for the entering freight trains varies from 85' to 170' while for those exiting Serbia from 40' to 100'. The waiting time before the implementation of the controls varies for the entering freight trains from 10' to 60' and for those exiting from 10' to 40'. There are controls performed on boards if necessary. The station is not linked with the Central Custom Offices although there is regular communication with the neighbouring BCP.

The main problems the station faces are the lack of capacity in relation to the demand, the lack of the required infrastructure to serve all carriers, the poor state of the railway infrastructure resulting that the maximum speed for all trains inside the station is limited to 10km/h, the obsolete equipment and specifically the lack of radio communication, the untimely coordination between carriers in Serbia and Hungary which as a result increases the retention of the freight trains in the station and last but not least the insufficient number of working staff. The Authorities of the BCP suggest that improvements in IT connectivity and better coordination between the managers of the public railway infrastructure, railway transport operators and other services at border stations are possible.

5.3.26 Tovarnik Rail BCP (Xb branch), Croatia

The Tovarnik Rail BCP is located in Croatia at the borders with Serbia. The level of the provided information is considered to be insufficient to allow an in depth analysis.

5.3.27 Sid Rail BCP (Xb branch), Serbia

The Sid Rail BCP is located in Serbia at the borders with Croatia. The station was constructed in 1946 and the last interventions were made in 1997. At the station there are Custom agents and Police officers serving 24 hours per day. There is also one (1) phyto-sanitary and one (1) veterinary agents serving 10-12 hours per day.

The facilities overall are in bad level although the telephone connection and the computer equipment are in satisfactory level. There are no tracing means and the internet connection is in bad level. The time needed for the controls to be implemented regarding for entering freight trains varies from 50' to 300' while for those exiting from 40' to 250'. Furthermore, the waiting time before the implementation of any controls for those trains entering varies from 3' to 10' but for those exiting varies from 50' to 900'. The station is not linked to the Central Custom Offices, although the Authorities have regular communication with the Authorities of the neighbouring BCP.

The main problems the Authorities face concern the obsolete infrastructure and the lack of sufficient and well-trained staff. The Authorities highlight the necessity of reconstructing the majority of the existing infrastructure as well as the necessity of the station to be properly equipped with modern and updated IC tools and technologies.

5.3.28 Vrbnica Rail BCP (R4 branch), Serbia

The Vrbnica Rail BCP is located in Serbia at the borders with Montenegro. The station was constructed in 1976 and the latest interventions were made in 2017. There are Custom Agents and Police Officers serving 24 hours per day at the station.

The facilities overall are in bad level although the communication equipment is considered to be in satisfactory level. There are no tracing means available at the station. The time needed for the controls to be implemented at the station for the entering freight trains varies from 20' to 80' and for those exiting from 10' to 70'. No information regarding the waiting time before the implementation of any controls were provided.

The station in not linked to the Central Custom Offices although there is regular communication with the Authorities of the neighbouring BCP. The main problems the Authorities face concern the obsolete infrastructure and the lack of sufficient and well-trained staff. Moreover, the Authorities highlight the necessity of improving the coverage and strength of the existing mobile network.

5.3.29 Bijelo Polje Rail BCP (R4 branch), Montenegro

The Bijelo Polje Rail BCP is located in Montenegro at the borders with Serbia. The only information provided through the survey concern the problems the Authorities face.

According to the Authorities, regarding freight traffic, the main problem is that the railway station Bijelo Polje does not have a separate track at which a detailed control of freight trains would be carried out, which would be fenced and in which it would be possible to interrupt power supply for safety purposes of the officers conducting the control. Within the passenger traffic should be regulated that the train controls are carried out in such a way that officials of both neighbouring countries conduct train control during the movement of the train between the two closest train stations within the territory of both countries, thereby reducing holding at the border railway stations and in order to improve the effectiveness of controls in such a way as to prevent persons carrying undeclared and prohibited goods from removing it from the train at the border office.

5.3.30 Savski Marof Rail BCP, Croatia

The Savski Marof Rail BCP is located in Croatia at the borders with Slovenia. The level of the provided information is considered to be extremely poor. According to the Authorities there are no major problems.

Road network

The information regarding the road network of the OEM Corridor along the Western Balkan countries is extracted from the "Study on Orient/ East – Med TEN –T Core Network Corridor, 2nd Phase, Final Report on the related Core Network in the Western Balkan countries, December 2017" of the European Commission.

According to the above mentioned study, "*the physical and technical characteristics of the OEM related WB core network road sections were recorded on the basis of their compliance with the transport infrastructure requirements set in Article 17 of the Regulation No. 1315/2013, as well as the requirements of core network infrastructure listed in Article 39 (c), namely: the roads shall be specially designed and built for motor traffic, and shall be either motorways or express roads*".

It must be also mentioned that in the above mentioned study is reported that "*all the international E-roads as defined by the United Nation Economic Commission for Europe, are accessible either from interchanges or junctions regulated with traffic signs, and the stopping and parking on their carriageways is prohibited, the main important restriction is not to cross at grade any railway or tram track*".

Based on this criterion, the first road compliance check was performed for motorway or express road requirement and resulted that 94% of the road core network is in compliance (*railway level crossings were identified in only two sections with a total length of 103 km, one in RS (Grdelica (A1-438) - Preševo (Border RS/MK) and one in XK (Junction (R7, M25-M25.2) - Lipjan (M2-M25)*.

The study included then another criterion regarding the quality of road pavement and this is due to the "*specific situation in the Western Balkan countries*" as it is mentioned. The second road compliance check resulted that 63% of the road core network is in compliance. There are sectors that do not meet the above-mentioned criteria, as presented in Table 4.1 (Table 18 of the above mentioned study, page 56).

Table 4. 1. OEM Corridor related WB road sections not compliant with motorway or express road in good condition criterion

Country	Road section	Length (km)
RS	Belgrade by-pass road (Ostružnica – Orlovaca - Bubanj potok)	20
RS	Grdelica - Preševo (Border RS/MK)	95
RS	Orlovaca - Užice	185
RS	Balajnac - Prijepolje - Gostun (Border RS/ME)	57
RS	Prokuplje - Merdare (Border RS/XK)	60
	Total RS	***416***
MNE	Dobrakovo (Border RS/ME) - Mojkovac	45

MNE	Kolašin - Podgorica	71
	Total MNE	***116***
XK	Lipjan - Hani i Elezit/ Dj. Jankovic (Border XK/NMK)	54
	Total XK	***54***
NMK	Demir Kapija - Smokvica	34
NMK	Blace (Border XK/NMK) - Skopje junction Stenkovec	14
	Total NMK	***48***

The next criterion set by the study was the availability of clean fuels that substitute the fossil oil sources in the supply of energy to transport (electricity, hydrogen biofuels (liquids), synthetic fuels, methane (natural gas – CNG & LNG) and bio methane) and liquefied petroleum gas (LPG). The analysis of the collected data revealed that there is a reasonable supply of alternative fuels.

Furthermore, the study analysed data from different sources in order to identify capacity constraints along the OEM related core road network is Serbia, Montenegro, Kosovo and North Macedonia. The study following a specific methodology, identified the road sections on which the 2014 traffic exceeded 70% of the road capacity. These sections are presented in Table 4.2 (Table 20: Capacity bottlenecks in 2014 of the EC study, page 61).

Table 4. 2. Capacity bottlenecks in 2014 regarding OEM related core road network (Serbia, Montenegro, Kosovo and North Macedonia)

Country	Road section
SRB	Dobanovci (bypass) /A1-A3/<-->Ostružnica (bypass) /A1-26/
SRB	Orlovaca (bypass) /A1-22/<-->Bubanj Potok (bypass) /A1-A3/
SRB	Bubanj Potok (bypass) /A1-A3/<-->Mali Pozarevac /A1-25/
SRB	Grdelica /A1-438/<-->Preševo (Border RS/MK)
SRB	Orlovaca /A1-22/<-->Lazarevac /22-27/
SRB	Lazarevac /22-27/<-->Ljig /22-150/
SRB	Ljig /22-150/<-->Rudnik /22-152/
SRB	Rudnik /22-152/<-->Gornji Milanovac /22-177/
SRB	Gornji Milanovac /22-177/<-->Cacak /22-23/
SRB	Cacak /22-23/<-->Požega /21-23/
SRB	Požega /21-23/<-->Užice /23-28/
SRB	Prijepolje /23-200/<-->Gostun (Border RS/ME)
SRB	Prokuplje /216-35/<-->Kuršumlija /35-213/
MNE	Dobrakovo (Border RS/ME)<-->Ribarevina (Bijelo Polje) /2-21/
MNE	Ribarevina (Bijelo Polje) /2-21/<-->Mojkovac /2-P4/

Regarding the identified potential administrative and non-physical barriers causing bottlenecks on the road network of the WB corridor, the following are reported:

- Market liberalisation.
- Harmonisation of customs legislation.
- Border crossing procedures.
- Improvement of Road Safety.
- Road Maintenance System.

Finally, regarding the implementation of ITS on the core network, the study underlined that the WB6 countries are on different levels on introducing ITS systems. The strategic framework for ITS implementation was expected to be completed by July 2018.

Rail network

The information was extracted again from the "Study on Orient/ East – Med TEN –T Core Network Corridor, 2nd Phase, Final Report on the related Core Network in the Western Balkan countries, December 2017" of the European Commission.

For the rail characteristics the study was based on the Regulation No. 1315/2013 and the following parameters were set as criteria:

- Electrification. The core network is expected to be electrified by 2030.
- Axle load. The core rail freight lines will be compliant with the 22.5 tons' axle load by 2030.
- Line speed. The core rail freight lines will be compliant with the 100km/h speed limit by 2030.
- Train length. The core freight rail lines will be compliant with the 740m train length limit by 2030.
- ERTMS/ signalling system. The core network is expected to be equipped with ERTMS by 2030.
- Track gauge. New lines are expected to be built meeting the UIC standards (1435mm gauge).

The analysis of the collected data from several sources revealed that at the time of the implementation of the study, there were several rail sections not complying with the above mentioned criteria, except from the track gauge criterion for which the entire rail network of the WB countries is fully compliant.

Regarding the line speed, this limit can be achieved on approximately 44% or 813km of the rail network. Based on the analysed data, Serbia seems to be in better position compared to the other WB countries related to the OEM Corridor (67% of the section or 708km are compliant to the speed limit). The issue of speed limit for freight trains is most prominent in Kosovo and Montenegro as well as in North Macedonia according to the study.

The train length determined in the Regulation 1315/2013, should enable to operate 740m long freight trains, but in most of the analysed rail sections was not compliant with this requirement (1618 km or 87% of the network). This applies to the entire part of the Western Balkans rail network related to the OEM Corridor. It is noted, however, that for operational reasons of the Port of Bar, a very small section between the Port of Bar and Virpazar in Montenegro allows 800 metre trains. The "orphan" links in Hungary and Greece are compliant and allow length of up to 750 meters.

Trains with single axle loads of 22.5 tonnes are fully operable on most of the sections of the analysed Western Balkan rail network (1464 km or 79% of the rail network), except the sections Resnik – Velika Plana in Serbia and Stalac – Rudnica – Donje Jarinje (borders between Serbia and Kosovo).

The non-electrified sections make up approximately 17% (322 km) of the entire OEM related Western Balkan rail network.

Regarding signalling systems and telecommunication, the study resulted that "*the status of implementation of ERTMS, consisting of the two technical components ETCS and GSM-R, is underdeveloped and is not compliant with ERTMS deployment on any part of the Western Balkan rail network*".

Table 4.3 presents the length of the non-compliant rail sections on WB part of the OEM Corridor in 2014 in relation to the above-mentioned criteria (*Table 11: Status of Rail Infrastructure compliance on Western Balkan part of Orient/ East-Med corridor (2014), page 44*).

Table 4. 3. Length of the non-compliant rail sections on WB part of the OEM Corridor in 2014

Parameter	**Length share of non- compliant sections**
Operational speed	56%
Train length	87%
Axle load	21%
Electrification	17%
Number of tracks (at least double track)	89%
Signalling systems (ETCS)	100%
Telecommunication system (GSM-R)	Non identified

The study analysed the performance of the rail network regarding the capacity utilization, however the traffic data used were those of the REBIS study (World Bank, 2014) of 2012. The main results of the analysis are the following:

- Rail sections with no capacity constraints related to infrastructure. These rail sections refer to links with less than 40% utilization, thus no improvements are needed.
- Existence of minor capacity constrains in infrastructure that can be improved with some minor rehabilitation. These are assumed to be for the links with average utilization 40-65%.
- Significant capacity constraints in infrastructure that need major rehabilitation. These are links with utilization of 65-80%.
- Significant capacity constraints in infrastructure that needs the construction of new line: links with utilization above 80%, for which the above solutions are already introduced, a new line is needed.

According to the "Connectivity Agenda, Co-financing of Investment Projects in the Western Balkans, July 2018" of European Commission, a co-financed investment project in the Western Balkans concern the rail network of the OEM Corridor. This is the Montenegro-Serbia R4 Rail Interconnection, Bar – Vrbnica Section.

This investment project1 will rehabilitate four steel bridges as well as 20 km of railway track on the Bar – Vrbnica railway route which connects Montenegro with Serbia and specifically targets structural and safety improvements on the Lutovo – Bratonožići – Bioče railway section as well as on four steel bridges. The extension of the OEM Corridor into the Western Balkans along Route 4 is approximately 580 km long and runs from Vršac (Serbia/ Romania border) to Belgrade (Serbia) and then to Podgorica and Bar (Montenegro). Bar – Vrbnica is the most important section of the Montenegrin rail network, carrying about 20% of all its rail passengers and about 60% of its rail cargo. Rail is important for the Montenegrin economy, accounting for almost 60% of all freight and 10% of its passenger travel.

The main expected benefits of the project concern the considerable increase of the passenger and freight rail transport capacity as well as the reduction in travel times by 1 to 2 hours on the entire route. The project's estimated start date is mid-2020 and estimated end date is end of 2023.

5.4 Mediterranean corridor

In the WB area the different types of nodes located along the Med corridor are the following:

- Seaports
    - Port of Igoumenitsa, Greece
    - Port of Vlore, Albania
    - Port of Durrës, Albania
    - Port of Koper, Slovenia

    - Port of Ploče, Croatia
    - Port of Rijeka, Croatia
    - Port of Trieste, Italy
    - Port of Venezia, Italy
    - Port of Ravenna, Italy
- Road BCPs
    - Kakavia, Greece
    - Muriqan/ Sukobin, Albania
    - Debeli Brijeg, Montenegro
    - Karasovici, Croatia
    - Zaton Doli, Croatia
    - Neum II, Bosnia and Herzegovina
    - Neum I, Bosnia and Herzegovina
    - Klek, Croatia
    - Bijaca, Bosnia and Herzegovina
    - Metkovic, Croatia
    - Bosanski Samac, Bosnia and Herzegovina
    - Zupanja, Croatia
    - Batrovci, Serbia
    - Gorican, Croatia
    - Bregana, Croatia
    - Obrezje, Slovenia
- Rail BCPs
    - Tuzi, Montenegro
    - Bajza, Albania
    - Capljina, Croatia
    - Capljina, Bosnia and Herzegovina
    - Bosanski Samac, Bosnia and Herzegovina
    - Dobova, Slovenia
    - Korpivnica, Croatia

<u>Ports</u>

5.4.1 Port of Rijeka, Croatia

The Port of Rijeka is located in Croatia and was constructed in 1996. The most recent interventions were made in 2018 concerning berth reconstruction. The port is state owned and managed by the central government (Ministry of Maritime Affairs, Transport and Infrastructure). The provided services related to the existing terminals are those of container transport, Car Ro-Ro traffic, general cargo transport, timber, dry bulk, iron-ore-petroleum coke transport, silo, liquid cargoes, livestock and finally cruise traffic.

The port is equipped with different types of lifts (regarding lifting ability) in satisfactory condition as well as with fixed and mobile cranes being in satisfactory condition. The communication is possible through telephone, radio, internet and ICT alternative technologies.

The quay utilization is 30% while the storage yard utilization is 60%. The container moves per ship hour in port are 30. The port is accessed by road and rail. According to the Port's Authorities, the main problem is the development of road connection (D403) to the New Deep-Sea Container Terminal. There is an Action Plan for upgrading the Rijeka Port' s infrastructure as part of a Global Project for the development of the Port of Rijeka, which is a pre-identified section of the Mediterranean Core Network Corridor. The Action's main objective is the reconstruction of the quay in the Raša basin, to enable the port of Rijeka to adequately respond to the current growing trend of timber traffic. The reconstruction of the 164-meter quay will be done in two phases, i.e. first 90 metres and then the remaining 74 metres, while keeping the alternate part operational. The Action covers the executive design and works for:

- dismantling and removal of the existing equipment;
- reconstruction works of the quay;
- installation of crane tracks on the reconstructed quay structure;
- Installation of rail tracks on the reconstructed quay structure;
- Installation of equipment on the reconstructed quay structure.

The upgrade of the port infrastructure at the general cargo terminal Raša, is part of the Masterplan for development of the port of Rijeka and its implementation contributes to improvement of port operations as well as facilitation of the transport of goods.

There are other ongoing actions regarding the upgrade of the Port of Rijeka. The first one concerns the Rijeka Basin, which is part of the Port of Rijeka. Its existing railway infrastructure is aging, severely damaged and unsafe, hindering the efficiency of daily port operations. The aim of the Action is the creation of a larger operational area by the reconstruction of the railway infrastructure connecting the quays and piers of the Rijeka basin.

The second concerns the Bakar Basin which also is part of the Port of Rijeka. Its existing railway infrastructure is aging, severely damaged and unsafe, hindering the efficiency of daily port operations. The Action's main objective is the reconstruction of the railway infrastructure connecting the Podbok terminal to the existing Bakar freight railway station.

At the port of Rijeka, wireless communication technologies and cyber security for advanced technology networks are implemented. The Port Community System, Cloud computing, Internet of Things, Big data Analysis, Augmented Reality and Robotics and

Autonomy are technologies for which Port of Rijeka is interested in adopting and implementing in the future.

5.4.2 Port of Trieste, Italy

The Port of Trieste is located in Italy. Existing since the 18th Century the port has seen a considerable expansion during the industrialization of Italy after the II World War between the 1960s' and 1970s' with the development of the Liquid Bulk, Container and Ro-Ro terminals in addition to the expansion of the Dry Bulk and Multipurpose operations. The latest interventions were made in 2016 regarding the reinstatement of the rail link between Quay VII and Trieste main station (Campo Marzio).

According to Legislative Decree L.D. No. 169/2016, the port authority (AdSP) is a public, non-for- profit entity of national importance, subject to a specific legislative and regulatory regime and with administrative, organizational, regulatory, fiscal, and financial autonomy. (L.D. No. 169, art. 7(5). The Ministry of Infrastructure and Transportation oversees the port authority (AdSP), and the National Court of Auditors controls its accounts (Id. art. 7(7) & (9).

At the port the supported and provided services in relation to the existing terminal are those of: container transport, Car Ro-Ro traffic, general cargo transport, reefer, timber and dry bulk transport, silo and alumina, iron ore-coal –petroleum coke transport, liquid cargoes and livestock and finally cruise traffic.

The port is equipped with medium and small lifts as well as fixed and mobile cranes. Moreover, communication is possible through several ways (telephone, radio, internet, post, ICT alternative technologies, telegraph and radio telephone). The port is accessible by road and rail regarding freight transport.

According to the Port's Authorities, the major problem they face is the last mile by rail along which there is congestion due to infrastructure bottleneck and operating agreements. As a result, one train per time can access the Industrial Port and also the maximum length of the trains is limited by the rail infrastructure to 550m.

The main maritime infrastructure interventions foreseen are the following:

- Railway works inside and outside the port area: a) Upgrading of Trieste Campo Marzio station (PRG and ACC) and of the railway line "Linea di cintura" to Campo Marzio/Trieste Aquilinia. Intermodal integration; b) Realization of a new rail terminal in the Campo Marzio area to serve piers V, VI and VII and increase intermodality. This project foresees: 5 lines ramp with rail mounted gantry cranes, connected to the upgraded Campo Marzio tracks and existing line. Investments to increase train length operations up to 750m at Trieste C. Marzio station are planned for implementation as part of the wider initiative aimed at modernising the whole Trieste Campo Marzio station.

- Functional and technical restructuring of Pier VI in the Port of Trieste. This project is included in a wider MoS initiative ADRI-UP - Adriatic MoS Upgraded Services. The ADRI-UP project has been recommended for funding by INEA under the scope of the 2015 CEF transport calls - 2015-EU-TM-0310-M. The project develops a port and logistics infrastructure enhancing the regular waterborne transport logistics services along the Adriatic-Ionian MoS Corridor between the core ports of Trieste, Ancona and Igoumenitsa. 30% of the cost of project 1850 is indicatively assumed to be financed by the CEF.
- Construction of a new quay called "Logistic Platform" (First phase): construction of a new quay called "Logistic Platform" which has to be directly connected to the belt-road and the off-port rail network, with a wharf of about 600 meters in length and a depth of 14 meters. This project is going to be implemented as part of the initiative NAPA4CORE 2014 - 2014-EU-TM-0343-M
- Second phase: construction of a new quay called "Logistic Platform", with a wharf of about 600 meters in length and a depth of 12-14 meters
- Enlargement of the container terminal at quay VII increasing the potential up to a maximum of 1,200,000 TEU (dimension 200m, 18m depth).
- Realization of a new Ro-Ro terminal in the Noghere valley area with a "working" draught of no less than 12 meters for berthing RO-RO vessels and a total surface of 430.000m^2 (first phase).
- Realization of a new Ro-Ro terminal in the Noghere valley area with a "working" draught of no less than 12 meters for berthing RO-RO vessels and a total surface of 430.000m^2 (second phase).
- Second phase of passengers' terminal upgrade encompassing the enlargement of the related quay.
- Upgrading of the port railway system to operate longer trains coherently with the on-going upgrading action of the marshalling yard in Campo Marzio.
- Construction of a new rail connection from the Logistic Platform, the Timber terminal and the steel plant in Servola with the existing national rail system.
- Capital dredging of the port in the area of Noghere Muggia.

At the port of Trieste, the Single Window policy is supported and a Port Community System is operational. Moreover, Cloud computing, wireless communication technologies, Internet of Things and Big Data Analysis are also already implemented.

Regarding the PCS, the following stakeholders participate by exchanging information concerning specific services:

- Shipping agents: departures and arrivals, bookings, Port Calls Management and dangerous goods management.
- Terminal operators: port calls management, dangerous goods management and loading and discharge orders.
- Freight forwarders: custom procedures and information and goods declaration.

- Shippers: departures and arrivals, shipping instructions and loading and discharge orders.
- Port Authority: departures and arrivals, bookings, and shipping instructions.
- Official bodies: Road Transport Management, Rail Transport Management, custom procedures and information and goods declaration.

5.4.3 Port of Venezia (Venice), Italy

The port of Venezia is located in Italy. Existed since the VI Century. During the XVI Century the area around the island that is currently known as Venice started to sink and create the lagoon. At the end of VIX Century maritime stations were built in Santa Marta and Santa Lucia while the construction of the port in the area of Marghera dates back to 1917. The latest interventions were made in 2018.

According to Legislative Decree L.D. No. 169/2016, the port authority (AdSP) is a public, non-for- profit entity of national importance, subject to a specific legislative and regulatory regime and with administrative, organizational, regulatory, fiscal, and financial autonomy. (L.D. No. 169, art. 7(5). The Ministry of Infrastructure and Transportation oversees the port authority (AdSP), and the National Court of Auditors controls its accounts. (Id. art. 7(7) & (9).

At the port the supported and provided services in relation to the existing terminal are those of: container transport, Car Ro-Ro traffic, general cargo transport, reefer and dry bulk transport, silo and iron ore-coal –petroleum coke transport, liquid cargoes and finally cruise traffic.

The port is equipped with medium and small lifts as well as fixed and mobile cranes. Also, communication is possible through several ways (telephone, radio, internet, telegraph and radio telephone). The port is accessible by road and rail regarding freight transport.

The major critical issues at the port of Venezia are the low depth of the port and the future capacity of the railway. The rail and road infrastructure interconnecting to the port and within the port areas and terminals is overall compliant thanks to recently completed modernisation and upgrading works. However, In the long term, the existing railway connection is expected to become a possible capacity bottleneck, also causing traffic congestion problems at the Mestre railway node, which will require the development of a direct connection to the main railway line (following the railway section of the Baltic-Adriatic and Mediterranean core network corridors and the respective Rail Freight Corridors 5 and 6).

The main maritime infrastructural projects foreseen for Venice Ports are listed below:

- LNG supply facilities implementation at the Port of Venezia: the project foresees a LNG costal depot (about 32,000 mc). The project foresees a LNG fuel station in port area able to serve both road and maritime traffic. The project has received CEF funding support under the initiative GAINN4CORE - 2014-IT-TM-0450-S. It is now going to be proposed under the CEF blending call

- Interoperability between National Single Window and Venezia Port Community System (EASYCONNECTING project): definition of technical and functional elements for the reception of data from the National Single Window (NSW), upon signing of an Agreement/Memorandum of Understanding among Customs Agency, Harbour Masters General Command, Venice Port Authority and Genoa Port Authority in order to support the implementation of port authorities' institutional tasks. Development of software components needed to the reception and management of NSW data and their integration with Venice PCS and the port's areas access control system. Integration and alignment of PCS data functional to the interoperability with NSW and for statistics purposes.
- Direct Connection of the Venice Port to the Mediterranean and Baltic-Adriatic Corridors.
- Definitive Design of the Venice Onshore Offshore Port System for large ships: The Offshore/Onshore Terminal Project, aims to improve infrastructure capacity in order to attract modern vessels with additional cargo volumes in the North
- Upgrading to 2 tracks railway line in order to support growth in traffic flows due also to the realisation of Fusina Ro-Ro terminal (Adriamos EU project): Port railway network implementation able to solve capacity problems:1. Doubling of railway line connecting Fusina terminal to Via dell'Elettronica; 2. Doubling of rail section Via della Elettronica - Via dell'Elettricità;
- Upgrade of rail links between the South Industrial Area of Marghera and Marghera Scalo Station and redesign of road infrastructure: Upgrading of the rail track in order to develop a direct railway link (1,3 km) between the south area of Marghera and Marghera Scalo station, to avoid Mestre junction in shunting operations, and doubling part of Via dell'Elettricità. Upgranding of road connection on Via dell'Elttricità in order to reduce road/rail interferences.
- New rolling stock vehicle maintenance and repair depot in response to increasing demand for this kind of services by port's railway operators: New vehicle maintenance, depot and repair shop located close to Marghera Scalo station in order to improve services offered as wagons checking, inspections and maintenances to the wagons.
- Realisation of an information system in order to real time monitor maritime traffic and forecast the maritime traffic levels in the last maritime mile: Development of a decision support system to optimize arrival and departure in the port of Venice.
- Railway telematics systems for shunting operations (SIMA) and its integration with PCS and information systems of other subject involved in developing rail services: The project will implement the fully operational of SIMA and provide with all the necessary interfaces for the electronic data interchange with the information systems of the port operators who taking part in the processes. In

particular, the aim is to manage within SIMA for the secondary rail shunting considering all rail shunting operations provided by the port railway operator (ERF) on the port of Venice railway network. The added value is to provide to the port operators and customers with the possibility to know in real-time all information related to their wagons (track and trace) and about related the information/document workflow. The second phase of SIMA will include: extension in order to include private linking inside port area, implementation of an OCR system to automate the identification of containers and the rail wagons, development of interfaces with existing computer-based systems of the clients.

- West Industrial Canal Dredging: Works of dredging of the West Industrial Canal to reach the depth of 11.8 m to accommodate bigger bulk ship and load/unload higher cargo volumes.
- Broadband connection: Development of broadband connectivity for the development and competitiveness of the industrial area of Porto Marghera. The goal is to extend the benefits of ICT companies in the industrial area contributing to the infrastructural transformation of districts and industrial areas in terms of ultra-wideband, in agreement with the European Digital Agenda and local regulations. The project foresees the laying of a network of fiber optic cables and of all the optical equipment plugged, into existing or under construction infrastructure, and the infrastructure needed to contain the optical systems.
- New access to Passengers Terminal of Marittima: The project is part of a navigation route alternative for access to the port of Venice, as required by D.I. March 2, 2012 (Infrastructure and Transport, and Environment), subject to the need to maintain the existing passenger terminal. The new access will be through the Malamocco-Marghera and Vittorio Emanuele channels. The project involves the construction of a new waterway "Tresse New" connecting the Malamocco Marghera channel with the channel Vittorio Emanuele III. This project maximizes the use of existing channels, limiting the travel time taken and thus contains the interruption of commercial traffic due to the presence of cruise traffic.

At the port of Venezia, the Single Window policy is supported and a Port Community System is operational. Moreover, could computing, wireless communication technologies, Internet of Things, Big Data Analysis and cyber-security for advanced technology networks are also already implemented.

Regarding the Single Window policy, the following stakeholders participate by exchanging information concerning specific services:

- Shipping agents: departures and arrivals, bookings, dangerous goods management, loading and discharge orders custom procedures and information and good declaration.

- Terminal operators: port calls management, dangerous goods management and loading and discharge orders, custom procedures and information, goods declaration, cargo tracking and equipment status.
- Freight forwarders: custom procedures and information and goods declaration.
- Shippers: departures and arrivals, shipping instructions and loading and discharge orders.
- Port Authority: departures and arrivals, bookings, shipping instructions, Port Calls Management, loading and discharge orders, Road Transport Management, Rail Transport Management, custom procedures and information and goods declaration.
- Official Bodies: departures & arrivals, shipping instructions, custom procedures and information and goods declaration.

5.4.4 Port of Ravenna, Italy

The Port of Ravenna is located in Italy. In 1738 Port Corsini started its activities. No information was provided regarding any intervention made lately.

According to Legislative Decree L.D. No. 169/2016, the port authority (AdSP) is a public, non-for- profit entity of national importance, subject to a specific legislative and regulatory regime and with administrative, organizational, regulatory, fiscal, and financial autonomy. (L.D. No. 169, art. 7(5). The Ministry of Infrastructure and Transportation oversees the port authority (AdSP), and the National Court of Auditors controls its accounts. (Id. art. 7(7) & (9).

At the port the supported and provided services in relation to the existing terminal are those of: container transport, Car Ro-Ro traffic, general cargo transport, reefer, timber and dry bulk transport, iron ore-coal -petroleum coke transport, liquid cargoes and finally cruise traffic.

The port is equipped only with fixed and mobile cranes. Also, communication is possible through several ways (telephone, radio, internet, post, ICT alternative technologies, telegraph and radio telephone). The port is accessible by road and rail regarding freight transport. The port is accessible by road and rail regarding freight transport.

The plans for the development of the port concern the following:

- Ravenna Port Hub - 1st phase: Dredging works in several parts of the canal harbour up to - 12,50 meters (inner parts); up to -13,50 m (approaching canal). Operational quays upgrading. Realization of a new quay serving a specific container terminal. Re-use of dredged material as first step of the construction of areas for logistics activities.
- Ravenna Port Hub - 2nd phase: Dredging works in several parts of the canal harbour up to - 14,50 meters (inner parts); up to -15,00 m (approaching canal). Development of multimodal platform.

- Ro-Ro terminal upgrading: Upgrading of the existing Ro-Ro and Ro-pax terminals (Largo Trattaroli): construction of marine jetties and completion of parking area.
- ICT services for the port community: interoperability of PCS with the National Maritime Single Window; the National Logistics Platform and the Customs ICT platform: Implementation of advanced PCS based ICT services for port operators and public agencies. The main objective is to improve the PCS for a better coordination of the port processes using a wide range of interoperability features. Specifically, the new services will be developed for the processes related to: safety and security (including cybersecurity), logistics, reporting formalities, customs clearance, gate automation, ITS, etc. The most important goal in terms of interoperability is to implement the full interoperability with the National maritime single window, the customs agency single window and the National Logistics platform.
- Dredged material treatment plant: Construction of a dredged material treatment plant with an annual capacity of at least 400.000m^3.
- Improvement of Data connection infrastructure for port services: Improvement of connectivity infrastructure for the development of new general services supporting the port security and the digitalization of port procedures contributing to the de-materialization of the processes and to a better coordination among the Administrations for a general efficiency improvement. The general objective is to obtain a more stable, fast and secure infrastructure. The main activity is to extend the actual connectivity infrastructure based on WiMax and HyperLan connections installing new nodes and laying new optical fiber sections.
- Upgrading of the railway link to the port of Ravenna: Railway works inside and outside the port area. Elimination of the road interference in Via Canale Molinetto and upgrade to gabarit P/C80 of the link. Strengthening of "Destra" channel. Resolution of a physical bottleneck.
- LNG supply facilities implementation at the Port of Ravenna: The project foresees storage tanks, facilities for receiving LNG from LNG vessels and for bunkering and a station for fuelling LNG propelled vehicles and LNG tanker vehicles.

At the port of Ravenna, a Port Community System is operational. Moreover, could computing, wireless communication technologies and cyber-security for advanced technology networks are also already implemented. The port' authorities are interested in adopting and implementing in the future other ICT solutions and tools and specifically Internet of Things and Big Data Analysis.

Regarding the Single Window policy, the following stakeholders participate by exchanging information concerning specific services:
- Shipping agents: departures and arrivals, bookings, Port Calls Management, loading & discharge orders, goods declaration, goods declaration, custom information.
- Terminal operators: port calls management, Port Calls Management, loading and discharge orders, Inland Transport, custom information.

- Freight forwarders: loading & discharge orders, Inland Transport, goods declaration, custom information, cargo tracking.
- Shippers: departures and arrivals, loading and discharge orders.
- Port Authority: departures and arrivals, Port Calls Management, loading and discharge orders.
- Official Bodies: departures & arrivals, goods declaration, custom information.

5.4.5 Port of Ploče, Croatia

The Port of Ploče was constructed in 1950. The latest interventions were made in 2018 concerning the construction of new container, dry bulk, liquid and entrance terminals. The port is state-owned, and it is managed by the central government.

The port provides services for container transport, general cargo transport, Reefer, Timber, Dry Bulk transport, Silo, Alumina, Iron Ore-Coal-Petroleum Coke and finally Liquid Cargoes. The port is equipped with different types of lifts and cranes. The communication is possible through several ways (telephone, radio, internet, post, and telegraph).

According to the data provided by the port's authorities, the turnaround time for a truck is 20' and the respective time for a vessel (Ship) is 10 hours. Additionally, the vessel turnaround per TEU is 17'' and average vessel call size is 3,000TEUs. The gross crane productivity is 17,000TEUs per gantry crane and the average number of cranes per vessel on quay is 1.5. The quay utilization is 11%, while the storage yard utilization is 25%.

The port is equipped in such way that can serve road commercial vehicle, trains and also supports transhipment. According to the port's authorities, the critical and main bottlenecks affecting their performance are: a) bureaucracy, b) custom procedures, c) port infrastructure bottlenecks, d) railway bottlenecks and f) IT Systems bottlenecks. Furthermore, the main problem of the port is the poor state of road and railway connections (overall infrastructure) between the port and the hinterland.

There are plans for the development of the port and specifically the construction of a new jetty for liquid cargo. The authorities suggest that first of all the issues regarding the accessibility and connectivity of the port with the hinterland in terms of the road and railway infrastructure must be addressed, then the construction of a new jetty for liquid cargo and the extension of the quay regarding the container terminal will be beneficiary for the port's overall performance. Finally, the highlight the importance of the integration of the information systems concerning the exchange of information on local (port) level.

At the port of Ploče, a Port Community System is implemented as well as Cloud Computing, Wireless communication technologies and cyber – security for advanced technology networks. Moreover, the port of Ploče applies the Single Window policy. The authorities expressed their willingness to adopt and implement further ICT solutions and tools, such as Internet of Things, Big Data Analysis, Augmented Reality and Robotics and Autonomy.

The port's authorities strongly believe that development of port systems must include all relevant technologies so that the ports could be competitive. Many systems must be integrated so that flow of information runs smoothly without bottlenecks and without queues.

Port Community System is considered as an ideal system for this objective and by nature must be integrated to other systems in order to exchange information, so that all port users and stakeholders have relevant information on time. All information which are exchanged must be delivered or entered by human, but data which are entered should be entered only once and should be exchanged through systems. Use of smart technologies within sensors and bots based on IoT paradigm could speed up entering or delivering needed data especially those data which are relevant for daily business but depends on human users. All this must be developed and integrated following technological and security needs.

The applied Single Window policy at the port of Ploče provides the ability to several stakeholders to exchange critical information, as presented in the following:

- Shipping agents: Supports the shipping agents in exchanging information regarding departures and arrivals, bookings shipping instructions, custom procedures & information, and goods declaration.
- Terminal operators: Supports the terminal operators in exchanging information regarding Port Call Management, Dangerous Goods Management, loading and discharge orders, inland transport, road transport management, customs procedures & information and finally Goods Declaration.
- Freight forwarders: Supports the freight forwarders in exchanging information regarding Port Call Management, Dangerous Goods Management, loading and discharge orders, inland transport, road transport management, customs procedures & information and finally Goods Declaration.
- Port Authority: Supports Port's Authority in exchanging information regarding customs procedures & information and finally Goods Declaration.
- Official Bodies: Supports Official Bodies in exchanging information regarding customs procedures & information and finally Goods Declaration.

The existing PCS at the port of Ploče provides the ability to several stakeholders to exchange critical information, as presented in the following:

- Shipping agents: The PCS supports the shipping agents in exchanging information regarding departures and arrivals, shipping instructions, custom procedures & information and Goods Declaration.
- Terminal operators: The PCS supports the terminal operators in exchanging information regarding bookings, Port Call Management, Dangerous Goods Management, loading and discharge orders, road transport management, customs procedures & Information and Goods Declaration.

- Freight forwarders: The PCS supports the freight forwarders in exchanging information regarding Port Call Management, Dangerous Goods Management, loading and discharge orders, road transport management, custom procedures & Information and Goods Declaration.
- Port Authority: The PCS supports Port's Authority in exchanging information regarding Port Calls Management, Dangerous Goods Management, loading & discharge orders, road transport management, customs procedures & information and finally Goods Declaration.
- Official Bodies: The PCS supports Official Bodies in exchanging information regarding Port Calls Management, Dangerous Goods Management, loading & discharge orders, customs procedures & information and finally Goods Declaration.

In Port of Ploče for liquid cargo is used a Port Community System which is not integrated to Terminal Operating System used by terminal operators. Some of Terminal operators are using their own TOS system and most of them are using PCS system for terminal operations. For Ship arrivals and departures is used Croatian Integrated Maritime System (CIMIS) which is single window for maritime procedures. Aim is to integrate these systems. Exchange of information will be from CIMIS through PCS to TOS system. On local level PCS system will be local single window which will exchange information between port users and existing TOS system from different Terminal operators.

Finally, the port's authorities provided information regarding new ICT solutions/ tools that will be implemented in the Port of Ploče during the time period 2019-2021.

5.4.6 Port of Koper, Slovenia

The Port of Koper is located in Slovenia and was constructed in 1957. The most recent interventions were made in 2018 concerning the construction of a liquid bulk terminal and multipurpose warehouse and berths. There is no port authority at the port of Koper. The Company Luka Koper d.d. manages the development and maintenance of port area.

The port supports container transport, Car Ro-Ro traffic, general cargo transport, reefer, timber and dry bulk transport, silo and iron ore-coal- petroleum transport as well as liquid cargoes and livestock and finally cruise traffic.

The port is equipped with many and of different lifting ability lifts and cranes (both fixed and mobile) all in good condition. Furthermore, all possible communication methods are supported at the port (telephone, radio, internet, post, ICT alternative methods, telegraph and radio telephone).

The average time for turning around a vessel varies from 12 to 72 hours and through the port 100,000TEU per month are served. All transport modes are served at the port of Koper (road, rail and transhipment). The number of outbound trucks served at the port per day is 1,000 and the respective number of inbound trucks is 600. Regarding rail traffic at the port, in average 442 trains are served as outbound traffic and 233 as inbound.

Infrastructure bottlenecks linked to port's activities are mainly related to the railway transport and to the port's gates that are located in the near proximity of the city centre. The congestion at rush hours involves trucks and other vehicles at port's gate. On the other side, the port of Koper is connected with the hinterland just with one railway track and considering the volume of cargo increasing every year, there are concrete and reasonable expectations of lacks and bottlenecks in near future, related to the occupancy of tracks.

The main problems are related to the links of the port with the hinterland. The only railway track serving port's activities and also passengers transports, can be congested with lacks of services to be faced in near future. From the geographical point of view, the port of Koper is located near the city centre which limits the possibilities to increase the area to be dedicated to port's activities - no possibilities to extend areas in all directions.

In next few years the investments planned for the port of Koper are including works at container terminal, cars terminal, piers 1 and 2, with the internal redistribution of areas dedicated to containers, cars, timber and general cargo. The total value is foreseeing around 300 MLN euros of investments. Upgrade of existing tools and equipment can be significantly operated without enormous financial contributions. The existing infrastructure can be utilized with optimal procedures and organizational levels, until the investments and works are finished (2020-2025). It will allow Luka Koper to double capacities and throughputs.

At the port of Koper, the Single Window policy is supported and a Port Community System is operational. Moreover, could computing, wireless communication technologies, big data analysis and cyber security for advanced technology networks are implemented. Also, Internet of Things, Augmented Reality and Robotics and Autonomy are technologies for which Port of Koper is interested in adopting and implementing in the future.

Regarding the Single Window policy, the stakeholders participating is: shipping agents, terminal operators, freight forwarders, the port authority and official bodies in terms of exchanging information concerning departures and arrivals.

Regarding the PCS at the Port of Koper, the following stakeholders participate by exchanging information concerning specific services:

- Shipping agents: departures and arrivals, shipping instructions, loading and discharge orders, custom procedures and information and goods declaration.
- Terminal operators: departures and arrivals, shipping instructions, port calls management, dangerous goods management, loading and discharge orders, custom information, cargo tracking and equipment status (e-containers).

- Freight forwarders: departures and arrivals, shipping instructions, loading and discharge orders, custom procedures and information and goods declaration.
- Shippers: departures and arrivals, shipping instructions and loading and discharge orders.
- Depots: departures and arrivals.
- Port Authority: departures and arrivals, dangerous goods management and custom information.
- Official bodies: departures and arrivals, port calls management and dangerous goods management.

In the months to come new ICT solutions are about to be implemented in the Port of Koper (VBS – Vehicle Booking System and VMS Self Service).

5.4.7 Port of Durrës, Albania

The Port of Durrës is located in Albania and was constructed in 1928. The latest interventions were made in 2013 and concerned the reconstruction of the fishing port. The port is state owned and managed by a public legal entity (100% state owned).

There are 3 terminals private owned (container terminal, dry bulk terminal and cruise) and 1 public owned (general cargo terminal). The port is equipped with several types of lifts and cranes. The port is connected to the rail network as well as the road network serving 87 commercial vehicles/ trucks as outbound traffic and 97 as inbound traffic. At the moment there is no Vessel Traffic Management Information System installed but there are plans in the future for installing such a system.

The main bottlenecks at the port are related to the custom procedures and the limited depth of the entrance channel as well as dredging of the basin. There are plans of reconstructing several berths as well as expanding the land area in the eastern side of the port.

No additional information was provided through the survey.

5.4.8 Port of Vlore, Albania

The Port of Vlore is located in Albania and was constructed in 1974. The most recent interventions were made in 2003. The port is owned by the state and is managed by the central government. The existing facilities serve Car Ro-Ro traffic, General Cargo transport and Cruise traffic. The port is equipped with different types of lifts. The port serves only commercial vehicles/ trucks (20 per day). The age of the existing infrastructure is an obstacle to the performance of the port.

The Authorities are implementing at the moment the masterplan of 2014 and they suggest that in order to improve the maritime services not only in the port of Vlore but in general in Albania, same procedures must be implemented in all Albanian ports. At the port of

Vlore, Port Community System, Big Data Analysis, Cyber – Security for advanced technology networks are implemented as well as Cloud Computing. The Authorities expressed their willingness on adopting and implementing other ICT tools and applications and specifically wireless communication technologies, Internet of Things and Robotics and Autonomy technologies. For the Authorities, to ensure real time data flows in the most secure way is crucial and the adopted and implemented technologies ensure that. The existing software ensure the exchange of information in real time as well as their protection using sophisticated firewalls.

Road BCPs

5.4.9 Kakavia Road BCP (R2c branch), Greece

The Kakavia Road BCP is locates in Greece at the borders with Albania. The station was constructed in 1992 and the most recent interventions were made in 1998. There are Custom agents and Police officers serving 24 hours per day and a veterinary agent serving 8 hours per day. Although their facilities are considered to be sufficient, the number of working staff is considered to be insufficient according to the Custom Authorities.

In general, the level of the facilities is considered to be satisfactory. The existing X-Ray machine and the weighbridges are both considered to be in good level. The communication equipment and the available tracing means are in good level while the CCTV is in bad level.

The time needed for the controls to be implemented regarding the entering to Greece commercial vehicles varies from 20’ to 60’ while for those exiting the country varies from 10’ to 20’. Furthermore, both the entering and exiting commercial vehicles have to wait before the implementation of any controls for a time period from 10’ to 60’. The Authorities perform selective controls to every second vehicle and also 25% of the commercial vehicles are weighted (a process enduring 15’) and 35% pass through the X-Ray machine (a process enduring 20’). The station is linked to the Central Custom Offices but there is no communication with the Authorities of the neighbouring station in Albania. The main problems of the BCP concern the obsolete equipment and the facilities being in bad level.

The CONNECTA report mentions that the Kakavia-Kakavije BCPs cannot be considered an eQMS candidate site. Furthermore, it is mentioned at the report that the topography of the site creates difficulties regarding expansion of the existing facilities without requiring significant costs related to earthworks.

Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Kakavia-Kakavije BCPs the following:

- As strength (among others), the fact that the working staff is efficient taking into consideration the current needs.
- As weaknesses (among others), the lack of non-intrusive inspection equipment resulting the need of physical inspections which are labour-intensive and time consuming and that the cooperation between the teams of the two BCPs is not at the best level.
- As opportunity (among others), the construction of a one-stop-shop assuming that legal and institutional obstacles can be overcome.
- As threat (among others), the fact that freight traffic is growing over the last years.

5.4.10 Muriqan/ Sukobin Road BCP (R2b branch), Albania

The specific BCP was assigned to SEETO and due to the fact SEETO completed its mandate in 31 December 2018, available data is limited. Therefore, information was extracted from the CONNECTA report.

No commercial traffic is recorded through the BCP and thus the CONNECTA report had nothing to investigate.

5.4.11 Debeli Brijeg Road BCP, Montenegro

The Debeli Brijeg Road BCP is located in Montenegro at the borders with Croatia. The station was constructed in 2005. At the station there are Custom agents working 24 hours per day using sufficient facilities, but their number is considered by the Custom Authorities as insufficient. There are also Police officers, phyto-sanitary agents and veterinary agents but no additional information was provided concerning their working hours and sufficiency. As a newly constructed station the facilities are considered to be in good level as well as the communication equipment, tracing means and monitoring equipment (CCTV). However, there is no X-Ray machine and the existing weighbridge is in bad condition.

The time needed for the controls to be implemented concerning both entering and exiting Montenegro commercial vehicles varies from 5’ to 30’ (TIR vehicles 5’ to 15’). Furthermore, those vehicles must wait before the implementation of any controls for a time period from 5’ to 30’ (TIR vehicles 5’ to 15’). There is the ability of performing controls at separate areas but there is not the ability of simultaneous controls. The percentage of selective controls is 15%. The station is linked to the Central Custom Offices and also there is regular communication with the Croatian neighbouring BCP.

Trucks are regularly weighed at rate of 40%, on average and the time needed for this activity is 5’ (the International Vehicle Weight Certificate– Decision 2009/161/EC of 25 September 2008 is accepted). The station supports the usage of standardized international documents through the electronic custom platform (90% of the documents can be submitted electronically). Moreover, the One Stop Shop policy is supported as well as the

Electronic Single Window for Trade. The main problems of the BCP are the insufficient number of inbound and outbound lanes and the lack of space for a truck terminal.

5.4.12 Karasovici Road BCP, Croatia

The Karasovici Road BCP is located in Croatia at the borders with Montenegro. The station was constructed in 2004 and the latest interventions were made in 2018. At the station there are Custom agents and Police officers working 24 hours per day, but their number is considered insufficient according to the Custom Authorities. There are also phyto-sanitary and veterinary agents working 16 hours per day. The facilities as a newly constructed station are in good condition. The existing weighbridge is in good conditions as well as the communication and monitoring (CCTV) equipment.

The time needed for the controls to be implemented concerning both entering and exiting Croatia commercial vehicles varies from 2’ to 60’ (TIR trucks from 2’ to 20’). Furthermore, the waiting time before the implementation of any controls for the commercial vehicles (including TIR trucks) varies from 1’ to 180’.

There is the ability of simultaneous controls as well as controls at separate areas. Also, the percentage of selective controls is 5%. The station is linked to the Central Custom Offices and there is regular communication with the Authorities of the neighbouring BCP.

Although as mentioned on the above the existing weighbridge is in bad condition, all inbound commercial vehicles are weighted as well as 20% of the outbound vehicles. This process endures not more than 15’. The Trade Facilitation measure undertaken at the station concern the existence of Authorized Economic Operator (AEO) as well as Electronic Customs. As a result, all Customs Declarations can be submitted electronically. The main problems the BCP faces according to the Authorities are the insufficient number of officers and the lack of X-Ray scanners.

The CONNECTA report mentions that at the Debeli Brijeg-Karasovici BCPs the working staff between those two BCPs is unbalanced. The staffing level of the Croatian Border Police at Karasovici is higher than their Montenegrin colleagues, who are responsible not only for the Debeli Brijeg BCP but also for other three smaller BCPs in the area. The report mentions that this site is not an eQMS candidate.
Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Debeli Brijeg-Karasovici BCPs the following:

- As strengths (among others), the good level of cooperation between the teams of the two BCPs and the fact that the Croatian BCP at Karasovici was only recently refurbished.
- As weakness, the restrictions regarding possible expansion on the Montenegrin side due to the topography of the area.
- As opportunity, the construction of an inland clearance depot (ICD) could relieve the pressure on this site.

- As threat, the fact that freight traffic is growing over the last years.

5.4.13 Zatoni Doli Road BCP, Croatia

The Zatoni Doli Road BCP is located in Croatia at the borders with Bosnia and Herzegovina. The station was constructed in 2013. There are Custom Agents and Police officers working 24 hours per day but there are no phyto-sanitary and veterinary agents.

As a newly constructed station, the facilities are in good condition as well as the communication equipment. However, there is no X-Ray scanner but the existing weighbridge is in good condition. There are no tracing means available but the existing monitoring system (CCTV) is in good condition. The time period for the controls to be implemented concerning the entering to Croatia commercial vehicles varies from 10' to 30' (no respective time was given for the exiting commercial vehicles). Furthermore, the waiting time period before the implementation of the controls for both entering and exiting Croatia commercial vehicles varies from 2' to 30'.

At the station there is the ability of simultaneous controls as well as controls at separate areas. The vehicles are submitted to selective controls based on risk analysis. The station is linked to the Central Custom Offices and also there is regular communication with the Authorities of the neighbouring BCP. All trucks are weighted but the lack of X-Ray scanner is considered to be a problem. At the station all custom declarations can be electronically submitted.

5.4.14 Neum II (SE) Road BCP, Bosnia and Herzegovina

The Neum II Road BCP is located in Bosnia and Herzegovina at the borders with Croatia. The station was constructed in 2014 and thus is considered as a newly constructed BCP. At the station, there are Custom agents and Police officers working 24 hours per day. As expected for a new station, the facilities are in god condition as well as the communication equipment. However, there is no X-Ray scanner but the existing weighbridge is considered to be in good condition.

Through the station there is no traffic of commercial vehicles and thus no border controls are implemented. The station is not linked to the Central Custom Offices, however, there is regular communication with the authorities of the neighbouring BCP. The main problems according to the authorities are the lack of infrastructure, lack of communication, insufficient equipment for transitions and insufficient number of working staff.

The CONNECTA report considers the Zatoni Doli-Neum II BCPs as a unique case because the site processes predominantly Croatian-bound traffic travelling through a short corridor whilst transiting through Bosnia and Herzegovina. The report highlights the estimation that due to the opening of Peljesac Bridge, traffic volumes will drop significantly at this site. Furthermore, the report describes the Zatoni Doli BCP as a sister to Klek BCP because in reality traffic goes from one to another or vice versa. Both BCPs are 100% transit BCPs, processing the same traffic flows.

Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Zatoni Doli-Neum II BCPs the following:

- As strength, the fact that already high percentage of the traffic is cleared at inland clearance depots (ICDs).
- As weakness (among others), the fact that no trucks are allowed on Saturdays and Sundays during summer resulting impacts on national exporting and importing enterprises.
- As opportunity, the opening of Peljesac Bridge will relieve the pressure from this site allowing the authorities to choose a new role for this site.
- No major threats were identified.

5.4.15 Neum I (NW) Road BCP, Bosnia and Herzegovina

The Neum I Road BCP is located in Bosnia and Herzegovina at the borders with Croatia. The station was constructed in 2013 and thus is considered as a newly constructed BCP. At the station, there are Custom agents and Police officers working 24 hours per day. As expected for a new station, the facilities are in god condition as well as the communication equipment. However, there is no X-Ray scanner but the existing weighbridge is considered to be in good condition.

Through the station there is no traffic of commercial vehicles and thus no border controls are implemented. The station is not linked to the Central Custom Offices, however, there is regular communication with the authorities of the neighbouring BCP. The main problems according to the authorities are the lack of infrastructure, lack of communication, insufficient equipment for transitions and insufficient number of working staff.

5.4.16 Klek Road BCP, Croatia

The Klek Road BCP is located in Croatia and the borders with Bosnia and Herzegovina. The station was constructed in 2012 and is considered to be a newly constructed BCP. At the station, there are Custom agents and Police officers working 24 hours per day. The facilities are in good condition as well as the communication equipment. Although there is a weighbridge in good condition, there is no X-Ray scanner available.

The time needed for the controls to be implemented concerning the entering commercial vehicle varies from 3’ to 10’ (TIR trucks from 2’ to 5’), while for those exiting from 2’ to 7’ (TIR trucks 1’ to 5’). Furthermore, all commercial vehicles both entering and exiting Croatia, have to wait before the implementation of the controls for a time period from 2’ to 15’.

The station is linked to the Central Custom Offices and moreover the authorities have established regular communication with the authorities of the neighbouring BCP. At the station there is the ability for the performance of controls at separate areas but not simultaneous and also the percentage of selective controls is 20%.

The available trade facilitations at the station concern the Authorized Economic Operator, binding rulings, electronic customs, clearance of dry ports and/ or importers' premises and the usage of only standardized international documents. As a result, all custom declarations can be submitted electronically including the T2L procedure.

The main problems of the BCP according to the authorities concern the heavy traffic of passenger vehicles during the summer period and the parking areas for the vehicles' inspection. The authorities suggest the enlargement of the transit areas in order congestion phenomena during the summer period to be avoided.

The CONNECTA report describes the Neum I-Klek BCPs as a de facto Joint BCP or one-stop shop as the Bosnian officers are co-located in the booths next to their Croatian colleagues.

Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Neum I-Klek II BCPs the following:

- As strength, the fact that already high percentage of the traffic is cleared at inland clearance depots (ICDs).
- As weakness (among others), the limited possibilities of expanding the facilities due to the area's topography.
- As opportunity, the opening of Peljesac Bridge will relieve the pressure from this site allowing the authorities to choose a new role for this site.
- No major threats were identified.

5.4.17 Bijaca Road BCP, Bosnia and Herzegovina

The Bijaca Road BCP is located in Bosnia and Herzegovina at the borders with Croatia. The station was constructed in 2013 and the latest interventions were made in 2018. At the station there are Custom agents and Police officers working 24 hours per day. There are also phyto-sanitary agents working 12 hours per day and also veterinary agent(s).

The facilities in general are considered to be in good condition as well as the communication equipment. There is weighbridge available in satisfactory condition but there is no X-Ray scanner. Also, the installed monitoring equipment (CCTV) is operational and in good condition.

The time period needed for the controls to be performed concerning both entering and exiting Bosnia and Herzegovina commercial vehicles varies form 5' to 30'. Furthermore, those vehicles must wait before any controls are implemented for a time period from 5' to 30'.

The station is linked with the Central Custom Offices and there is regular communication with the authorities of the neighbouring BCP. However, no selective controls are performed at the station. However, trucks are weighed at the station depending on the type of goods that are transported. The weighing procedure itself takes very short, approximately 5 minutes.

The available trade facilitations at the station concern the Authorized Economic Operator and the usage of only standardized international documents. Moreover, the One Stop Shop police is supported and implemented. However, the electronically submission of the custom declarations is not supported.

According to the authorities the station needs to be maintained and the number of the working staff to be increased as it is considered insufficient.

The CONNECTA report mentions that at the Bijaca-Prud BCPs the facilities were recently renovated.
Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Bijaca-Prud BCPs the following:

- As strengths (among others), the strategic importance of this sit is recognized by both governments and the fact that already high percentage of the traffic is cleared at inland clearance depots (ICDs).
- No major weaknesses were identified.
- As opportunity, the willingness of both governments to transform the site to a joint border crossing facility, the possibility of further relief pressure by moving all imports and exports to inland clearance depots (ICDs), the opportunity to construct a one-stop shop in case institutional and legal obstacles can be overcome and finally if Bosnia and Herzegovina access EU all procedures and processes will be simplified.
- As threat, the report mentions the significant expansion of the Port of Ploče which can lead to increased traffic flows from the Port through Corridor Vc to Hungary through this site and also the fact that traffic flows are growing at a notably high rate every year.

5.4.18 Metkovic Road BCP, Croatia

The Metkovic Road BCP is located in Croatia at the borders with Bosnia and Herzegovina. The station was constructed in 2012. At the station there are Custom agents and Police officers working 24 hours per day. There are also phyto-sanitary and veterinary agents working 8 hours per day.

The facilities are considered to be in good condition as we all the communication equipment. There is weighbridge available in satisfactory condition but there is no X-Ray scanner. Also the installed monitoring equipment (CCTV) is operational and in good condition.

The time period needed for the controls to be performed concerning entering Croatia commercial vehicles varies from 5' to 30' (TIR trucks 2' to 10') while for those exiting from 5' to 20' (TIR trucks 2' to 10'). Furthermore, those vehicles must wait before any controls are implemented for a time period up to 15'. At the station selective controls are performed at 30% of the vehicles at separate areas. Moreover, all inbound commercial vehicles are weighted while only 60% outbound. The station is linked to the Central Custom Offices and also there is regular communication with the authorities of the neighbouring BCP.

The available trade facilitations at the station concern the Authorized Economic Operator, binding rulings, electronic customs, clearance of dry ports and/ or importers' premises and the usage of only standardized international documents. As a result, all custom declarations can be submitted electronically including supporting documents.

According to the authorities, the main problem is that the traffic lanes for commercial vehicles and goods inspections are not closed. The number of working staff has to be increased and also financial agency should be established in order the provided services to be improved.

The CONNECTA report mentions that at the Metkovic-Doljani BCPs is open only to buses and passenger cars and thus no freight flows are recorded.

5.4.19 Bosanski Samac Road BCP, Bosnia and Herzegovina

The Samac Road BCP is located in Bosnia and Herzegovina at the borders with Croatia. The station was constructed in 2006 and since then no interventions were made. At the station there are Custom agents and Police officers working 24 hours per day. Phyto-sanitary controls are also implemented.

The facilities are considered to be in good condition as we all the communication equipment. There is weighbridge available in satisfactory condition but there is no X-Ray scanner. Also, the installed monitoring equipment (CCTV) is operational but is considered to be in bad condition.

The time period needed for the controls to be performed concerning both entering and exiting Bosnia and Herzegovina commercial vehicles varies from 5' to 30'. Furthermore, those vehicles must wait before any controls are implemented for a time period from 5' to 60'. At the station selective controls are performed if needed at separate areas. The station is not linked to the Central Custom Offices but there is regular communication with the authorities of the neighbouring BCP.

No information was provided regarding available trade facilitations at the station.

According to the authorities, the main problem is the necessity of maintaining the BCP. Also, the number of the Police officers has to be increased.

The CONNECTA report mentions that at the Bosanski Samac-Slavonski Samac BCPs and specifically at the Bosanski Samac BCP the current layout creates problems for trucks coming from the opposite direction. The reports also mention that the BCP is not properly equipped for non-intrusive checks. Also, due to the fact that most of import trucks are cleared on the Bosnian side, the report proposes specific measure for relieving the pressure created at the Bosnian side.

Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Bosanski Samac-Slavonski Samac BCPs the following:

- As strengths (among others), the good level of cooperation between the teams of those two BCPs and that the traffic lanes have proper signage.
- As weaknesses (among others), the lack of sufficient traffic lanes during peak periods, the non-optimal layout of the site.
- As opportunities (among others), to construct a one-stop shop in case institutional and legal obstacles can be overcome on the Bosnian side and if brokers use Advance Notification for import trucks can assist to reduce congestion during peak periods.
- As threat, the fact that traffic flows are growing at a notably high rate every year.

5.4.20 Zupanja Road BCP, Croatia

The Zupanja Road BCP is located in Croatia at the borders with Bosnia and Herzegovina. The station was constructed in 2017. At the station there are Custom agents and Police officers working 24 hours per day. Phyto-sanitary controls are performed by calling agent when is necessary.

The facilities are considered to be in good condition as we all the communication equipment. There is weighbridge available in satisfactory condition but there is no X-Ray scanner. Also, the installed monitoring equipment (CCTV) is operational and in good condition.

The time period needed for the controls to be performed concerning entering Bosnia and Herzegovina commercial vehicles varies from 5’ to 60’ (TIR trucks 2’ to 30’) while for those exiting from 5’ to 15’ (TIR trucks 1’ to 10’). Furthermore, those vehicles must wait before any controls are implemented for a time period up to 5’. At the station selective controls are performed at 5% of the vehicles at separate areas. Moreover, all inbound and outbound commercial vehicles are weighted. The station is linked to the Central Custom Offices and also there is regular communication with the authorities of the neighbouring BCP.

The available trade facilitations at the station concern the Authorized Economic Operator, advance filing, binding rulings, electronic customs, clearance of dry ports and/ or importers' premises and the usage of only standardized international documents. As a result, 90% of custom declarations can be submitted electronically.

No information was given regarding the main problem of the BCP or any suggestion on how the provided services could be improved.

5.4.21 Batrovci Road BCP, Serbia

The Batrovci Road BCP is located in Serbia at the borders with Croatia. The BCP was constructed in 2006 and the last interventions were made in 2009 concerning mainly the construction of a weighbridge serving the commercial vehicles entering the BCP.

The agencies present at the BCP are: Customs with insufficient number of staff working 24/7, Police with unknown level of sufficiency concerning the number of staff working 24/7, Phytosanitary and Veterinary with insufficient number of staff working Monday to Friday 24/7 and during the weekends from 19:00 to 07:00. No other Agencies are present at the BCP.

The facilities in general are in satisfactory level as well as the communication equipment. There are weighbridge and an X-Ray scanner in good condition. However, the existing monitoring equipment (CCTV) is considered insufficient to cover the entire BCP area.

For the commercial vehicles both entering and exiting Serbia the time period for the controls to be implemented varies from 30' to 90' (TIR trucks from 10' to 30'). Furthermore, the commercial vehicles (both entering and exiting) have to wait before the implementation of the controls for a time period from 1' to 40' (including TIR trucks).

The station is linked to the Central Custom Offices and also there is regular communication with the authorities of the neighbouring BCP.

The main problems of the BCP as reported by the Authorities are the insufficiency of the provided parking places, the insufficiency of the number of the Custom Agents, the insufficient number of lanes per direction serving the vehicles, the inexistence of a terminal for the Custom Agency and the inexistence of separate areas for the detailed inspections to be performed. Moreover, the bad level of the facilities and of the electric and water supply networks make the work of the staff even harder.

The CONNECTA report mentions that due to the fact that the Bajakovo-Batrovci BCPs process significant traffic volumes, increasing working staff and constructing additional control lanes, must be augmented with electronic pre-clearance and the usage of technologies, for example National Single Window and eQMS, to support operation and therefore relief the current pressure.

The report emphasizes the fact both customs and border police have their own separate information systems including internet and intranet connections as well as supporting equipment.
Furthermore, the CONNECTA report emphasizes through a SWOT analysis for the Bajakovo-Batrovci BCPs the following:

- As strengths (among others), the usage of tidal lanes allows operational flexibility to add capacity as and when needed and that inbound and outbound trucks are organized by type of cargo or priority cargo such as perishable or hazardous material so as to give them priority for processing.
- As weaknesses (among others), the fact that there are visual checks instead of 100% selected examinations based on risk profiles, that not all traffic lanes are staffed during peak periods and that there are no designated traffic lanes for NCTS, TIR (transit) or AEO.
- As opportunities (among others), the construction of extra traffic lanes for trucks as well as a lane for when the NCTS system gets implemented and the construction of a one-stop-shop assuming that legal and institutional obstacles can be overcome.
- As threat (among others), the fact that the current facilities are near the end of their useful life.

5.4.22 Gorican Road BCP, Croatia

The Gorican Road BCP is located in Croatia at the borders with Hungary. The BCP was constructed in 1993.

The agencies present at the BCP are: Customs working 24/7 but the sufficiency of the number of staff it was not reported, Police with insufficient number of staff working 24/7, Phytosanitary working from 07:00 to 19:00 sufficient number of working staff and Veterinary working from 07:00 to 24:00 with sufficient number of working staff as well.

The facilities in general are in satisfactory level as well as the communication equipment. There are weighbridge and an X-Ray scanner in good condition.

For the commercial vehicles both entering and exiting Croatia the time period for the controls to be implemented varies from 2’ to 8’. Furthermore, the commercial vehicles (both entering and exiting) have to wait before the implementation of the controls for a time period from 5’ to 10’.

The station is not linked to the Central Custom Offices but there is regular communication with the authorities of the neighbouring BCP. The authorities reported that selective controls are performed at 5% of the total traffic. Also it was reported that at the BCP “Green lanes” are installed.

The main problems of the BCP as reported by the Authorities is the insufficient number of Police officers.

5.4.23 Bregana Road BCP, Croatia

The Bregana Road BCP is located in Croatia at the borders with Hungary. The BCP was constructed in 2005.

The agencies present at the BCP are: Customs with insufficient number of staff working 24/7, Police with insufficient number of staff working 24/7, Phytosanitary and Veterinary with insufficient number of staff working Monday to Friday from 07:00 to 19:00 and on Saturday from 07:00 to 13:00. There are also other Agencies present at the BCP but the sufficiency of their staff or the working hours were not reported.

The facilities in general are in satisfactory level as well as the communication equipment. There are weighbridge and an X-Ray scanner in satisfactory condition.

For the commercial vehicles both entering and exiting Croatia the time period for the controls to be implemented varies from 2' to 5'. Furthermore, commercial vehicles (both entering and exiting) have to wait before the implementation of the controls for a time period from 10' to 120'.

The station is not linked to the Central Custom Offices and there is regular communication with the authorities of the neighbouring BCP. Although there are selective controls performed at the BCP, their percentage compared to the total traffic was not reported by the Authorities. All the controls are performed simultaneously and in case of a suspicious vehicle the controls are performed at separate areas. The BCP provides services of the so called "Green Lanes" for the passenger vehicles.
The main problems of the BCP as reported by the Authorities is the insufficient number of working staff and the condition of the existing equipment.

5.4.24 Obrežje Road BCP, Slovenia

The data submitted is considered as inadequate and therefore the description of the station is not possible.

Rail BCPs

5.4.25 Tuzi Rail BCP, Montenegro

The Tuzi Rail BCP is located in Montenegro at the borders with Albania. The station was constructed in 2013 and is considered to be a new station.

Although no detailed information was provided through the survey, the authorities of the BCP reported that the major problem is the lack of IT infrastructure highlighting the lack of internet connection.

5.4.26 Bajza Rail BCP (R2 branch), Albania

The Bajza Rail BCP is located in Albania at the borders with Montenegro. The station was constructed in 1985 but the station was reconstructed in 2014. There are neither Custom agents nor Police officers at the Bajza BCP. However, Albanian custom agents and police officers are stationed at the Tuzi BCP in Montenegrin territory providing their services for 12 hours per day. Furthermore, at Tuzi a phyto-sanitary agent is also stationed working 12 hours per day.

As a newly constructed station the facilities are in good condition as well as the supporting equipment (computer). However, there are no telephone and internet connections. The missing telephone line is further stipulated within the provisions of the Protocol agreed between both infrastructures of Albania and Montenegro. Given notices and received notices and orders in traffic activities are recorded in the telegraph and telephone Book (Order no. from TT diary Form S-43). Service Inspector of IM-HSH via mobile Telephone of Albanian personnel on duty communicates directly to a fixed phone number foreman for movement of ZICG. The mobile phone no. is available during service and valid only on purpose of regulation of traffic on this line via mobile phone. Other use of private mobile phone for official purpose is not allowed. The recording system of ZICG via fixed land telephonic line is provided for registration of conversations. All general Orders are written and signed by the foreman for movement (ZICG-MNE) and Service Inspectors (IM-HSH).

There are no tracing means at the station and also there is no CCTV system. The time needed foe the controls to be performed concerning both entering and exiting Albania freight trains varies from 15' to 40'. Furthermore, the time needed for the freight trains to wait before the implementation of the controls for those entering can be up to 120' and for those exiting up to 80'. Specific controls can be performed in board (brake controls) but there are no simultaneous controls performed.
Although there is not internet or telephone connection, and thus the station is not linked to the Central Custom Offices, the authorities have regular communication with the authorities of the neighbouring BCP.

The main problem of the BCP according to the authorities, is that domestic and border freight transport is performed by the ALBANIAN RAILWAYS TRAINS (HSH), of which incoming trains of tractions vehicles of HSH locos are using the foreign wagons entering in the Albanian railway territory. On the other hand, outgoing empty trains are going back to TUZI joint rail station and the border Zone, since none of the rolling stock of HSH has got a Vehicle Authorization V.A.

There are many plans regarding the development of the BCP (the border railway station of Bajze incorporated to the DD study project of rehabilitation of Vora-Hani i Hotit granted by WBIF/EC and Lead IFI EBRD. The promoter of the project is MIE and beneficiary HSH and the project kicked-off in July 2018. The priority project is based on economic/financial evaluation of the entire Albanian railway network in the scenario

Shkodra-Hani i Hotit. The border section is further prioritized according to the CBA and MCA based on the EU Guidelines and on the Decision of the NIC National Investment Committee. The project /incl. rehabilitation of Bajza border station is already adopted in the DoCM 811/2016 for Approval of the Transport Sector Strategy NTS and Action Plan 2016-2020. The project is at implementation of CRSMP 2018 for the regional participant Albania and published in the SEETO web portal).

Regarding the suggestion reported by the authorities of the BCP, planning and deployment of ERTMS and EDI as well as RAILDATA, RNE are considered to be very important. Other suggestions reported concern the modernization of rolling stock for HSH as well as the rehabilitation of the Albanian railway network in the core Transport network.

5.4.27 Capljina Rail BCP (Vc branch), Croatia

The Capljina Rail BCP is located in Croatia at the borders with Bosnia and Herzegovina. The station was constructed in 2018. There are Custom agent(s), phyto-sanitary agent(s) and veterinary agent(s) stationed at the BCP, but no additional information was provided regarding their sufficiency or working hours.

As a newly constructed station, the facilities are in good condition, as well as the communication equipment. There are no tracing means installed at the station.

The time needed for the implementation of the controls concerning both entering and exiting Croatia freight trains is 30’. Furthermore, the trains have to wait 30’ before the implementation of any controls.

The station is linked with the Central Custom Offices and also there is regular communication with the authorities of the neighbouring BCP. Finally, no major problems were reported by the BCP’s authorities.

5.4.28 Capljina Rail BCP (Vc branch), Bosnia and Herzegovina

The other Capljina Rail BCP is located in Bosnia and Herzegovina at the borders with Croatia. The station was constructed in 1974 and was renovated in 2014 regarding the facilities and part of the railway network.

There are Custom agents and Police officers at the station working 24 hours per day. The facilities are in good condition. Beside the telephone connection being in good condition, both the supporting equipment (computer) and internet connection are in bad condition. Although there are no tracing means available at the station, there is radioactivity control equipment in good condition.
The time needed for the controls to be implemented concerning both entering and exiting freight trains varies from 25’ to 105’. Furthermore, the waiting time before the implementation of the controls for both entering and exiting freight trains varies from 30’ to 70’.

The station is linked to the Central Custom Offices and also there is regular communication with the authorities of the neighbouring BCP.

The major problems according to the BCP's authorities concern the outdated supporting and communicating equipment and the insufficient number of Police officers. Finally, the authorities suggest that a precise protocol procedure between the services of Bosnia and Herzegovina and the Republic of Croatia is needed.

5.4.29 Bosanski Samac Rail BCP (Vc branch), Bosnia and Herzegovina

The Bosanski Samac Rail BCP is located in Bosnia and Herzegovina at the borders with Croatia. The station was constructed in 1947 and in 2003 was renovated. At the station there is a Custom agent working 24 hours per day and Police officers working 24 hours per day as well. Also, a phyto-sanitary agent provides services when acquired.

The facilities overall are in satisfactory condition. The supporting equipment (computer) is in good condition but there is no internet connection. Although there are no tracing means available, radioactivity control equipment is available.

The time needed for the controls to be implemented concerning both entering and exiting freight trains varies from 45' to 150'. Furthermore, the waiting time before the implementation of the controls for both entering and exiting freight trains varies from 5' to 10'.

The station is linked to the Central Custom Offices and also there is regular communication with the authorities of the neighbouring BCP.

5.4.30 Dobova Rail BCP, Slovenia

Despite several attempts on behalf of the responsible on collecting the respective data through the questionnaire based survey (LK, Port of Koper) no feedback is provided up to date.

5.4.31 Koprivnica Rail BCP, Croatia

The Korpivnica Rail BCP is located in Croatia at the borders with Hungary. The data submitted is considered as inadequate and therefore the description of the station is not possible.

Road network

The information regarding the road network of the Med Corridor along the Western Balkan countries is extracted from the "CEF support to Mediterranean Corridor, February 2018" of the European Commission. It must be mentioned that the report concerns the Med

Corridor and not the WB countries related to the Corridor. Therefore, is not possible to distinguish those actions that concern the WB countries.

According to the report, the road network is compliant about 100%. There is a significant budget regarding actions for the deployment of Intelligent Transport Systems (ITS) as well as actions concerning the installation of supply point for alternative fuel for road transport.

According to the "Connectivity Agenda, Co-financing of Investment Projects in the Western Balkans, July 2018" of European Commission, several co-financed investment projects in the Western Balkans concern the Med Corridor as presented in Table 4.4.

Table 4. 4. Co-financing of Investment Projects in the Western Balkans in 2018

#	Beneficiary	Description / Title
1	Bosnia and Herzegovina	Mediterranean Corridor: Bosnia and Herzegovina - Croatia CVc Road Interconnection, Tarčin - Ivan Subsection I
2	Bosnia and Herzegovina	Mediterranean Corridor: Bosnia and Herzegovina - Croatia CVc Road Interconnection, Tarčin - Ivan Subsection II
3	Bosnia and Herzegovina	Mediterranean Corridor: Bosnia and Herzegovina - Croatia CVc Road Interconnection, Buna - Počitelj Subsection
4	Montenegro	Mediterranean Corridor: Montenegro - Croatia - Albania R1 Road Interconnection, Budva Bypass

Actions #1 and #2

This investment project1 will construct approximately 4.9 km of new motorway on a subsection of the Mediterranean Core Network (Corridor Vc) in Bosnia and Herzegovina. It is the fifth pledge made by the EU on the same Corridor since 2015, with the aim of connecting Bosnia and Herzegovina to Hungary and Croatia and thus to the Adriatic Sea. The segment to be funded under this project will improve connections between Sarajevo and Mostar via the Sarajevo South (Tarčin) – Mostar North motorway. It will decrease travel time between the two cities as well as offer better and safer access routes to larger urban areas for the citizens living in the rural areas surrounding the proposed development. The expected benefits of the project concern the substantial decrease in travel time between Sarajevo and Mostar, an increase in annual traffic by more than 3,500 vehicles, matched with adequate safety and security conditions, the reduction of accidents rates by 7% and of vehicle operating costs by 6% and finally the improved trade flows with the countries in the region. The project estimated start date in mid-2019 and the estimated end date is end of 2022.

Action #3

This investment project will build approximately 7.2 km of new motorway on a subsection of the Mediterranean Core Network (Corridor Vc) in Bosnia and Herzegovina. The new section will shorten the distance and improve overall traffic conditions between Mostar and Croatia, as part of the larger motorway section between Mostar North and Bijača border crossing point with Croatia. The main benefit of the project (among others) will be the substantial decrease in travel time between Mostar and Croatia.

Action #4

This investment project will build an 8.5 km-long priority bypass around Budva, a 2,500-year-old Montenegrin town on the Adriatic coast. The Budva bypass is part of an EU driven initiative to develop a modern transport route along the extension of the Mediterranean Core Network Corridor in the Western Balkans. Also known as the Adriatic–Ionian Expressway or the Blue Highway, the new development will create a seamless route from Trieste in Italy to Greece, while branching out to Slovenia, Croatia, Montenegro, and Albania. Integrating Bosnia and Herzegovina is also being considered. The main benefits of the project concern the substantial decrease in travel time along the Croatia – Montenegro – Albania route, the reduction in accident rate and vehicle operating costs and the improved trade flows with countries in the region.

Rail network

The main findings of the above-mentioned report concern the different track gauges, limited ERTMS deployment, restrictions in terms of train length and axle load. The foreseen actions expect to adapt, upgrade and improve several km of railway lines, addressed to 28 identified bottlenecks.

5.5 Scandinavian – Mediterranean Corridor

Ports

5.5.1 Port of Ancona, Italy

Despite several attempts on behalf of the responsible on collecting the respective data through the questionnaire based survey (ITL, Fondazione Istituto sui Trasporti e la Logistica) no feedback is provided up to date.

5.5.2 Port of Bari, Italy

Despite several attempts on behalf of the responsible on collecting the respective data through the questionnaire based survey (ITL, Fondazione Istituto sui Trasporti e la Logistica) no feedback is provided up to date.

5.6 Baltic - Adriatic Corridor

Along the Baltic – Adriatic Corridor the ports participating in the ADRIPASS project are Venice, Trieste, Ravenna and Koper, which are already presented in the Mediterranean Corridor description.

5.7 Rhine – Danube Corridor

Inland Water Ways Ports

5.7.1 Slavonski Brod IWW Port, Croatia

The Slavonski Brod IWW Port is located in Croatia and is still under construction although the constructing process began in 2018. The port is state owned and under the control of Ministry of the Sea, Transport and Infrastructure.

At the port the supported and provided services in relation to the existing terminal are those of: container transport, general cargo transport, timber, dry bulk transport, silo, liquid cargoes and finally cruise traffic.

No additional information was provided regarding the port's equipment and communicating tools. The port is accessible by road and rail regarding freight transport.

The suggestions made by the port's authorities concern the construction and upgrade of infrastructure. Slavonski Brod and its connections with the rail, road and IWW TEN-T network, aim to increase the use of inland waterway transport on the Rhine-Danube Corridor and ensure a good navigation status of the Danube. This will be achieved by upgrading the basic port infrastructure and the supporting transhipment operations in Slavonski Brod.

The scope of ongoing actions (March 2017 – March 2020) is the following:

- Capital dredging works in the Sava river area in front of Slavonski Brod port vertical quay;
- Construction of two new vertical quays and a handling and logistics area;
- Construction of an industrial road network, industrial rail tracks and a crane rail;
- Construction of two handling and logistics area;
- Upgrade and installation of the port public utilities infrastructure.
- Construction of a Port weigh house.

The project "Construction and upgrading of infrastructure in the port of Slavonski Brod" is a project of great significance for the Republic of Croatia and the European Union, as it is situated at the border between the Republic of Croatia and Bosnia and Herzegovina, thus representing the first and the only international input port of the European Union. Through a railway network, the port Slavonski Brod is connected to the major Croatian seaports Ploče, Split, Zadar and Rijeka. The project comprises the construction of the vertical coast, two piers, installation of the equipment for handling the goods (cranes), the construction of weighing clams, container- and RO-LA terminals and other related facilities. The project is part of the global project of developing the inland port Slavonski Brod, which will create a better system of inland waterways navigation of the TEN-T network and improve freight handling at the Sava River waterways.

The result of this investment will include:

- upgraded infrastructure,
- enhanced inter-mobility and improved transhipment procedures in the road, railway and river transport,
- increased capacities of the port Slavonski Brod and, consequently, of the total capacity of the corridor,
- promoted development of the internal river navigation,
- improved business activity in the port, its rear area and the region as a whole,
- transhipment of cargo from road- and railway- to the river transport resulting in lower transport costs for final consumers.

The construction of planned capacities in the operational part of the port will enable performing of port operations and providing port services to concessionaries in the business zone with considerable savings in the process of transporting raw materials or finished products, as well as further development of the port of Slavonski Brod and increase in freight on inland waterways.

Another project concerns the construction of a Dangerous Goods Terminal in the Port Area Slavonski Brod. The importance of the future Terminal:

- Storage and transhipment of petroleum products, to:
    - ship supply and reception of oil-water and faecal,
    - transhipment of petroleum products to final beneficiary.
- Current ship supply is unsafe because waste disposal of liquids (water, oil, faecal) not exist.
- Dangerous goods Terminal is relevant for environmental protecting on Sava river (water, coast, plants, animals) – in Croatia and the other countries.

No additional information was provided including any ICT solutions and tools implemented at the IWW Port of Slavonski Brod.

5.7.2 Vukovar IWW Port, Croatia

No data submitted.

5.7.3 Brčko IWW Port, Bosnia and Herzegovina

The Brčko IWW Port is located in Bosnia and Herzegovina and was constructed in 1913. The latest interventions were made in 2005 concerning the revitalization of overhaul mechanism. The port is private owned.

At the port the supported and provided services in relation to the existing terminal are those of: container transport, general cargo transport, timber, dry bulk transport, silo, liquid cargoes and finally cruise traffic.

No additional information was provided regarding the port's equipment and communicating tools. The port is accessible by road and rail regarding freight transport and also transhipment is supported. Through the port as outbound traffic per year 4,800 trucks and 19 ships are served while as inbound traffic per year 800 trains and 40 ships are served.

The port is equipped with two portal cranes with capacity of up to 6 tons, three forklifts and one loader.

The identified by the port authorities' critical issues and main bottlenecks concern the following;

- As far as customs and other goods and services are concerned, when it comes to road, river or rail, at time can be timely and costly.
- As far as customs terminal and vehicle processing are concerned, the procedure can be long.
- Regarding the procedures of arrival and departure of goods by river, they are relatively effective, the problem is the lack of a Customs Report in Brčko for River Traffic.
- Regarding the arrival of goods by rail, it is very often a delay in lowering wagons in the harbor as well as their extraction as well as limited working hours Railways.
- As for the narrow throats in Lule, there is a lack of certain manipulative mechanisms and equipment for manipulating objects in waters. Lack of certain storage capacity for certain types of goods.

The main problems are the limited navigation and launch period for commercial vessels of more than 2 meters. The reported future plans for developing the port concern the realization of certain projects funded by the World Bank and the EBRD, when it comes to improving the working conditions (purchase of larger capacity cranes, procurement of manipulative conveyor mechanisms, storage of infrastructure in Port). It is critical for the authorities the port to be properly equipped and investments to be made regarding the infrastructure.

The port has developed co-operation with the Neum I, Neum II, Bosanski Samac, Capljina and Bijaca Road BCPs as well as the Neum I, Neum II, Bosanski Samac and Capljina Rail BCPs.

The time needed as an average value for a truck to be served is up to 12', for a train up to 30' and finally a ship requires 16 hours so that 1,500 tons are unloaded.

It is the authorities' belief that the performance of the BCPs affect the level of their provided services.

5.7.4 Novi Sad IWW Port, Serbia

No data submitted.

5.7.5 Belgrade IWW Port, Serbia

No data submitted.

5.8 Logistic Facilities

As logistic facilities for the needs of the ADRIPASS project are considered those facilities in which logistics activities are performed and which are located in the countries of interest of the project. Those facilities are parts of the logistic supply chain of the area and their affected by the performance of the Road and Rail BCPs as well as the maritime ports. Therefore, it was decided to implement a questionnaire-based survey addressed to the authorities of those facilities aiming to identify the problems they face in relation to the performance of the Road and Rail BCPs as well as the maritime of IWW ports in their countries. However, although some questionnaires were filled and returned to be used as feedback, it was decided that those facilities won't be evaluated in order to avoid legal issues as some of them are private companies (an evaluation could affect their image in the national as well as the international market). Therefore, regarding the information collected by the respective questionnaire-based survey, it will only be presented thoroughly in the paragraphs to follow.

5.8.1 Padova freight village, Italy

The terminal was constructed in 1973 and the latest interventions were made in 2017 concerning a) constructing of a new gate in the east part of the terminal, b) increasing the length of rail tracks up to 750m and c) constructing new rail tracks for loading and unloading.

The terminal is public/ state owned by Comune di Padova, Provincia di Padova, Camera di Commercio di Padova and Ferriovie dello Stato. At the terminal can be served commercial trucks and trains. Specifically, 50 trains per week as served as outbound traffic (to La Spezia, Genova Voltri, Rotterdam, Melzo, Genoca M.Ma, Livorno, Trieste, Bari, Incoronata and Cervignano) as well as 58 as inbound traffic (from La Spezia, Genova Voltri, Rotterdam, Melzo, Genova M.Ma, Livorno, Trieste, Bari, Incoronata and Cervignano). Overall, more than 5,500 trains per year are moved at the terminal. Regarding the rail infrastructure, Nuovo Grande Terminal is equipped with 2 sets of 3 tracks and 1 set of 2 tracks (each of 750m length) and the Terminal Fs Logistica is equipped with 8 tracks of 450m of each length maximum. Moreover, regarding the intermodality equipment, there are 4 rail mounted gantry cranes (RMG) since 2018 and 14 wheeled cranes (6 for empty containers and 8 for full containers).

Concerning the development of the terminal, the plans reported by the authorities are the following:

- Enhancing the efficiency of the new container terminal of Interporto di Padova. The Action is part of the Global Project - 'Development of multimodal logistics platform of Padova'. The Action aims at further developing the multimodal logistic platform of Padova by improving its intermodal transhipment as well as its storage capacity. The project will include the installation of high-efficiency fix rail-based gantry cranes, increasing the number and extending the length of rail tracks to accommodate 750 m trains as well as redefining the terminal layout. In long term the project will improve the performance of the terminal, facilitate modal shift and can lead to a reduction of CO2 emissions.
- Enhancing Interporto di Padova - Step 2: ancillary measures and ICT solutions for optimising terminal operations, accessibility and interconnections. The project is part of the Global Project - 'Development of multimodal logistics platform of Padova'. The CEF 2015 proposal aims at fully exploiting all the potentials arising from the infrastructural improvements gained from the ongoing CEF 2014 project maximising the efficiency in the operations performed within the terminal by setting an ICT infrastructure providing a centralized management system making large use of automation. It furthermore addresses the optimization of traffic flows and operations within and outside the terminal, extending flows monitoring and information exchange along the corridors heading to Interporto Padova.

Finally, concerning the ICT solutions and tools implemented at the terminal, these are a) Wireless communication technologies and b) Internet of Things.

5.8.2 Trieste freight village, Italy

The terminal was constructed in 1972 and the latest interventions were made in 2015 concerning shuttle service by rail linking Molo V and Fernetti Interport to carry semitrailers to/ from Ro-Ro terminal (Molo V).

The terminal is public/ state owned by Autorita di Sistema portuale di Trieste, Camera di Commercio di Trieste, Comune di Trieste and Comune di Monrupino. The terminal can serve commercial vehicles and trains. Specifically, per week 6 trains are served as outbound and as inbound traffic as Ro-La to and from Salzburg, Austria. Overall, two Ro-La trains from/ to Molo V (Port of Trieste) are active 5 days a week carrying 20 trucks each. Furthermore, general cargo trains arrive and depart from the Interport of Trieste. Regarding the rail infrastructure there are 3 rail tracks of 450m length each and 3 rail tracks of 350m length each.

Concerning the development of the terminal, the plans reported by the authorities are the following:

- Construction of a new apron for trucks and for containers at the areas once called ex Wärtsilä (270,000m^2).
- Adjustment of railway (connection with Aquilinia station) and warehouse at the areas once called ex Wärtsilä.

- Electrification of the rail yard (activity 6.1 of the ADRI UP project): the aim of this project is to boost the link of the Interport of Trieste with the electric-powered line Villa Opicina – National border.
- Logistics facilities to support intermodality (activity 6.2 of the ADRI UP project): the action consists in new warehouse facilities for the organisation of the cargo flows and in the preparation of intermodal units for delivery: 1) 800 m^2 shed next to existing warehouses; 2) a new warehouse of 3,000 m^2 for various goods adjacent to the railway embankment beam rails north side.

Finally, concerning the ICT solutions and tools implemented at the terminal, these are a) Port Community System, b) Cloud Computing, c) Wireless communication technologies, d) Internet of Things and e) Big Data Analysis.
Based on the fact that a Port Community System is implemented in the terminal, the stakeholders participating and for which services are the following:

- Waterways
    - Departures & Arrivals. The stakeholders participating is: a) shipping agents, b) Port Authority and c) Official Bodies.
    - Bookings. The stakeholders participating is: a) Shipping agents and b) Port Authority.
    - Shuttle Instructions. The stakeholders participating is: a) Port Authority and b) Official Bodies.
- InterPort Operations
    - InterPort Calls Management. The stakeholders participating are the Shipping agents.
    - Dangerous Goods Management. The stakeholders participating is: a) Shipping agents, b) Terminal operators and c) Port Authority.
    - Loading & Discharge Orders. The stakeholders participating are the Terminal operators.
- Inland Transport
    - Road Transport Management. The stakeholders participating is the Official Bodies.
    - Rail Transport Management. The stakeholders participating are; a) the Haulage comp. and b) the Official Bodies.
- Custom Authorities
    - Customs. The stakeholders participating are: a) Freight forwarders, b) Haulage comp. and c) Official Bodies.
    - Goods Declaration. The stakeholders participating are: a) Freight forwarders, b) Haulage comp. and c) Official Bodies.
    - Customs Information. The stakeholders participating are: a) Freight forwarders, b) Haulage comp. and c) Official Bodies.

5.8.3 Bologna freight village, Italy

The terminal was constructed in 1971 and the latest interventions were made in 2018 concerning a 3,000m^2 of a warehouse for SDA.

The terminal is public/ state owned by Comune di Bologna, Provincia di Bologna, Camera di Commercio di Bologna, Trenitalia s.p.a, some banks and other companies. At the terminal can be served commercial trucks and trains. Specifically, 2,210 trucks per day as outbound traffic which can be translated to 15,988 tons per day, as well as 2,193 trucks as inbound traffic which can be translated to 17,109 tons per day. Furthermore, the terminal serves 17 trains per day as outbound traffic, which is equal to 10,901 tons per day as well as 18 trains per day as inbound traffic, equal to 10,920 tons per day.

Regarding the rail infrastructure, is equipped with 2 tracks with average length of 460m, 15 rail tracks with average length of 550m and finally 6 rail tracks with average length of 600m. Moreover, concerning intermodality equipment there are 7 reach stalkers.

As major critical issue and main bottleneck it was reported that the lack of infrastructure expected based on the “Cura del ferro” established by the previous Government. These are the high profile PC80/P400 on the rail lines Milano-Bologna and on the Adriatic one. The main problems of the terminal concern the competition of the rail terminal if the so called “gronda nord” (north drainpipe, composed of the rail terminals located in the northern Italy: Novara, Busto Arsizio, Melzo, Segrete, Verona, Padua) together with the rail terminals of the Emilia Romagna Region. The lack of the infrastructures referred to in the previous question would allow to lower that line (gronda) till Bologna.

Regarding the development of the terminal, the plans reported by the authorities concern ICT system application in RRT on the Italian part of the corridor, for operations synchronization and management efficiency with other nodes.

Finally, the ICT solutions and tools implemented at the terminal, are a) Cloud Computing, b) Wireless communication technologies, c) Internet of Things. However, the terminal’s authority reported the willingness of implementing in the future other ICT solutions and tools as well and specifically, a) Big Data Analysis, b) Augmented Reality, c) Robotics and Autonomy and d) Cyber - Security for advanced technology networks.

5.8.4 Pristina Terminal, Kosovo

The terminal was constructed in 2013 and it is private owned.

At the terminal can be served commercial trucks and trains. Specifically, 10 trucks per day as outbound traffic which can be translated to 210 tons per day, as well as 160 trucks as inbound traffic which can be translated to 3,300 tons per day. No information was provided regarding the rail outbound and inbound traffic.

Regarding any major critical issue and main bottleneck, it was reported that at Pristina, there are no technical obstacles related to the work process, there are no bureaucratic procedures, all procedures are automated and the clearance time is very short for about 80% of deliveries that are submitted for regular clearance without including shipments for detailed physical control, which require a more detailed treatment. Also, no problems are identified by the terminal's authorities.
The terminal exchanges information with the BCPs of the country through official forms, Outlook, AW system, SEED system as well as active official communications through official lines. Those BCPs are the PKK Vermica, the PKK Hani i Elezit, the PKK Merdare, the PKK Jarinje, the PKK Zubin Potok and the PKK Kullë. The co-operation among the terminal and the above mentioned BCPs is considered to be excellent as well as their performance.

At the terminal, TRS pilot was carried out on September 26 and 27, 2016. The actual TRS data collection was carried out from October 10 – 15, 2016. The summary of those results were reported as the following:

- For import, the average time between the date and time the conveyance arrives at the BCP and the date and time the conveyance leaves the BCP is 6 minutes. The average time between the date and time the conveyance arrives at the inland terminal and the date and time the Release Order is issued is 4 hours and 6 minutes.
- For export, the average time between the date and time the conveyance arrives at the inland terminal and the date and time the conveyance leaves the inland terminal is 33 minutes. For export, the average time between the date and time the conveyance arrives at the BCP and the date and time the conveyance leaves the BCP is 1 hour 10 minutes.
- The average times listed above show the total time required for all procedures including the Food and Veterinary Agency (FVA) broker and bank processing.

The terminal's authorities reported that the performance of the BCPs could affect their level of the provided services if all BCPs work with priority in the west of the operational procedures and based on the job description of each official - delays can only be in cases when there are technical problems with the network or the system, which are many very rare.

5.8.5 Smederevo Port, Serbia

The terminal was constructed in 1997 and the latest interventions were made in 2004 concerning the installation of 2 Portal cranes and 1 bunker for discharging of raw materials in the New Port. The terminal is private owned.

At the terminal can be served commercial trucks, trains and IWW vessels. Specifically, 300 trucks per day are served as outbound traffic which can be translated to 9,000 tons per day, as well as empty trucks as inbound traffic for loading bulk cargo. Furthermore, the terminal serves 14 trains per day as outbound traffic, which is equal to 14,000 tons

per day (bulk cargo) as well as 7 trains per day as inbound traffic, equal to 10,000 tons per day (general cargo). Finally, regarding IWW transport 1 vessel per day is served which is translated to 1,000-1,500 tons of general cargo as outbound traffic as well as 6 vessels per day are served which is translated to 9,000 tons per day.
Regarding the rail infrastructure, is equipped with 3 tracks with length of 400m each.

As major critical issue and main bottleneck it was reported that the absence of rail connection of the New Port which is currently under construction as well as the fact that the Old Port is located in the center of Pristina. It was highlighted that the New Port must be connected with HBIS by rail.

The terminal does not exchange information with the BCPs located in Serbia. Concerning, the time needed for the different types of vehicles to be served was reported as following: a) 5' per commercial truck, b) 20' per train and c) 240' per IWW vessel.

5.8.6 Adria Terminal Sežana, Slovenia

The terminal was constructed in 1980 and the latest interventions were made in 2017 concerning the reconstruction of the existing rail tracks. The terminal is owned by state company.

At the terminal can be served commercial trucks and trains. Specifically, up to 60 trucks per day as outbound traffic which can be translated to 1,200 tons per day can be served, as well as 30 trucks as inbound traffic which can be translated to 600 tons per day. Furthermore, the terminal serves 3 trains per day as inbound traffic, equal to 5,000 tons per day.

Regarding the rail infrastructure, is equipped with 9 loading/ unloading ramps tracks of 300m length each. The terminal is equipped with several intermodal equipment supporting the loading and unloading processes.
As major critical issue and main bottleneck it was reported the lack of production in Italy in order to transport cargo back to eastern EU by rail.

Regarding the development of the terminal, there is a need to develop a bigger and modern logistic centre in Sežana. To achieve this purpose, there are plans to build a car and container terminal, a multistore warehouse, and multipurpose warehouse for additional cargo. The average time needed for a truck to be served at the terminal is 30', as reported, and concerning rail transport the terminal can serve 1,000 tons every 10 hours.

Finally, at the terminal the only ICT solution implemented concerns Wireless communication technologies.

5.8.7 Container Terminal Ljubljana – Moste, Slovenia

The terminal was constructed in 1982 and the latest interventions were made in 2005 concerning depot reconstruction. The terminal is state owned.

At the terminal can be served commercial trucks and trains. Specifically, up to 24 trucks per day as outbound traffic which can be translated to 720 tons per day can be served, as well as 24 trucks as inbound traffic which can be translated to 432 tons per day. Furthermore, the terminal serves 28 trains per day as outbound traffic, equal to 21,090 tons per day and 28 trains as inbound traffic equal to 14,250 tons per day.

Regarding the rail infrastructure, is equipped with 2 tracks of 550m length each. The terminal is equipped with 1 bridge crane and 2 container manipulators regarding intermodal equipment supporting the loading and unloading processes.

As major critical issue and main bottleneck the following were reported:
The need for a new line is also clear in the central part of Slovenia, where freight traffic could reach over 200 trains a day. Such traffic will not be easily added to the passenger traffic in the Ljubljana area. As regards road, the Ljubljana ring road is already a main bottleneck, suffering from capacity limitations especially during peak hours.

- There is a limitation of capacity due to high traffic volumes on roads and RRTs.
- Lack of capacity for railway lines.
- Lack of connection between Ljubljana airport and the railway network.
- Cargo traffic through the city centre needs to be reduced, through a bypass of the Ljubljana railway hub.
- The Ljubljana ring road is the main road bottleneck, as it suffers from severe capacity limitations.

Ljubljana is a major node bottleneck. The majority of railway tracks in Ljubljana run at ground level, grade separated crossings of roads and railways occur only in some places, mostly at main line crossings. Level crossings with gates are still in the majority, which causes significant congestion, especially during rush hours.

The average time needed for a truck to be served at the terminal is 20’, as reported, and 300’ concerning rail transport.

Finally, at the terminal the only ICT solution implemented concerns Wireless communication technologies.

5.8.8 Intermodal Terminal Maribor Tezno, Slovenia

The terminal was constructed in 1983 and the latest interventions were made in 2010 without however reporting the nature of these interventions. Also, the current form of the terminal was not reported.

At the terminal can be served commercial trucks and trains. Specifically, up to 15 trucks per day as outbound traffic which can be translated to 3,850 tons per day can be served, as well as 15 trucks as inbound traffic which can be translated to 5,500 tons per day. Furthermore, the terminal serves 6 trains per day as outbound traffic equal to 5,700 tons per day and 6 trains as inbound traffic equal to 6,930 tons per day.

Regarding the rail infrastructure, is equipped with 1 track of 285m length. The terminal is equipped with 2 container manipulators regarding intermodal equipment supporting the loading and unloading processes.

No major critical issue and main bottleneck were reported. Concerning any plans for the development of the terminal, an expansion of the working area for 20m width which will be used to deploy the containers.

5.8.9 Luka Koper, Slovenia

The terminal was constructed in 1957 and the latest interventions were made in 2018 concerning a multipurpose warehouse and berths 1.4. Regarding the current form of the terminal no information was provided.

At the terminal can be served commercial trucks, trains and IWW vessels. Specifically, up to 1,000 trucks per day as outbound traffic which can be translated to 11,309 tons per day can be served, as well as 600 trucks as inbound traffic which can be translated to 6,148 tons per day. Furthermore, the terminal serves 442 trains per day as outbound traffic equal to 147,069 tons per day and 233 trains as inbound traffic equal to 77,680 tons per day. No information was provided regarding the inbound and outbound traffic for IWW traffic.

Regarding the rail infrastructure there are 5 rail tracks of 700m length each, 2 rail tracks of 270m length each, 2 rail tracks of 300m length each.

The terminal is equipped with:

- 3 STS panamax cranes 40 (40 feet) / 45 (2 x 20 feet) under spreader
- 4 STS post-panamax cranes 51 (40 feet) / 65 (2x20 feet) under spreader
- 2 STS Super post-panamax cranes 51 (40 feet) / 65 (2x20 feet) under spreader
- 22 Rubber-Tyred G/C (storage area) 40 t
- 3 Rail Mounted Gantries (railway) 40 t
- 12 Reach Stackers 42-45 t
- 8 ECH - empty container handler 7-9 t
- Yard Trucks = 61
- Trailers = 61
- Ro-Ro Trucks = 1
- Ro-Ro Trailers = 1

As major critical issue and main bottleneck the following were reported:

- Due to the high growing volumes and confirmed new market potentials, the port of Koper needs additional port infrastructure capacities in order to support the growing volumes via the port of Koper, suitable supporting and connecting public infrastructure has to be realized (railway, maritime and road last mile connection). Since the cargo in the Port of Koper uses in more than 60% railway services, it is essential that railway infrastructure eliminating potential bottlenecks is provided on time along the corridor.
- Main physical bottleneck is about the rail section Koper-Divača (a new - shortest rail link is under construction), in the meanwhile, the major transport infrastructure is the A1 highway connecting Koper to Divača and Ljubljana. Divača-Koper Port is a single rail track-electrified connection (48km), situated in a mountainous region with operational real speed for freight transportation of 34 km/h.
- Potential lack of port infrastructure considering the expected growth of cargo volumes. Dredging port's basins and port's accessing canals according needs; extension of Pier I and Pier II, new berthing facilities in Basins I, II and III, passenger terminal infrastructure, new port entry and supporting road infrastructure, additional connecting rail infrastructure network within the port, construction of the Pier III and arrangement of hinterland areas for port activities use are needed in order to achieve increase of annual cargo traffic above 20mo tons until 2015, above 24mo tons until 2020 and above 30mo tons after 2030.

The main problem is linked with the traffic congestion around gates area. The port has only one gate and it's located in the middle of the city centre. The new gate is planned to be completed within 2019 and until that time the increased number of trucks will congest streets and accesses to the city and the port. An additional issue is represented by the spatial limitation, which is penalizing the growth of port's terminals, focusing the view on the increasing volumes of freights coming from Far East. An optimization of port's operations is required in order to face the challenges related to the increased volumes and the actual storage spaces.

The Port of Koper is connected with the main national railway network through the Koper-Divača railway line, belonging to the Baltic-Adriatic (BA) Corridor. It is connected with the national motorway network through national roads 741 and 406, interlinked with the A1 motorway. The modernization of the existing track between Koper and Divača is at its implementation phase. Construction of the second track on the line Koper-Divača is planned for the period 2016-2025, to support the planned expansion of the port infrastructure and expected traffic increase. Road and rail internal works are also planned to be implemented by 2020 to improve accessibility. Direct interconnection between the A1 motorway and the Port is missing at present and should be developed together with the associated construction of a truck terminal.

Luka Koper's main planned infrastructural activities are the extension of the existing piers, the deepening of waterways and the construction of a third pier, which would allow the reorganization of works and improved operational flexibility. One of the priority projects is also an increase in the capacity of cargo transferred from the port to rail. In order to maintain the 60% modal split, a second track on the track Divača-Koper needs to be implemented.

The terminal's authorities were kind enough to provide thorough information regarding research projects in which the terminal participated.

Specifically:

1. Improving North Adriatic ports' maritime accessibility and hinterland connections to the Core Network (NAPA4CORE)

The Action aims to improve maritime and land accessibility of ports of Trieste and Koper situated on the Baltic-Adriatic and Mediterranean Core Network Corridors. It is part of Global Project, implemented by North Adriatic Port Association, which addresses development of the North Adriatic ports of Venice, Trieste, Koper and Rijeka in order to increase their capacity and improve their hinterland connections. The Action concerns reconstruction and extension of existing quay walls, backfilling works, construction of new railway tracks and construction of a new entrance in the port of Koper.

2. Sustainable LNG Operations for Ports and Shipping -Innovative Pilot Actions (GAINN4MOS)

GAINN4MOS is a twinned Action among a number of Member States which contributes to the implementation of the LNG bunkering project in the Atlantic and the Mediterranean by:

i. Providing the core ports of Koper, La Spezia, Venezia, Fos-Marseille and Nantes-Saint Nazaire with initial pilot infrastructures (in the first 3 cases) and fully operational LNG bunkering stations (in the last 2 cases).
ii. Providing tested technologies that can be used to retrofit and/or build a large percentage of the short-sea fleet deployed in the EU Atlantic and Mediterranean.
iii. Proving that bunkering barges, tugboats, general cargo and pax or ro-pax types of vessels can be successfully retrofitted for them to use LNG as marine fuel and that financial feasibility analyses for their operating companies after the indicators obtained in real life pilots are taken into account confirm the convenience of this choice to external sea carriers.
iv. Paving the way for the implementation of LNG as fuel for ship and port machinery.
v. Increasing the competitiveness of port services and shipping.
vi. Strengthening new EU niche markets associated to LNG.

vii. Providing involved Member States with the practical and operational background necessary to deal with the challenges posed by the Sulphur Directive and by the Alternative Fuel Infrastructures Directive.

3. ELEMED - Electrification of the Eastern MEDiterranean area through the extensive use of Cold Ironing and the introduction of electricity as a propulsion alternative Motorways of the Sea (MoS)

This MoS wider benefit Action (twinned with 2015-EU-TM-0235-S) is focused on the assessment of the possibilities to introduce onshore power supply and electric propulsion alternative for ships in the Eastern Mediterranean. It includes Slovenia (Port of Koper) and under the twinned project Cyprus (Limassol port) and Greece (Port of Killini, Port of Piraeus). The Action consists of background and preparatory studies aimed at providing a basis for preparation of a front-end engineering design (FEED) for cold ironing installations, in particular in the port of Koper. The Action will promote onshore power supply solutions and electricity-based propulsion systems for vessels leading to improved environmental performance of shipping and ports.

4. CarEsmatic – Supporting cars and electric cars distribution using Motorways of the Sea's solutions and promoting sustainable shipping concepts

The Action will improve the existing MoS service between these ports in order to increase transport of electrical cars by sea and enable modal shift from road to maritime transport. To this end the Action will: develop access infrastructure in two ports (Koper and Barcelona) to improve port access and railways connections. Further, the Ports of Koper, Port of Barcelona and Neptune lines as operator, will study and prototype installation of electrical charging columns. Overall benefits will include decongestion of roads parallel to this maritime line and promotion of cleaner automotive industry.

There are also on-going actions in which the terminal participates. Specifically:
• Extension of Pier I (on-going works provided by the Port of Koper own funds; project design for additional extension co-financed in 50% by TEN-T - project NAPA PROG)
• Construction of a second access to port's area with a new gate in front of the container terminal;
• Extension of port's back area at the third berthing basin: sixth group of railways and parking for cars entering/leaving the port as freight;
• Reconstruction of berths 7, 7a, 7b, 5;
• Rationalization of container yards' definition and positioning;
• Reconstruction of berthing place nr.12 for general and project cargo.

Furthermore, several suggestions were reported by the terminal's authorities. Specifically, as of road, works to increase the standards of the last mile connections are envisaged at the ports on the Baltic sea and at Koper. The internal road infrastructure requires modernisation/upgrading at all Baltic ports as well as in Bratislava, Venezia, Ravenna and Koper. Improvements to respond to capacity expansion needs in view of future traffic increase are foreseen or already ongoing in the Baltic ports, Venezia and

Koper. In Gdynia, Szczecin, Świnoujście, Venezia, Ravenna and Koper solutions to mitigate the impact of road transport on the respective urban areas are also needed.

The terminal's authorities exchange information with the BCPs of Slovenia. Being the port of Koper one of the BCPs in Slovenia, the access to the data and exchange with national checking entities is inevitable. Exchanged data are for example: type of cargo, weight of cargo, country of origin of the cargo, reg. nr. of the vehicle that transported the cargo (truck, wagon, vessel etc.), customs certificate etc. Furthermore, the authorities reported that the performance of the BCPs do not affect the level of the provided services. Basically, customers know which procedures and timings are requested for their type of goods and they base their further activities on the experiences gained from usual businesses. The port of Koper is basically more flexible than other ports.

Regarding the average time needed for a commercial vehicle to be served, the authorities reported that a truck requires 180' to be served, while for a train the respective time is equal to 300'.

The ICT solutions and tools implemented at the terminal, the authorities reported that already implemented are the following: a) Single Window, b) Port Community System, c) Cloud Computing, d) Wireless communication technologies, e) Big Data Analysis and f) Cyber-Security for advanced technology networks. Also, the terminal's authorities reported their willingness to implement in the future the following ICT solutions and tools: a) Internet of Things, b) Augmented Reality and c) Robotics and Autonomy.

As a Port Community System is implemented at the terminal, the authorities provided information regarding the stakeholders participating in the following processes and procedures:

- Departures and Arrivals. a) Shipping agents, b) Terminal operators, c) Freight forwarders, d) Haulage comp, e) Shippers, f) Depots, g) Terminal Authority and h) Official Bodies.
- Shuttle Instructions. A) Shipping agents, b) Terminal operators, c) Freight forwarders and d) Shippers.
- Terminal Calls Management. a) Terminal operators and b) Official Bodies.
- Dangerous Goods Management. a) Terminal operators, b) Terminal Authority and c) Official Bodies.
- Loading & Unloading Orders. a) Shipping agents, b) Terminal operators, c) Freight forwarders, d) Haulage comp. and e) Shippers.
- Customs. a) Shipping agents and b) Freight forwarders.
- Goods Declarations. a) Shipping agents and b) Freight forwarders.
- Customs information. a) Shipping agents, b) Terminal operators, c) Freight forwarders and d) Terminal Authority.
- Cargo Tracking. Terminal operators only.

- Equipment status. a) Shipping agents, b) Terminal operators and c) Freight forwarders.

Finally, 3 new ICT solutions and tools were reported to be implemented at the terminal. Specifically:

- ACAR system since November 2018;
- VBS (Vehicle Booking System) since March 2019;
- VGM self-service, since March 2019.

5.9 Evaluation of the performance of different types of nodes

The evaluation of the performance of different types of nodes (i.e. Road BCPs, Rail BCPs, Maritime Ports and Inland Water Ways Ports) is based on the Multi Criteria Analysis (hereafter mentioned as **MCA**). The specific method was selected because there are several factors affecting the performance of these nodes, as it is imprinted to the questionnaires developed for the respective surveys. In order to overcome the issue of subjectivity while assessing the weights in each factor/ criterion, the methodology developed for the needs of the ACROSSEE project (Accessibility improved at border CROSsings for the integration of South East Europe) and specifically report "5.4 – Cutting Stops at Border Crossings", WP5 – Institutional Platform and Administrative Cooperation of December 2014, was taken into consideration.

However, it must be mentioned that, the MCA used in the ADRIPASS project is customized to the needs of the project since the ACROSSEE project focused on cutting stops at the BCPs while the ADRIPASS project is focused promoting soft measure (ICT solutions and applications) in order to eliminate non-physical barriers for freight transport in the WB area.

It must be noted that the developed MCA and specifically the weights assigned to the criteria used, are based on the following:

- Regarding Road and Rail BCPs, the developed MCA in the framework of the ACROSSEE project, as described in the report entitled "ACROSSEE 5.4 Cutting Stops at Border Crossing", provided valuable and useful information.
- Regarding maritime and IWW ports, to develop a MCA without any reference to financial data, it was a challenging task. The international literature was analyzed in order to identify potential indicators which can be used for evaluating their performance, but at the same time in a realistic basis rather than a theoretical one. For this reason, the methodology developed had to take into consideration the feedback provided through the questionnaire-based survey. This factor, affected significantly which criteria should be used and which weights should be assigned to these criteria. Furthermore, the criteria chosen had to refer to data provided by the authorities covering, if possible all but, at least the majority of the ports

participating, and at the same time without ignoring indicators that according to the international literature consist the core of an evaluation process without using financial data.

- The developed methodology is designed to cover the needs of the ADRIPASS project and not covering in general the necessity of evaluating the performance of different types of nodes. Moreover, the evaluation of those nodes was performed not in the framework of comparing them but in an effort to identify their weak (and inevitably their strong points as well) points, so that specific solutions can be addressed (promoting ICT solutions aiming to reduce bottlenecks).
- The criteria used, can consist at the same time the clusters of the proposed solutions, as trough the evaluation process, possible weak points will be identified.

5.9.1 MCA for Road BCPs

Based on the collected data from the questionnaire-based survey addressed to the Road BCPs' authorities (both in qualitative and quantitative terms) and the scope of this task, the MCA for the Road BCPs is based on the following criteria:

- Facilities;
- Existence (or not) of X-Ray scanner;
- Existence (or not) of weighbridge;
- Existence (or not) of computer equipment;
- Existence (or not) of internet connection;
- Existence (or not) of tracing means;
- Time reported for the controls to be implemented as an average value for both entering and exiting commercial vehicles;
- Waiting time before the implementation of the controls as an average value for both entering and exiting commercial vehicles;
- Existence (or not) of Internet connection with Central Custom Offices;
- Existence (or not) of Trade Facilitations;
- Support (or not) of electronic submission of Custom Declarations;
- Support (or not) of electronic submission of supporting documents (other than the Custom Declarations).

Table 4.5 presents the developed MCA methodology for the Road BCPs based on the following steps:

The first step was to extract the collected information by the respective (for each BCP) questionnaire (see Table 4.6).

The second step concerned the identification of the possible answers to each one of them (based on the reported data) and then addressing values to these potential answers (see Table 4.7).

The third step was to give weights to each one of these criteria based on how related they are to ICT solutions and applications and the affection they have to the performance of the BCPs (see Table 4.8).

Finally, the initial scores as well as the weighted score were calculated.

Table 4. 5. Developed MCA for Road BCPs' evaluation

			1st step				2nd step					3rd step	
			Identified possible answers based on the analysis of the collected data				Values for each answer of step 1				Max score	Weights for each criterion (%)	Max weighted score
			Good	Satisfactory	Bad	Not existing	Good	Satisfactory	Bad	Not existing			
Criteria	A	Facilities					5,0	2,0	1,0		5,0	5%	0,25
	B	X-Ray scanner					5,0	2,0	1,0	0,0	5,0	5%	0,25
	C	Weighbridge					5,0	2,0	1,0	0,0	5,0	5%	0,25
	D	Computer equipment					5,0	2,0	1,0	0,0	5,0	5%	0,25
	E	Internet connection					5,0	2,0	1,0	0,0	5,0	5%	0,25
	F	Tracing means					5,0	2,0	1,0	0,0	5,0	5%	0,25
			0-15'	16'-45'	46'-90'	>90'	0-15'	16'-45'	46'-90'	>90'			
	G	Time reported for the controls to be implemented as an average value for both entering and exiting commercial vehicles					5,0	3,0	1,0	0,5	5,0	10%	0,5
	H	Waiting time before the implementation of the controls as an average value for both entering and exiting commercial vehicles					5,0	3,0	1,0	0,5	5,0	10%	0,5
			Yes	No			Yes	No					
	I	Internet connection with Central Custom Offices					5,0	0,0			5,0	10%	0,5
	J	Trade Facilitations					1 pt for each existing facility				10,0	20%	2,0
	K	Electronic submission of Custom Declarations					5,0	0,0			5,0	10%	0,5
	L	Electronic submission of supporting documents					5,0	0,0			5,0	10%	0,5
										Sum	65,0	100%	6,0

Table 4. 6. Extracted values by Road BCPs' questionnaire-based survey

	A	B	C	D	E	F		G	H		I	J	K	L
BCP	**Buildings**	**X-Ray scanner**	**Weighbridge**	**Computer equipment**	**Internet connection**	**Tracing means**		**Time reported for the controls to be implemented as an average value for both entering and exiting commercial vehicles**	**Waiting time before the implementation of the controls as an average value for both entering and exiting commercial vehicles**		**Internet connection with Central Custom Offices**	**Trade Facilitations**	**Electronic submission of Custom Declarations**	**Electronic submission of supporting documents**
Promachonas (GR)	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory		15'	30'		n.a.	0	n.a.	n.a.
Evzonoi (GR)	Bad	Good	Satisfactory	Good	Good	Satisfactory		6'	30'		Yes	0	Yes	No
Kakavia (GR)	Good	Good	Good	Good	Satisfactory	Good		22'	15'		Yes	0	Yes	n.a.
Neum I (BIH)	Good	No	Satisfactory	Good	No	No		No commercial flows	No commercial flows		No	0	n.a.	n.a.
Neum II (BIH)	Good	No	Satisfactory	Good	No	No		No commercial flows	No commercial flows		No	0	n.a.	n.a.
Bijaca (HR)	Good	No	Satisfactory	Satisfactory	Satisfactory	No		15'	15'		Yes	3	No	n.a.
Samac (BIH)	Satisfactory	No	Good	Satisfactory	Satisfactory	No		7'	30'		No	0	n.a.	n.a.
Dobrakovo (MNE)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.	n.a.		n.a.	n.a.	n.a.	n.a.
Debeli Brijeg (MNE)	Good	No	Bad	Good	Good	Good		12'	12'		Yes	2	Yes	Yes
Gostun (SRB)	Satisfactory	No	No	Satisfactory	Satisfactory	No		25'	35'		No	n.a.	n.a.	n.a.
Karasovici (HR)	Good	No	Good	Good	Good	Good		10'	10'		Yes	2	Yes	No
Zupanja (HR)	Good	No	Good	Satisfactory	Satisfactory	No		20'	4'		Yes	7	Yes	No
Bajakovo (HR)	Satisfactory	Bad	Satisfactory	Good	Satisfactory	No		20'	15'		Yes	1	Yes	No
Zaton Doli (HR)	Good	No	Good	Good	Bad	No		20'	10'		Yes	0	Yes	No
Klek (HR)	Good	No	Good	Good	Good	No		4'	5'		Yes	5	Yes	Yes
Metkovic - Nova Sela (HR)	Good	No	Good	Good	Good	No		10'	5'		Yes	5	Yes	Yes
Obrežje (SLO)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.	n.a.		n.a.	n.a.	n.a.	n.a.

Table 4. 7. Scores for Road BCPs based on the developed MCA methodology

	A	B	C	D	E	F	G	H	I	J	K	L
BCP	Buildings	X-Ray scanner	Weighbridge	Computer equipment	Internet connection	Tracing means	Time reported for the controls to be implemented as an average value for both entering and exiting commercial vehicles	Waiting time before the implementation of the controls as an average value for both entering and exiting commercial vehicles	Internet connection with Central Custom Offices	Trade Facilitations	Electronic submission of Custom Declarations	Electronic submission of supporting documents
Promachonas (GR)	2,0	2,0	2,0	2,0	2,0	2,0	5,0	3,0	0,0	0,0	0,0	0,0
Evzonoi (GR)	1,0	5,0	2,0	5,0	5,0	2,0	5,0	3,0	5,0	0,0	5,0	0,0
Kakavia (GR)	5,0	5,0	5,0	5,0	2,0	5,0	3,0	5,0	5,0	0,0	5,0	0,0
Neum I (BIH)	5,0	0,0	2,0	5,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Neum II (BIH)	5,0	0,0	2,0	5,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Bijaca (HR)	5,0	0,0	2,0	2,0	2,0	0,0	5,0	5,0	5,0	3,0	0,0	0,0
Samac (BIH)	2,0	0,0	5,0	2,0	2,0	0,0	5,0	3,0	0,0	0,0	0,0	0,0
Dobrakovo (MNE)	n.a	n.a	n.a	n.a	n.a	n.a	n.a.	n.a.	0,0	0,0	0,0	0,0
Debeli Brijeg (MNE)	5,0	0,0	1,0	5,0	5,0	5,0	5,0	5,0	5,0	2,0	5,0	5,0
Gostun (SRB)	2,0	0,0	0,0	2,0	2,0	0,0	3,0	3,0	0,0	0,0	0,0	0,0
Karasovici (HR)	5,0	0,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	2,0	5,0	0,0
Zupanja (HR)	5,0	0,0	5,0	2,0	2,0	0,0	3,0	5,0	5,0	7,0	5,0	0,0
Bajakovo (HR)	2,0	1,0	2,0	5,0	2,0	0,0	3,0	5,0	5,0	1,0	5,0	0,0
Zaton Doli (HR)	5,0	0,0	5,0	5,0	1,0	0,0	3,0	5,0	5,0	0,0	5,0	0,0
Klek (HR)	5,0	0,0	5,0	5,0	5,0	0,0	5,0	5,0	5,0	5,0	5,0	5,0
Metkovic - Nova Sela (HR)	5,0	0,0	5,0	5,0	5,0	0,0	5,0	5,0	5,0	5,0	5,0	5,0
Obrezje (SLO)	n.a	n.a	n.a	n.a	n.a	n.a	n.a.	n.a.	0,0	0,0	0,0	0,0

Table 4. 8. Weighted scores for Road BCPs based on the developed MCA methodology

	A	B	C	D	E	F	G	H	I	J	K	L	
BCP	Buildings	X-Ray scanner	Weighbridge	Computer equipment	Internet connection	Tracing means	Time reported for the controls to be implemented as an average value for both entering and exiting commercial vehicles	Waiting time before the implementation of the controls as an average value for both entering and exiting commercial vehicles	Internet connection with Central Custom Offices	Trade Facilitations	Electronic submission of Custom Declarations	Electronic submission of supporting documents	
Promachonas (GR)	0,10	0,10	0,10	0,10	0,10	0,10	0,50	0,30	0,00	0,00	0,00	0,00	1,40
Evzonoi (GR)	0,05	0,25	0,10	0,25	0,25	0,10	0,50	0,30	0,50	0,00	0,50	0,00	2,80
Kakavia (GR)	0,25	0,25	0,25	0,25	0,10	0,25	0,30	0,50	0,50	0,00	0,50	0,00	3,15
Neum I (BIH)	0,25	0,00	0,10	0,25	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,60
Neum II (BIH)	0,25	0,00	0,10	0,25	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,60
Bijaca (HR)	0,25	0,00	0,10	0,10	0,10	0,00	0,50	0,50	0,50	0,60	0,00	0,00	2,65
Samac (BIH)	0,10	0,00	0,25	0,10	0,10	0,00	0,50	0,30	0,00	0,00	0,00	0,00	1,35
Dobrakovo (MNE)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0,00	0,00	0,00	0,00	0,00
Debeli Brijeg (MNE)	0,25	0,00	0,05	0,25	0,25	0,25	0,50	0,50	0,50	0,40	0,50	0,50	3,95
Gostun (SRB)	0,10	0,00	0,00	0,10	0,10	0,00	0,30	0,30	0,00	0,00	0,00	0,00	0,90
Karasovici (HR)	0,25	0,00	0,25	0,25	0,25	0,25	0,50	0,50	0,50	0,40	0,50	0,00	3,65
Zupanja (HR)	0,25	0,00	0,25	0,10	0,10	0,00	0,30	0,50	0,50	1,40	0,50	0,00	3,90
Bajakovo (HR)	0,10	0,05	0,10	0,25	0,10	0,00	0,30	0,50	0,50	0,20	0,50	0,00	2,60
Zaton Doli (HR)	0,25	0,00	0,25	0,25	0,05	0,00	0,30	0,50	0,50	0,00	0,50	0,00	2,60
Klek (HR)	0,25	0,00	0,25	0,25	0,25	0,00	0,50	0,50	0,50	1,00	0,50	0,50	4,50
Metkovic - Nova Sela (HR)	0,25	0,00	0,25	0,25	0,25	0,00	0,50	0,50	0,50	1,00	0,50	0,50	4,50
Obrezje (SLO)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0,00	0,00	0,00	0,00	0,00

Based on the above presented MCA for the road BCPs, the final scores achieved are the following:

Klek (HR)	**4,5**
Metkovic - Nova Sela (HR)	4,5
Debeli Brijeg (MNE)	4,0
Zupanja (HR)	3,9
Karasovici (HR)	3,7
Kakavia (GR)	3,2
Evzonoi (GR)	2,8
Bijaca (HR)	2,7
Bajakovo (HR)	2,6
Zaton Doli (HR)	2,6
Promachonas (GR)	1,4
Samac (BIH)	1,4
Gostun (SRB)	0,9
Neum I (BIH)	0,6
Neum II (BIH)	0,6
Dobrakovo (MNE)	0,0
Obrežje (SL)	0,0

It is obvious that the highest scores achieved concern those BCPs that the facilities as well as the supporting equipment allow the working staff to implement the required processes and procedures without any significant delays and thus the commercial vehicles to be served without problems. Further to this, the implementation of ICT solutions and tools and especially any trade facilitations applied, contributes the BCPs to perform sufficiently. However, it must be mentioned that because the evaluation methodology is based on the collected data through the questionnaire-based survey, the absence of crucial data (as it was the data asked) affects the achieved score. Moreover, in some cases (fortunately few) although the authorities confirmed the existence of tracing means or supporting equipment, they did not specify their condition. As a result, it was decided to consider for those cases that the most appropriate solution would be to take as an answer the average possible value (i.e. satisfactory level).

5.9.2 MCA for Rail BCPs

Based on the collected data from the questionnaire-based survey addressed to the Rail BCPs' authorities (both in qualitative and quantitative terms) and the scope of this task, the MCA for the Road BCPs is based on the following criteria:

- Facilities;
- Existence (or not) of computer equipment;
- Existence (or not) of internet connection;

- Existence (or not) of tracing means;
- Time reported for the controls to be implemented as an average value for both entering and exiting freight trains;
- Waiting time before the implementation of the controls as an average value for both entering and exiting freight trains;
- Existence (or not) of Internet connection with Central Custom Offices;
- Implementation (or not) of on board controls;
- Implementation (or not) of simultaneous controls;
- Implementation (or not) of controls at separate areas.

Table 4.9 presents the developed MCA methodology for the Rail BCPs based on following steps:

For the criteria above, the first step was to extract the collected information by the respective (for each BCP) questionnaire (see Table 4.10).

The second step concerned the identification of the possible answers to each one of them (based on the reported data) and then addressing values to these potential answers (see Table 4.11).

The third step was to give weights to each one of these criteria based on how related they are to ICT solutions and applications and the affection they have to the performance of the BCPs.

Finally, the initial scores as well as the weighted score were calculated (see Table 4.12).

It must be mentioned that regarding the ICT solutions and tools, despite those already implemented which are awarded with a score, for those solutions reported that there is the willingness to be implemented in the future, a score (lower of course than the one for those already implemented) was also awarded, in order to reward the fact that the authorities acknowledge the necessity and importance of those ICT solutions towards the improvement of their performance.

Table 4. 9. Developed MCA for Rail BCPs' evaluation

			1st step				2nd step					3rd step	
			Identified possible answers based on the analysis of the collected data				Values for each answer of step 1				Max score	Weights for each criterion (%)	Max weighted score
			Good	Satisfactory	Bad	Not existing	Good	Satisfactory	Bad	Not existing			
Criteria	A	Facilities					5,0	2,0	1,0		5,0	10%	0,5
	B	Computer equipment					5,0	2,0	1,0	0,0	5,0	15%	0,75
	C	Internet connection					5,0	2,0	1,0	0,0	5,0	10%	0,5
	D	Tracing means					5,0	2,0	1,0	0,0	5,0	15%	0,75
			0-45'	46'-90'	91'-120'	>120'	0-45'	46'-90'	91'-120'	>120'			
	E	Time reported for the controls to be implemented as an average value for both entering and exiting freight trains					5,0	3,0	1,0	0,5	5,0	10%	0,5
			0-30'	31'-60'	61'-90'	>90'	0-30'	31'-60'	61'-90'	>90'			
	F	Waiting time before the implementation of the controls as an average value for both entering and exiting freight trains					5,0	3,0	1,0	0,5	5,0	10%	0,5
			Yes	No			Yes	No					
	G	Internet connection with Central Custom Offices					5,0	0,0			5,0	10%	0,5
	H	On board controls					5,0	0,0			5,0	10%	0,5
	I	Simultaneous controls					5,0	0,0			5,0	5%	0,25
	J	Controls at separate areas					5,0	0,0			5,0	5%	0,25
										Sum	50,0	100%	5,0

Table 4. 10. Extracted values by Rail BCPs' questionnaire-based survey

	A	B	C	D	E	F	G	H	I	J
BCP	Buildings	Computer equipment	Internet connection	Tracing means	Time reported for the controls to be implemented as an average value for both entering and exiting freight trains	Waiting time before the implementation of the controls as an average value for both entering and exiting freight trains	Internet connection with Central Custom Offices	On board controls	Simultaneous controls	Controls at separate areas
Idomeni (GR)	Bad	Satisfactory	Good	Satisfactory	90'	45'	Yes	Yes	Yes	Yes
Presevo (SRB)	Bad	Bad	Bad	No	20'	5'	No	No	No	n.a.
Vrbnica (SRB)	Bad	Satisfactory	Satisfactory	No	30'	n.a.	No	No	No	No
Sid (SRB)	Bad	Satisfactory	Bad	No	65'	73'	No	No	No	No
Tovarnik (HR)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Savski Marof (HR)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bijelo Polje (MNE)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Subotica (SRB)	Bad	Satisfactory	Satisfactory	No	75'	25'	No	Yes	No	No
Blace	-	-	-	-	-	-	-	-	-	-
Gevgelija	-	-	-	-	-	-	-	-	-	-
Hani I Elezit	-	-	-	-	-	-	-	-	-	-
Rudnica	-	-	-	-	-	-	-	-	-	-
MŽGP Čapljina (BIH)	Good	Bad	Bad	No	n.a.	55'	Yes	Yes	No	No
MŽGP Šamac (BIH)	Good	Good	No	No	n.a.	7'	No	n.a.	Yes	No
Tuzi (MNE)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bajza (ALB)	Good	Good	Good	No	30'	100'	No	No	Yes	No
Capljina (HR)	Good	Good	Good	No	30'	30'	Yes	No	Yes	No
Koprivnica (HR)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Dobova	-	-	-	-	-	-	-	-	-	-

Table 4. 11. Scores for Rail BCPs based on the developed MCA methodology

	A	B	C	D	E	F	G	H	I	J
BCP	Buildings	Computer equipment	Internet connection	Tracing means	Time reported for the controls to be implemented as an average value for both entering and exiting freight trains	Waiting time before the implementation of the controls as an average value for both entering and exiting freight trains	Internet connection with Central Custom Offices	On board controls	Simultaneous controls	Controls at separate areas
Idomeni (GR)	1,0	2,0	5,0	2,0	3,0	3,00	5,0	5,0	5,0	5,0
Presevo (SRB)	1,0	1,0	1,0	0,0	5,0	5,00	0,0	0,0	0,0	n.a.
Vrbnica (SRB)	1,0	2,0	2,0	0,0	5,0	n.a.	0,0	0,0	0,0	0,0
Sid (SRB)	1,0	2,0	1,0	0,0	3,0	1,00	0,0	0,0	0,0	0,0
Tovarnik (HR)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Savski Marof (HR)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bijelo Polje (MNE)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Subotica (SRB)	1,0	2,0	2,0	0,0	3,0	5,00	0,0	5,0	0,0	0,0
Blace	-	-	-	-	-	-	-	-	-	-
Gevgelija	-	-	-	-	-	-	-	-	-	-
Hani i Elezit	-	-	-	-	-	-	-	-	-	-
Rudnica	-	-	-	-	-	-	-	-	-	-
MŽGP Čapljina (BIH)	5,0	1,0	1,0	0,0	n.a.	3,00	5,0	5,0	0,0	0,0
MŽGP Šamac (BIH)	5,0	5,0	0,0	0,0	n.a.	5,00	0,0	n.a.	5,0	0,0
Tuzi (MNE)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bajza (ALB)	5,0	5,0	5,0	0,0	5,0	0,50	0,0	0,0	5,0	0,0
Capljina (HR)	5,0	5,0	5,0	0,0	5,0	5,00	5,0	0,0	5,0	0,0
Koprivnica (HR)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Dobova	-	-	-	-	-	-	-	-	-	-

Table 4. 12. Weighted score for Rail BCPs based on the developed MCA methodology

	A	B	C	D	E	F	G	H	I	J	
BCP	Buildings	Computer equipment	Internet connection	Tracing means	Time reported for the controls to be implemented as an average value for both entering and exiting freight trains	Waiting time before the implementation of the controls as an average value for both entering and exiting freight trains	Internet connection with Central Custom Offices	On board controls	Simultaneous controls	Controls at separate areas	
Idomeni (GR)	0,10	0,30	0,50	0,30	0,30	0,30	0,50	0,50	0,25	0,25	**3,30**
Presevo (SRB)	0,10	0,15	0,10	0,00	0,50	0,50	0,00	0,00	0,00	0,00	**1,35**
Vrbnica (SRB)	0,10	0,30	0,20	0,00	0,50	n.a.	0,00	0,00	0,00	0,00	**1,10**
Sid (SRB)	0,10	0,30	0,10	0,00	0,30	0,10	0,00	0,00	0,00	0,00	**0,90**
Tovarnik (HR)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**n.a.**
Savski Marof (HR)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**n.a.**
Bijelo Polje (MNE)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**n.a.**
Subotica (SRB)	0,10	0,30	0,20	0,00	0,30	0,50	0,00	0,50	0,00	0,00	**1,90**
Blace	-	-	-	-	-	-	-	-	-	-	**-**
Gevgelija	-	-	-	-	-	-	-	-	-	-	**-**
Hani i Elezit	-	-	-	-	-	-	-	-	-	-	**-**
Rudnica	-	-	-	-	-	-	-	-	-	-	**-**
MŽGP Čapljina (BIH)	0,50	0,15	0,10	0,00	n.a.	0,30	0,50	0,50	0,00	0,00	**2,05**
MŽGP Šamac (BIH)	0,50	0,75	0,00	0,00	n.a.	0,50	0,00	0,00	0,25	0,00	**2,00**
Tuzi (MNE)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**n.a.**
Bajza (ALB)	0,50	0,75	0,50	0,00	0,50	0,05	0,00	0,00	0,25	0,00	**2,55**
Capljina (HR)	0,50	0,75	0,50	0,00	0,50	0,50	0,50	0,00	0,25	0,00	**3,50**
Koprivnica (HR)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**n.a.**
Dobova	-	-	-	-	-	-	-	-	-	-	**-**

Based on the above presented MCA for the rail BCPs, the final scores achieved are the following:

	3,5
Idomeni (GR)	3,3
Bajza (ALB)	2,5
MŽGP Čapljina (BIH)	2,0
MŽGP Šamac (BIH)	2,0
Subotica (SRB)	1,9
Presevo (SRB)	1,3
Vrbnica (SRB)	1,1
Sid (SRB)	0,9
Tovarnik (HR)	n.a.
Savski Marof (HR)	n.a.
Bijelo Polje (MNE)	n.a.
Tuzi (MNE)	n.a.
Koprivnica (HR)	n.a.
Blace (NMK)	-
Gevgelija (NMK)	-
Hani i Elezit (KOS)	-
Rudnica (SRB)	-
Dobova (SL)	-

It is obvious that the highest scores achieved concern those BCPs that the facilities as well as the supporting equipment allow the working staff to implement the required processes and procedures without any significant delays and thus the freight trains can be served without any significant problems. Regarding the rail BCPs, based on the experience from other similar project (i.e. ACROSSEE project) the implementation of simultaneous or/ and on-board controls can be proved crucial for the required time in order a train to be served. As a result, those BCPs applying that kind of policies, achieve higher scores.

However, it must be mentioned that because the evaluation methodology is based on the collected data through the questionnaire-based survey, the absence of crucial data (as it was the data asked) affects the achieved score. Moreover, for many BCPs the data collected is poor and as a result their evaluation cannot be considered complete (these are the BCPs for which the final score is reported as n.a.). Finally, the BCPs highlighted in yellow cells are those BCPs for which the survey was not implemented (as they were assigned to SEETO).

5.9.3 MCA for Ports (Maritime and IWW)

Based on the analysis of the international literature and specifically those academic and scientific projects aiming to evaluate the performance of freight maritime ports, as well as the objective of the ADRIPASS project, and taking into consideration the fact that based on the collected data from the questionnaire based survey addressed to the maritime ports' authorities (both in qualitative and quantitative terms), the developed and proposed MCA is based on the following criteria:

- **Cargo Volumes**. The amount of cargo that passes through the ports (Cargo Throughput – **CT**) is an important factor expressing the performance of the ports. In order this indicator to be comparable among several ports, it is necessary firstly to address the same time period for all ports, and secondly to determine the type(s) of cargo(es) that should be compared. Although, the time period to be defined is a simple case, the definition of the cargo(es) to be compared is a rather complex case. The easiest way to overcome the difficulty of comparing different types of cargoes (dry, bulk, liquid, etc.) is to focus on the total throughput which refers to the sum of all imported, exported and transhipped cargoes of all types expressed in tones.
- **Port Location**. The location of a port is considered to be an important factor, affecting its competitiveness and overall performance. The attributes that can be taken into consideration regarding the port's location, both in terms of seaside and landside location's importance, are a) the distance from the main hinterland (Hinterland Distance – **HD**) and b) the Liner Shipping Connectivity Index (**LSCI**) as presented by the UN Conference on Trade and Development statistic database (UNCTAD STAT). The Hinterland Distance attribute, for the needs of the project, will be calculated as the distance of the ports' location from the capital city of each country. The shortest distance is rewarded with the highest score. As the distance increases, the port's score is decreased.
- **Port Efficiency & Performance**. Port efficiency and performance are factors expressing and describing the service level of a port. The attributes taken into consideration for the needs of the project are **a)** the ship waiting time (**SWT**), **b)** the container dwell time (**CDT**), **c)** the ship turnaround time (**STA**), **d)** the truck processing time (**TPT**) and **e)** the crane productivity (**CP**). These factors represent ship-to-shore and terminal efficiency of port productivity and directly influence the efficiency of shipping companies as well as other ports' users.
- **Port Infrastructure**. Regarding the ports' infrastructure, it is well understood that the better the infrastructure is the higher the level of the provided services is expected to be. According to the international literature, the ports that are able to accommodate more and larger vessels at t given period of time are deemed more efficient and competitive. Moreover, the ports' infrastructure assists on reducing the port congestion by serving the ships faster and more efficient. The attributes taken into consideration for the needs of the project are **a)** the water depth (**WD**) affecting the permissible drafts for vessels under full load, **b)** linear berth length (**LBL**) and **c)** terminal size (**TS**). Usually a port with deeper drafts, longer berths and larger terminal areas is a port with better infrastructure.
- **ICT Solutions & Tools.** In relation to the project's objective, ICT solutions and tools are considered to be of fundamental importance concerning the performance of

maritime ports, especially when acting as communication and information tools, building up the co-operation of different stakeholders and promoting simplified processes and procedures regarding goods transportation. Therefore, according to the questionnaire based survey addressed to the ports' authorities, the ICT solutions and tools taken into consideration for the needs of the project are **a)** the Port Community System (**PCS**), **b)** the Single Window policy (**SW**), **c)** Cloud Computing (**CC**), **d)** Wireless Communication (**WC**), **e)** Internet of Things (**IoT**), **f)** Big Data Analysis (**BDA**), **g)** Augmented Reality (**AR**), **h)** Robotics & Autonomy (**R&A**) and **i)** Cyber-Security (**CS**). If any of these ICT solutions and tools are already implemented the ports are rewarded with a score. In case of non-implementation, the score is equal to zero. However, based on the fact that all ports' authorities, had expressed their willingness to implement in the near future some of them, is decided to reward this fact with a score (which is significantly lower than the score of any implemented solution and tool). This decision was made on the basis that the ports acknowledge the necessity and importance of these ICT solutions and tools but they are not in position to implement them so far and they are willing to do it in the near future.

Table 4.13 presents the developed MCA methodology for the maritime ports based on the above following steps. For those criteria, the first step was to extract the collected information by the respective (for each BCP) questionnaire (see Table 4.14). The second step concerned the identification of the possible answers to each one of them (based on the reported data) and then addressing values to these potential answers (see Table 4.15). The third step was to give weights based on their affection to the efficiency and performance of the maritime ports. Finally, the initial scores as well as the weighted score were calculated. (see Table 4.16). It must be mentioned that regarding the ICT solutions and tools, despite those already implemented which are awarded with a score, for those solutions reported that there is the willingness to be implemented in the future, a score (lower of course than the one for those already implemented) was also awarded, in order to reward the fact that the authorities acknowledge the necessity and importance of those ICT solutions towards the improvement of their performance.

Table 4. 13. Developed MCA for maritime ports' evaluation

				1st step		2nd step			3rd step	
				Identified possible answers based on the analysis of the collected data		Values for each answer of step 1		Max score	Weights for each criterion (%)	Max weighted score
				Free values		Free values				
Criteria	A	Cargo Volume	CT (Cargo Throughput = Import+Export+Transshipment in tonnes)				Taking into consideration all ports, the highest or lowest value is rewarded with 10,0. For the rest ports, each value is calculated as percentage of the best value	10,0	5,0%	0,50
	B	Port Location	HD (Hinterland Distance in km)					10,0	2,5%	0,25
			LSCI (Liner Shipping Connectivity Index, value from UNCTAD STAT)					10,0	2,5%	0,25
	C	Port Efficiency & Performance	SWT (Ship Waiting Time in Days)					10,0	6,0%	0,60
			CDT (Container Dwell Time in Days)					10,0	6,0%	0,60
			STA (Ship Turnaround Time in Hours)					10,0	6,0%	0,60
			TPT (Truck Processing Time in Hours)					10,0	6,0%	0,60
			CP (Crane Productivity in Moves/ Hour)					10,0	6,0%	0,60
	D	Port Infrastructure	WD (Water Depth in m)					10,0	2,5%	0,25
			LBL (Linear Berth Length in m)					10,0	2,5%	0,25
			TS (Terminal Size in Ha)					10,0	5,0%	0,50

				Yes	No	Not implemented but willing to implement	Yes	No	Not implemented but willing to implement			
	E	ICT Solutions & Tools	PCS (Port Community System Yes or No)				10,0	0,0	2,0	10,0	10,0%	1,00
			SWin (Single Window Yes or No)				10,0	0,0	2,0	10,0	10,0%	1,00
			CC (Cloud Computing Yes or No)				10,0	0,0	2,0	10,0	5,0%	0,50
			WC (Wireless Communication Yes or No)				10,0	0,0	2,0	10,0	5,0%	0,50
			IoT (Internet of Things Yes or No)				10,0	0,0	2,0	10,0	4,0%	0,40
			BDA (Big Data Analysis Yes or No)				10,0	0,0	2,0	10,0	4,0%	0,40
			AR (Augmented Reality Yes or No)				10,0	0,0	2,0	10,0	4,0%	0,40
			R&A (Robotics & Autonomy Yes or No)				10,0	0,0	2,0	10,0	4,0%	0,40
			CS (Cyber-Security Yes or No)				10,0	0,0	2,0	10,0	4,0%	0,40
									Sum	200,0	100%	10,00

Table 4. 14. Extracted values by ports' questionnaire based survey

Port	Cargo Volume	Port Location		Port Efficiency & Performance					Port Infrastructure			ICT Tools								
	TT	HD	LSCI	SWT	CDT	STA	TPT	CP	WD	BL	TS	PCS	Swin	CC	WC	IoT	BDA	AR	R&A	CS
	Tons	km	km	days	days	hours	hours	moves/ hours	m	m	Ha	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing
Igoumenitsa (GR)	-	471	59,41	n.a.	n.a.	n.a.	n.a.	n.a.	-	-	-	Yes	No	Yes	Yes	Willing	Willing	Willing	No	Yes
Thessaloniki (GR)	12888777	502	59,41	n.a.	n.a.	n.a.	n.a.	n.a.	10	6200	150	Yes	Willing	No	Yes	Willing	Yes	No	Yes	Yes
Piraeus (GR)	-	8	59,41	n.a.	n.a.	n.a.	n.a.	n.a.	18	-	3900	Yes	Willing	Yes	Yes	Willing	Yes	No	No	Yes
Ravenna (IT)	26508485	352	67,22	n.a.	n.a.	n.a.	n.a.	n.a.	10	-	-	Yes	No	Yes	Yes	Willing	Wiling	No	No	Yes
Trieste (IT)	61955405	686	67,22	n.a.	n.a.	n.a.	n.a.	n.a.	18	770	-	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Venezia (IT)	25134620	526	67,22	n.a.	n.a.	n.a.	n.a.	n.a.	12	30000	2045	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Durrës (AL)	3683773	1	3,04	n.a.	n.a.	n.a.	n.a.	n.a.	11	3661	79	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Vlore (AL)	74903	121	3,04	n.a.	n.a.	n.a.	n.a.	n.a.	10	360	0,045	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes
Slavonski Brod (HR)	-	-	38,41	n.a.	n.a.	n.a.	n.a.	n.a.	-	-	-	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Rijeka (HR)	13404784	165	38,41	n.a.	n.a.	n.a.	n.a.	n.a.	18	1313	370	Willing	Willing	Willing	Yes	Willing	Willing	Willing	Willing	Yes
Bar (MNE)	1700537	40	2,99	n.a.	n.a.	51	n.a.	250	10	1440	52	Yes	Yes	No	Willing	No	No	No	No	No
Patra (GR)	290590	211	59,41	n.a.	n.a.	n.a.	n.a.	n.a.	-	-	-	Yes	Willing	No	Willing	Willing	No	No	No	Yes
Ploče (HR)	4529000	506	38,41	n.a.	n.a.	10	20	17	10	2280	230	Yes	Yes	Yes	Yes	Willing	Willing	Willing	Willing	Yes
Koper (SL)	23400000	105	39,32	n.a.	n.a.	30	54	n.a.	14	3171	280	Yes	Yes	Yes	Yes	Willing	Yes	Willing	Willing	Yes
Ancona (IT)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bari (IT)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 4. 15. Scores for ports based on the developed MCA methodology

Port	Cargo Volume	Port Location		Port Efficiency & Performance					Port Infrastructure			ICT Tools								
	TT	HD	LSCI	SWT	CDT	STA	TPT	CP	WD	BL	TS	PCS	Swin	CC	WC	IoT	BDA	AR	R&A	CS
	Tons	km	km	days	days	hours	hours	moves/ hours	m	m	Ha	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing
Igoumenitsa (GR)	-	1	9	0	0	0	0	0	-	-	-	10	0	10	10	2	2	2	0	10
Thessaloniki (GR)	2	1	9	0	0	0	0	0	5,5	2	0,4	10	2	0	10	2	10	0	10	10
Piraeus (GR)	-	9	9	0	0	0	0	0	10	-	10	10	2	10	10	2	10	0	0	10
Ravenna (IT)	4	3	10	0	0	0	0	0	5,5	-	-	10	0	10	10	2	2	0	0	10
Trieste (IT)	10	1	10	0	0	0	0	0	10	0,25	-	10	10	10	10	10	10	0	0	0
Venezia (IT)	4	1	10	0	0	0	0	0	6,6	10	5,2	10	10	10	10	10	10	0	0	10
Durrës (AL)	0,6	10	0,5	0	0	0	0	0	6,1	1,2	0,2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Vlore (AL)	0,01	7	0,5	0	0	0	0	0	5,5	0,12	0	10	0	10	10	10	10	0	10	10
Slavonski Brod (HR)	-	-	6	0	0	0	0	0	-	-	-	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Rijeka (HR)	2	7	6	0	0	0	0	0	10	0,44	0,95	2	2	2	10	2	2	2	2	10
Bar (MNE)	0,3	9	0,5	0	0	2	0	10	5,5	0,5	0,13	10	10	0	2	0	0	0	0	0
Patra (GR)	0,04	5	9	0	0	0	0	0	-	-	-	10	2	0	2	2	0	0	0	10
Ploče (HR)	0,73	1	6	0	0	10	10	0,7	5,5	0,76	0,6	10	10	10	10	2	2	2	2	10
Koper (SL)	3,8	7	6	0	0	3	3,7	0	7,8	1	0,72	10	10	10	10	2	10	2	2	10
Ancona (IT)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bari (IT)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 4. 16. Weighted score for ports based on the developed MCA methodology

Port	Cargo Volume	Port Location		Port Efficiency & Performance					Port Infrastructure			ICT Tools									
	TT	HD	LSCI	SWT	CDT	STA	TPT	CP	WD	BL	TS	PCS	Swin	CC	WC	IoT	BDA	AR	R&A	CS	
	Tons	km	km	days	days	hours	hours	moves/ hours	m	m	Ha	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	Yes/ No/ Willing	
Igoumenitsa (GR)	-	0,03	0,23	0,00	0,00	0,00	0,00	0,00	-	-	-	1,00	0,00	0,50	0,50	0,08	0,08	0,08	0,00	0,40	2,9
Thessaloniki (GR)	0,10	0,03	0,23	0,00	0,00	0,00	0,00	0,00	0,14	0,05	0,02	1,00	0,20	0,00	0,50	0,08	0,40	0,00	0,40	0,40	3,5
Piraeus (GR)	-	0,23	0,23	0,00	0,00	0,00	0,00	0,00	0,25	-	0,50	1,00	0,20	0,50	0,50	0,08	0,40	0,00	0,00	0,40	4,3
Ravenna (IT)	0,20	0,08	0,25	0,00	0,00	0,00	0,00	0,00	0,14	-	-	1,00	0,00	0,50	0,50	0,08	0,08	0,00	0,00	0,40	3,2
Trieste (IT)	0,50	0,03	0,25	0,00	0,00	0,00	0,00	0,00	0,25	0,01	-	1,00	1,00	0,50	0,50	0,40	0,40	0,00	0,00	0,00	4,8
Venezia (IT)	0,20	0,03	0,25	0,00	0,00	0,00	0,00	0,00	0,17	0,25	0,26	1,00	1,00	0,50	0,50	0,40	0,40	0,00	0,00	0,40	5,4
Durrës (AL)	0,03	0,25	0,01	0,00	0,00	0,00	0,00	0,00	0,15	0,03	0,01	-	-	-	-	-	-	-	-	-	0,5
Vlore (AL)	0,00	0,18	0,01	0,00	0,00	0,00	0,00	0,00	0,14	0,00	0,00	1,00	0,00	0,50	0,50	0,40	0,40	0,00	0,40	0,40	3,9
Slavonski Brod (HR)	-	-	0,15	0,00	0,00	0,00	0,00	0,00	-	-	-	-	-	-	-	-	-	-	-	-	0,2
Rijeka (HR)	0,10	0,18	0,15	0,00	0,00	0,00	0,00	0,00	0,25	0,01	0,05	0,20	0,20	0,10	0,50	0,08	0,08	0,08	0,08	0,40	2,5
Bar (MNE)	0,02	0,23	0,01	0,00	0,00	0,12	0,00	0,60	0,14	0,01	0,01	1,00	1,00	0,00	0,10	0,00	0,00	0,00	0,00	0,00	3,2
Patra (GR)	0,00	0,13	0,23	0,00	0,00	0,00	0,00	0,00	-	-	-	1,00	0,20	0,00	0,10	0,08	0,00	0,00	0,00	0,40	2,1
Ploče (HR)	0,04	0,03	0,15	0,00	0,00	0,60	0,60	0,04	0,14	0,02	0,03	1,00	1,00	0,50	0,50	0,08	0,08	0,08	0,08	0,40	5,4
Koper (SL)	0,19	0,18	0,15	0,00	0,00	0,18	0,22	0,00	0,20	0,03	0,04	1,00	1,00	0,50	0,50	0,08	0,40	0,08	0,08	0,40	5,2
Ancona (IT)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bari (IT)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Based on the above presented MCA for the ports, the final scores achieved are the following:

Ploče (HR)	**5,4**
Venezia (IT)	5,4
Koper (SL)	5,2
Trieste (IT)	4,8
Piraeus (GR)	4,3
Vlore (AL)	3,9
Thessaloniki (GR)	3,5
Bar (MNE)	3,2
Ravenna (IT)	3,2
Igoumenitsa (GR)	2,9
Rijeka (HR)	2,5
Patra (GR)	2,1
Durrës (AL)	0,5
Slavonski Brod (HR)	0,2
Ancona (IT)	-
Bari (IT)	-

It must be mentioned that because the evaluation methodology is based on the collected data through the questionnaire-based survey, the absence of crucial data (as it was the data asked) affects the achieved score. As a result, the authorities provided information regarding those indicators describing the productivity of their ports, will see themselves ranking at high places. The final ranking of the ports based on the collected data reveals how important was for the ports' authorities to provide information non fragmented information.

It is obvious that ports serving significant amounts of cargoes (Trieste, IT), or ports that are located very close to the capital city of their country (Piraeus, GR), or their berths are of significant length (Venezia, IT), are ranked below the port of Ploče, HR because the port's authorities provided crucial information regarding the indicators describing the port's productivity.

However, overall the ports' performance can be described as at least sufficient, due to the fact that the collected data do not allow a complete evaluation process.

5.10 Possible solutions

As referred to the book under the title "Border Management Modernization, "published by the World Bank (Editors: McLinden G., Fanta E., Widdowson D. and Doyle T.) of 2011, the ICT used by border management agencies since the 1980s have evolved significantly.

Figure 4.2 present this evolution by comparing the evolution of business and technology directions at border management agencies for the time period 1980s – 2020s.

At the moment, ICT solutions and tools are at the stage, regarding the business direction, on requiring flexibility for customs to rapidly adapt global political changing as well as any functional challenges. More important is that customs are globally recognized to be the driver of competitiveness and growth and that role creates puts a burden to the border management authorities' shoulders. Finally, the integration of customs and border management has passed the level of a requirement and has become necessity.

On the other hand, the technology direction puts ICT solutions and tools in the position of adopting service-oriented architecture and web-based services between agencies. All systems are (or should be) organized around identity management assurance. The current situation globally creates the necessity (perhaps more than ever before) to tag all legitimate goods so that they can be easily tracked and traced (bar codes and RFID). The technological progress provides the tools to support all the above mentioned through the usage of intelligent devices such as integrated PDA, GSM, microchip biometric controls enable to all systems, not only for security reasons but also for reducing the time needed for the vehicles to be controlled and at the same time to optimize the border crossing points' performance.

Overall, there is an increasing amount of online activity, which almost automatically rise issues as interoperability and necessity of greater sharing of information and intelligence not just within agencies, but also across a wide range of stakeholders. "*State of the art ICT will be the key to achieving required growth and competitiveness nationally, regionally and internationally*" as said in the above-mentioned book.

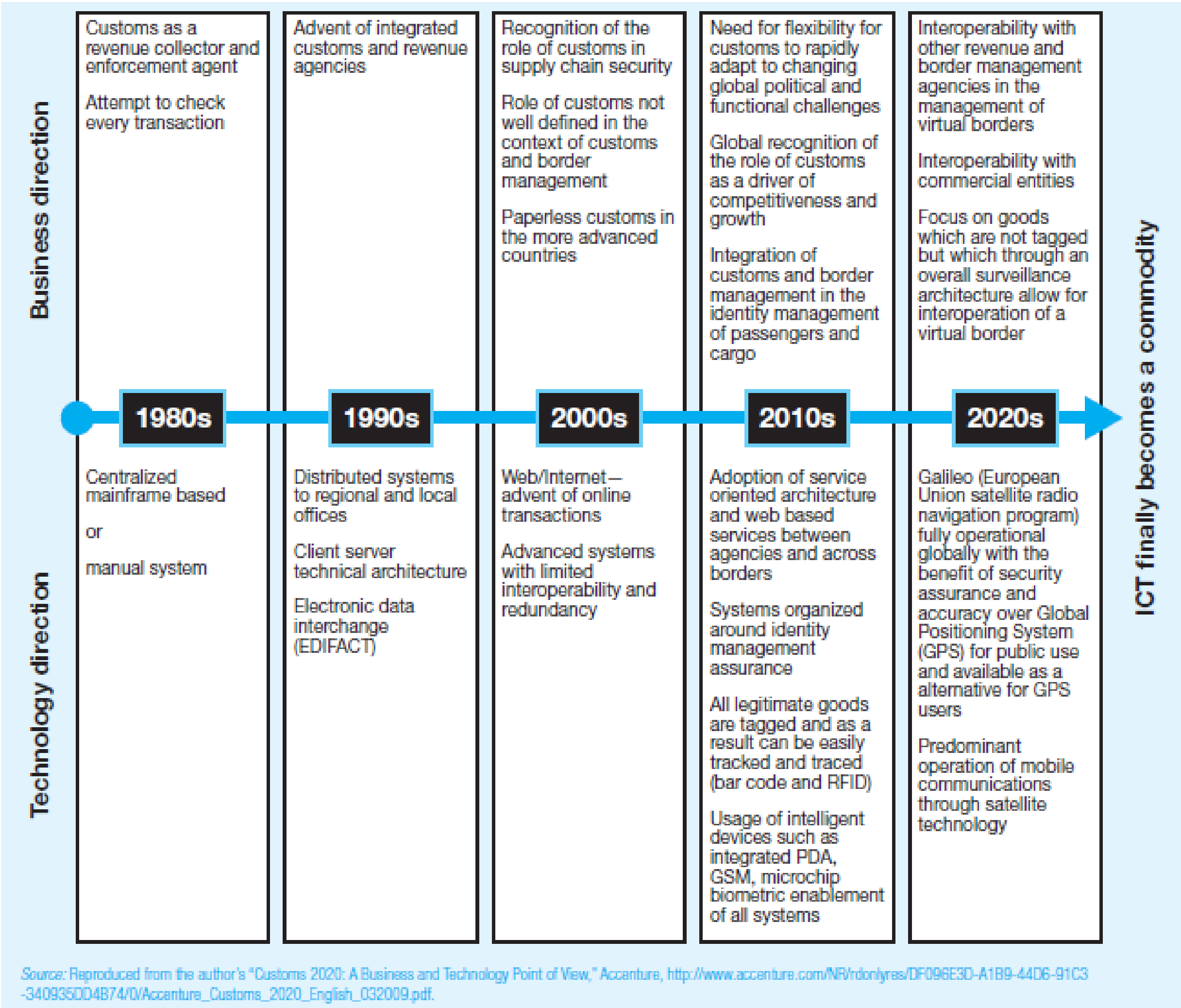


Figure 4. 2. Comparison of the evolution of ICT solutions and tools from 1980s to 2020s (Source: World Bank, 2011)

The possible solutions are aligned to the problems identified through the corridor analysis. Although the identified problems concern organizational and operational issues, the solutions are focused on the operation of the different types of nodes through ICT tools and applications. In order the process of developing possible solutions to be simplified and more solid, the identified problems per type of node are clustered.

The identified problems are those used as criteria/ indicators for the corridor analysis as described on the above. The process of evaluating the performance of the different types of nodes was extremely challenging due to the amount of the collected data, which is primarily characterized as fragmented. It is mentioned on the above, that in order to evaluate the different types of nodes, it was necessary to have commonly reported data related to those required. If a criterion is not commonly reported at least by the majority of the evaluated nodes (best case scenario would be by all nodes), the process becomes weak.

To avoid this possibility, it was decided to perform the evaluation of the nodes using those fields that are commonly reported through the surveys.

5.10.1 Road BCPs

The identified problems used as criteria for the evaluation process and thus the corridor analysis, based on the above mentioned, are clustered as the following:

- Facilities;
- Tracing means;
- Supporting and communicating equipment;
- Trade facilitations;
- Electronic submission of required documentation;
- Procedural and waiting times.

Those six (6) clusters consist not only the identified problems but at the same time possible solutions which must be developed under the spectrum of implementing ICT tools and applications. However, the facilities are excluded by this process due to the fact that any possible solutions must be related to interventions to infrastructures which is not the objective of the project. Moreover, any solutions regarding the facilities would require heavy measures and by that is meant significant budget and time. Therefore, the remaining five (5) clusters of identified problems should consist the core based on which possible solutions must be developed and presented.

The CONNECTA report, described on the above, focuses on analysing hypothetical scenarios regarding the implementation of a) One-Stop Shop and b) Electronic Queue Management Systems (eQMS).

As One-Stop Shop (OSS) is referred "*the ability to complete all formalities in one place (i.e. joint controls from the two border sides). It is applied to many administrative processes, especially for the issuance of documents, permits and certificates to citizens. It can also be applied to export, import and transit processes. The OSS requires that all Border Agencies – primarily Customs and Border Police – operate from a single office. By definition, a road BCP ban be organized into two One-Stop Shops: one on each side of the border or jurisdictional boundary*".

The Electronic Queue Management Systems (eQMS) "*typically consist of three main components: a) the underlying software system; b) a payment system; and c) a camera system. Software is used for pre-booking time slots via an online portal, which provides users with clear step-by-step information starting with a virtual waiting process, arrival, and check-in at the waiting area, the actual (physical or in-presence) queuing, and finally exit from the waiting area (using license plate recognition cameras). The entire process* *is streamlined. Information sharing and the data clearinghouse that functions in the back-end of the system without active users' participation, allows for background checks to take place in advance of the BCP".*

The CONNECTA report came to the conclusion that the following sites (pairs of road BCPs) can be considered as candidates for the implementation of eQMS:

- Batrovci (SRB)/ Bajakovo (HR)
- Horgos (SRB)/ Roszke (HUN)
- Neum I (BIH)/ Klek (HR)
- Neum II (BIH)/ Zaton Doli (HR)
- Presevo (SRB)/ Tabanovci (NMK)
- Bogorodica (MDK)/ Evzonoi (GRE)
- Merdare (SRB)/ Merdare (XK)

5.10.1.1 Tracing means

During the evaluation process of Road BCPs, the criteria used related to this cluster, concerned the existence or not of a) X-Ray scanner, b) weighbridge and c) other tracing means. In order the control process to be optimized and the required time to be reduced the above-mentioned equipment is considered critical. However, it must be mentioned that their existence does not automatically ensures that the control time will be reduced and/ or the BCPs' performance will be optimized.

Tracing means must be used as parts of an exchanging information system in real time, providing the ability of cross-checking information between different entities not just within agencies but across a wide range of stakeholders. In this framework, any ICT solutions and tools should be focused on ensuring data exchange in real time through secure communication channels among many stakeholders.

5.10.1.2 Supporting and communicating equipment

The second cluster of identified problems concern the supporting and communicating equipment and is related to the following criteria used for the BCPs' evaluation: a) computer, b) internet connection and c) connection with the Central Custom Offices.

There were several cases (BCPs' authorities) reporting computer in bad condition and/ or slow - low bandwidth internet and/ or moreover, no direct connection to the Central Custom Offices. These issues although are easily treated and healed, they do exist in several cases. Border Crossing Points should be equipped with state of the art supporting equipment as well as communicating equipment. The current decade, as mentioned on the above, is characterized regarding the BCPs' operation and performance by increasing online activity. Therefore, ICT solutions and tools should be focused on informing the authorities regarding new technologies on cloud computing, secure communications with high encryption capabilities, big data analysis, etc.

5.10.1.3 Trade facilitations

Trade facilitations concern actions/ tools/ applications aiming to simplify the processes and controls at the BCPs. Through the questionnaire-based survey, the BCPs' authorities were asked to report which, among ten (10) facilitations, are implemented in their stations. These trade facilitations were:

- Service time statement;
- Authorized Economic Operator (AEO);
- Advance Filing;
- Binding Ruling;
- Electronic Customs;
- Clearance at Dry Ports and/ or Importers' Premises;
- Use of only standardized international documents;
- Reduction of the number of documents;
- One Stop-Shop;
- Electronic Single Window for Trade;

The evaluation process takes into consideration these facilitations. Those BCPs that have implemented one or more of these facilitations are rewarded by one (1) point per facilitation.

5.10.1.4 Electronic submission of required documentation

The electronic submission of the required documentation for the commercial vehicle, the drivers and the cargo, is part of the pre-arrival process. This process makes optimum use of the time for risk assessments and release decisions while goods are travelling.

The electronic submission of the necessary documentation requires efficient computer and communicating equipment, internet connection and secured communication channels.

5.10.1.5 Procedural and waiting times

All the above-mentioned solutions aim to reduce the required procedural and waiting times at the BCPs. Overall, the implementation of ICT solutions and tools aims to simplify the processes without arising any security and safety issues.

Overall, the CONNECTA report highlights the importance of implementing the appropriate per case ITS solutions and tools, which could be summarized to the following:

- Segregation of BCP users (at minimum freight traffic should be segregated from passenger traffic).
- Lane management by applying traffic counters, Variable Message Signs (VMS), info boards, etc.

- Automating procedures, such weighing the trucks in motion along with the implementation of an Automatic Number Plate Recognition (ANPR) system and systems to identify the vehicles' dimensions and containers codes.
- Managing traffic to avoid congestion though IT systems that inform in real time, based on data through traffic sensors installed along the road network before the BCP, the drivers for possible congestion and therefore they should park in specific areas before and near the BCP. Furthermore, the drivers will be informed to approach the BCP when the conditions allow them to be processed without significant waiting time and delays.
- Pre arrival information available to the users, based on VMS, roadside facilities, internet, highway radio system, etc.
- Traffic equipment for implementing eQMS.

Finally, the CONNECTA report describes specific measures regarding IT systems as well as physical infrastructure improvements for those BCPs participated in the survey.

5.10.2 Rail BCPs

The identified problems used as criteria for the evaluation process and thus the corridor analysis, based on the above mentioned, are clustered as the following:

- Facilities;
- Tracing means;
- Supporting and communicating equipment;
- Performance of a) simultaneous, b) on board and c) at separate areas, controls.
- Procedural and waiting times.

Those five (5) clusters consist not only the identified problems but at the same time possible solutions which must be developed under the spectrum of implementing ICT tools and applications. However, the facilities are excluded by this process due to the fact that any possible solutions must be related to interventions to infrastructures which is not the objective of the project. Moreover, any solutions regarding the facilities would require heavy measures and by that is meant significant budget and time. Therefore, the remaining four (4) clusters of identified problems should consist the core based on which possible solutions must be developed and presented

5.10.2.1 Tracing means

During the evaluation process of Road BCPs, the criteria used related to this cluster, concerned the existence or not of tracing means. In order the control process to be optimized and the required time to be reduced the existence of the necessary tracing means could be proved as critical.

Tracing means must be used as parts of an exchanging information system in real time, providing the ability of cross-checking information between different entities not just within agencies but across a wide range of stakeholders. In this framework, any ICT solutions and tools should be focused on ensuring data exchange in real time through secure communication channels among many stakeholders.

5.10.2.2 Supporting and communicating equipment

The railway electronic information systems automate the organization of cargo traffic and provide at the same time a communication interface between railways undertakings and their clients, business partners and control authorities at border crossing points. Information system applications could support electronic processing of documents such as electronic consignment note.

Furthermore, Electronic Data Interchange (EDI) allows efficient exchange of information among railways to complete border crossing formalities. Implementation of EDI between railways of neighbouring countries requires goods cooperation between the railways, formal arrangement and suitable capacity and provided interoperability between the information systems. The border crossing railways EDI may include data on trains, wagons and cargo. The data should be automatically generated from other relevant information systems.

The EU regulation on technical specification for interoperability relating to the telematics applications for freight subsystem of European rail system (referred to as the TAF TSI) ensures efficient interchange of information in rail transport by setting a framework for common interfaces to allow communication and data exchange between different systems. For this reason, the TAF specifications are flexible and suitable for implementation in many different countries. The TAF TSI covers the applications for freight services and the management of connections with other modes of transport. The TAF TSI has an impact on the conditions of use of rail transport by railway undertakings, infrastructure managers, other service providers (e.g. wagon companies, intermodal operators) and customers (UN ESCAP, 2018). The EU TAF provisions was transposed in COTIF to Uniform Technical Prescription Telematics Applications for Freight (UTP TAF) that entered into force on 1 December 2017. Differently from EU, application of OTIF UTP TAF is not limited to one single customs territory.

Railway ICT Solutions that support implementation of TAF TSI have been developed by: Rail Network Europe (RNE), RAILDATA, a special group under UIC set up in 1995 by several European railway undertakings and Common Components Group (CCG), a special group of the UIC, assigned to develop, maintain and operate the Reference Files system and the Common Interface are presented in Figure 4.3.

TAF TSI functionality	Company/ Organization	Product
RU/IM communication		
Path request at short notice	RNE	RNE PCS
Train Preparation	RNE	RNE PCS
Train Running Forecast	RNE	RNE TIS
Service disruption information	RNE	RNE TIS
Train location	RNE	RNE TIS
Data exchange for quality improvement	RNE	RNE TIS
RU/RU communication		
Consignment note data	RAILDATA	ORFEUS
Shipment of ETI/ETA	RAILDATA	ISR
Exchange reporting	RAILDATA	ISR
Wagon movement	RAILDATA	ISR
Databases which have to be implemented		
Infrastructure restriction notice database	-	*IRNDB has to be ensured by each IM*
Rolling stock reference database	RSRD[2]	RSRD[2]
Wagon and intermodal unit operational database	RAILDATA	ISR
Trip plan for wagon/intermodal unit	RAILDATA	ISR
Reference files	CCG – UIC *Will be hosted by RNE in the future*	Reference files
Common interface		
Common interface	CCG - UIC	Common interface

Figure 4. 3. TAF – TSI ICT solutions (Source: UN ESCAP, 2018)

5.10.2.3 Performance of a) simultaneous, b) on board and c) at separate areas, controls

The implementation of non-physical inspections is a critical issue at the border crossing points because it's a way to reduce the required time for controls and at the same time does not require the physical presence of working staff.

As a result, the working staff is able to perform other controls requiring their physical presence. Due to the fact that almost all reporting BCPs' authorities reported insufficient number of working staff, it is totally understandable that the working staff assigned for the performance of several and of different nature inspections and controls is charged with ta heavy and time consuming duty.

It is important for the performance of the BCPs to manage in the best possible way the time available for the performance of inspections and controls. A possible solution to this issue is the implementation of simultaneous and/ or on-board controls and inspections, speeding up the entire process. At the same time, due to the nature of those inspections and controls which require the physical presence of working staff, the availability of separate areas (specifically designed and equipped) for the implementation of those inspections and controls is critical.

In this framework, ICT solutions and tools should be focused on ensuring first of all the optimized time management, through the exchange of information concerning the inbound traffic before the freight trains arrive at the BCPs in order the authorities to assign to the working staff the inspections and controls to be implemented in a more optimized way. Secondly, during these inspections and controls the working staff should be equipped in such way that the information concerning the inspections and controls are transmitted to the BCPs' control center in real time. At the same time, the working staff implementing the inspections and controls must have access to data bases and other material which can assist them in their tasks.

Communication and cyber security are the main keywords regarding the implementation of ICT solutions and tools for this criterion.

5.10.2.4 Procedural and waiting times

All the above mentioned solutions aim to reduce the required procedural and waiting times at the BCPs. Overall, the implementation of ICT solutions and tools aims to simplify the processes without arising any security and safety issues.

5.10.3 Maritime ports

The evaluation of the maritime ports' performance is based in several criteria, among which there are indicators that can be considered as problems that the ports face and therefore can be clustered as the following:

- Port efficiency & performance;
- Port infrastructure;
- ICT solutions & tools;

Those three (3) clusters consist not only identified problems but at the same time possible solutions which must be developed under the spectrum of implementing ICT tools and applications. However, the ports are different types of nodes compared to road and rail BCPs, based on the fact that these are larger, more complicated in terms of processes and procedures and also that heavy economic activities are implemented in those facilities.

5.10.3.1 Port efficiency & performance

The efficiency and performance of maritime ports can be evaluated by using several attributes, which can be considered as evaluating indicators. For the needs of the ADRIPASS project and based on the collected data through the questionnaire-based survey, the attributes/ indicators used are the following:

- Ship waiting time;
- Container dwell time;
- Ship turnaround time;
- Truck processing time;
- Crane productivity.

For those attributes/ indicators the performance and efficiency of the ports can be improved by using highly sophisticated equipment, for example robotics & autonomy, and of course specialized equipment for accelerating the processes and procedures concerning loading and unloading the goods. Moreover, another issue for improving their performance and efficiency in relation to the above-mentioned attributes/ indicators considers the facilities of the ports, especially those concerning the availability of the ships to dock as close as possible to existing loading and unloading equipment. Another issue regarding the facilities in relation to transhipping the goods to another transport mode, considers the time needed for those transport means (trucks and trains) to enter and exit the ports' facilities. In other words, it is crucial that those means are served in the minimum possible way, without of course delays and queues at the entrance and exit gates. Beside the required equipment for any processes and procedures to be undertaken, the implementation of ICT solutions and tools can be beneficial towards this objective.

5.10.3.2 Port infrastructure

Regarding the port infrastructure and how it enables to the performance and thus the evaluation of maritime ports, in the framework of ADRIPASS project, the following attributes are taken into consideration:

- Water depth;
- Linear berth length;
- Terminal size.

For those attributes/ indicators any proposals regarding how they can be improved, require hard measures which outside the scope of ADRIPASS project. However, it is crucial for the evaluation process to be considered as solid, to be taken into consideration.

5.10.3.3 ICT solutions and tools

In relation to the nature and objective of the ADRIPASS project, as described in the relative Application Form, these attributes are considered as the most important for the evaluation process. Therefore, the questionnaire-based survey included as many as possible ICT solutions and tools, not only those implemented at maritime ports as commonly used but also those referred to the international literature. Those ICT solutions and tools are:

- Port Community System;
- Single Window;
- Cloud Computing;
- Wireless Communication;
- Internet of Things;
- Big Data Analysis;
- Augmented Reality;
- Robotics and Autonomy;

- Cyber Security.

It is clear that as ICT solutions and tools, all the above-mentioned attributes/ indicators can be proposed to be implemented at maritime ports, depending their characteristics, in order their performance to be improved.

6 Freight transport facilitation and improvement of Corridor performance through ICT

The core of the ADRIPASS project is the examination, evaluation and implementation of ICT tools and applications at the seaports of the transport corridors in the Western Balkan area. These transport corridors are consisted not only by seaports performing as gateways, but also by several transport infrastructure and freight transport facilities. The objective of the implementation of ICT tools and applications is to reduce problems and inefficiencies and to improve the performance of these corridors, by achieving, among other things, the following:

- Elimination of bottlenecks not only along the transport networks but also at the nodes of the supply chain.
- Increase of transport capacity, if possible, along the transport corridors.
- Reduction of time needed for processes to be performed at the nodes of the transport corridors.
- Promotion of multimodal transport in an effort to optimize the usage of the available transport modes.

In this framework, the present chapter presents the selected/ proposed ICT tools and applications as they are provided by the administrators of the nodes and networks along the segments of the identified transport corridors in the area covered by the ADRIPASS project.

6.1 Ports-Gateways

For those seaports performing as gateways, selected/ proposed ICT tools and applications which are considered as Pilot Actions are presented concerning selected seaports. These seaports are the following:

- Luka Koper, Slovenia (Pilot Action no. 1)
- Ploče, Croatia (Pilot Action no. 2)
- Bar, Montenegro (Pilot Action no. 3)
- Region of Epirus/ Thesprotia (in cooperation with Igoumenitsa port authority), Greece (Pilot Action no. 4)
- Durrës, Albania (Pre-investment study)

The authorities of these seaports, participated in an internal data collection procedure, focused on identifying the main problems that they face as well as the ICT tools and applications that if were to be implemented, will assist the respective authorities to overcome their problems and improve their performance.

6.1.1 Port of Koper, Slovenia

The Port of Koper lies on the Core Network of the TEN-T corridors. Its role is very important, considering that it represents a core node between two main EU corridors: the Mediterranean and the Baltic-Adriatic corridors.

The main transport mode leaving and entering the port is railway, but also road freight transport is well-developed all-over Europe, as well as in Slovenia, for which congestions and traffic issues are occurring around the only existing gate, near the city centre. In that way, new gates for the container terminal and cars terminal are being urgently developed, with particular emphasis on the streamline of access points and faster data-transfer solutions.

The expansion of the Port of Koper is a direct consequence of the increasing volumes of cargo being handled through the only Slovenian port. The most urgent priorities to be addressed are the data processing and organization of works involving containers and cars terminal, where capacities are being improved, for which a software adaptation of the port's PCS is needed, in order to accompany the development of the whole administrative system within the port's area. One of the main reasons that hamper the growth and the economic development of logistic operations is the lack of efficient maritime - hinterland connections, mainly caused by the existence of various bottlenecks at border level.

The most urgent upgrades are needed at container and cars terminal, where new gates and areas are being prepared, to face the lack of space and organization at system level.

IT operations in Port of Koper are based on the work of an information system consisting of over 20 sub-systems that are interconnected. The information system can be divided into those sub-systems that are specialized and at the same time support the implementation of port activities 24/7 and to generic information systems used for business purposes.

The basic operative system, which, among other things, enables (1) the commissioning of services, (2) the planning of work at most terminals, (3) the preparation of the ship's mooring plan, (4) the management of warehouse records, (5) invoicing etc. is the TinO system (marketing and operations) that has been in use since 2007 and replaced the previous System Host. In accordance with the Decision of the Customs Administration of the Republic of Slovenia of 2007, TinO is the official system for keeping records of goods located in the territory of the Port of Koper. For this purpose, the system is linked to the Customs systems as described above. The system is experiencing continuous upgrades in line with the operational needs of port activities and the development of information technologies.

Recently, the connection between the NEO (National Single Window) system, operated by the Maritime Authority of Slovenia and the TinO system, was initiated, so that ship reporting agents send only the NEO system, which then distributes the information to the TinO system. With the TinO system, it is possible to communicate using the Lunaris web solution developed by Luka Koper with the external contractor and is available free of charge to subscribers and / through commercial solutions of various IT providers present on the market (Panteon Group d.o.o., Trinet doo, etc.), but contractors may also opt for their own link development. Communication of subscribers with the TinO system takes place through the so-called "entry point", which is based on MQ (message queue) technology. It performs the function of the messenger, validates all received messages, transforms them and directs them.

Due to the specialization of work at the container terminal and at the car terminal, there are specialized TOS (terminal operation systems), which are systems that support the planning and execution of works. At the container terminal, the Tideworks system is in use, and at the car terminal there is an updated AVTI system that supports the bar code system that is installed on cars. For the needs of the management of the distribution centre and the fruit terminal, TinO is also integrated with the WMS (warehouse management system) - system of the Mentek manufacturer, which enables the planning, handling and storage of goods based on micro locations.

Luka Koper is the only Slovenian port which represents a unique and nearest window on the sea, for countries of Central and Eastern Europe. Cargo flows arriving from Far East for EU and back, are increasing. Bigger quantities of containers and cars are the main challenge for the Port of Koper, especially when assuming that the 60% of the whole port's cargo is leaving the port by train. New solutions and new gates at the car and container terminal will allow quicker movements of goods, with big emphasis on the rationalization of the existing equipment and transport organization. The implementation of the PCS will allow quicker scanning and registration of goods, with higher level of data exchange between terminals and operators within the port's area. Development of the PCS will allow railway operators, forwarders and terminal employees, to better plan their works, better know where the goods are located and what is the status of bureaucracy linked to the cargo leaving/arriving in the port.

6.1.2 Port of Ploče, Croatia

Port of Ploče Authority has developed Port Community System for stakeholders in port of Ploče area with aim to increase in savings and efficiency in administrative and physical logistics. This is realized by collaboration between the port stakeholders where the following aspects were relevant:

- focused investment in technology (as enabler) and in the organization (changed processes);
- trust and commitment in the development of a Port Community System (PCS) and a Coordination Application (CA) aiming at efficient and effective exchange of relevant information.

PCS system has been first implemented on 1st July of year 2013 and on that day first electronic message was sent in PCS system. Development of PCS system was from year 2007 until year 2013, which included analysis of processes and development of system based on analysis. PCS system was financed from loan of World Bank, which is also used for construction of dry bulk cargo terminal, container terminal and entrance terminal. Within this construction of terminal, Centralized systems which control flow of electronic information was needed. Through development of port terminals and due to the need for exchange of information, PCS system technology is used also on the construction of entrance terminal to control and manage such terminals. This system is based on existing PCS system and exchange information with PCS because control and process of information based on business rules and defined business processes are crucial. PCS system also exchange information with security system that is used for control of vehicles and visitors, and is used for issuing permits for vehicles and visitors (truck drivers etc.) This was crucial because some information is generated based on exchanged information through PCS system.

PCS in Ploče must be upgraded to new technology. Nowadays older technology is used. Specifically, this technology is used in front-end development which has direct impact on users. PCS system has many features and end users are using web portal for entering data. This must be upgraded on a new functional level and technological level so that users can smoothly enter data without any problems.

Port of Ploče Authority has constructed new entrance terminal with Control and Management system that control gate in/out procedures. Terminal is automated, and this automation has impact on billing system and monitoring activities regarding cargo and vehicles, which are entering to, or leaving port area. Through this monitoring and big data analysis, there is an impact to custom procedures and therefor PCS must serve as an intelligent system having the ability to properly report services based on BI and Big Data aspects for improving data use and data analytics aiming to modernize and fasten cargo flows and procedures in port areas. With this action, users through PCS system will be able to control and analyse data that are exchanged in port areas as prerequisite for proper decisions.

PCS as control management system will gather all information and data that are exchanged among PCS users and present those data to restricted users from which they can have benefits in further analysis and planes for further management activities. PCS will not only act as exchange platform. By using new technologies, it will be developed as a tool with higher value providing smarter presentation and use of data. Data which are exchanged must not be only operational data. Data must have other important purpose as well, with benefit for all included stakeholders and proper digitalization of processes with aim of transformation to digital so that could be exchange on all levels to all systems, if needed, based on proper defined rules.

6.1.3 Port of Bar, Montenegro

The Port of Bar is an important link in the intermodal transport chain. It is a part of the Indicative Extension to Neighbouring Countries for the extension of Trans-European Transport Network. It is integrated with the Belgrade-Bar railway and the road traffic network as well as with Podgorica-Nikšić (industrial city in Montenegro) railway and Podgorica-Tirana (Albania) railway. Future motorway Bar – Belgrade is under construction.

The main BCPs addressed are:

- By road: with Serbia (Dobrakovo – distance 187 km), with Albania (Božaj – distance 65 km), with Bosnia and Herzegovina (Šćepan Polje – distance 186 km), with Croatia (Debeli brijeg – distance 93, 6 km)
- By rail: with Serbia (Bar – Vrbnica, distance 167km), which is a part of Bar-Belgrade railway.

In accordance with ADRIPASS goals, pilot actions of the Port of Bar will intend to improve the planning capacities of transport stakeholders and policy makers concerning the multimodal transport accessibility and network efficiency in Montenegro. These will be achieved through better use of available data in Port Community System (hereafter mentioned as **PCS**) which was developed in year 2014, as a part of the pilot will be the development of the PCS, which is related to the statistical data, dashboards, etc. The developed PCS can be replicated at BCPs in Montenegro or PCS can communicate with other similar systems via messages (EDI, XML, etc.). The pilot action will improve port operations and increase competitiveness between the port and the hinterland. In addition, better communication between different types of stakeholders will be achieved through the end-user-oriented pilot actions (upgrade of the GUI, mobile solutions for the PCS, etc.). All activities are part of the soft measures intended to support regional economic growth and to streamline freight flows in the ADRION region.

Port of Bar was a partner in three EU co-funded projects through which the PCS system was developed, integrated and upgraded: ADB Multiplatform (IPA SEE Programme), EA SEA-WAY and CAPTAIN (IPA ADRIATIC Programme). The idea of the ADB Multiplatform project was to develop and promote environmentally friendly, multimodal transport solutions from the ports in the SEE programme area to inland countries and regions along a selected pilot transnational network. The main output of the project referred to the Port of Bar was the development and implementation of the 1st phase of the Port Community System (PCS) (Implementation of pilot ICT tools - Integrated Port Management System). The developed PCS is a centralized and automated system for exchanging of information and documentation among stakeholders and maritime transport authorities. The implemented PCS is in line with EU Directive 65/2010. In addition, PCS has improved port operations and increased competitiveness of the Port of Bar. PCS will be a part of the future Maritime Single Window in Montenegro. Within the ADB project, the core of the system was developed as well as the main modules (modules Disposition and Customs). Disposition is a basic document for all activities related to the cargo movement. This is also a main connection among Customs, forwarders/agents and port. Further development of the PCS was done in the EA SEA-WAY project (output Innovative ICT system & infrastructure). Main achievement was the implementation of activities referred to electronic exchange of all relevant information related to ship's arrival and departure resulting in usage and exchange of ship information (arrivals, departures) on different types of ICT systems, introduction of IMO FAL forms, etc.

In the near future, this information can be used/exchanged with all relevant stakeholders for achieving better information on mobility issues. The implemented ICT/IT tools (PCS) were upgraded within CAPTAIN project. The goal of this upgrade was to ensure efficient up-to-date exchange of information delivered by machine generated emails about different actions in the PCS (e.g. for Ship announcement, berthing requests and Pilot requests on different milestones, etc.). This kind of data exchange was necessary in order to involve different stakeholders or maritime authorities in the PCS. The current PCS required several upgrades. Specifically:

- "Control center" (statistics, dashboards, etc.) upgrade.
- "Customs module" upgrade.
- "Truck module" upgrade.
- Mobile solution/application.
- User interface upgrade (better GUI, user friendly).

6.1.4 Port of Igoumenitsa, Greece

The access to Regional Unit of Thesprotia can be performed by road and by sea using the port of Igoumenitsa. There is no rail infrastructure in the Region of Epirus.

The construction and operation of the Egnatia and the Ionian Motorways is very important and both motorways have upgraded RUTH to a significant node for the Trans – European Networks in the Eastern and Western Mediterranean area.

Along the border of Epirus Region line with Albania, there are allocated 3 Border Crossing Stations (Sagiada, Mertziani – Konitsa and Kakavia). Egnatia Motorway starts from Igoumenitsa and passes through the entire Northern Greece (Western Macedonia, Thessaly, Central Macedonia, Eastern Macedonia and Thrace) ending to Kipi (Border Crossing Station with Turkey). Currently, Ionia Motorway starting from Egnatia in Ioannina, passes through Western Greece connecting Epirus with Patras and Athens.

Igoumenitsa Port Authority (OLIG) developed, integrated and upgraded its Port Community System (PCS) through the participation, as partner, in the following projects of the previous Programming Period: Adriatic Port Community – APC (IPA Adriatic Programme), MED-PCS (Med Programme) and GAIA (Greece-Italy Programme).

The current PCS of Igoumenitsa Port Authority, GAIA, is an integration of the systems developed within the projects above and has been fully customized to the needs of the Port. The PCS provides the following operations:

- Passenger Flow Management System. The Passenger Flow Management System records and controls the passenger flow (including vehicles) through the control check points through the use of tickets or security cards.
- Electronic Document Management System. Through the EDMS passenger information can be imported and tickets (security cards) to be issued as by the shipping companies. The current EDMS is supported by a set of web services that can be used by shipping companies to send data on expected ships, freights and vehicles, offering direct communication between OLIG and shipping companies' information systems. In cases that shipping companies do not operate an IT system, a web application was implemented in order to serve the possibility of issuing and printing the security card (with a unique barcode) by the shipping agent before arriving in the port.
- Control/ security subsystem for passenger/ vehicles handling. The application operates by scanning the barcode of ticket/ security card through PDAs at the control checkpoints. Ticket and security cards information is imported directly through EDMS as described above, while the data from PDAs are being transferred via the Wi-Fi network to the central Passenger and Vehicle Tracking System.
- Passenger and Vehicle Tracking System. The tracking system presents in total all information available in the previous subsystems, offering tracking of passengers and vehicles within the port area. In addition, the system allows for reports such as number of passengers entered the Port and how many are expected on a particular trip.

The pilot action entails two (2) sub-actions. The major sub-action is the design, development, operation of a Platform for PCS flows analysis, and forecast, while an additional sub-action refers to the development of Augmented Reality (AR) virtual navigation mobile application for vehicle drivers.

- Platform for PCS flows analysis

OLIG already operates a PCS, providing useful information for passengers, vehicles, freights and ships. Therefore, the pilot application that will be implemented through ADRIPASS project will be a web-based platform operated by RUTH, for PCS flows analysis, which by getting input from the current system, will process appropriate information through data analysis, performance management and Business Intelligence (BI) tools in order to provide RUTH and OLIG various type of useful information about the transport load presented through charts and dashboards in a comprehensive and user friendly way. In addition, the platform will elaborate various scenarios in order to provide forecast charts of transport flows and warnings in case of insufficient infrastructure. Moreover, the system will be accessible from other transport stakeholders and public authorities as well, with limited however, user permissions, providing them with a customized level of information adjusted and based on their needs.

The platform will use various tools such as digital boards, offering adequate information about current and previous situation of the transport flow. Such tool may host and visually include high volume of data in order that users will be able to compare actual performance in terms of goals, standards and previous network performance.

In addition, business intelligence procedures (such as data analysis) offer the opportunity to the users to make decisions on transportation issues, which in turn will improve their operational effectiveness. This analysis of PCS data concerning the above flows is an important activity both for OLIG and for Regional Unit of Thesprotia. Obviously, for the Port, the ability to gather and present in a comprehensive way all data concerning flows of passengers, vehicles, freights and ships will act as a business intelligence tool for the improvement of administrative and operational purposes.

Nevertheless, the importance is significant for RUTH as well, because the organization will improve the planning capacities in the field of transportation taking into account the strategic position of Igoumenitsa in the West Balkans. It will also help RUTH to provide data to several transport stakeholders facilitating the design and implementation of medium/ long term transportation strategies for the area, in collaboration with other organizations such as Egnatia Motorway Observatory and the Ministry of Infrastructure and Transport.

AR virtual navigation mobile app

- Augmented Reality (AR) tools

The second sub-action is addressed mainly to vehicle drivers (trucks, TIR trucks, buses, cars) which will be designed to serve as a virtual tour mobile application (available on Android and iOS) in order to provide drivers with useful information about the route that has to be followed from the arrival to the Port from Egnatia Motorway up to the boarding and backwards. The mobile app will present useful information about the location of critical points within the port area, i.e. terminals, control checkpoints, tickets/ security cards, as well as the relevant documentation needed at each critical point. Through the mobile app, the vehicle driver approaching the Port of Igoumenitsa will have the opportunity to receive navigation information by means of AR tools.

6.1.5 Port of Durrës, Albania

The Durrës Port Authority does not have a PCS system. It is foreseen the launch of a project led by Durrës Port Authority to set up PCS system as a standardized electronic platform that connects multiple systems and enables intelligent and secure exchange of information between stakeholders in the port community.

The PCS is seen as a system that is organized and used by private and public entity in port community sector. The project is going to be built by considering PCS, as centralized and automated system for exchanging of information and documentation between organizations and marine transport authorities in Durrës Port Community.

Each movement of the cargo in the port requires multiple communications among members of the port community, thus creating a complex information web. One of the main goals to be achieved through this system is the harmonization of procedures for organizing and standardizing operations in the logistics chain.

Up to today, the different actors of the Durrës Port community are exchanging information - traditionally paper, but now increasingly electronically - between each other, both for:

- Administrative purposes, to: a) Custom administration, b) Border police, c) National statistical office, and d) Health and Sanitary inspection
- Operational purposes, to: a) Terminal Operators, b) Stevedoring companies, c) Shipping Agents, and d) Freight forwarders.

For the Port of Durrës Authority, it is an urgent need for a neutral and open PCS to the entire port community, enabling secure exchange and an intelligent use of information between public and private stakeholders in order to improve the competitive position in the port communities.

6.2 Road and Rail networks

The ITS tools and applications can contribute, among others, to a cleaner, safer and more efficient transport system and of course to assist the elimination of non-physical impediments along road and rail networks. In this framework, REBIS Study[27] published in 2015, identified short to medium term development needs in view of non-physical bottlenecks in customs and transport for six (6) countries of Western Balkans and specifically Albania (AL), Bosnia and Herzegovina (BiH), the former Yugoslav Republic of Macedonia (North Macedonia), Kosovo (KOS), Montenegro (MNE) and Serbia (SRB).

These needs concerned Custom and Border Crossing, Inter. Multimodal Transport, Road Transport, Rail Transport and Maritime and/ or Inland Waterways. These needs are presented in the following paragraphs by transport mode/ type.

For road transport, the study identified the needs of strengthening the administrative capacity in Road Transport and Safety Agencies in all six countries. Secondly, the need of facilitating admission to road haulage market and profession was identified for five countries (ALB, BIH, MK, KOS and MNE). Thirdly, implementing legislation regarding dangerous goods was needed for all the above-mentioned countries (ALB, BIH, MK, KOS, MNE, SRB).

Another issue regarding the road network of the above mentioned countries is that compared to EU Member States from Central and Eastern Europe (EU-CEE), they have typically low or average levels of motorway density as referred to the regional study entitled “Infrastructure Investment in the Western Balkans, A First Analysis” by the European Investment Bank of 2018 (EIB Regional Study, 2018) and presented in Figure 5.1. It seems that only North Macedonia has achieved so far levels comparable for instance to the Czech Republic, but in any case is still far away for the much higher densities observable among the front runners in the comparator group of countries – Slovenia, Croatia and Hungary (EIB Regional Study, 2018).

[27] The Regional Balkans Infrastructure Study (REBIS) Update, Enhancing Regional Connectivity Identifying Impediments and Priority Remedies, Main Report, 2015, Report No. 100619-ECA, © International Bank of Reconstruction and Development.

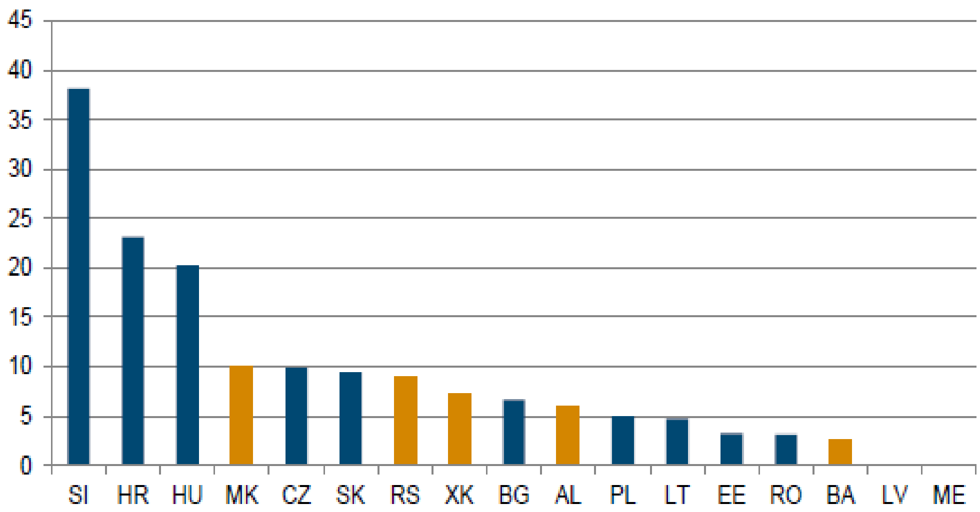
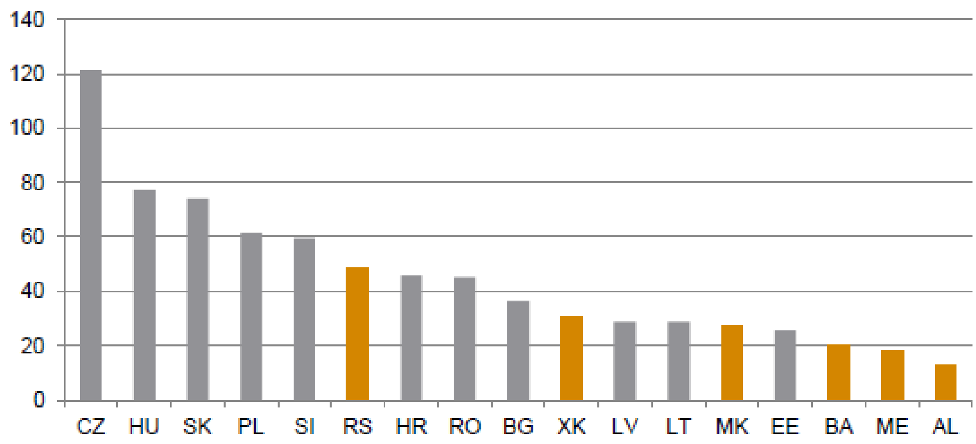


Figure 5. 1. Motorway density in km per 1000km² land area of 2015 (Source: EIB Regional Study, 2018)

As referred in the Study on Orient/ East-Med TEN-T Core Network Corridor of 2017, for the road sections on the OEM WB6 corridor, 17 projects (on-going at the moment or planned) were identified, taking into account the Connectivity Agenda, the National Single Project Pipelines as well as SEETO MAP 2016:

- Completion of Belgrade bypass, Sector 6: Strazevica-Bubank Potok (RS);
- Reconstruction and upgrade of road section between Ostruznica and Strazevica (Sectors 4 and 5) (RS);
- Construction of road section between Grdelica and Presevo (RS);
- Pozega-Boljare road (border with MNE) (RS);
- Construction of the road sections Pozega-Belgrade (RS);
- Construction of highway section Merdare-Kursumlija-Prokuplje bypass-Merosina-Nis (RS);
- Completion of Road Route 4, section Matesevo-Andrijevica (MNE);
- Construction of bypass Podgorica (Capital-Smokovac-Farmaci) (MNE);
- Route 4: Highway Bar-Boljare, section Matesevo-Podgorica (Smokovac) (MNE);
- Route 4: Highway Bar-Boljare-section Djurmani-Farmaci (MNE);
- Route 4: Highway Bar-Boljare-section Andrijevica-Boljare (MNE);
- Reconstruction of road section between Demir Kapija and Udovo (NMK);
- Rehabilitation of the road sections between Jumanovo and Miladinovci (NMK);
- Construction of road section Skopje-Kosovo border (NMK);
- Construction of the road section Prishtine/ Pristina border with NMK (XK);
- Construction of the motorway section Prishtine/ Pristina-Merdare (XK);
- Implementation of ITS on Road Corridor X (NMK).

Regarding railway density (see Figure 5.2), as referred to the EIB Regional Study "*while Serbian railway density is comparable to the average of the peers, most WB countries are at the very bottom of this statistics. Particularly the region's countries neighbouring the Adriatic Sea have developed hardly any major railway lines. This is similar to the situation in Greece, where in the West of the country, neighbouring the Ionian Sea, almost no railways were ever built. The barely existing rail connections on the eastern shores of the Adriatic and the Ionian Sea have likely contributed to the lack of industrialization of this part of Europe*" (EIB Regional Study, 2018).



Source: Eurostat.

Figure 5. 2. Railway density in km per 1000km² land area of 2015 (Source: EIB Regional Study, 2018)

Concerning rail transport, for all six countries it was identified the need to strengthen the administrative capacity in Rail Safety and Regulatory Agencies. Also, separating operations form infrastructure management could assist on eliminating non-physical bottlenecks in all countries. Finally, for rail transport opening up the rail market to competition would be beneficial for Bosnia and Herzegovina, North Macedonia and Serbia.

As referred in the Study on Orient/ East-Med TEN-T Core Network Corridor of 2017, for the road sections on the OEM WB6 corridor, 15 projects (on-going at the moment or planned) were identified, taking into account the Connectivity Agenda, the National Single Project Pipelines as well as SEETO MAP 2016:

- Modernisation of the Nis-Presevo (border with NMK) railway line (RS);
- Reconstruction, modernization and construction of the second track on the section Stalac-Djunis of the railway line Belgrade-Nis (RS);
- Modernisation for the contemporary double track traffic of the single track section of the railway line Resnik-Klenje-Mali Pozarevac-Velika Plana (RS);
- Modernisation and reconstruction of the Railway Line Velika Plana-Stalac (RS);

- Reconstruction and modernization of the railway line Novi Sad-Subotica-border with Hungary (Kelebija) (RS);
- Reconstruction and modernization of the railway line Stalac-Kraljevo-Rudnica (RS);
- Reconstruction and Modernization Railway Line (Belgrade) - Vrbnica – Bar 1) Rehabilitation of Train Track (superstructure), Culverts, Regulation of watercourse, reconstruction of steel bridges 2) Rehabilitation of Slopes 3) Rehabilitation of landslides, tunnels, concrete bridges and electrical works (MNE);
- Reconstruction of the railway section along the corridor X Dracevo – Veles (NMK);
- Rehabilitation and modernization of the railway section along Corridor X Tabanovci-Dracevo (NMK);
- Rehabilitation and modernization of the railway section along Corridor X Veles-Gevgelija (NMK);
- General rehabilitation of Railway Route 10 (admin. Line with Serbia Leshak-Fushe-Kosove-Hani i Elezit-Border with NMK (XK);
- Construction of new deviation of the existing line Thessaloniki-Idomeni (GR);
- installation of ECTS level 1 in Thessaloniki-Polikastro (GR);
- Installation of GSM-R in Thessaloniki-Idomeni (GR);

For Maritime and/ or Inland Waterways strengthening administrative and technical capacity of Maritime Administrations for all countries could be helpful as well as developing the Sava and Danube waterways and related IT systems in Bosnia and Herzegovina. Additionally, concerning Inter. Multimodal Transport, the study identified that enabling better use of inter-modal transport was necessary for Albania, Bosnia and Herzegovina, North Macedonia, Kosovo and Serbia.

Finally, concerning Customs and Border Crossing, the study identified the need of: a) strengthening the CEFTA Committee on Trade Facilitation in all countries, b) collecting and monitoring comparable data on process times at Border Crossing Points in all countries, c) implementing the NCTS Transit Convention in all countries, d) improving Customs IT systems in all countries, e) implementing efficient risk management, post control audit and simplified procedures in all countries, f) supporting Single Window procedures in all countries and g) establishing AEO status procedures and providing capacity building in Albania, Bosnia and Herzegovina, Kosovo, Montenegro and Serbia.

The description of ITS tools and applications along the road and rail networks in Western Balkans is based on the results of a study implemented by SEETO[28] and the CONNECTA project on ITS (2018).

[28] Intelligent Transport Systems, Assessment of ITS on TEN-T Core Network in the Western Balkans, South East Europe Transport Observatory (SEETO) Regional Participants, Final Version, 2016.

6.2.1 Albania

According to the SEETO Study, at the time the study was implemented, although there was no specific strategy on ITS development in the country, Transport Sectoral Strategy 2016-2020, was being drafted. In June 2018, the First Monitoring Report was published by the Albanian Ministry of Infrastructure and Energy[29]. According to the report, 43 policies (Priority Actions) were identified in order to define a solid National Transport Strategy and Action Plan.

Concerning road transport the main issues concerning the implementation of soft measures are to a) ensure the implementation of the cross-border agreement with Montenegro as part of the Adriatic-Ionian highway project, b) reduce border crossing times and procedures by establishing joint road BCPs following the principle of Single Window applied to the Muriqan-Sukobin BCP to all existing and planned road BCPs, c) build dedicated parking infrastructure in BCPs in order to speed up border crossing procedures for trucks and buses.

According to the “Strategic framework for implementation of ITS on TEN-T Core/ Comprehensive Network on the WB6” (CONNECTA, 2018), Albania approved the national Transport Sector Strategy 2016-2020 in November 2016, in which priority actions are included regarding the deployment of ITS.

The railway strategy reforms implementation for establishing the new railway bodies, opening rail market in the TEN-T corridor and RFCs rail freight corridors as well as planning deployment of the ITS/ ERTMS. Furthermore, in 2017 the Tuzi joint railway station for common control procedure of all authorities of railways with Montenegro was opened and is now operational. Based on Action No. 4 of SEETO strategic Working Programme in 2017, RAILDATA and RNE systems were established.

Significant information regarding the ITS deployment along the railway network of Albania is presented in the CONNECTA report. Specifically, it is mentioned that “*Albania has no ERTMS/ ITS services at the moment. The railway network is completely operated by manual signalling and telecommunications services are limited to AM radio (subsequently supplanted by mobile telephony, as is the case in countries where public available technology gets implemented faster than system-specific technology). At this point, Albania is in direct need of local basic knowledge and experience to start building a signalling system of its own on its rail network.*

There are a number of designs, mostly feasibility studies and preliminary designs (one of which has been completed and three are under elaboration) for existing alignments as well as future alignments that would complete the western arm of Corridor VIII, and all

[29] Sectorial Strategy of Transport & Action Plan 2016-2020, First Monitoring Report, Ministry of Infrastructure and Energy, Albania, 2018.

entail the use of ERTMS Level 1. This is the only signalling system planned in Albania at the moment, and no other systems were considered. Currently there is no fibre optics network, and no General Design or strategy for implementing it. There is a GSM-R feasibility study, but no GSM-R network, and the frequency band that GSM-R should use is currently the private property of the mobile provider, and –according to the information provided-with an option to be reassigned to GSM-R" (CONNECTA, 2018).

6.2.2 Bosnia and Herzegovina

In Bosnia and Herzegovina, ITS has been deployed on several newly built motorway sections on Corridor Vc in the length of 52 km. ITS is being managed from two control centres and one smaller intervention control centre for the section Sarajevo North – Sarajevo South. ITS is under 24h surveillance from at least one control centre, with strictly defined rules on the traffic management. ITS on the deployed sections is equipped with the following equipment:

- Remote tunnel monitoring and management system.
- WIS (Weather information system) with 12 weather stations installed.
- AID (automatic incident detection) – with approx. 400 cameras.
- System of radio diffusion which covers VHF, Tetra Ready, FM, 2G, 3G frequencies.
- Adaptable traffic signalling system.
- Telephone system, fire alerting system, ventilation system, tunnel audio system.

There were plans to introduce ITS on the existing motorway section form Gradiska – Banja Luka, while another control centre is completed in Doboj. Overall, in Bosnia and Herzegovina the progress regarding strategic and legal documents is poor. However, ITS is deployed in some tunnels (CONNECTA, 2018).

Concerning rail network, up until 2016, ERTMS has not been deployed on any sections. However, two planned projects were identified concerning the deployment of ERTMS at the Core Network sections as well as in one project regarding the Comprehensive Network.

Significant information regarding the ITS deployment along the railway network of Albania is presented in the CONNECTA report. Specifically, it is mentioned that "*The railway network in Bosnia and Herzegovina is equipped with a partial legacy signalling system, left over from ex-Yugoslavia, done as a patchwork with every area covered by a system from a different manufacturer. Current ITS is limited to optic fibre links (a section is being equipped with optic fibre and there is a General Design on Telecommunications). ERTMS was discussed several times over the years, but low understanding of the matter and severe limitations on the network resulted in dismissal of the idea every time it was considered. No ERTMS technical standards have been officially adopted; only the relevant EN standards, preconditions for ERTMS*" (CONNECTA, 2018).

Interesting information comes from the report of the International Bank for Reconstruction and Development/ The World Bank under the title "The Western Balkans, Benchmarking Corridor Performance, A Pilot for Corridor Vc in Bosnia and Herzegovina"[30]. Regarding Corridor Vc, the report describes it as a multimodal corridor that traverses Bosnia and Herzegovina connecting the country with Croatia. The road corridor carries about ⅔ of the freight on the Corridor and the rail corridor the rest. Out of total of about 400km, the majority of the Corridor Vc is inside the territory of Bosnia and Herzegovina. The corridor begins in the south at the Port of Ploče in Croatia. While less than 1% of goods leaving the port head to Montenegro and roughly 8% are distributes directly in Croatia, the rest 91% head towards Bosnia and Herzegovina, although the country does not always constitute the final destination of these goods. The corridor passes through the border between Croatia and Bosnia and Herzegovina twice (one in the south at the Nova Sela – Bijaca BCPs and once in the north through the Brod-Slavonski Brod BCPs).

According to the above-mentioned report, "the *route largely consists of two-lane roads with at-grade intersections, running through BiH 's main cities of Doboj, Zenica, Sarajevo and Mostar. The section between Visoko and Sarajevo (A1 motorway) is tolled at two mainline toll plazas. The sections with the highest traffic volumes (AADT of more than 15,000 vehicles) are close to Sarajevo: Visoko-Semizovac; Semizovac-Sarajevo; Sarajevo-Blažuj and are four-lane roads. SEETO reports that the roads along Corridor Vc are in good or fair (medium) condition*" (World Bank, 2017).

The report through the applied methodology, presents the average travel time for trucks along Corridor Vc between Ploče and Brod (a distance nearly 400km) for the time period January 2015-November 2016, in a monthly base. The time calculated includes crossing two BCPs as well as truck stoppage time along the corridor. The report mentions that "*The results show a relatively consistent performance as measured by average cruising speed varying between 41 km per hour and 42 km per hour in the southbound direction; and between 37 km per hour and 40 km per hour in the northbound direction-averaging 40 km per hour. It is a relatively low average cruising speed for the technical standard of the roads on this corridor*" (World Bank, 2017). Through the analysis of the collected data, presented thoroughly at the report, "*Travelling northbound, the travel time appears to have increased by two hours from 2015 to 2016. A closer look indicates that the increase is due to the increase it time associated with the border crossing at Bijača/Nova Sela. When taking this into account, is becomes clear that the cruising speeds along the corridor have not changed much. Also from a corridor macro perspective, travelling northbound from Ploče to Brod appears to take one hour more than travel southbound*" (World Bank, 2017). Furthermore, the report after referring to the international literature regarding on how to identify bottlenecks based on predictability of travel times and travel speeds, classifies them according to their severity, and finally comes to the conclusion that "*that travel conditions on over 50 percent of the corridor length is considered predicable and fast. The remaining sections experience congestion or/and slow travel*

[30] The Western Balkans, Benchmarking Corridor Performance, A Pilot for Corridor Vc in Bosnia and Herzegovina, Report No: ACS22590, International Bank for Reconstruction and Development/ The World Bank, 2017.

delays. Out of the total length, around 130-140 km of roads on the corridor can be classified as predictable but slow (consistently low speeds) and 40-48 km as unpredictable and slow with the coefficient of variation of speed more than 50 percent. The speed on these sections range from 5-30 km" (World Bank, 2017). For the year 2016, the report presented a map showing the location of bottlenecks on Corridor Vc (see Figure 5.3). There were at least six sections along which concerned BCPs and cities/ towns with the highest Annual Average Daily Traffic (AADT) along the corridor (Mostar, Zenica, Capljina and Sarajevo).

Figure 5. 3. Location of bottlenecks along Corridor Vc in 2016 (Source: Figure 14, World Bank, 2017)

The railway network along Corridor Vc is a 428km line that connects Bosnia and Herzegovina (Samac) with Croatia (port of Ploče) along which the following stations exist: Samac, Doboj, Zenica, Sarajevo and Capljina.

6.2.3 North Macedonia

ITS applications have not been deployed in the country until 2016 according to the SEETO Study. However, one ITS project was recorded concerning the introductions of communication-information system for traffic control and management on Corridor X, section Tabanovce – Gevgelija in the length of 175km. The deployment of ITS along the road network is included in the new Transport Strategy. Furthermore, the country has implemented The New Computerized Transit System (NCTS).

Concerning rail network, Corridor X is equipped with optic fiber, SDH/ IP procedures and data transfer. Although ERTMS had not been deployed until 2016, track-side subsystems equipped with electro relay ALB and 30 stations equipped with electro relay interlocking exist. Furthermore, along Corridor X a Traffic Management Centre for monitoring trains flows and managing operations (CTC) is installed. Finally, in 2016, ECTS Level 1 deployment was ongoing on section of Corridor X, Bitola-Kremenica. Regarding ITS deployment along the rail network in the country (CONNECTA, 2018):

- There is an existing optical fiber network.
- A prefeasibility study on ERTMS and GSM-R has been assigned and was expected to be finalized in 2018.
- There are ERTMS Designs on some sections of the network.
- There is GSM-R legislation and frequency bands are reserved in order to be used.
- Self-service ticketing machines are being installed and entering service.

6.2.4 Greece

Greece has already implemented a number of ITS projects mainly in the field of road transport and in large cities (Athens and Thessaloniki). According to ITS Progress Report for Greece of 2014[31] the major ITS providers were; a) Athens Traffic Management Centre (hereafter mentioned as **TMC**), b) Attiki Odos TMC, c) Egnatia Odos TMC, d) Motorways (Concessions) and e) Intermodal Services.

Athens TMC is operational since 2004 and its main equipment included up until 2014 550 monitoring positions, 216 CCTV control cameras, 24 Variable Message Signs (VMS), SITTRAFIC CONCERT software, traffic lights' controllers, etc.

PATHE (Patra – Athens – Thessaloniki – Evzonoi) Major Motorway implements ITS for traffic management and the provision of information. Other systems comprise for collection, vehicle detection and safety systems. Furthermore, the Greek Interoperable Tolling System (GRITS) is a service provided by the participating road networks of Attiki Odos, Olympia Odos, Moreas, Aegean Motorway and Rion-Antirion Bridge, allowing the use of same transponder at all electronic toll lanes of the participating motorways, making the journey to Southern, Central and Northern Greece faster and easier.

According to the Network Statement of 2019[32], the train protection system installed in Greece is of ETCS Level 1 type and requires the prior existence of signalling along the line. The central traffic management (remote command) on the national network is performed

[31] ITS Progress Report for Greece, Ministry of Infrastructure, Transport and Networks, Hellenic Republic, 2014.
[32] Network Statement 2019, Greek Railway Organization S.A.

by the Central Operators installed at the Traffic Control Centers. There are Traffic Control Centers in Korinthos (under temporary operation suspension), Athens (under temporary operation suspension), SKA (Aharnais Railway Center), Lianokladi, Larissa and Thessaloniki (under temporary operation suspensions).

6.2.5 Italy

ITS in Italy are a sector operating since the 1980s, even if it had a relevant development starting from the 1990s, in parallel with the growth of the industry in other major industrialized countries[33]. The critical aspects concerning the implementation of ITS in Italy are the lack of general guidelines for standard development of open and interoperable systems, the fact that pilot projects are not always part of large-scale applications, the lack of national funds for financing ITS, etc. The national ITS action plan ("Plano d'Azione ITS nazionale") has been issued in December 2012 and identified the national priorities until 2017. Some of the Actions included in the abovementioned plan and were related to the objective of the ADRIPASS project were the following:

- Priority Area 2: AP1 (Development of ITS services for multimodal logistics), AP5 (Continuity of services along the borders).
- Priority Area 3: AP2 (Implementation of safe and secure parking places for trucks and commercial vehicles), AP6 (Nationwide deployment of ITS for long freight transport control), AP7 (ITS solutions for managing and monitoring of dangerous goods transport).

Concerning rail network, according to the National Statement of 2019[34] regarding the Rail Freight Corridors related to the ADRIPASS project that use segments of the national rail infrastructure are the following:

- Scan-Med Corridor: Verona – La Spezia/ Livorno/ Ancona/ Taranto/ Augusta – Palermo.
- Baltic – Adriatic Corridor: Udine – Venice/ Trieste/ Bologna/ Ravenna
- Mediterranean Corridor: Turin – Milan – Verona – Padua/ Venice – Trieste.

Unfortunately, the Network Statement does not include any information regarding the deployment of ERTMS or ECTS (both systems are deployed and operational along segments of the Italian rail network). ERTMS is mainly deployed on High Speed Lines of the Italian network (near Chieri to Milan, near Lodi to Bologna and finally form BO.S. Donato to Firenze P.P.)[35].

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[33] Intelligent Transport Systems in South East Europe, Final Publication of the SEE-ITS Project, Ayfandopoulou G., Mitsakis E., Iordanopoulos P., South East Europe Transnational Cooperation Programme, ISBN 978-618-80673-2-5.

[34] Network Statement 2019, Update in accordance with the CEO Provision no. 12 of December 2017, Rete Ferroviaria Italiana, Gruppo Ferrovie Dello Stato Italiani.

[35] http://www.rfi.it/cms-file/allegati/rfi/pir/Planimetria9.pdf

According to an article published in International Railway Journal by Sue Morant in March 1st 2018[36], CEO of Italian Rail Network, ERTMS/ ECTS High Density was going to be installed by June 2018 on lines in the urban nodes of Milan, Florence and Rome (50km) and later the system will be extended to other main nodes in Italy, namely Naples, Turin, Bologna and Genoa. Additionally, two signalling initiatives were underway for use on secondary and low0-traffic lines (ECTS Level 3 Regional signalling system and Ersat EAV system for secondary low-traffic conventional lines) so that ERTMS will be possible to interface and integrate with the Galileo satellite navigation and positioning technology.

6.2.6 Montenegro

Core Network in Montenegro encompasses highway Bar-Boljare (Route 4) and the Adriatic – Ionian Highway (Route 1). In 2016, ITS have been deployed only in Tunnel Soniza and its access road on Route 4. As mentioned in CONNECTA report of 2018, "*The new Transport Development Strategy Report for Montenegro (November 2017) defines ITS as one of its priority areas. ITS is identified as one of the four priority areas for infrastructure, where the expected outcomes are upgraded services to users, advanced monitoring and management of network operations and performance and safety improvement with infrastructural measures, such as installation of ITS equipment (VMS, dynamic signage, WIM stations), installation of integrated system for monitoring and information provision of interurban public transport*" (CONNECTA, 2018).

Concerning rail network, optic fiber along Route 4 has been installed and in railway station Podgorica, ECTS Level 1 equipment was to be installed. Significant information regarding the IST deployment in the country are included in the recent CONNECTA report of 2018. Specifically," Regarding *infrastructure, Montenegro has a functional optic fibre network with no ring architecture/ redundancy, 60 fibres per cable and with more than 90% capacity unused due to low demand for current ITS services. Excess capacity is rented out. Infrastructure is relatively old, with latest upgrades dating from the '80s, ex-Yugoslavia. All the railway alignments are single track. Signalling systems are a challenge to maintain, given that they are out-dated. There is a plan for interstate alignment Podgorica – Vlore; the Montenegrin side of the section will be equipped with ERTMS Level 1, so Montenegro is also inconsistent, in the sense that one of its primary needs is cross border compatibility*" (CONNECTA, 2018).

6.2.7 Serbia

Until 2016, ITS has been implemented only on some parts of Corridor X, however introduction of ITS systems on 220km of section Belgrade – Nis has been planned. As referred to the recent CONNECTA report of 2018, "*The latest achievement regarding ITS in Serbia is the adoption of a new law on roads (May 2018), where a definition of ITS system and interoperability is given, together with priority areas and actions. The law*

[36] https://www.railjournal.com/signalling/italian-rail-network-chases-three-minute-headways-with-etcs-high-density/

also defines tunnel safety advisor, toll collection and European Electronic Toll Collection and European Electronic Toll Service Provider. ETC and EETC systems have been introduced. Main elements from Directive 2010/40 have been adopted and this law establishes a legal framework for transposition of ITS Directive. A number of by-laws still needs to be drafted and adopted in order to achieve functional implementation" (CONNECTA, 2018).

Concerning rail network in Serbia, no ERTMS project has been implemented so far. However, on the railway line Belgrade – Subotica – border, implementation of ECTS Level 2 is planned after the building, modernization and reconstruction of the double-track railway line. Moreover, an ERTMS Deployment Strategy is underway.

6.2.8 Kosovo

Until 2016, no ITS application had been deployed although there are plans to introduce ITS on two Core Network Routes: 6 (Pristina – Hani I Elezit) and 7 (Besi – Morine).

Concerning rail network, certain pre-conditions for ERTMS instalment exist. All railway stations and other official railway places are connected between themselves and with the central railway node in Fushe Kosove though an independent digital phone centre, which fulfils all criteria for communication and safety. Kosovo has no ERTMS technical standards officially adopted and there are no ITS systems at this time. The Kosovo Network statement states that the network is equipped with fibre optics. However, it does not detail the type of fibre optics and it is only used for telephony, so confirmation is needed in order to claim it as part of ITS (CONNECTA, 2018).

6.3 Inland waterways

Core Inland Waterway Network in Western Balkans encompasses River Danube, River Sava and River Tisa. There are four (4) ports along the IWW in the study area, the ports of Belgrade and Novi Sad in Serbia, ports of Brcko and Samac in Bosnia and Herzegovina and port of Slavonski Brod in Croatia.

6.3.1 Bosnia and Herzegovina

Along the Inland Waterway Corridor in the territory of Bosnia and Herzegovina River Information Services have not been deployed. However, the country has signed along with the other countries of the Sava region, a Framework Agreement in which declares her commitment to prepare a River Information System, as IT System along the Sava navigation path.

6.3.2 Serbia

River Information services have been deployed on the Danube River and Sava River in the country, consisting of sub-systems for tracking and tracing of vessels (18 base stations), notices to skippers, voyage planning, correction of GDP signal according to IALA standards, etc. Moreover, the RIS in Serbia is expected to be upgraded with the implementation of the navigation monitoring system on the Danube River (AtoNs – Aids to Navigation), the deployment of shore-based Radar Surveillance System alongside the “blue borders” in order to achieve higher navigation safety and better control to the navigation transport, traffic, border control, people and goods flows. This surveillance system must to be combined with AIS based tracking and tracing system, so that a clear overview of all activities in the border stretches to be achieved.

6.3.3 Croatia

At the end of 2005 in the framework of research project CRORIS, started the phase of processing the full RIS system installation on Croatian international inland waterways. On the 18th of January 2006 first RIS centre in Vukovar was established and ever since Croatian sections of the Danube and Drava Rivers have been covered with the AIS signal.

A second research project under the acronym RIS COMEX (RIS Corridor Management Execution) was launched in 2016 and it will last until the end of 2020. RIS COMEX is a CEF funded multi-Beneficiary project aiming at the definition, specification, implementation and sustainable operation of Corridor RIS Services following the results of the CoRISMa study. In this project, Agency for Inland Waterways of Croatia participates as a partner. Among the main objectives of the project, is the development of harmonized River Information Services for inclusion in the DINA initiative that will bring RIS one step further to integration with other transport modes[37].

[37] http://www.riscomex.eu/ris-comex/

7 Conclusions

7.1 Main findings regarding Orient East-Med Corridor

Along the extension of OEM Corridor in the WB area as well as the countries through which the corridor passes and always in the framework of the ADRIPASS project, four (4) maritime ports, twelve (12) road BCPs and eleven (11) rail BCPs were evaluated using a developed for this scope Multi Criteria Analysis (MCA) and based on collected data through surveys.

Unfortunately, the assignment of a significant number (11 in total, 6 to be updated as participated to the previous ACROSSEE project and 5 new in the framework of ADRIPASS project) of road BCPs to SEETO followed by the completion of its mandate on 31 December 2018, created a gap. It must be mentioned that for the Dobrakovo BCP, the collected data is considered to be inadequate and therefore its evaluation was not possible.

For OEM Corridor, SEETO was assigned to collect data from nine (9) road BCPs, but unfortunately data was submitted for only one (1) BCP. For the rest of those BCPs, data is incomplete. It is rather clear than this development which affected the evaluation process. The developed MCA for road BCPs related to OEM Corridor gave results for only four (4) BCPs (Evzonoi, Promachonas, Gostun and Bajakovo). The MCA results for these BCPs showed that all four face significant problems with the facilities and the existing supporting and communicating equipment. Although the processing and waiting times can be considered as acceptable, when compared to the rest of the corridor's road BCPs, they are amongst the highest values. Furthermore, the absence of implemented and applied trade facilitations as well as the inability for electronic submission of Custom Declarations, aggravate the mission of the authorities and working staff of those BCPs.

For the rail BCPs, along the extension of OEM Corridor to the countries of WB area, for the needs of the ADRIPASS project, eleven (11) BCPs were surveyed. The available data for the evaluation process concerned four (4) BCPs, as for the rest seven (7) there were two cases: a) four (4) of them were assigned to SEETO and b) for three (3) of them the collected data is considered inadequate and as a result no evaluation process was possible. Regarding those four (4) BCPs that the respective developed MCA gave results, the fact that Idomeni rail BCP achieved the highest score is explained by the fact that controls are performed on-board, simultaneously and at separate areas compared to the other three (3) BCPs (Presevo, Vrbnica and Sid rail BCPs). The facilities of all BCPs are in bad condition, and the supporting and communicating equipment is marginally considered satisfactory. The procedural and waiting times at those BCPs are considered overall to be satisfactory, but the absence of on board, simultaneous and at separate areas controls at the Presevo, Vrbnica and Sid BCPs have an impact to their achieved scores.

Concerning maritime ports, four (4) are identified to be affecting and being affected by the OEM Corridor as well its extension to the WB area, always aligned with the needs and the scope of the ADRIPASS project. On one hand, data was collected for all ports but on the other hand for all Greek ports the data came from unofficial sources (not the ports' authorities) and therefore reliability cannot be guaranteed. Furthermore, the fact that the core of the developed MCA for maritime ports is based on ports' attributes/ indicators regarding their productivity and efficiency, combined with the unwillingness of the majority of the authorities to share this information as it was considered by them to be sensitive and thus non publishable, had a significant impact to the ports' achieved scores. Authorities that shared data regarding their productivity and efficiency, even partially compared to the actually required by the survey, managed to achieve higher scores than others. Another important factor affecting the ports' achieved scores, is the infiltration level of ICT solutions and tools, already implemented but also planning or willing to be implemented. Based on the aforementioned, all ports achieved high score, with Piraeus leading, followed by Thessaloniki, Bar and last but not least Patra. However, it has to be mentioned that the only authority that shared data related to the port's productivity and efficiency was the Port Authority of Bar. The low score of Patra's port is based mainly to the poor implementation of ICT solutions and tools, at least according to the information available.

A SWOT analysis is presented in Table 6.1, aiming to highlight the strengths, weaknesses, opportunities and threats for the different types of nodes (road & rail BCPs maritime ports) along the OEM Corridor.

Table 6. 1. SWOT analysis for OEM Corridor regarding different types of nodes

	S - Strengths	W - Weaknesses	O - Opportunities	T - Threats
Road BCPs	Facilities in satisfactory level (overall)	Inadequate data	One-Stop-Shop	Increasing freight traffic at most of the BCPs
	Electronic submission of Custom Declarations	High values of waiting times before the implementation of any controls	Joint Border Controls	
	Communicating equipment in satisfactory level (overall)	Not all BCPs are equipped properly	Construction of inland clearance depots (ICDs) that can relieve the	
	Interventions are ongoing or planned for many BCPs aiming to upgrade their capacities	Very poor level of implemented trade facilitations (overall)		
		Many BCPs lack non-intrusive inspection equipment		
Rail BCPs	One-stop-shop for orders of Railway Freight Corridor OEM railway infrastructure	Possibility of ordering the routes through Corridor One Stop Shop is not used	Speeding up the modernization process	Bad technical condition in some sections of railway lines
	Availability of Corridor One Stop Shop	Lower flexibility compared to road goods transport	Good technical conditions of railway infrastructure	Locations of railway infrastructure restriction resulting in increase in transport time
	Conflict solving procedure by Corridor One Stop Shop	Long cross-border waiting times at certain borders of the Railway Freight Corridor OEM	Improving mutual cooperation between corridors	Building logistic centres without connecting to railway infrastructure
	Annual Report by Railway Freight Corridor	Traffic disturbances due to work-related temporary capacity restrictions	Increase in impact of transport policy of individual countries in favour of rail	
	Interconnection of railway infrastructure within Railway Freight Corridor OEM countries		Improvement of cross-border cooperation on rail system subjects	
Maritime Ports	High level of implementation of ICT solutions and tools	No data provided regarding attributes/ indicators describing the ports' productivity and efficiency	Pilot actions in the framework of the ADRIPASS project	
	Willingness to adopt more ICT solutions and tools			

- Facilities in satisfactory level (overall)
- Electronic submission of Custom Declarations
- Communicating equipment in satisfactory level (overall)
- Interventions are ongoing or planned for many BCPs aiming to upgrade their capacities

- Inadequate data
- High values of waiting times before the implementation of any controls
- Not all BCPs are equipped properly
- Very poor level of implemented trade facilitations (overall)
- Many BCPs lack non-intrusive inspection equipment

- One – Stop – Shop
- Joint Border Controls
- Construction of inland clearance depots (ICDs) that can relieve the pressure from the BCPs

- Increasing freight traffic at most of the BCPs

Figure 6. 1. SWOT Analysis of Road BCPs along OEM Corridor

- One-Stop-Shop for orders of Railway Freights Corridor OEM railway infrastructure
- Availability of Corridor One Stop Shop
- Conflict solving procedure by Corridor One Stop Shop
- Annual Report by Railway Freight Corridor
- Interconnection of railway infrastructure within Railway Freight Corridor OEM countries

- Possibility of ordering the routes through Corridor One Stop Shop is not used
- Lower flexibility compared to road goods transport
- Long cross-border waiting times at certain borders of the Railway Freight Corridor OEM
- Traffic disturbances due to work-related temporary capacity restrictions

- Speeding up the modernization process
- Good technical condition of railway infrastructure
- Improving mutual cooperation between corridors
- Increase impact of transport policy of individual countries in favor of rail
- Improvement of cross-border cooperation on rail system subjects

- Bad technical condition in some sections of railway lines
- Locations of railway infrastructure restriction resulting in increase in transport time
- Building logistic centers without connecting to railway infrastructure

Figure 6. 2. SWOT Analysis of Rail BCPs along OEM Corridor

- One-Stop-Shop for orders of Railway Freights Corridor OEM railway infrastructure
- Availability of Corridor One Stop Shop
- Conflict solving procedure by Corridor One Stop Shop
- Annual Report by Railway Freight Corridor
- Interconnection of railway infrastructure within Railway Freight Corridor OEM countries

- No data provided regarding attributes/ indicators describing the ports' productivity and efficiency

- Pilot actions in the framework of the ADRIPASS project

- No threats identified

Figure 6. 3. SWOT Analysis of ports along OEM Corridor

7.2 Main findings regarding Mediterranean Corridor

Along the extension of Med Corridor in the WB area as well as the countries through which the corridor passes and always in the framework of the ADRIPASS project, nine (9) maritime ports, sixteen (16) road BCPs and six (6) rail BCPs were evaluated using a developed for this scope Multi Criteria Analysis (MCA) and based on the collected data.

Again, the assignment of a significant number (11 in total, 6 to be updated as participated to the previous ACROSSEE project and 5 new in the framework of ADRIPASS project) of road BCPs to SEETO followed by the completion of its mandate on 31 December 2018, created a gap concerning the collected data and thus the ability to evaluate the BCPs' performance. However, due to the fact that along MED Corridor SEETO was responsible for collecting data for four (4) BCPs, resulting to a better evaluation process than the OEM Corridor (Muriqan, Batrovci, Gorican and Bregana). Moreover, at the Neum I and Neum II BCPs no freight traffic passes through and therefore their respective scores are low, since those attributes concerning the efficiency of the BCPs related to freight traffic could not be taken into consideration. Finally, regarding Obrezje BCP the collected data is considered inadequate and thus it was also excluded from the evaluation.

Overall, the majority of the BCPs achieved high scores except the Bosanski Samac BCP. The reason for this is the absence of the necessary tracing means for the performance of the controls as well as the fact that none of the identified trade facilitations included in the survey are implemented, although the facilities and the supporting equipment are, in general, in a satisfactory condition. The procedural and waiting times for all BCPs are considered to be reasonable as well as the condition of the facilities and the supporting and communicating equipment (with some minor exceptions) is considered to be more than acceptable.

For the rail BCPs, along the extension of Med Corridor to the countries of WB area, for the needs of the ADRIPASS project, six (6) BCPs participated to the data collection process. However, from those six (6), the collected data was considered to be adequate to perform the evaluation process for only three (3) of them (Bajza, Capljina and Bosanski Samac) while for the rest three (3) this was not the case (Tuzi, Dobova and Koprivnica). The achieved scores for those BCPs evaluated are considered to be satisfactory. The Capljina BCP faces significant problems with the supporting and communication equipment, being in bad condition, while the other two (2) BCPs are in better condition. However, no procedural times were reported for Capljina and Bosanski Samac BCPs, an issue that affected their overall score. On the other hand, at the Bajza BCP the fact that there is no internet connection with the Central Custom offices is an issue that must be taken care. Contrary to road BCPs, the rail BCPs along the Med Corridor did not perform so well.

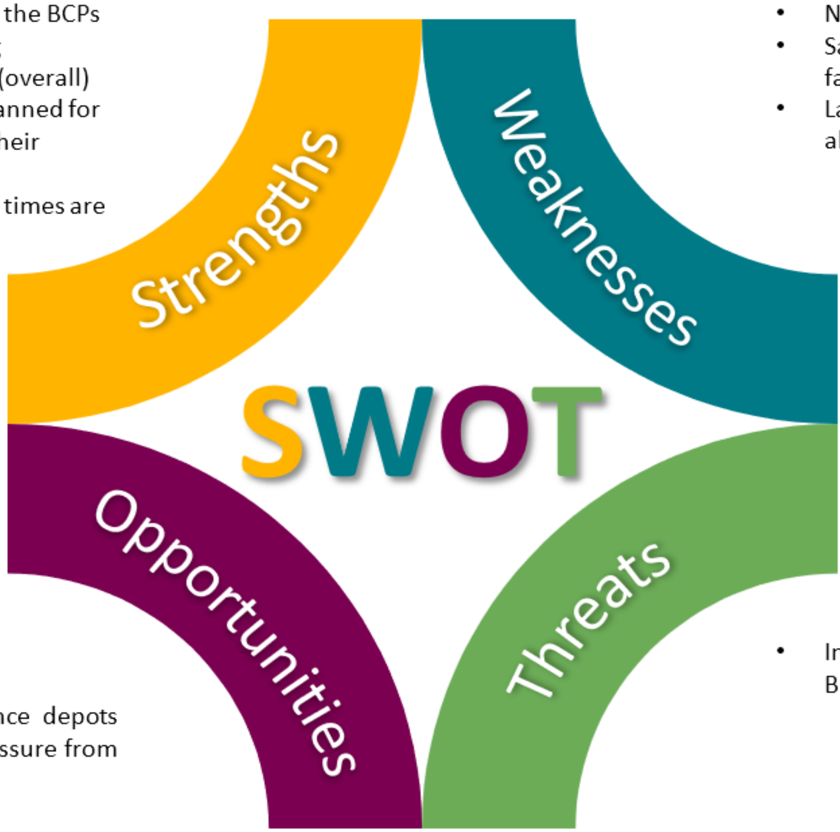
Concerning maritime ports, nine (9) are identified affecting and being affected by the Med Corridor as well its extension to the WB area, always aligned with the needs and the scope of the ADRIPASS project. Except from one (1) port, the rest ports achieved high scores and three (3) of them were close to achieve the highest score (Venezia, Ploče and Koper). Except from the Venezia port, the other two (2) ports along with Bar port form OEM Corridor, were the only ports of which the authorities shared some information regarding their level of productivity and efficiency (respective attributes/ indicators). This fact contributed on achieving such high scores, but it was not the only reason. Another reason is the fact that these ports are implementing many of the identified ICT solutions and tools, and for those not implemented so far, the respective authorities expressed their willingness to implement them in the near future, acknowledging their significance and importance. The port achieving the lowest score is Durrës, however it must be mentioned that this is explained by the fact that no information was provided regarding the implementation of any ICT solutions and tools. Overall, the ports of the Med Corridor based on the available data performed pretty well.

Table 6. 2. SWOT analysis for Med Corridor regarding different types of nodes

	S - Strengths	W - Weaknesses	O - Opportunities	T - Threats
Road BCPs	Facilities in good level (overall)	High values of waiting times before the implementation of any controls	One-Stop-Shop	Increasing freight traffic at most of the BCPs
	Electronic submission of Custom Declarations for the majority of the BCPs	Not all BCPs equipped properly	Joint Border Controls	
	Communicating and supporting equipment in satisfactory level (overall)	Satisfactory level of implemented trade facilitations	Construction of inland clearance depots (ICDs) that can relieve the	
	Interventions are ongoing or planned for many BCPs aiming to upgrade their capacities	Lack of non-intrusive tracing means for almost all BCPs		
	Overall, procedural and waiting times are considered as reasonable			
Rail BCPs	Facilities in good level	Insufficient data for half of the BCPs	Increase in impact of transport policy of individual countries in favour of rail	Bad technical condition in some sections of railway lines
	Communicating and supporting equipment in satisfactory level (overall)	Lack of non-intrusive tracing means for all BCPs	Improvement of cross-border cooperation on rail system subjects	Locations of railway infrastructure restriction
	Procedural times are considered as reasonable	No internet connection with the Central Custom Offices for some BCPs	Implementation of on-board controls could speed up the procedures	Building logistic centres without connecting to railway
Maritime Ports	High level of implementation of ICT solutions and tools	Poor data provision about ports' attributes/ indicators describing their	Pilot actions in the framework of the ADRIPASS project	
	Willingness to adopt more ICT solutions and tools			
	High volumes of goods transported through the ports			

- Facilities in good level (overall)
- Electronic submission of Custom Declarations for the majority of the BCPs
- Communicating and supporting equipment in satisfactory level (overall)
- Interventions are ongoing or planned for many BCPs aiming to upgrade their capacities
- Overall, procedural and waiting times are considered as reasonable

- High values of waiting times before the implementation of any controls
- Not all BCPs are equipped properly
- Satisfactory level of implemented trade facilitations (overall)
- Lack of non-intrusive tracing means for almost all BCPs



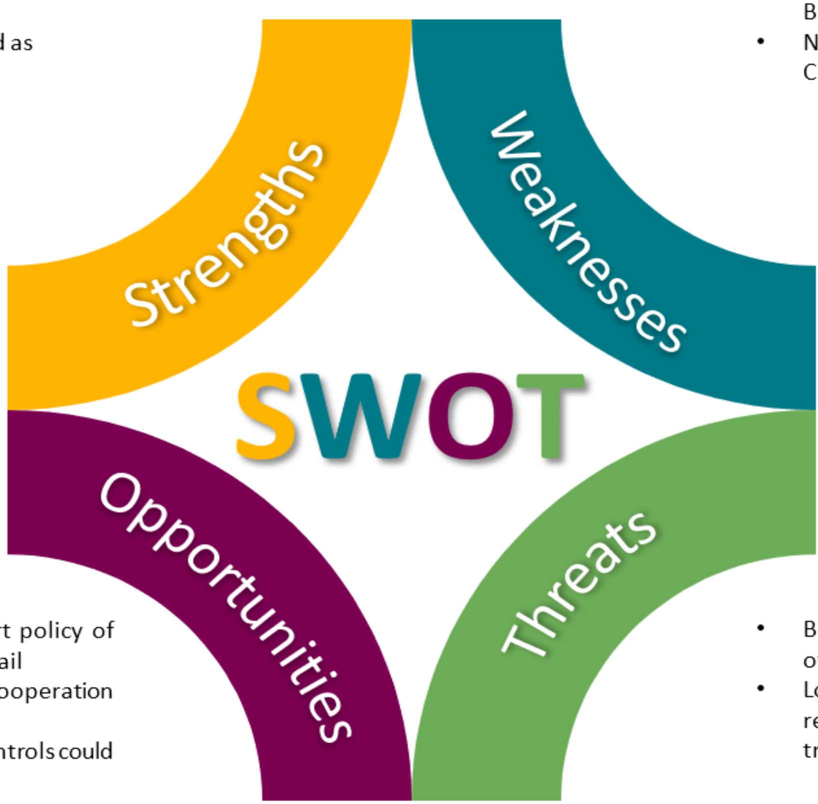
- One – Stop – Shop
- Joint Border Controls
- Construction of inland clearance depots (ICDs) that can relieve the pressure from the BCPs

- Increasing freight traffic at most of the BCPs

Figure 6. 4. SWOT Analysis of Road BCPs along Med Corridor

- Facilities in good level (overall)
- Electronic submission of Custom Declarations
- Procedural times are considered as reasonable

- Insufficient data for half of the BCPs
- Lack of non-intrusive tracing means for all BCPs
- No interest connections with the Central Custom Offices for some BCPs



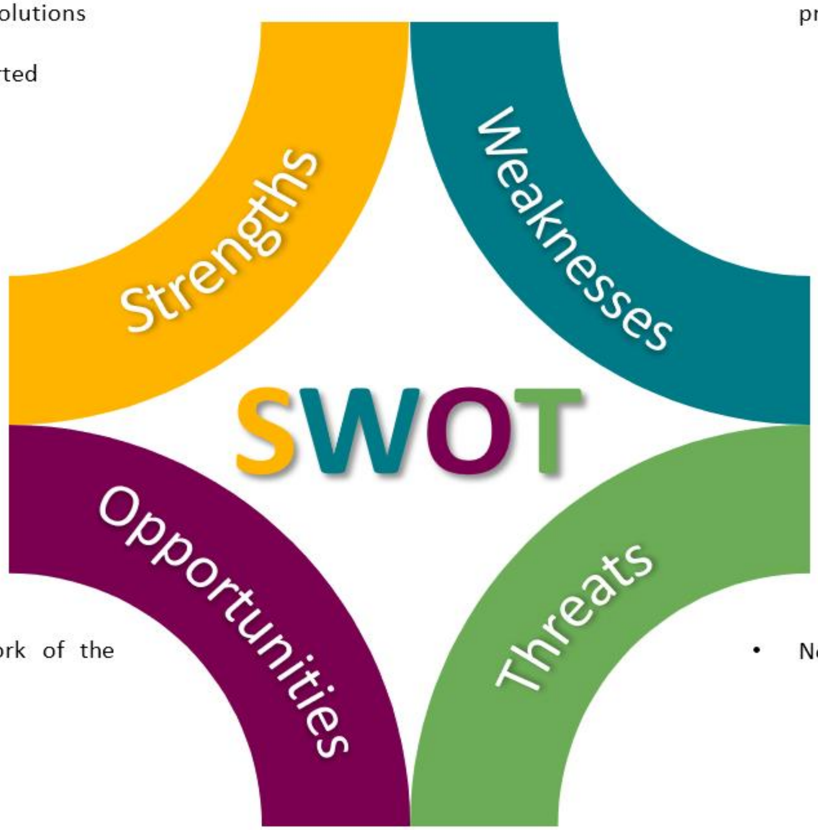
- Increase in impact of transport policy of individual countries in favor of rail
- Improvement of cross-border cooperation on rail system subjects
- Implementation of on-board controls could speed up the procedures

- Bad technical condition in some sections of railways lines
- Locations of railway infrastructure restrictions resulting in increase in transport time

Figure 6. 5. SWOT Analysis of Rail BCPs along Med Corridor

- High level of implementation of ICT solutions and tools
- Willingness to adopt more ICT solutions and tools
- High volumes of goods transported through the ports

- Poor data provision about ports' attributes/ indicators describing their productivity and efficiency



- Pilot actions in the framework of the ADRIPASS project

- No threats identified

Figure 6. 6. SWOT Analysis of ports along Med Corridor

7.3 Main findings regarding Scad-Med Corridor

Due to the fact that no data was collected for the two (2) identified maritime ports, Ancona and Bari, no evaluation was implemented.

7.4 Main findings regarding Baltic-Adriatic Corridor

The identified maritime ports related to the Baltic-Adriatic Corridor (Venezia, Trieste, Ravenna and Koper) have been already evaluated as nodes of the Med Corridor.

7.5 Overall conclusions

The core of the ADRIPASS project is the examination, evaluation and implementation of ICT tools and applications at the seaports of the transport corridors in the Western Balkan area. Given that these transport corridors are consisted not only by seaports – gateways, but also by the entire transport infrastructure and freight transport facilities, the report attempted to present all components of the transport chain, i.e. Road, Rail, Inland Waterways, border crossing points, inland terminals (freight villages, intermodal terminals, Inland Waterways ports), based on the data collected via questionnaire-based surveys and desktop research.

From the assessment of the progress of data collection and the information/ data obtained, it is concluded that, for the reasons explained below, the major volume of data has been derived unevenly from the direct surveys and the various data sources available.

Assessing the data collection progress, the following can be summarized:

- All partners, with the exception of SEETO that ceased operations in the end of 2018, have concluded the data collection either through externalization of services or using their own resources.
- For the Road and Rail BCPs, although the general picture is better, the fact that SEETO has concluded its mandate on 31 December 2018, creates a significant problem, especially when is taken into consideration that SEETO was responsible for collecting data from 37% of the Road BCPs, 48% of the Rail BCPs, 13% of maritime ports and 36% of Logistics Facilities. The collected data (except from SEETO) by the rest of the partners is considered to be satisfactory, although there were cases that the collected data can be considered inadequate for the needs of the project. Regarding the ports, the critical information for the evaluation process was considered as sensitive and thus the survey is considered underperformed.
- Overall, difficulties have been encountered in identifying timely the contact persons of stakeholders, in understanding specific data requirements (in English or local languages where translation was needed) and unresponsiveness-engagement of stakeholders in participating in the questionnaire-based survey. For this reason, partners followed an approach of more intensive communication and meetings with

the identified contact persons and provision of translations and explanations/ clarifications provision. Moreover, stakeholders (especially private ones, which also consider some of the requested information as "sensitive" and non-publishable) that are not involved in the project as partners, in many cases were unwilling to contribute due to work overload, low level of perceived own-interest and low level of understanding of the project aims and their potential profit from the anticipated improvement and facilitation of transport and trade flows.

In few words, delays were mainly due to bureaucratic reasons (formalities and use of official channels required for contacting stakeholders and target groups), procedural, operational and practical reasons (externalization process late or no activation, drawbacks with translations with national authorities) and low response and interest from target groups/ stakeholders. The problem with external stakeholders and target group was partially due to the delays in project communication activities (WPC), which costs the project in terms of visibility and recognisability among all levels of stakeholders (international or national level, Ministries, associations, etc.).

These problems have been already identified primarily in the project's Application Form, as well as in the Risks and SWOT Analysis described in the WPT1 methodologies for implementation and for data collection. Corrective measures, already undertaken in most of the cases by the partners, include:

- official (signed) letters sent to the stakeholders to facilitate the process, presenting to them the scope of the project and of the surveys/ analysis,
- reminders to the already contacted stakeholders,
- increase of awareness about project scope and activities (also in cooperation with WPC and WPT3 leaders), and
- organization of meetings with stakeholders (transport/ freight/ shipping associations, Customs at higher level, Infrastructure Operators Road/Rail/IWW, etc.).

The corridor analysis through the identification of the problems the different types of nodes across TEN-T corridors in related to WB area countries, provided the ability to outline possible solutions through the implementation of ICT solutions and tools. It must be underlined, that the evaluation process was not implemented in an effort to compare the corridors and come up with which one is the best to be used, but under the spectrum of evaluating their performance in order to propose solutions and tools aiming to improve their efficiency and increase their attractiveness. Moreover, the evaluation was based on specific attributes/ indicators, related firstly to ICT solutions and tools and secondly to identifying the ways to reduce those obstacles that create bottlenecks and perform as physical and/ or non-physical barriers.

Regarding the road BCPs and their evaluation, overall the BCPs face more or less the same problems. Those problems concern the level and condition of the facilities, the supporting and communicating equipment between the BCPs and the National Central Custom

Offices, as well as the required tracing means in order to implement the necessary controls. The evaluation process for the road BCPs led to the conclusion that those BCPs implementing trade facilitations achieved higher scores that the other BCPs, revealing that those trade facilitations, according to the international literature as well, are quite important for simplifying the processes, reducing waiting and procedural times at the BCPs and in general for improving their performance in the service of freight traffic.
Regarding rail BCPs, it must be mentioned that the pending so far data is quite important and thus their evaluation cannot be considered completed in any way. However, for those BCPs that the evaluation was possible, the highest scores concern those BCPs that achieve low waiting and procedural times for freight trains. This is the result of a combination of factors: a) good level of facilities and equipment and b) performance of simultaneous and/ or on-board controls. Based on that fact, it could be helpful towards the improvement of the provided services and thus reducing waiting and procedural times, the implementation of ICT services and tools supporting the performance of simultaneous and/ or on-board controls.

Finally, regarding maritime ports, due to the fact, as mentioned above, that ports are complicated transport nodes in which significant financial activities are performed, the evaluation process, following the questionnaire based survey addressed to maritime ports, had to be based on those attributes/ indicators combining different types of ports' characteristics: a) time needed for serving all transport means in the framework of multimodal freight transport, b) ports' infrastructure and c) the implementation of ICT solutions and tools that is commonly accepted affecting in a positive way their performance and efficiency.

In conclusion, from the analysis of the data made available, it is evident that there is a large margin for improvement of operations at ports and gateways and the border crossing points located along the most important Corridors in the region.

Improvement of physical and non-physical barriers to trade and transport with low-cost measures and investments would mean an important increase of utilisation of existing infrastructures.

Large infrastructure projects are underway in the region, and particularly in the Western Balkans, with the support of the European Union and the International Financial Institutions. Improvement of the performance and of the attractiveness of the Corridors is anticipated through the implementation of these projects but will be made tangible mainly with the arsis of the existing obstacles to smooth flows of people and goods.

Unless serious measures are taken, border crossings and other non-physical barriers will still hamper the full exploitation of existing, upgraded or even completely new and modern infrastructures. This will mean a much slower pace in the return of investments, in the improvement of the attractiveness and competitiveness of the Corridors and in regional and national economic development and convergence.

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