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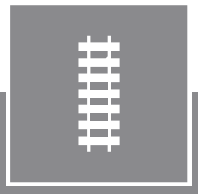

T1 INTERMODAL TRANSPORT SOFT MEASURES **Version final**

DT1.3.1 Report on simulation of the connections between involved ports **03/2023**

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1. INTRODUCTION

Bar is a central port of the Montenegrin port system and Port of Bar, being the only multimodal hub, which connects three transport modes – maritime, rail and road transport – holds a crucial place in Montenegrin transport system.

Figure 1: Berths on passenger terminal at Port of Bar

The capacity of the **Port in Bar** is nearly 5 million tonnes and cargo throughput is about 2,2 million of tonnes at the moment. As the main port of Montenegro, it is located in the southern part of the Adriatic Sea. The port area is located west of the town of Bar. The company Port of Bar JSC (Luka Bar AD in Montenegrin language) is a joint-stock company, in which the state of Montenegro holds about 80% of the shares in stocks. The economy of city of Bar relies upon Port of Bar to a significant extent. The port, as practically the only cargo port in Montenegro, has capacities and development potentials (length of the operational coast, depth of the water, connection with the railway and a large area for expansion), which give it regional status.

Integrated with the Belgrade - Bar railway and road traffic network, the Port represents a very important link in the chain of intermodal transport. In addition, the Port of Bar, as a modern port, offers great opportunities for further development of combined transport and interconnection of all regions, since the necessary road-railway infrastructure is located in its hinterland.

The passenger terminal in the Port of Bar is located in the most northern part of the port. Although it is officially classified as a passenger terminal, it is in fact a ferry terminal or a Ro-Pax terminal.

The passenger terminal disposes of a total berth length of 430 m, distributed into five berths, all enabling port or starboard (alongside) berthing of vessels, while berth 52 serves for stern or bow berthing, depending on the location of the vessel's ramp. Berths 54, 53, and 51 are most frequently used, while berth 52 is rarely used as the berthed vessels obstruct unhindered passage to the eastern basin of the passenger terminal, temporarily in use as a marina.

The depth at berths varies from 4,0 to 5,9 m, enabling medium size vessels to berth at the passenger terminal. Length and depth at available berths of the passenger terminal are given in the following Table 1:

Berth	44	51	52	53	54
Length (m)	97.5	97.5	20	107.5	107.5
Depth (m)	4.5	4	5.8	5.5	5.9

Table 1: Passenger terminal berths characteristic (source Port of Bar)

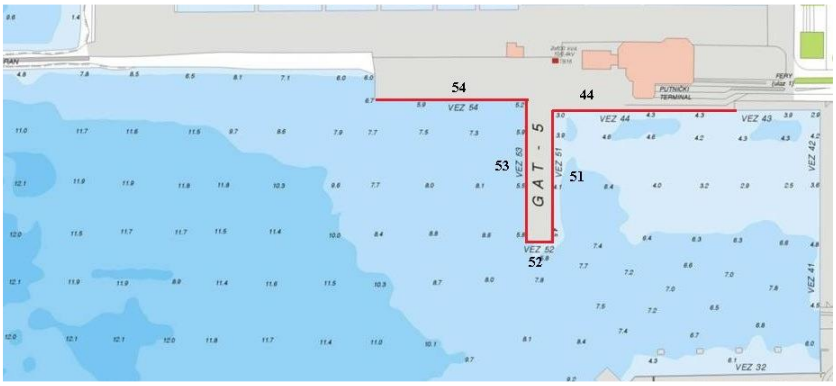

Figure 2: Layout of the passenger terminal at Port of Bar (source Port of Bar)

The passenger terminal is equipped with a four lane road (2 entry and 2 exit lanes) connecting it to the major roads through the town of Bar and further on. There are no railway connections from the passenger terminals nor do they seem to be necessary for the present or planned level and scope of

operations. The passenger terminal hosts a modern building for ticketing services and passenger waiting areas, including the customs facilities for passengers and their vehicles. Entrance and exit gates are located in the immediate vicinity of the berths and provide smooth access to and from ships. The terminal building also hosts border and immigration police station and customs office. (6)

Today, there is one seasonal ferry line that connects the passenger terminal at the Port of Bar with Italian port Bari. It is uncertain when the line will be established on a yearly basis.

Port of Bari is an Adriatic ferry port located in the Southern Italy (approximate coordinates N 41° 08' 14.93" - E 016° 52' 02.40"). Ferries which operate in the port link Italy with Montenegro, Albania, Croatia and Greece.

Figure 3: Bari Ferry Terminal - new port (source https://www.marinas.com)

It is also a cruise port, and the largest Mediterranean cruise companies, such as Costa and MSC, as well as ships of AIDA and TUI visit the Port of Bari mostly all year around.

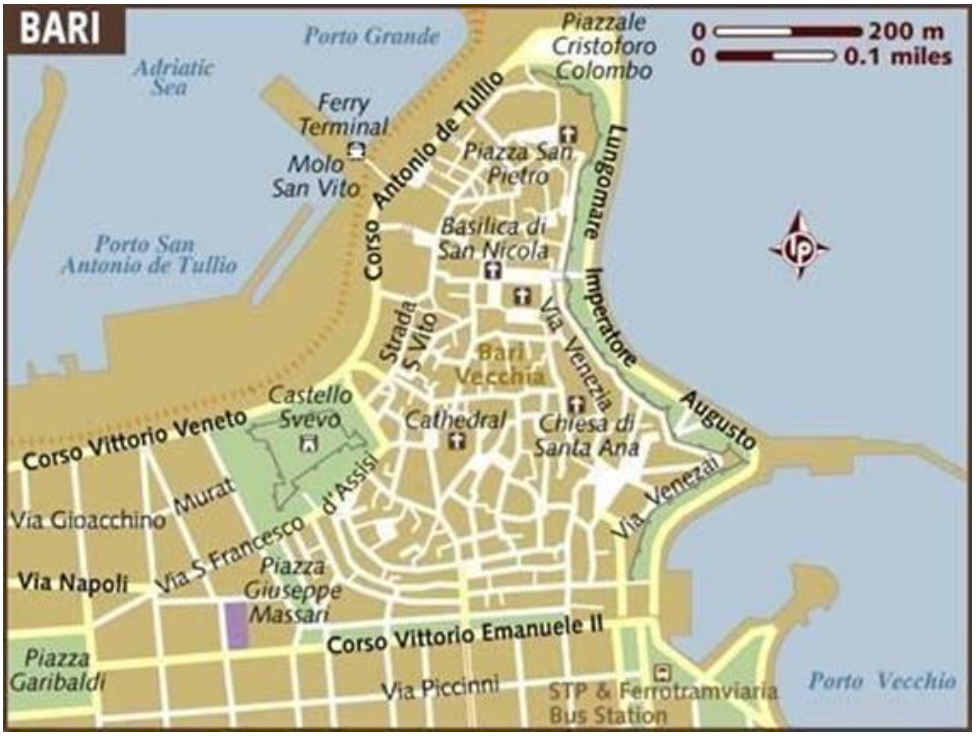

Figure 4: Map of Port of Bari (source https://www.cruisemapper.com/ports/bari-port-73)

The Port of Bari has three docks which are primarily used for freight vessels, ferries, and cruise ships. (3) An old buidling for cruise ships has been refitted and, a new "Cruise Terminal" (located at berths 13-14) is fully operative since April 2003. Other two berths, no. 10 and 12, are usually reserved to cruise ships as well (4) .

The types of vessels regularly calling at the cruise terminal are Passenger Ship (46%), Ro-Ro Cargo (38%), Ro-Ro/Passenger Ship (15%). The maximum length of the vessels recorded to having entered this terminal is 295.26 meters. The maximum draught is 8.6 meters and the maximum deadweight is 24000 t. The average duration of the vessels staying docked in this terminal is 0.3 days. (5)

Ferries dock at the New Port, which is within walking distance from the city center. Passengers from ships up to 280 m disembark close to the main Bari cruise port terminal. Passengers from bigger vessels disembark at San Vito Dock. The Dock is 5 minutes from the terminal.

The new terminal building of the Bari cruise port is located between the Foraneo quay and the Saint Cataldo quay. It is well equipped with facilities that include check-in desks, waiting areas, vending machines, a souvenir shop. As other ports, the terminal provides taxi, bus and shuttle services.

Figure 5: Bari Ferry Terminal - new port (source https://www.marinas.com)

The airport is 14 km away from from the Bari cruise port terminal. It can be reached by approximately 23 minutes by car (3).

2. BARI – BAR SEA SHIPPING CONNECTION

In the mid-sixties, the company "Prekookeanska plovidba" worked intensively on connecting the Montenegrin and Italian coasts. As a result of these efforts, the ferry "Sveti Stefan" was purchased on 10 May 1965 with the support of the Executive Council of Montenegro. The ferry was forseen to provide maritime transport services between Bar and Bari. The distance between these cities was approximatelly 120 nautical miles. The ferry sailed on its first journey across the Adriatic Sea on 18 June 1965.

The same company, “Barska plovidba”, operated the ferry line for the 45 years straight. During that period, the ferry line from Bar to Bari operated all year round. There was another line which connected Bar with Ancona. This ferry line operated during the peak of tourist season, from July till September.

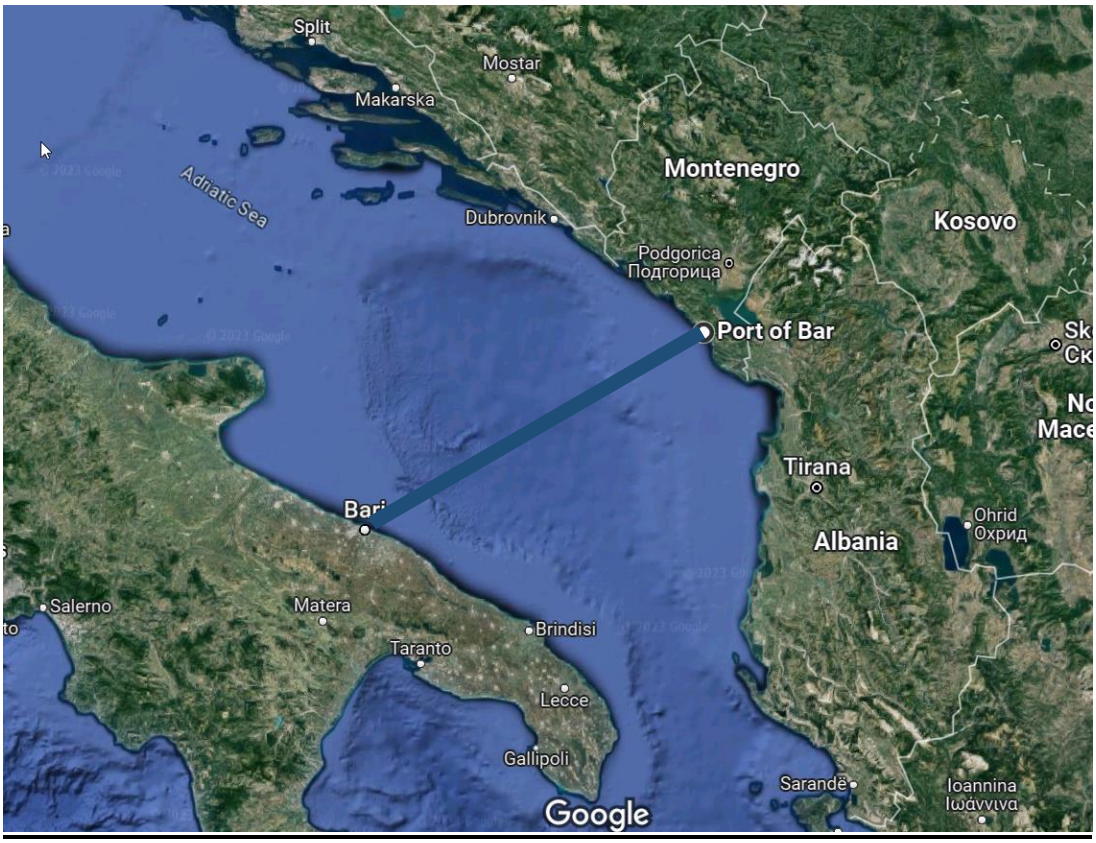

Figure 6: Connection Bar-Bari map (source www.google.com)

In below graphics is statistic data related to the passenger and trucks flow at the passenger terminal in Port of Bar. During the last several years a large decrease in the number of passengers and trucks is noticeable.

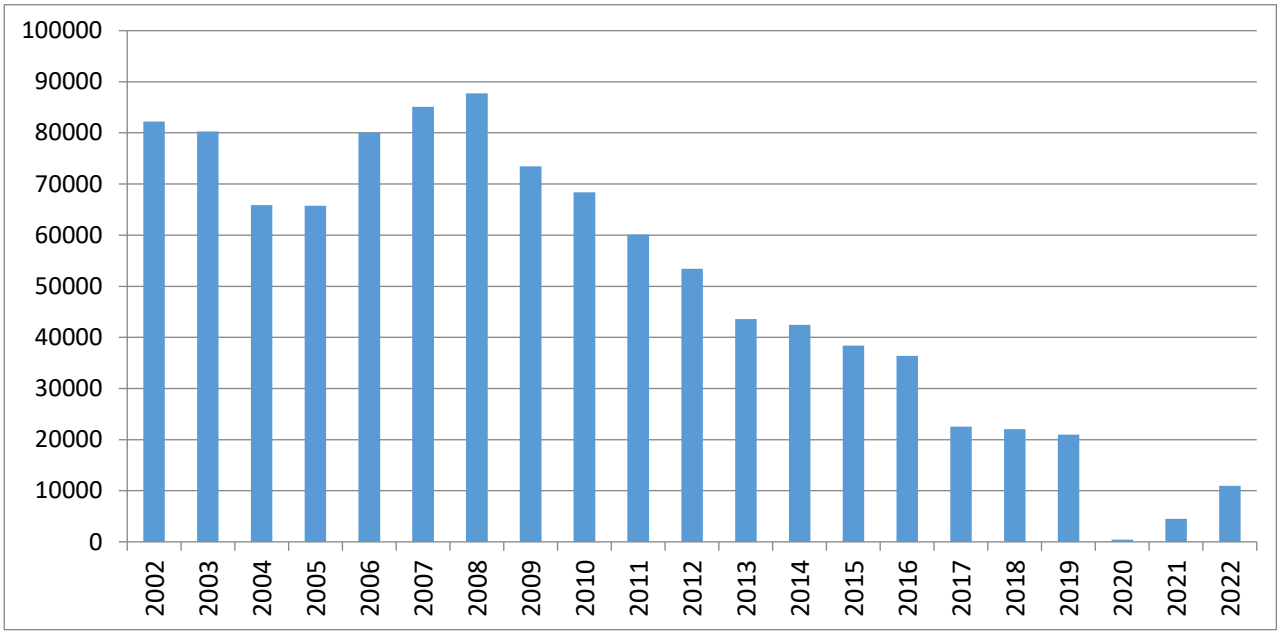

Figure 7: Number of passengers at passenger terminal in Port of Bar

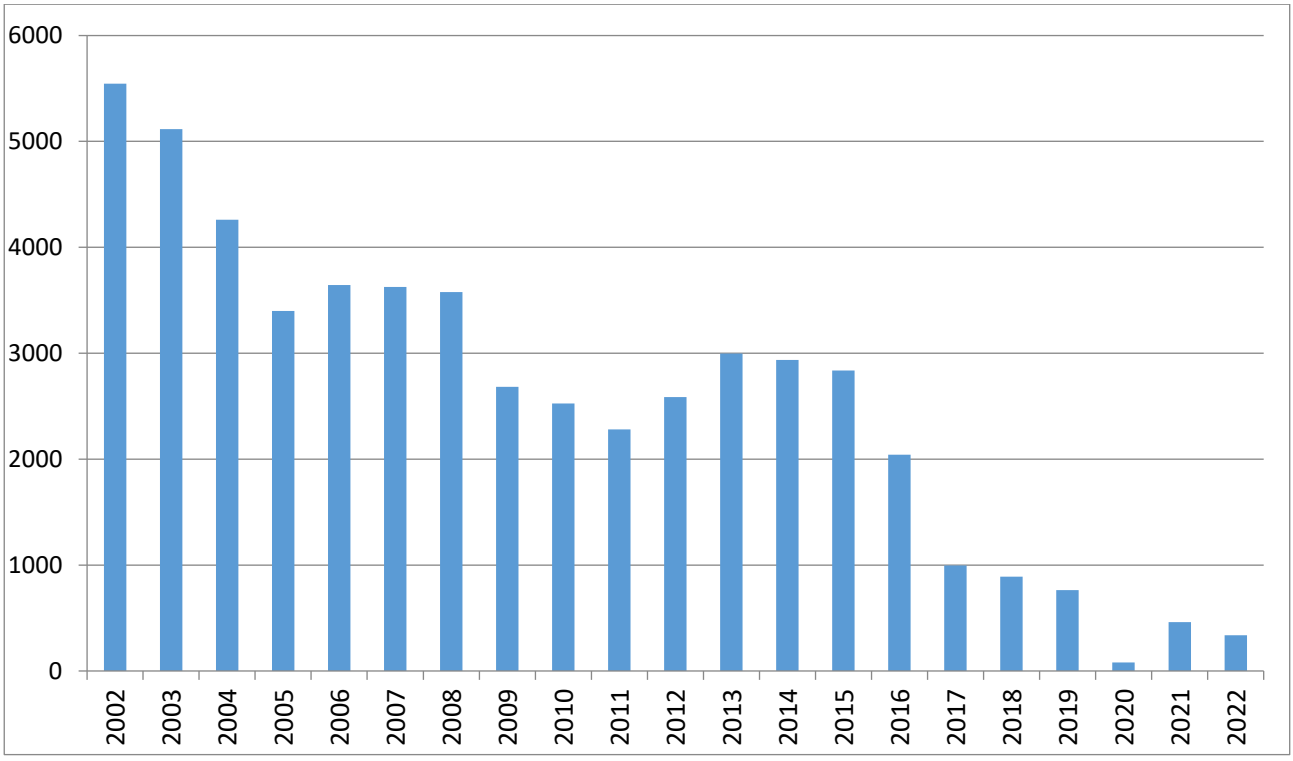

Figure 8: Number of trucks at passenger terminal in Port of Bar

3. PORT COMMUNITY SYSTEM PLATFORM

Port Community System is a centralized and automated system for exchanging of information and documentation between organizations and marine transport authorities. This system is in line with EU Directive 65/2010.

According to the International Port Community Systems Association (IPCSA, 2011), a PCS is defined as an electronic platform that connects multiple systems operated by a variety of organizations that make up a seaport community. It is shared in the sense that it is set up, organized and used by firms in the same sector – in this case, a port community.

Two key characteristics of a PCS are:

- it shall be neutral and open electronic platform enabling intelligent and secure exchange of information between public and private stakeholders or in order to improve competitive position of the sea port community.
- it shall optimize, manage and automate port and logistics processes through a single submission of data and connecting transport and logistics chains.

PCSs in Europe have a long tradition. Key drivers for the establishment of Port Community Systems were, on the one hand, the need for a standardized communication platform in order to improve the systems in terms of punctuality, reliability or costs and, on the other hand, the need to increase competitive position among ports.

The number of ports connected to a PCS varies from one to many. Smaller ports in particular often join forces to set up a PCS or connect to an already existing PCS of a larger port or ports.

PCS is a modular system with functionality designed to provide all the various sectors and players within a port community environment with tools specific to them, thus delivering a tightly integrated system. Developed for port users by port users, a PCS encompasses exports, imports, transhipments, consolidations, hazardous cargo and maritime statistics reporting.

PCSs in general provide a huge range of services and key features which can be summarized as follows:

- Easy, fast and efficient EDI information exchange, re-use and centralization, available 24/7/365
- Customs declarations
- Electronic handling of all information regarding import and export of containerized, general and bulk cargo
- Status information and control, tracking and tracing through the whole logistics chain
- Processing of dangerous goods
- Processing of maritime and other statistics

With all of these services come many advantages. The core benefits for all parties involved are higher efficiency and speed regarding port processes, particularly through automatization and the reduction of paperwork. In this way, PCSs contribute to sustainable transport logistics and support the ambitions to meet global carbon reduction requirements. The PCS offers improved security, cost reduction and potentially more competitiveness for each user.

Motivations to implement a PCS system:

- Meet requirements of the logistic community
- Improve port operations and increase competitiveness
- Interchange data between all subjects in the logistic chain
- Avoid paper
- Rapidly adapt to changes in surroundings
- Efficiently integrate with information systems and solutions in the port
- Formalize processes

Receipt of messages from senders or sender systems in real-time

- Verification of conformity of messages
- Sending replies to the sender
- Transformation of messages into a format, which is expected by receivers
- Platform independence
- Recording of messages into a database - “message repository”
- Sending messages to receivers:
- UN/EDIFACT

- XML format
- Flat file messages (Fixed length, Variable length, CSV, etc.)

PCSs deliver both B2B (business-to-business) and B2G (business-to-government) services or messages and even G2G (government-to-government) services in some cases.

One of the reasons for creating port community systems is that port service users and customers need an increasing amount information every day to innovate and to optimize their own processes. Such innovations in the trade, logistics, transport and port sector should not only contemplate the internal approach of each individual company, but look beyond this to see the companies and other entities related to transport as links in one single chain where the speed of the chain is determined by the slowest link. Therefore, all the parties involved in the transport chain must make a firm commitment to innovation and technological innovation processes to be prepared for the future and behave as virtual enterprise.

PCS in Bar was developed in 2014. 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). 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.

Further development of the PCS was done in the EA SEA-WAY project (output Innovative ICT system&infrastructure). Additional update was implemented 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.).

PCS was also updated within the ADRION programme (projects ADRIPASS; ADRIPASS PLUS and MultiAPPRO PLUS).

The Port Community System (PCS) of the Port of Bari is called **GAIA** – Generalised Automatic exchange of port Information Area – and was developed within the GAIA project co-funded by the Interreg Italy-Greece Cross-Border Cooperation Programme 2007-2013.

GAIA is the Port Community System of the Port of Bari with which some port processes are managed digitally and with which innovative information services are offered to passengers and operators as well as free wi-fi internet connection in the passenger parking areas. GAIA constantly monitors the entire port process in real time, for each ferry ship departing from the Port of Bari, from the Security Card issuing procedure until the ship arrives at the destination port. It provides information on the status of boarding, on weather conditions, on the arrival and departure times of ships and, through the tracking function, it notifies passengers of the exact position of ships during navigation and arrival times. All travel information is thus displayed directly on users' mobile devices, such as smartphones, tablets, notebooks, allowing constant and timely updates on boarding times and any ship delays, free of charge, making the travel experience and stay in a more peaceful city. Detailed information, in particular on road conditions, is also made available to road hauliers who, through these services, can thus decide on the best possible route to reach their intended boarding, as well as request online authorizations for access to the port and areas. of security. All the information generated by Gaia is also accessible in the port through special interactive kiosks. The use of GAIA has, in fact, revolutionized port activities by improving the work of operators, information management and the movement of passengers and vehicles, facilitating security checks by the police force.

4. DEVELOPED DATA EXCHANGE FORMAT FOR THE SIMULATION

According to the Application form of the EFINTIS project, a model of messages that would be exchanged between the ports of Bar and Bari was developed in cooperation with external experts. Considering the necessary data and the legal regulations that protect personal data, it has been decided that the simulation would refer only to freight traffic i.e., truck traffic between the mentioned ports.

The communication between the Montenegrin Port of Bar PCS system and the Italian Port of Bari PCS system has been enabled by sharing the truck information, contained within the Ro-Ro cargo manifest. Following is the Truck list data structure for the exchange:

ID	Column Name	Data type	Nullable
1.	Seq. Number	integer	no
2.	B/L	varchar	no
3.	Agent	varchar	no
4.	Registration	varchar	no
5.	Truck Company	varchar	no
6.	Truck Driver	varchar	no
7.	Nationality	varchar	no
8.	Destination port	varchar	no
9.	Port of loading	varchar	no
10.	Port of discharge	varchar	no
11.	Truck Length	decimal	yes
12.	Cargo Desc	varchar	no
13.	Cargo Weight	decimal	no
14.	Voyage ID	varchar	yes
15.	Name of ship	varchar	yes
16.	IMO number	varchar	yes
17.	Vessel Departure Date	datetime	yes
18.	Truck Status	varchar	no
19.	Gate Arrival Date	datetime	yes

It is a responsibility of the ports (Bari and Bar) to enable future availability of this data as well as to provide preconditions for their exchange (investment in further development of ICT tools is necessary to implement this communication). The same principle can be used for other ports interested in the exchange of information.

Developed SOAP message structure containing the truck information is as follows:

- **Sending request for the truck list data:**

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:wsv="http://wsVpa.apcwindow.eu/">
  <soapenv:Header/>
  <soapenv:Body>
    <wsv:apc10_get_vehicle_list>
      <!--Optional:-->
      <wsv:in_1_1_PlateNumber>aa111aa</wsv:in_1_1_PlateNumber>
      <!--Optional:-->
      <wsv:in_6_0_VehicleDriver>d1</wsv:in_6_0_VehicleDriver>
      <!--Optional:-->
      <wsv:in_7_0_Nationality>d</wsv:in_7_0_Nationality>
      <!--Optional:-->
      <wsv:in_14_0_VoyageID>voyage1</wsv:in_14_0_VoyageID>
      <!--Optional:-->
      <wsv:in_15_0_NameOfShip>APC_FORZA</wsv:in_15_0_NameOfShip>
      <wsv:in_17_0_VesselDepartureDate>2001-01-
01T00:00:00.000+01:00</wsv:in_17_0_VesselDepartureDate>
```

```
        <wsv:in_19_0_GateArrivalDate>2001-01-
01T00:00:00.000+01:00</wsv:in_19_0_GateArrivalDate>
        <!--Optional:-->
        <wsv:in_apc_UserId></wsv:in_apc_UserId>
        <!--Optional:-->
        <wsv:in_apc_UserPw></wsv:in_apc_UserPw>
        <!--Optional:-->
        <wsv:in_apc_LdapTicket></wsv:in_apc_LdapTicket>
        <!--Optional:-->
        <wsv:in_apc_UserGroup></wsv:in_apc_UserGroup>
        <!--Optional:-->
        <wsv:in_apc_UserRole></wsv:in_apc_UserRole>
     </wsv:apc10_get_vehicle_list>
  </soapenv:Body>
</soapenv:Envelope>
```

Figure 9: EFINTIS project image

- **Receiving response with the truck list data:**

<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
<SOAP-ENV:Header/>
<SOAP-ENV:Body>
<ns2:apc10_get_vehicle_listResponse xmlns:ns2="http://wsVpa.apcwindow.eu/">
<ns2:apc10_get_vehicle_listResult>
<ns2:apc10_out_imo_vehicle_list>
<ns2:out_1_0_SeqNumber>1</ns2:out_1_0_SeqNumber>
<ns2:out_1_1_PlateNumber>aa111aa</ns2:out_1_1_PlateNumber>
<ns2:out_6_0_VehicleDriver>d1</ns2:out_6_0_VehicleDriver>
<ns2:out_7_0_Nationality>d</ns2:out_7_0_Nationality>
<ns2:out_8_0_DestinationPort>d</ns2:out_8_0_DestinationPort>
<ns2:out_9_0_PortOfLoading>d</ns2:out_9_0_PortOfLoading>
<ns2:out_10_0_PortOfDischarge>d</ns2:out_10_0_PortOfDischarge>
<ns2:out_11_0_VehicleLength>11.11</ns2:out_11_0_VehicleLength>
<ns2:out_13_0_VehicleWeight>11.11</ns2:out_13_0_VehicleWeight>
<ns2:out_14_0_VoyageID>voyage1</ns2:out_14_0_VoyageID>
<ns2:out_15_0_NameOfShip>APC_FORZA</ns2:out_15_0_NameOfShip>
<ns2:out_17_0_VesselDepartureDate>2001-01-
01T00:00:00.000+01:00</ns2:out_17_0_VesselDepartureDate>
<ns2:out_18_0_VehicleStatus>1</ns2:out_18_0_VehicleStatus>
<ns2:out_19_0_GateArrivalDate>2001-01-
01T00:00:00.000+01:00</ns2:out_19_0_GateArrivalDate>

```
        </ns2:apc10_out_imo_vehicle_list>
      </ns2:apc10_get_vehicle_listResult>
    </ns2:apc10_get_vehicle_listResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

For the establishment of the direct connection between PCS in Bari and Bar these two messages are needed to be exchanged (Sending request for the truck list data and Receiving response with the truck list data). New upgrades of the PCS in both ports are needed to allow this communication. Within the simulation Truck list data were filled with random data/numbers/names/etc.

5. CONCLUSION

It is expected that freight trucks will be less detained in the ports of Bari and Bar if a regular exchange of data is established between the ports of Bari and Bar, and taking into account that the port authorities will be informed about the arrival of trucks with cargo as well as the characteristics of that cargo in advance. This will enable better planning and reduced dwell time of freight trucks in the port area.

The exchange of messages needs to be on a secure data platform like Port Community System. Development of new functionalities of the PCS in terms of data sharing between ports can be proposed in new programming period as a new project and in addition, as a capitalization of the EFINTIS projects results. The new project could include Port of Durres as this port has established the PCS as a new ICT tool in the port thanks to the project EFINTIS.

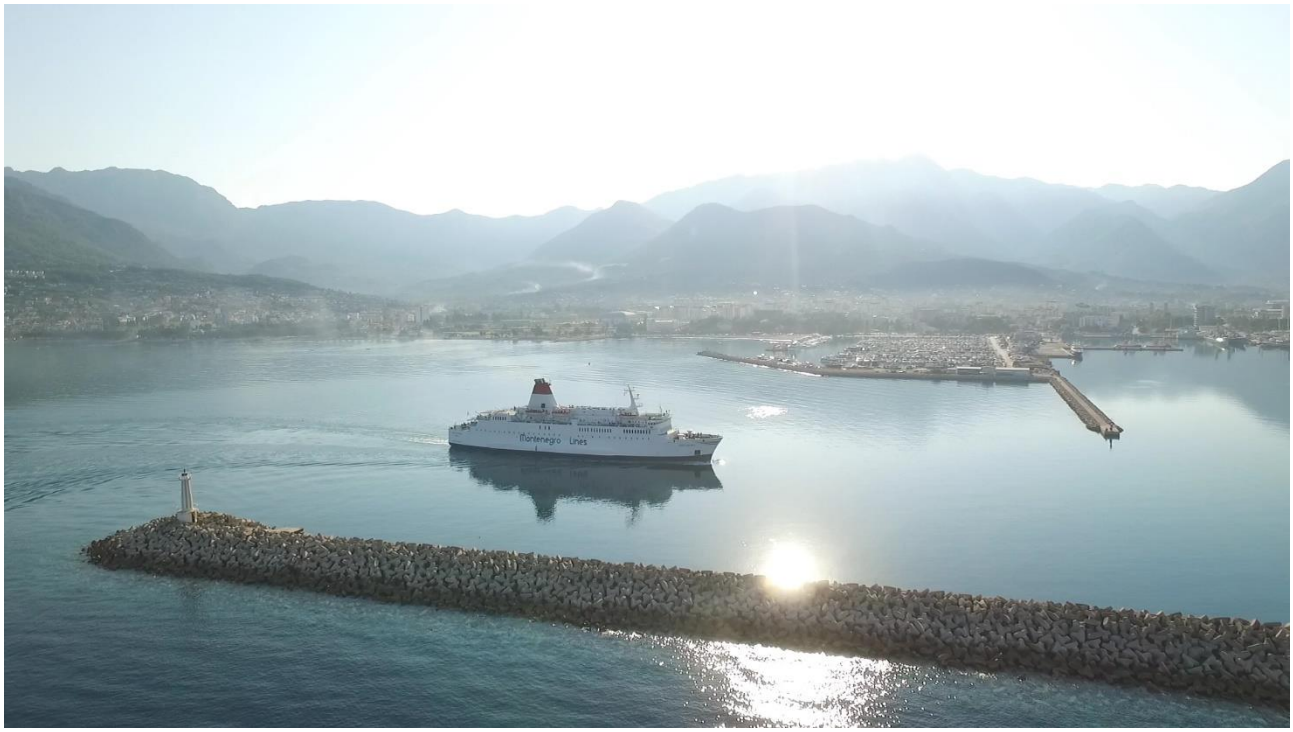

Figure 10: Ferry boat Sveti Stefan in Port of Bar (source: Port of Bar)

Developed connection between PCS in Port of Bar and Custom IT system within the project which will be operational in 2024 after Custom IT update is also a necessary precondition to allow reduced dwell time of freight trucks in the port.

6. REFERENCE LIST:

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7. TABLE OF FIGURES: