D.4.1.3 Comprehensive report on the future scenarios of traffic flows between Italian-Croatian ports

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Contents

1 INTRODUCTION AND ABSTRACT

This document evaluates the current and future scenarios of freight traffic flows between Italia-Croatian ports. The scope is to highlight the potential developments of traffic flows between Italian and Croatian ports in line with the partner reports for each partner and EUSAIR action plan.

The document is deliverable D 4.1.3 of activity D 4.1 “Joint market analysis to assess traffic potential market between Adriatic Ports”. The methodology for the potential traffic flow analysis is part of the work package 4 – Enhancing freight traffic flows and connections between the Adriatic ports. The main objective of the WP4 is to foster the traffic flows and the connectivity between the Adriatic ports involved in CHARGE, to contribute to the competitiveness of territories served by the maritime links. This methodology is part of the project CHARGE (Capitalization and Harmonization of the Adriatic Region Gate of Europe) which capitalizes the collected results of IPA CBC Program 2007-2013 CARICA project and other projects like ADRIATICMOS, INTERMODADRIA and EASYCONNECTING from IPA and ADB Multiplatform form South-East Europe with the development of freight transports in the Adriatic area and connectivity to the other EU member states as an objective.

The following deliverables have been used for the elaboration of this document:

- D 4.1.1 — Common methodology for potential traffic flow analysis: SPA elaborates and propose a common methodology for the collection and elaboration of ferry and containers traffic data including areas of origins and destinations of the traffic and typology of freight, starting from the results of CARICA project. The methodology includes a common index for the final analysis of each partner, and it is approved by all partners.
- D 4.1.2 — Analysis on potential market flows of involved ports: each involved port collects data and elaborates the analysis on the basis of the agreed methodology.

2 REPORT SUMMARY

This report evaluates the current and future scenarios of freight traffic flows between Italia-Croatian ports.

In Chapter 3, DEFINITION OF THE MAIN CHARACTERISTICS OF THE PARTNER PORTS AND PORT AREAS, there is a collection and harmonization of the contributions provided by the 5 Partner Ports. In this chapter general description, port layouts, port hinterlands and gravitational areas and port assets are proposed with a comparative approach. The scope is to highly the difference and the similarities, the strength and the weakness between Partner Ports, in order to crate the base background for the potential traffic analysis.

In Chapter 4, PORT FREIGTH TRAFFIC STATISTICS, there is a collection and harmonization of the contributions provided by the 5 Partner Ports. In this chapter all the port traffic stats are proposed with a comparative approach. The scope is to highly the difference traffic flow operated by the Partner Ports, in order to crate the base background for the potential traffic analysis.

In Chapter 5, OVERVIEW AND ANALYSIS OF THE EXISTING FREIGTH TRAFFIC FLOWS BETWEEN ITALIAN-CROATIAN PORTS, additional data sources are taken into account:

- COEWEB ISTAT Freight Data Base: that provides historical freight volumes between Italian regions and foreign countries, classified by goods and transport system-
- RAM Freight Data Base: that provide the current maritime flows between Italian ports and foreign countries.
- Other macro-economic stats: as historical trend of the Italian and Croatian GDP.

The elaboration and combination of those data bases shows a clear picture of the current traffic flows between the partner port an in general between the gravitational area of each port. It is also the starting point for the potential traffic analysis.

In Chapter 6, ANALYSIS ON POTENTIAL MARKET FLOWS AND PROJECTION OF FUTURE FREIGTH TRAFFIC FLOWS BETWEEN ITALIAN-CROATIAN PORTS, is implemented an statistical traffic model to forecast the future trend of the freight flows across the study area. For each Partner Port is defined a gravitational area and a freight flow origin-destination matrix is

defined for the current year and fort the future scenarios (up to 2025). The freight traffic forecasts are based both on historical trend and GDP future forecasts.
In Chapter 7, POTENTIAL UNDESIRABLE EFFECTS AND POINTS OF CONGESTION, there is a list of the current points of congestions and criticalities for each Partner Port.
In Chapter 8, CONCLUSIONS, final consideration on the current and future scenarios of freight traffic flows between Italia-Croatian ports are reported.

3 DEFINITION OF THE MAIN CHARACTERISTICS OF THE PARTNER PORTS AND PORT AREAS

3.1 Geographical Location

- **Port: of Venice**: located at the upper end of the Adriatic Sea. In 2017 it handled freight weighing over 25,000,000 t and served 1,650,000 passengers. Four main areas make up the port, First Marghera, the largest port section. Second Marttima which is the passenger port section. Third, Fusina a Ro-Pax terminal. Fourth, San Leonardo an Oil products pipeline terminal.

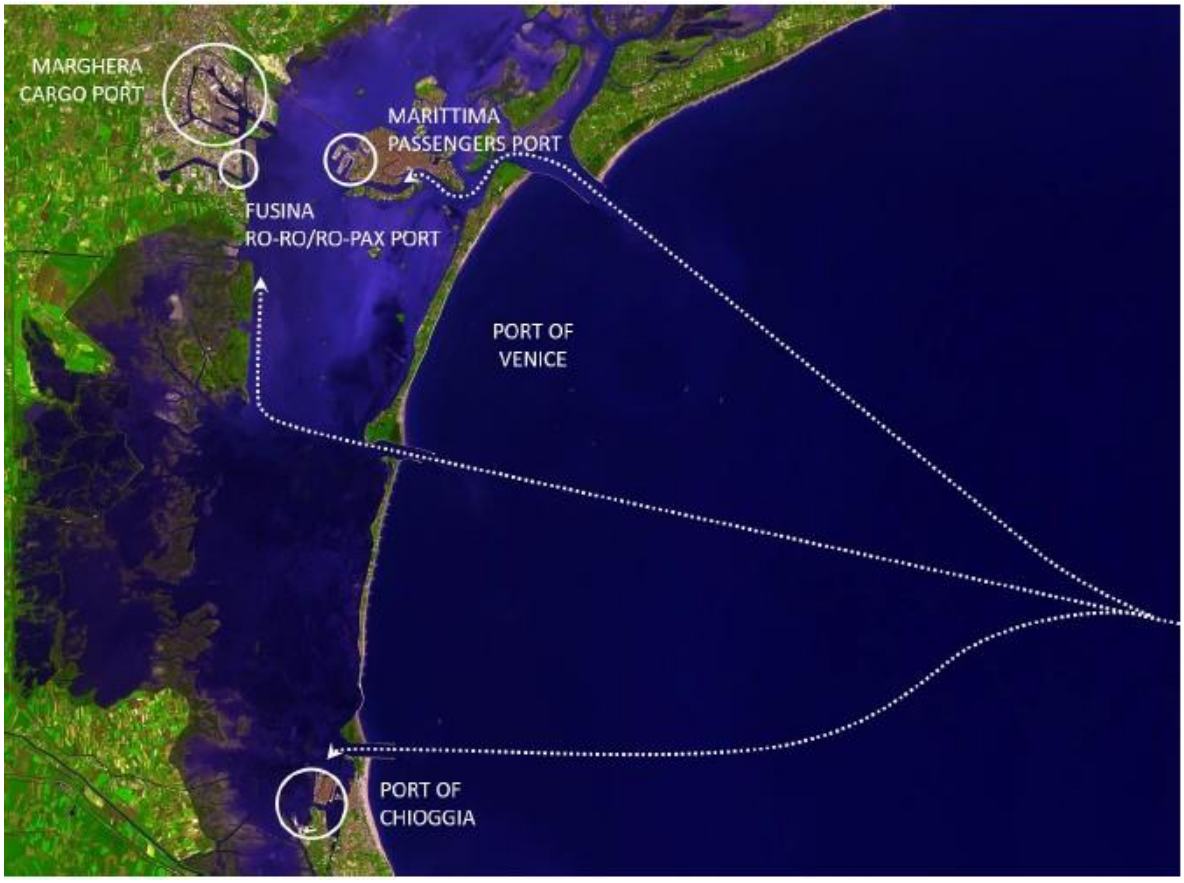

Figure 1 Overview of the ports under the North Adriatic Sea port Authority

- **Port of Ploče**: situated at the Central Adriatic coastline, approximately 100 km South-East from the city of Split and 100 km North-West from Dubrovnik. Port of Ploče is geographically the biggest cargo port and the second largest cargo port in Croatia in total throughput volume, after Rijeka, and it is a classical landlord port. The capacity of the port is presently estimated to be at approximately 10 million tons per anno for dry bulk and general cargo and amounts to 1.2 million tons for liquid bulk.

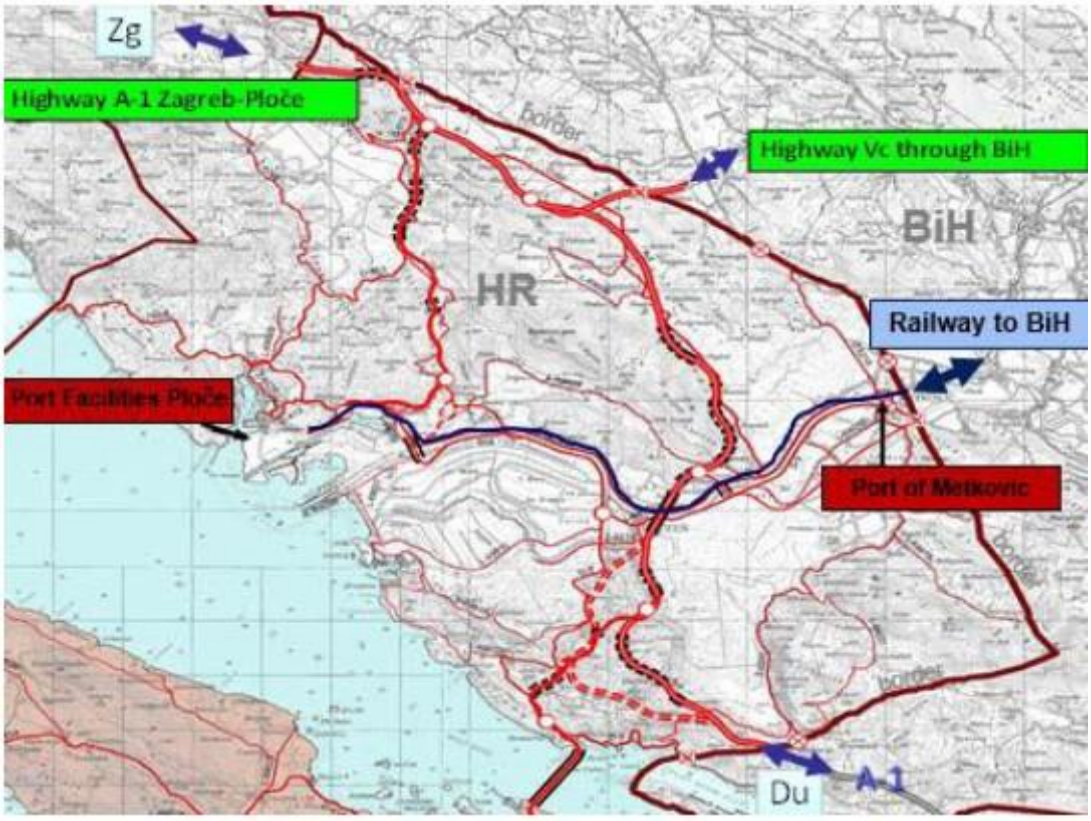

Figure 2 Location of the port and major rail and road connections

- **Port of Split:** situated in the central part of the eastern coast in the Adriatic basin. As for its strategic position it has become one of the most important passenger ports in the Mediterranean, often called as the gateway to the islands. The favorable geostrategic location enabled primary the development of passenger transport towards the domestic markets mainly situated on central Dalmatian island and other costal destinations but also the segment of cruise tourism to various international destinations in the Adriatic and Mediterranean figure (3).

Figure 3 Location of the port of Split

- **Port of Bari**: The Port of Bari is one of the largest ports in southeastern Italy, located in the central part of Metropolitan City of Bari, the province of Bari. The port of Bari is traditionally considered the gateway between Europe, the Balkan peninsula and the Middle East.

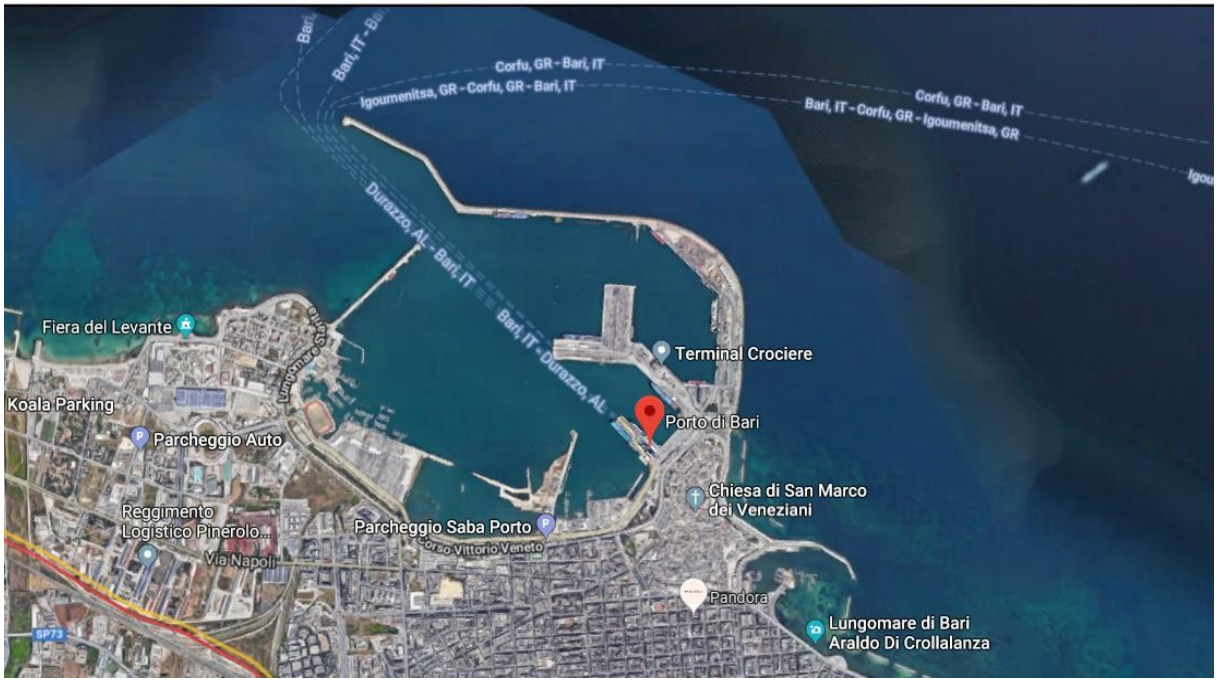

Figure 4 The map of the port of Bari

- **Port of Ancona**: The Port of Ancona is located in the middle of the Italian Adriatic coast, precisely in the Gulf of Ancona, between two hills. Its natural position allowed since roman period to be a strategical point of reference and a natural safe shelter for navigators and sailors. The city is situated between the slopes of the two extremities of the promontory of Monte Conero, Monte Astagno and Monte Guasco and it represents the main economic and demographic center of Marche Region. Ancona area is characterized by a hilly landscape with numerous valleys and by the presence of several beaches, both rocky and sandy. Ancona area is classified as medium-high seismicity zone (level 2) by the Italian civil defense.

Figure 5 The map of the port of Ancona and the historical city centre

3.2 Current markets (Gravitational Area) and port hinterland

This chapter provides information about the gravitational area of each port defined by our partners.

- **Port of Venice**: the port serves primarily Northern Italy, but also some markets north of the Alps, notably with multimodal trains moving semi-trailers between the Ro-Pax Terminal in Fusina and Germany.
- **Port of Ploče**: covering the Dalmatian coastline, as well as Bosnia and Herzegovina (BH), Serbia (SR), Montenegro (MNE) and Hungary (HU). While not even 1% of the goods leaving the port are directed towards the southern neighbouring state of Montenegro (MNE) and roughly 8% are distributed directly to the Croatian surroundings (HR), 91% of the goods are heading towards BH.

Figure 6 Port of Ploče's hinterland

- **Port of Split**: central and south Dalmatian islands with few destinations along the coast, as well as the international market of passenger and vehicle transport with Italy.

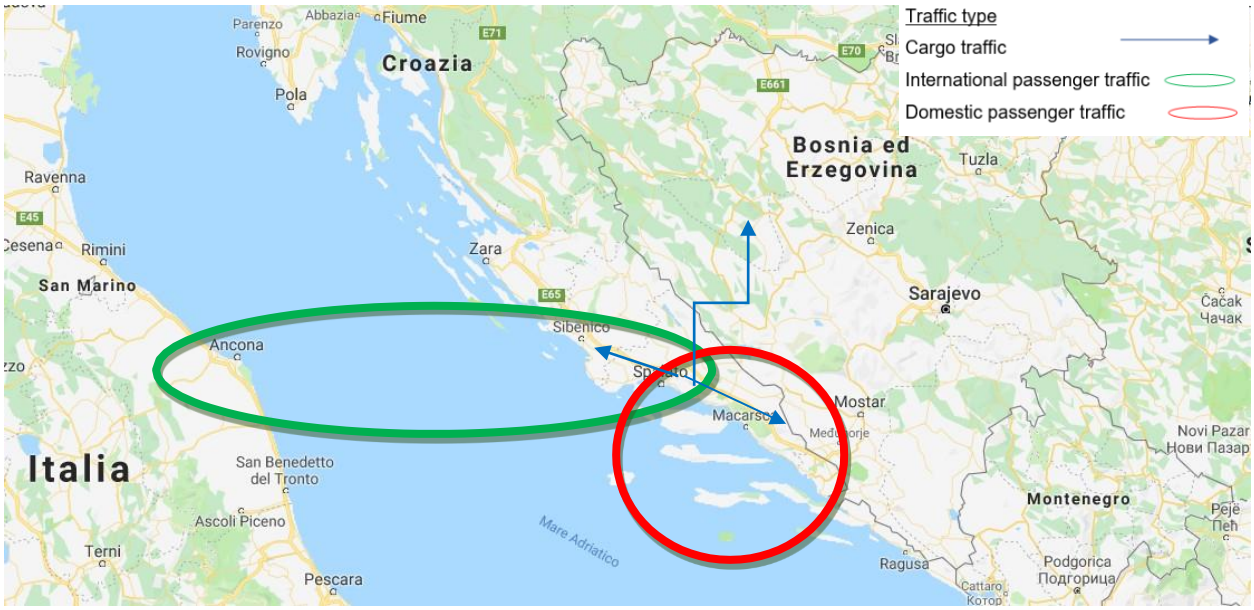

Figure 7 Port of Split current markets

- **Port of Bari**: The regional interpore of Puglia is located on the north-western outskirts of the city, a short distance from the motorway junction and the airport, and is connected to the port area, via the north-south node, and with the railway network, by means of a well-equipped railway terminal. It constitutes the most important multimodal logistic center of commercial exchanges of the Puglia region, and between the region itself and the neighboring countries of the Mediterranean basin, and those of Northern Europe by sea.

- **Port of Ancona**: The current markets of the Port of Ancona are mainly related with passenger transport and cargo transport. Indeed, the port is the main logistic hub of central Adriatic coast and it is the main Italian port for international passenger traffic by ferries. The main market is represented by Ro-Ro traffic, with intense traffic flows of trucks and therefore Ro-Ro freight. The main routes involve the Adriatic Sea and the Adriatic ports. Precisely, intense relations are entertained with the Italian ports of Trieste, Venezia and Ravenna, especially for cargo transport and container traffic, while, for international routes, intense traffic flows are recorded with Greece (Igoumenitsa and Patras), Croatia (Split) and Albania (Durres), especially regarding passenger transport and Ro-Ro freight transport.

Figure 8 Current market areas of the port of Ancona, both national (red) and international (blue)

3.3 Port infrastructure

- **Port of Venice**: San Leonardo oil terminal, Fusina Ro-Pax terminal and Porto Marghera (freight). Marittima and San Basilio-Santa Marta (passengers)

Figure 9 Map of the port of Venice's terminals

- **Port of Ploče**: Through a 24 km railway line and road, the port is linked with its immediate hinterland of BH and further to the North-East of Croatia and Central Europe

- **Port of Split:** consists of two dislocated areas, the ferry and cruise terminal predetermined for transport of passengers and vehicles located in the southern part of the city of Split and cargo terminal (traditionally nominated as the North port) in the northern part.

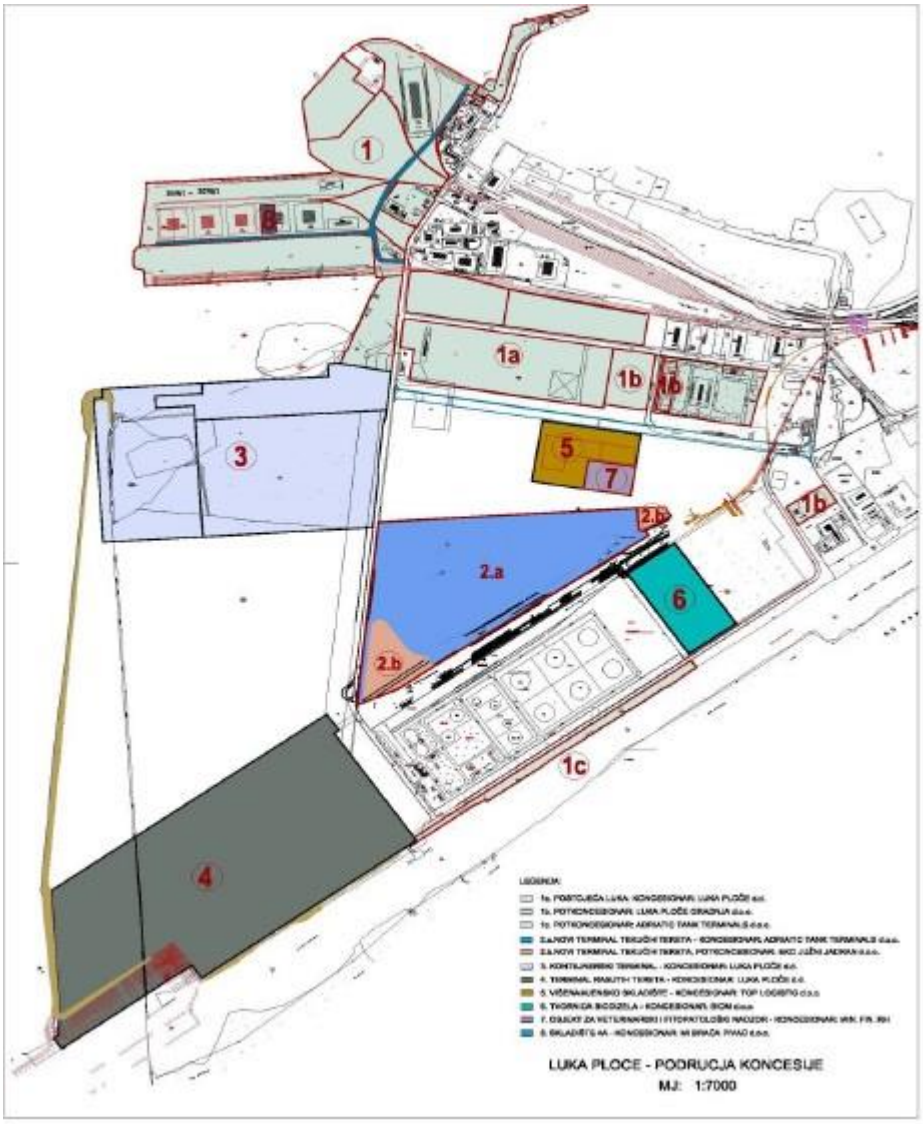

Figure 10 Plan of the port, port concessionaires and sub-concessionaries

- **Port of Bari**: Is composed to the east by a large breakwater and to the west by the San Cataldo dock. Within the port area there are five basins: Bacino Grande, Darsena di Ponente, Darsena di Levante, Darsena Vecchia and Darsena Interna.

Figure 11 Port Areas Bari according to the use destination

- **Port of Ancona**: The Port of Ancona is one of the most vital and active harbors in the Mediterranean area and plays a primary role in trade. Moreover, it is classified as an international port by the European Union. The Port of Ancona has 27 quays, including wharfs, piers, docks, layovers and a first inner harbor.

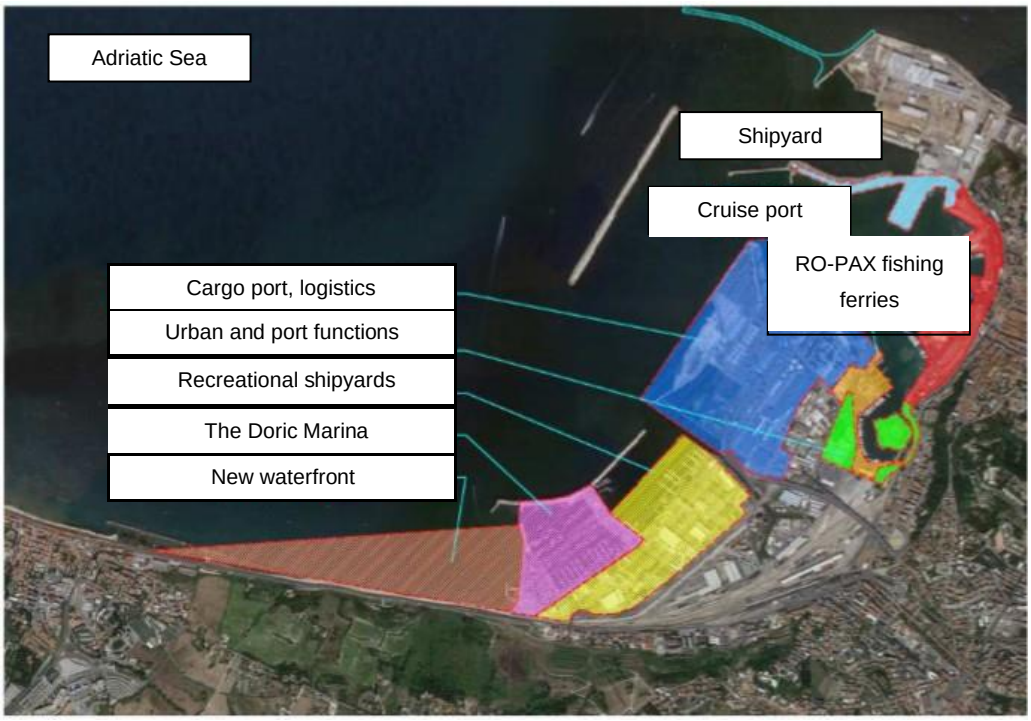

Figure 12 Port areas split according to the use destination

3.4 Intermodal nodes

- **Port of Venice**: The port railway network is about 45km long. In 2018 the Port of Venice generated 5.543 trains, moving 2.6 million tons of freight on more than 100.000 shunted wagons (Venice Green Terminal_VGT logistics platform, Venice free Zone is one of two customs free zones in Italy).
- **Port of Ploče**: connected to international inland waterways. They are the Sava River from Sisak to Belgrade and the Danube River, constituting pan-European transport Corridor VII. Through the latter, a connection to other European inland waterways, such as the Rhine is possible via the Rhine-Main-Danube Canal.
- **Port of Split**: The access road to the port area is Kralja Zvonimira road which continues through quay of Knez Domagoj. Also, from the year 2019, ferry and catamaran sailing schedule are adjusted to the airplane schedules in the Split airport terminal.
- **Port of Bari**: it is served by the A14 and A16 motorways, which connect it to Bologna and Naples respectively to the north and Taranto to the south. Five other arterial roads depart with sections of the highway: the SS 100 in the direction of Taranto, the provincial road 236 in the direction of Bitritto-Matera, the provincial road 54 in the direction of Modugno, the SS 96 in the direction of Altamura-Matera and the provincial road 231 in direction Bitonto-Andria. The city of Bari is served by several railway stations, the main one being the Bari Centrale station; in addition to the Adriatic and Bari-Taranto lines, the South East Railways converge there.
- **Port of Ancona**: The Port of Ancona has a high intramodality level between maritime traffic and road traffic, while between maritime traffic and railway traffic there is a moderate intramodality. The intramodality between maritime and road transport is intense thanks to the high traffic flows of Ro-Ro traffic, which allows to transport trucks and trailers as well as other vehicles, Moreover, the requalification of Italian Motorways of the Sea (*Autostrade del Mare*) has allowed to consider the Port of Ancona as a strategic point for the trade between South West Europe and West Mediterranean countries, of which imports and exports are foreseen to increase, and Italy, Central and North West Europe.

3.5 Port concessionaires and stakeholders

- **Port of Venice**: stakeholders are all subjects, entities, companies and parties which have an interest in the numerous activities performed in the port area.
- **Port of Ploče:** stakeholders are all subjects, entities, companies and parties which have an interest in the numerous activities performed in the port area.
- **Port of Split**: Stakeholders of the port of Split are all subjects, entities, companies and parties having an interest in the industry, and directly or indirectly affected by the business resources.
- **Port of Bari**: Stakeholders of the port of Bari are local, regional and public entities, companies, sectoral agencies and high educational bodies.
- **Port of Ancona**: stakeholders are all subjects, entities, companies and parties which have an interest in the numerous activities performed in the port area.

4 PORT FREIGTH TRAFFIC STATISTICS

This chapter elaborates the overall traffic in the ports of the involved project partner, also featuring the analysis of the traffic segmentation in the respective port based on the statistical data and performance indicators. The essential input, when analyzing the traffic flows, is the traffic statistics provided by each individual port. The results shown the competitive advantage or disadvantage of each port involved, due to the current state and statistical data on freight transport. The data will be used as a guideline in the following chapters for the projection of the future port performance and future scenarios of traffic flows. Also, the comparison of the Italian and Croatian port performances in the Adriatic will support the future decision-making process in the adoption of infrastructure investment decisions and will indicate discrepancies in performing the port business processes. The analysis is especially focus on the general data on ferry and container transport. The report includes (reference year should be 2017 and historical data preview for at least 5 years).

4.1 Freight traffic statistics

➢ **Vehicle traffic [cars, trucks, and - where applicable - buses and trailers]**

The total vehicle traffic of the ports of the involved project partner in 2013-2017 period is represented in the table below.

Year	2013	2014	2015	2016	2017	2018	Avg. Growing Factor
Port of Venice	51.452	46.620	34.411	47.139	67.328	81.539	13.1%
Port of Ploče	15.369	13.963	17.755	15.741	17.600	_	3.7%
Port of Split	654.944	651.150	686.049	733.269	775.396	811.214	4.4%
Port of Bari	130.866	125.778	125.616	132.102	149.596	158.013	4.0%
Port of Ancona	345.872	335.116	331.691	351.120	379.123	397.321	2.9%

Table 1 Overall Vehicle traffic throughput 2013-2017

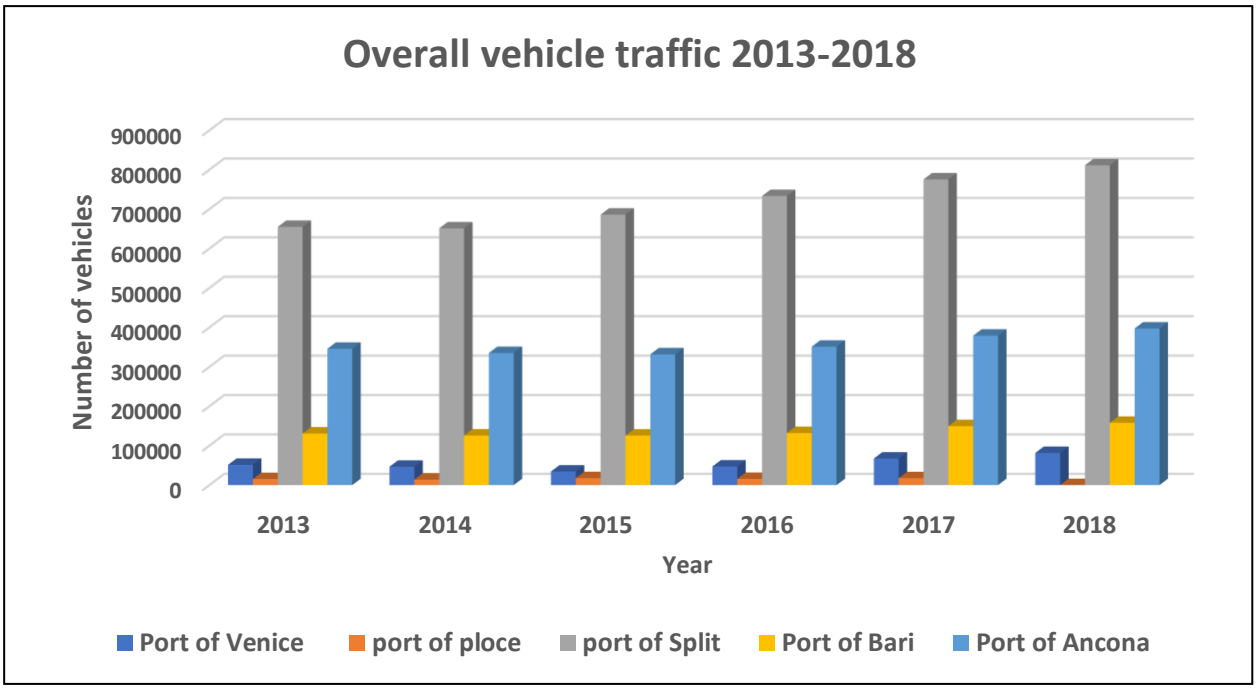

Figure 13 Overall vehicle traffic in 2013-2017 period

Looking at the charts, is possible to notice that the total vehicle traffic in the port of Split has the highest values among the other ports in 2013-2017 period. The total vehicle traffic in the port of split has been increasing steadily. In 2017 it amounted to 775,396 vehicles out of which around 5% in the international traffic. Vehicle traffic in the port of Venice increased by 31% in volume, passing from 54,452 to 67,328 units. During the mentioned period in the port of Ancona, despite a slight decrease (-4,1%) between 2013 (345.872 vehicles) and 2015 (331.691 vehicles). Looking at the last three years, the total amount raised by about 8% in 2017 (379.123 vehicles). Therefore, currently the Port of Ancona is recording an increase in vehicles traffic flows. The total vehicle in the port of Bari is quite stable during the analysis period.

- **Container traffic [TEU]**

The number of containers transiting via the ports of the involved project partner between 2013 and 2017 is shown in the table below.

Year	2013	2014	2015	2016	2017	2018	Avg. Growing Factor
Port of Venice	446.428	456.068	560.301	605.875	611.383	632.250	7.5%
Port of Ploče	18.713	16.859	20.676	20.965	24.121	_	7.3%
Port of Split	5.062	9.476	9.240	9.977	11.207	11.207	21.0%
Port of Bari	30.862	35.422	60.063	71.593	68.695	68.262	19.8%
Port of Ancona	91.982	99.839	106.923	110.841	110.815	97.117	1.4%

Table 2 Overall container cargo throughput 2013-2017

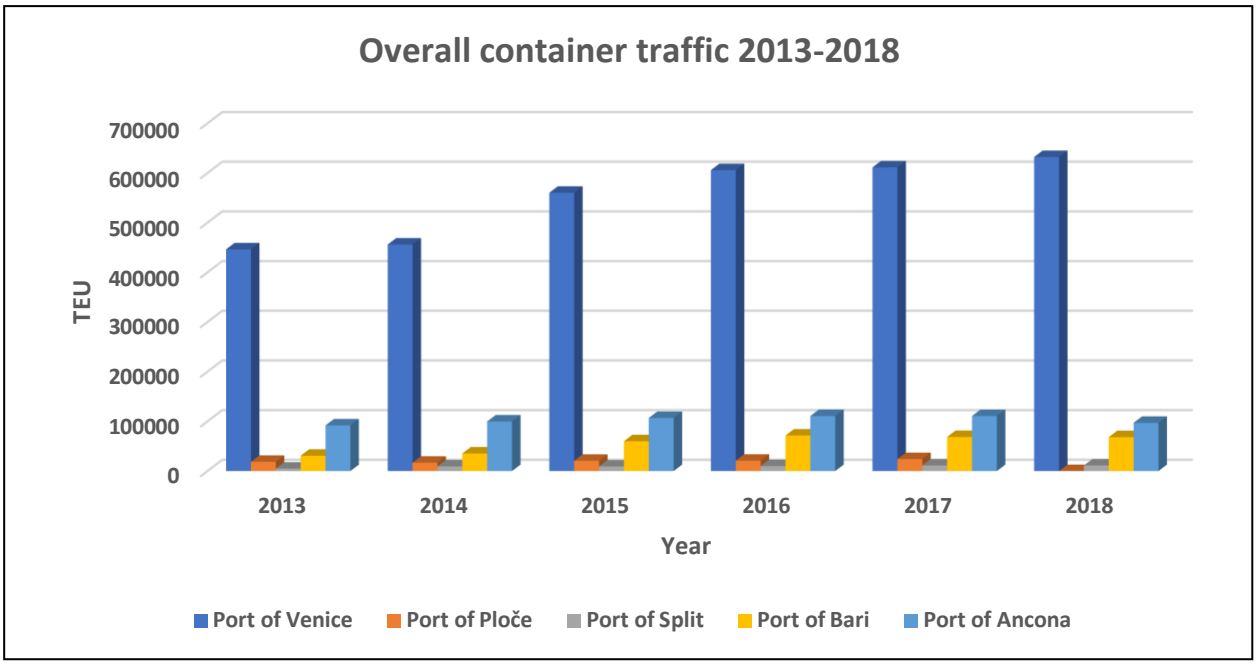

Figure 14 Overall container traffic 2013-2017

Container traffic at the port of Venice grew 37% in the years 2013-2017, passing from 446.428 to 611.383 TEUS. All was de facto international traffic, since all the shipments to national ports like Gioia Tauro were meant for transhipment onto vessels directed to international destinations. The port of split handled 115.624 tons of containerized cargo in 2017, the total volume of TEU being 11.207. Over the last 5 years the volume of TEU traffic has been increasing steadily. In 2017 it was approximately 121% larger than in 2013. In the period 2013-2017, port of Ploče has a growth of container traffic at a rate of 28.9% passing from 18.713 TEUs in 2013 to 24.121 TEUs in 2017. Most of the growth was international traffic, mostly for Bosnia and Herzegovina. . The trend of container traffic at the port of Ancona is positive from 2013 to 2016. Starting from 91.982 containers in 2013, the containers recorded were 99.839 in 2014 (+8,5%), 106.923 in 2015 (+7,1%) and 110.841 in 2016 (+3,7%). However, from 2016 to 2018 the trend became negative. The traffic flows decreased to 101.815 containers in 2017 (-8,1%) and then to 97.117 containers in 2018 (-4,6%). Therefore, by considering the period 2013-2018. the trend was initially positive and then negative. Container traffic at the port of Bari grew 105% in the years 2013-2017, passing from 30.862 to 71.593 TEUs.

- **Other cargo traffic: dry/liquid bulk, other general cargo**

traffic statistics of the ports o involved project partner between 2013 and 2017 is shown in the table below

Year	2013	2014	2015	2016	2017	2018	Avg. Growing Factor
Port of Venice	18.826.529	16.089.323	19.085.541	18.553.016	17.935.296	18.952.397	0.7%
Port of Ploče	2.746.234	2.703.725	2.830.650	2.706.421	3.194.962	_	4.2%
Port of Split	3.108.247	3.166.453	3.102.308	2.744.786	3.136.347	2.998.013	-0.4%
Port of Bari	4.443.292	4.967.393	5.394.661	5.609.702	5.661.927	5.489.085	4.5%
Port of Ancona	6.974.533	8.568.956	8.593.062	8.976.692	8.440.198	8.676.118	4.9%

Table 3 Overall cargo traffic throughput 2013-2017

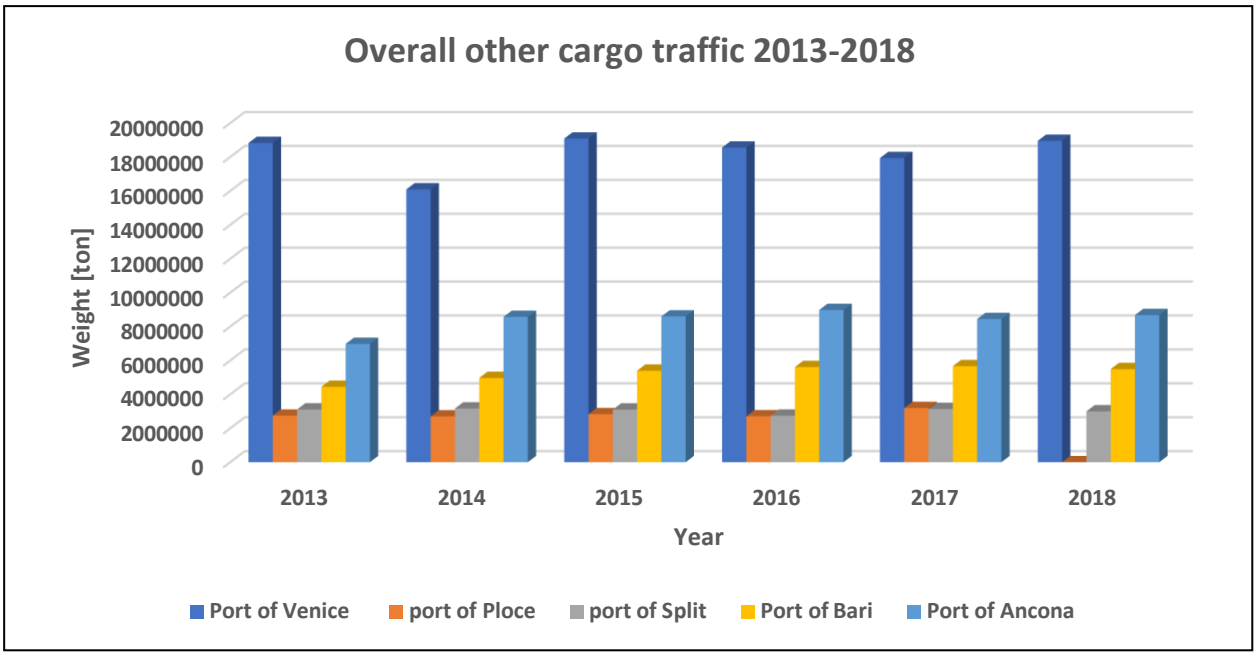

Figure 15 Overall other cargo 2013-2017

Looking at the charts, is possible to notice that port of Venice has the highest value of cargo among the other partner ports in 2013-2017 period. In the years considered there was a series of ups and downs with tonnes handled moving from 18,826,529 in 2013 to 16,089,323 in 2014 to 19,085,541 in 2015 to 18.533.016 in 2016 to 17,935,296 in 2017. Most of the traffic was international.

In the period of 2013 -2017 port of Ploče has a slight decline of general cargo traffic because of the strong decline of steel and aluminium products. Although was significant increase of bagged and containerized cargo. It was not enough to annul the decrease caused by mentioned decline.

The general trend in the port of Ancona has been slightly positive. Indeed, after a relevant positive variation of +22,9% between 2013 (6.974.533 tons) and 2014 (8.568.956 tons), there was an alternance of positive and negative variations, with 8.593.062 tons in 2015 (+0,3%), 8.967.692 tons in 2016 (+4,4%), 8.676.118 tons in 2017 (-3,3%). Despite the negative trend of the last two years, the total freight has remained quite stable.

In the year of 2017 the total cargo traffic handled by the port of split amounted to 3.136.347 tons. Overs the years the cargo traffic handled by the port of split does not oscillate too much. The fluctuations are much smaller than in the traffic of passengers and vehicles. The total cargo traffic handled by the port of Bari has been increased from 6.974.533 tons in 2013 to 8.568.956 in 2014. Despite the positive trend in 2014, the total freight has remained quite stable.

➢ **Passenger traffic [pax]**

Passenger traffic can be split in two categories: ferry passenger traffic and cruise passenger traffic. In the following table the total passenger traffic data are shown.

Year	2013	2014	2015	2016	2017	2018	Avg. Growing Factor
Port of Venice	2.072.642	1.945.324	1.755.485	1.777.399	1.649.063	1.787.848	-2.7%
Port of Ploče	225.000	250.000	310.000	353.000	350.000	_	12.0%
Port of Split	4.421.568	4.451.638	4.793.226	4.982.652	5.261.166	5.422.589	4.2%
Port of Bari	1.702.089	1.683.450	1.486.116	1.521.588	1.620.528	1.735.075	0.6%
Port of Ancona	1.174.054	1.080.116	1.010.144	1.005.886	1.090.639	1.090.639	-1.3%

Table 4 Total passenger traffic 2013-2017

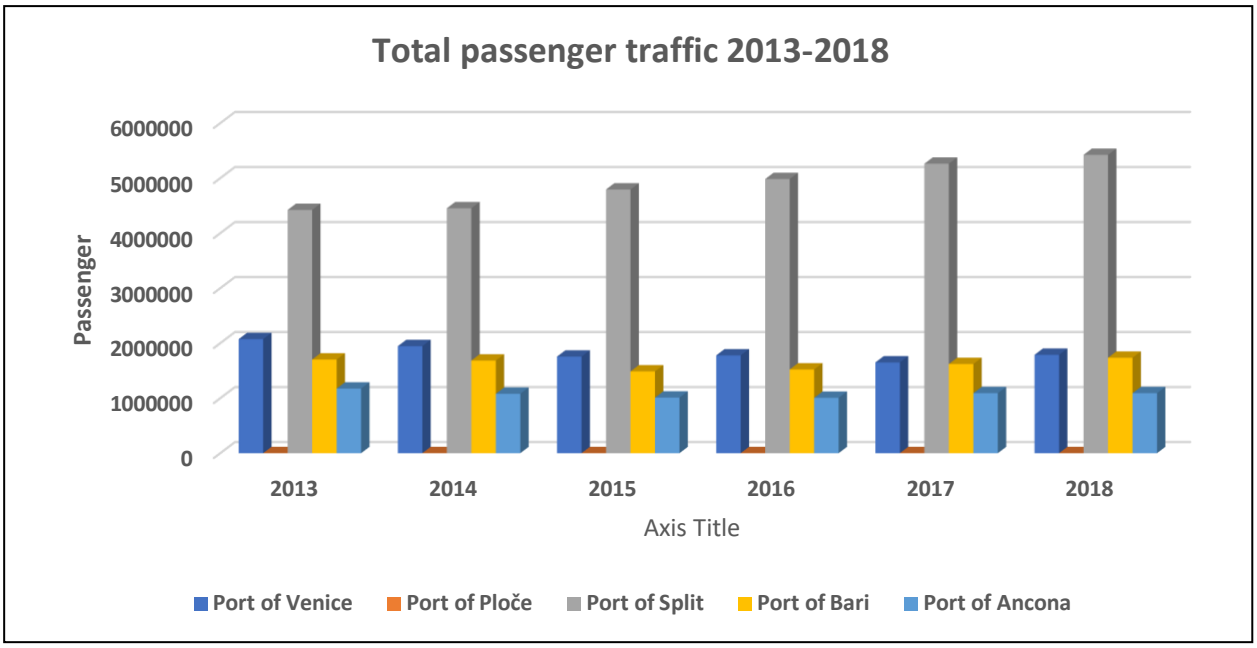

Figure 16 Total passenger traffic 2013-2017

During the years 2013-2017, passenger traffic at the port of Venice decreased from 2.072.642 to 1.649.063 passengers, due to a decline in the cruise sector. Ferry passengers rebounded: decreasing from 138.732 in 2013 to 58.263 in 2016, the reached 104.294 in 2017.

Passenger traffic in the port of split has been steadily increasing over the last 5 years and amounted to 5 million passengers in 2017. Most of the flow refers to local traffic between split and the neighbouring islands: around 93% of the overall passenger traffic. the international traffic of passenger refers to liner trades with Italian port (in 207 there was only one: split-Ancona), and to passengers on cruise ships.

In the projected period, there was a significant (55%) increase of passenger traffic in the port of Ploče. Since port of Ploče is predominately a cargo port, whole passenger traffic comes from a single ferry line that connect Ploče with Peljesac peninsula (ferry line Ploče-Trpanj).

Ferry traffic flows at the port of Ancona are more relevant than cruise traffic. Indeed, the trend of total passenger traffic and ferry traffic is the same: negative from 2013 to 2015, steady in 2016 and positive until 2018.

4.2 Vessel traffic statistics

- **All vessels traffic**

In order to discuss about the vessel traffic statistics, an overview of all vessel traffic can be presented. In the table below are reported the data for the total vessel traffic.

Year	2013	2014	2015	2016	2017	2018	Avg. Growing Factor
Port of Venice	3.554 77.616.022 GT	3.360 71.274.508 GT	3.408 73.393.987 GT	3.505 76.589.575 GT	3.459 75.936.262 GT	3.593 81.782.148 GT	0.3%
Port of Ploče	423	382	379	366	419	_	0.1%
Port of Split	15.107 (2,841 for international lines and tourist vessels)	15.604 (3,177 for international lines and tourist vessels)	16.856 (3,613 for international lines and tourist vessels)	17.271 (2,712 for international lines and tourist vessels)	16.439 (2,868 for international lines and tourist vessels)	18.237 (3.251 for international lines and tourist vessels)	4.0%
Port of Bari	2.060 46.192.281 GT	2.008 44.752.357 GT	2.182 47.601.471 GT	2.219 51.915.643 GT	2.258 52.181.960 GT	2.278 56.563.292 GT	2.1%
Port of Ancona	4.382	4.496	4.482	4.570	4.089	3.977	-1.8%

Table 5 Vessel traffic 2013-2017

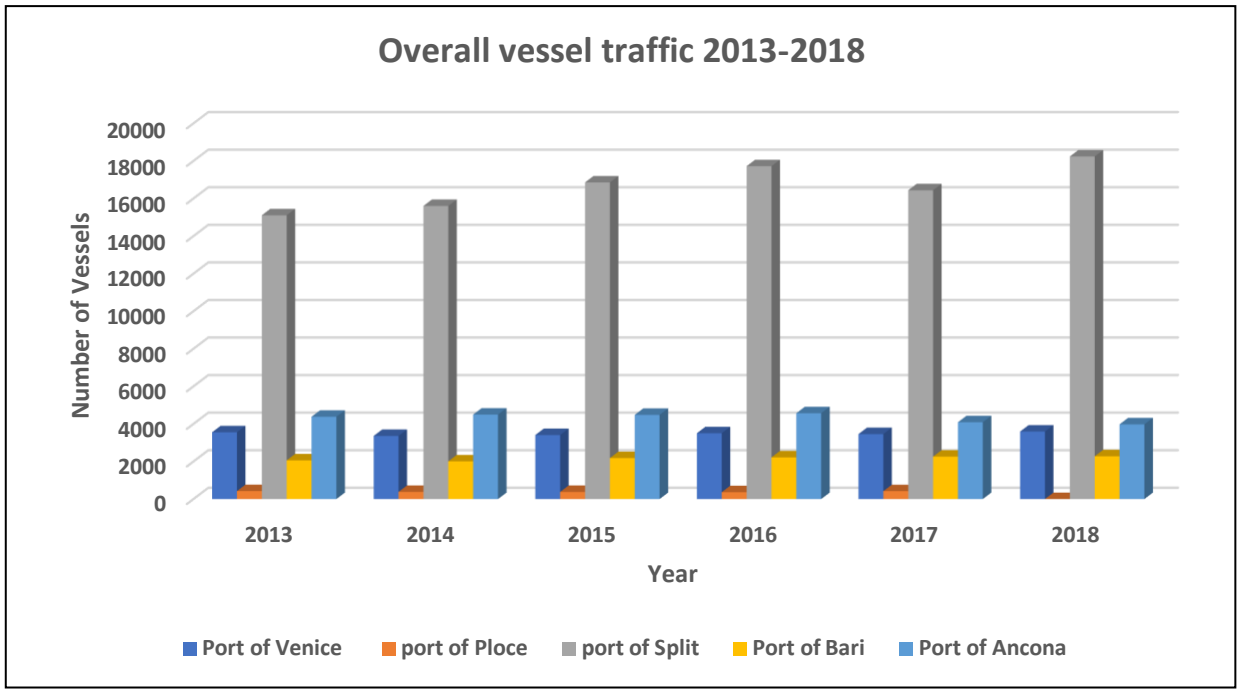

Figure 17 Overall Vessel traffic 2013-2017

Looking at the charts, is possible to notice that in the period 2013-2017 the total vessel traffic in the port of Ancona has the highest value among the other partner ports. The trend of total vessel traffic in the port of Ancona has been negative during period 2013-2017 Their average tonnage was close to 22,000 GT starting from 4.382 vessels in 2013, there was a small increase in 2014 with 4.496 vessels (+2,6%). In 2015 the number of vessels was steady at 4.482 (-0,3%). In 2016 there was a small increase at 4.570 vessels (+2%), then a negative variation until 2018 (4.089 vessels in 2017, -10,5%; 3.977 vessels in 2018, -2,7%).
Vessel traffic in the port of split has been steadily increasing over the last years and amounted 17.271 ships in 2016 after it had a slight decrease in 2017 with total vessel traffic 16.439.
About 3500 ships called at the port of Venice each year. The trend of vessel traffic in the port of Bari was quite stable during the projected period.

4.3 Other related data

Intensity of traffic flows on main maritime routes on approach to port;

- **Port of Venice:** There is no data available
- **Port of Ploče:** There is no data available**.**
- **Port of Split:** The largest volume of sea traffic in the wider area of Split relates to passenger vessels that connect the Port of Split with the neighboring islands and their ports.
- **Port of Bari:** The largest volume of sea traffic relates to passengers is from / to Greece, from/to Albania. Relates cargo, the port is connected from/to Mediterranean Sea and Black Sea.
- **Port of Ancona:** the main routes of the port regard the traffic addressed towards the other Adriatic ports situated in Northern Italy (especially Trieste), the Balkan countries (Slovenia, Croatia, Albania and Montenegro) and towards the south of Adriatic Sea (especially Greece).

Available measures of surveillance and management of vessel traffic, VTMIS (Vessel Traffic Management Information System)

- **Port of Venice:** Venice VTS center is operational 24/7, and referring to it is mandatory for all vessels of 300 GT and above (or of m 45 LOA and longer) entering the VTS area
- **Port of Ploče:** Ploče VTS center is operational 24/7, and referring to it is mandatory for all vessels of 300 GT and above (or of m 45 LOA and longer) entering the VTS area
- **Port of Split:** Croatia's VTMIS is a complex technical and information system designed for monitoring, management and organization of the overall maritime traffic
- **Port of Bari:** The port has a Port Community System called GAIA, managed by the Port Authority, which supports the management of security controls provided by the Port Security Plans as well as port logistics. able to manage all the people accessing to port gates though our PCS, in particular is able to manage in real time the passenger flow embarking on ferries and other services.

- **Port of Ancona:** Vessel Traffic Service (VTS) is a set of services aimed to increase security and efficiency of maritime traffic. In Italy, the responsible for the development and management of VTS is the General Command of Coast Guards.

Average waiting time in port and at anchorage (or duration of stay of ships at berth or anchor), if applicable

- **Port of Venice:** There is no data available.
- **Port of Ploče:** There is no data available**.**
- **Port of Split:** there are no major delays. Passenger and ro-ro traffic run according to schedule.
- **Port of Bari:** There is no data available.
- **Port of Ancona:** vessels don't stop for a long time in the port area. Indeed, in average, each ship stays less than one day in the port of Ancona. This continuous flow helps to avoid high level of port congestion and points out the high level of organization and efficiency of port management activities**.**

5 OVERVIEW AND ANALYSIS OF THE EXISTING FREIGTH TRAFFIC FLOWS BETWEEN ITALIAN-CROATIAN PORTS

In this part of the report, as requested by deliverable 4.1.1 Common methodology for potential traffic flow analysis, there is a review and analysis of the existing maritime links in the Adriatic, with the focus on the Italian-Croatian traffic flows.

The study is limited to the port area and the gravitational area of the port, which has direct impact on traffic flows and potential points of congestion. According to this methodology each involved partner should determine, for the port of their responsibility, the existing traffic flows based on the analysis of general port statistics and trade exchange between individual ports when performing business activities in the segment of ferry and container freight traffic. In case of lack of information provided by the partner, general freight DB collected by public authorities are taken into account. The traffic flows between Italian-Croatian ports with the focus on ferry and container traffic is presented and analysed in detail.

5.1 Data sources

In addition to the data sets provided by the partners ports, this is the list of official data sources collected to reconstruct the past and present traffic flows between Italy and Croatia:

- **COEWEB ISTAT Freight Data Base:** Source National Statistical Institute, Central Office for the Directorate for Prices and Foreign Trade. Direct link to access trade data https://www.coeweb.istat.it/. This information is derived from the Single Administrative Document (SAD) and from Intrastat forms acquired by the Customs Agency as regards Extra-EU and intra-EU flows, respectively. The data collected and received by ISTAT are first processed in compliance with Community regulations applying to statistics on foreign trade, and subsequently revised and validated by reviewers.
- **RAM Freight Data Base:** Source RAM - Logistica Infrastructure e Trasporti S.p.A. Traffic Flow stats for Italian Ports. O-D traffic flows from Italian Ports to foreign countries. http://www.ramspa.it.

5.2 Trend of the Total Freight Traffic Flows between Italia and Croatia

In this section of the report, the traffic data extract from COEWEB ISTAT Data Base are elaborated to study the historical trend of freight traffic flows between Italia and Croatia. The statistics (converted in Tons in this report) are disaggregated by the following characteristics:

- **Direction**
  - Import (Respect to Italy): Goods traveling from Croatia to Italy
  - Export (Respect to Italy): Goods traveling from Italy to Croatia
- **Goods Classifications (NTS 2007)**
  - 01 Products of agriculture, hunting, and forestry; fish and other fishing products
  - 02 Coal and lignite; crude petroleum and natural gas
  - 03 Metal ores and other mining and quarrying products; …
  - 04 Food products, beverages and tobacco
  - 05 Textiles and textile products; leather and leather products
  - 06 Wood and products of wood and cork (except furniture); …
  - 07 Coke and refined petroleum products
  - 08 Chemicals, chemical products, and man-made fibers; …
  - 09 Other non metallic mineral products
  - 10 Basic metals; fabricated metal products, except machinery and equipment
  - 11 Machinery and equipment n.e.c.; office machinery and computers; …
  - 12 Transport equipment
  - 13 Furniture; other manufactured goods n.e.c.
  - 14 Secondary raw materials; municipal wastes and other wastes
  - 15 Mail, parcels
  - 16 Equipment and material utilized in the transport of goods
  - 17 Goods moved in the course of household and office removals; …
  - 18 Grouped goods: a mixture of types of goods which are transported together
  - 19 Unidentifiable goods
  - 20 Other goods n.e.c.
- **Transport Systems**
  - A Other Transport
  - N Not Declared
  - 1 Maritime Transport
  - 2 Rail Transport
  - 3 Road Transport
  - 4 Air Transport

5.2.1 Current GDP trend for Italy and Croatia

The gross domestic product (GDP) measures of national income and output for a given country's economy. The gross domestic product (GDP) is equal to the total expenditures for all final goods and services produced within the country in a stipulated period. The following table and chart provide growth rate for Italy GDP and Croatia GDP compared to the year of 1999 actual values. The data used has been taken from IMF: World Economic Outlook (WEO) Database.

Year	Annual GDP (Croatia)	Growth with respect to (1999)	Annual GDP (ITALY)	Growth with respect to (1999)
2018	60,806M.$	160%	2,073,902M.$	66%
2017	55,201M.$	136%	1,946,890M.$	56%
2016	51,623M.$	121%	1,869,970M.$	50%
2015	49,519M.$	112%	1,833,200M.$	47%
2014	57,683M.$	147%	2,155,150M.$	72%
2013	58,158M.$	149%	2,131,160M.$	70%
2012	56,549M.$	142%	2,073,970M.$	66%
2011	62,399M.$	167%	2,278,380M.$	82%
2010	59,866M.$	156%	2,129,020M.$	70%
2009	62,712M.$	168%	2,190,700M.$	75%
2008	70,465M.$	201%	2,402,060M.$	92%
2007	60,110M.$	157%	2,206,110M.$	76%
2006	50,387M.$	116%	1,944,260M.$	56%
2005	45,347M.$	94%	1,855,660M.$	48%
2004	41,523M.$	78%	1,800,200M.$	44%
2003	34,668M.$	48%	1,572,350M.$	26%
2002	26,868M.$	15%	1,270,430M.$	2%
2001	23,290M.$	0%	1,163,110M.$	-7%
2000	21,774M.$	-7%	1,144,880M.$	-8%
1999	23,374M.$	0%	1,250,170M.$	0%

Table 6 Annual GDP Italy and Croatia

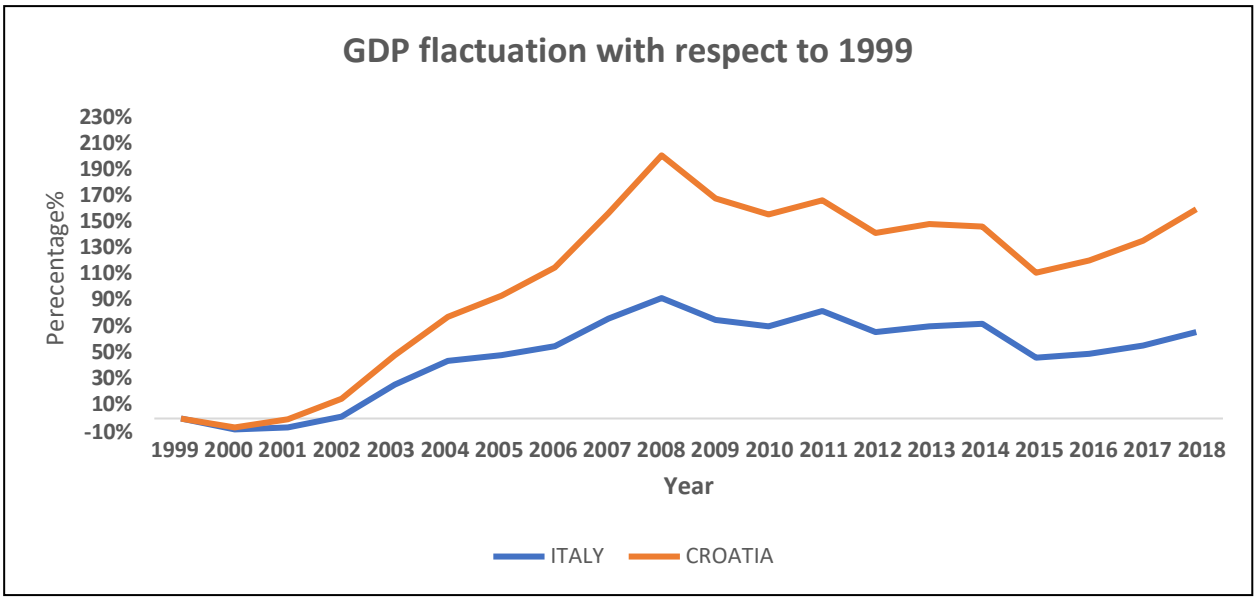

Figure 18 GDP fluctuation for Italy and Croatia with respect to year 1999

The economy of Italy is the 3rd-largest national economy in the eurozone, the 8th-largest by nominal GDP in the world, and the 12th-largest by GDP (PPP). Italy has a major advanced economy. Italy is the eighth largest exporter in the world with 514$ billion exported in 2016. Its closest trade ties are with the other countries of the European Union, with whom it conducts about 59% of its total trade. The largest trading partners, in order of market share, are Germany (12.6%), France (11.1%), the United States (6.8%), Switzerland (5.7%), the United Kingdom (4.7%), and Spain (4.4%).

The economy of Croatia is a developed high-income service-based economy with the tertiary sector accounting for 60% of total gross domestic product (GDP). After the collapse of socialism, Croatia went through a process of transition to market-based economy in the 1990s, but its economy suffered badly during the Croatian war of independence. After the war the economy began to improve, before the finical crisis of 2007_08 the Croatian economy grew at 4-5% annually, incomes doubled, and economic and social opportunities dramatically improved.

5.2.2 Trend of the total freight flows between Italia and Croatia

In the following chart is reported the trend of the total freight traffic flows for all transport systems between Italy and Croatia in the period of 1999 and till 2018.

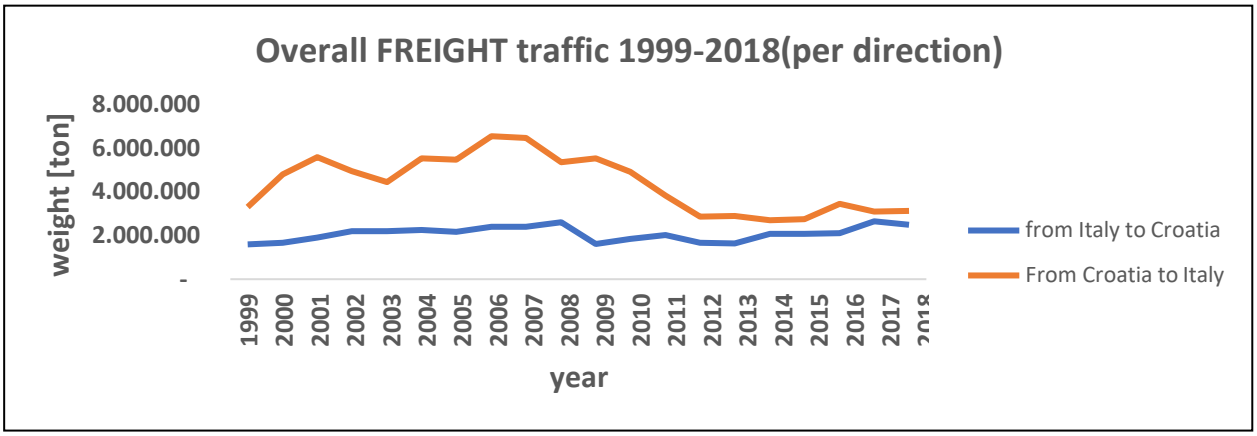

Figure 19 Total freight traffic flow between Italy and Croatia per direction

Looking at the charts, is possible to notice that the import is always higher than the export during the past 20 years. In the year of 2006 the overall import reached its peak and then it started to decrease until the year of 2012. The trend was almost stable from the year of 2012 and till the year of 2015 and then it had a slight increase. Over the past 20 years the export was fluctuating between 1.5 million and 2.5 million tons Figure 19.

The graph shows the overall freight traffic between Italy and Croatia over a 20-years period from 1999 to 2018. The Figure 20 is given as the sum of both directions.

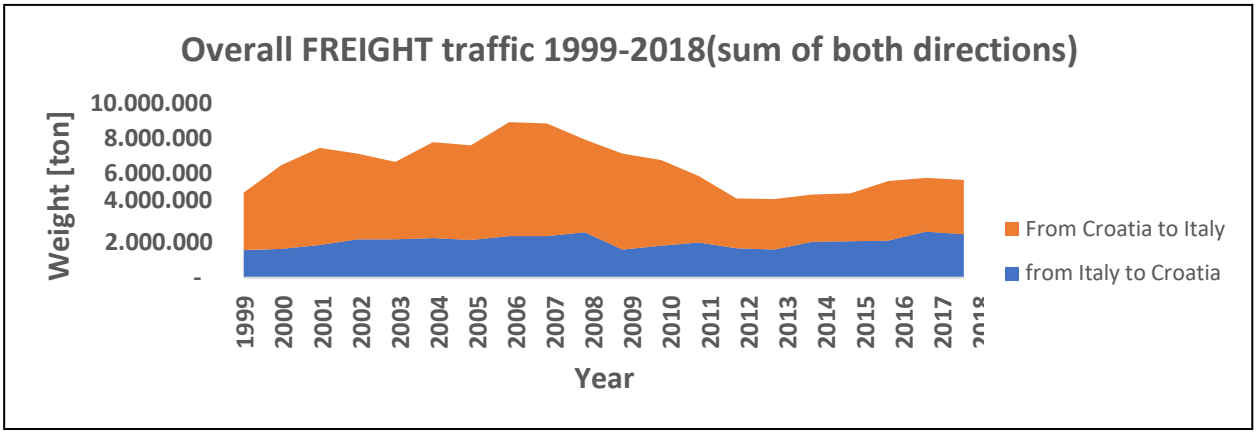

Figure 20 Total freight traffic flow between Italy and Croatia (sum of both directions)

Looking at the chart we can notice that the sum Freight traffic between Italy and Croatia has increased from 4 million ton in 1999 to 9 million ton in 2006. The trend of total Freight traffic has been negative during period 2007-2013 Their average tonnage was close to 4 million ton starting from 9 million ton in 2006 and to 4 million in 2013. There was a small increase in 2016 there was a small increase (+2%).

The graph shows the trend of GDP for Italy and Croatia and the trend of total freight traffic flow between Italy and Croatia in the period between 1999_2018.

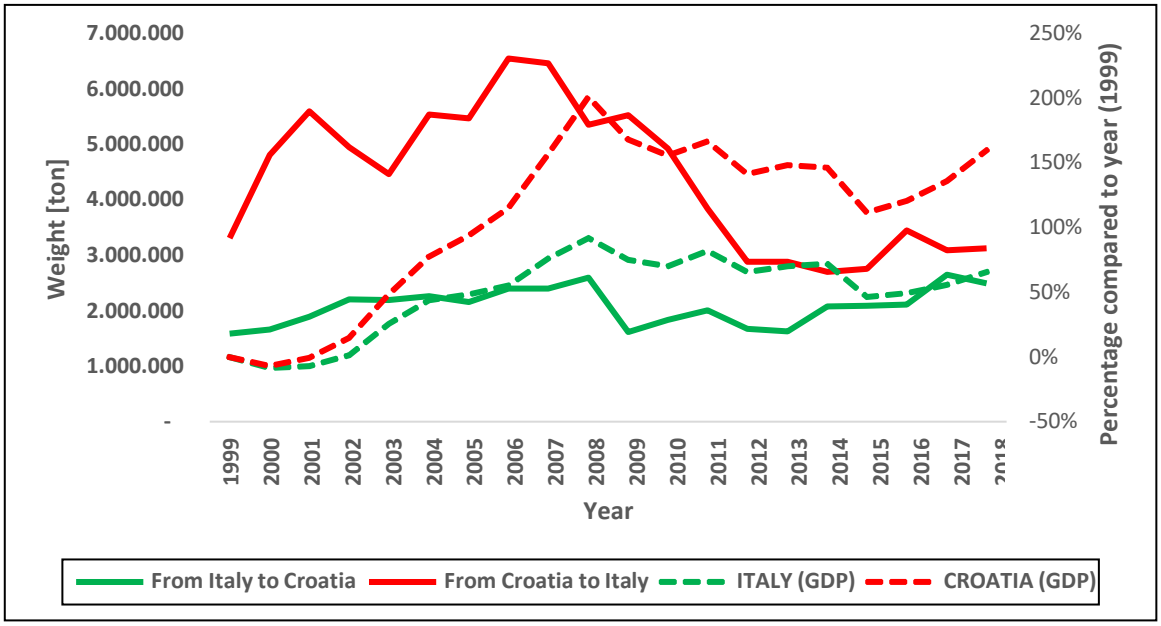

Figure 21Trend of GDP for Italy and Croatia & trend of total freight traffic between Italy and Croatia

The important role of exports and imports in the economy cannot be overemphasized. Exports and imports play an integral role in determining the trade balance of a country. It is known that exports are an engine of economic and social development because of their ability to influence economic growth and poverty reduction.

Looking at the chart we can notice that the GDP of Croatia has been increased with the increase of exports from Croatia to Italy and then a decrease began after crisis in 2008. On the Hand the GDP of Italy was almost stable along the study period in parallel with Italian exports to Croatia.

5.2.3 Trend of the freight flows classified per goods between Italia and Croatia

In the following chart is reported the trend of freight traffic flows classified per goods type from Croatia to Italy in the period of 1999 and till 2018. Goods has been classified into two categories the first one is Dry/liquid bulk correspond to goods classification (NTS 2007) 2,3,7 the second category contains the other goods.

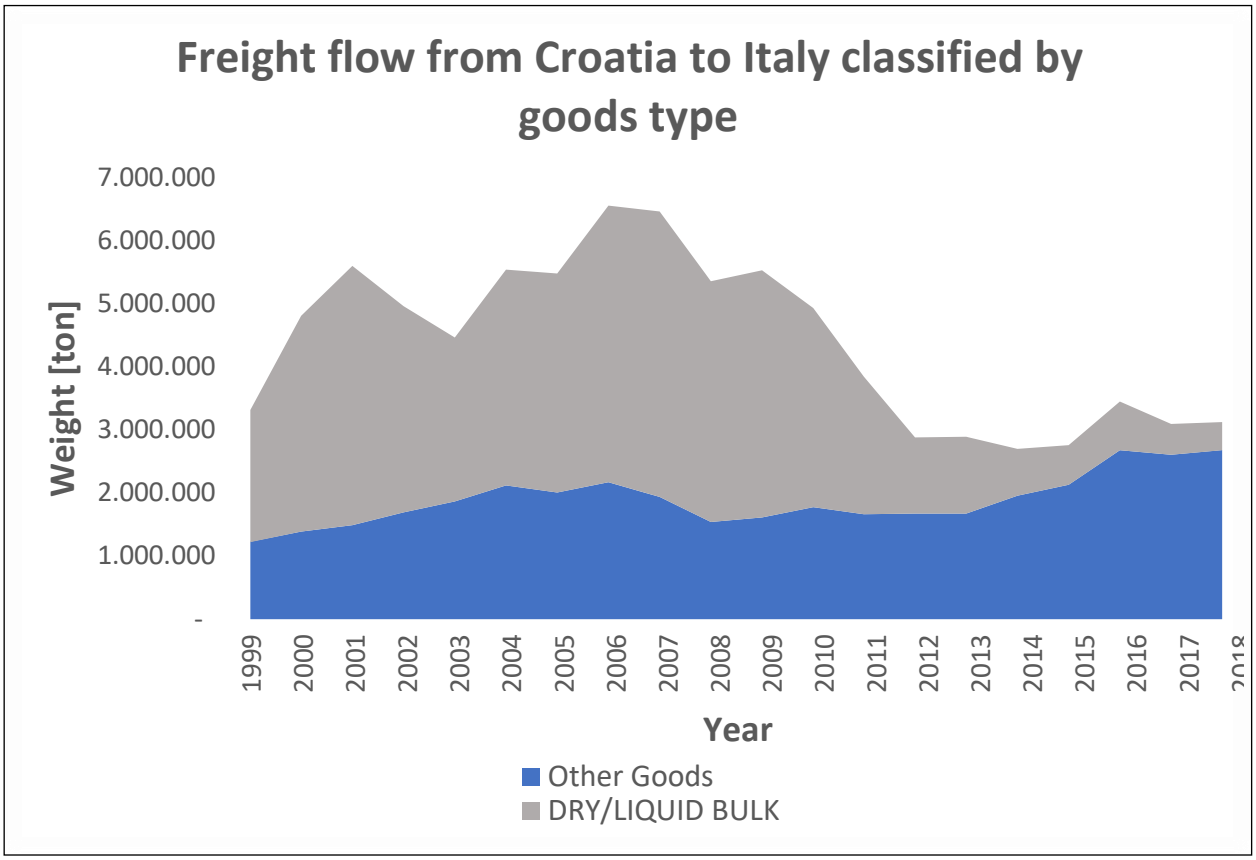

Figure 22 Freight traffic flow from Croatia to Italy classified by Cargo type

Looking at the charts, is possible to notice that in the year of 2006 the sum of goods travelling from Croatia to Italy reached its peak and then it started to decrease until the year of 2012. The trend was almost stable from the year of 2012 and till the year of 2015 and then it had a slight increase Figure 22.

In the following chart is reported the trend of freight traffic flows classified per goods from Italy to Croatia in the period of 1999 and till 2018 for Dry/Liquid Bulk and Other Goods.

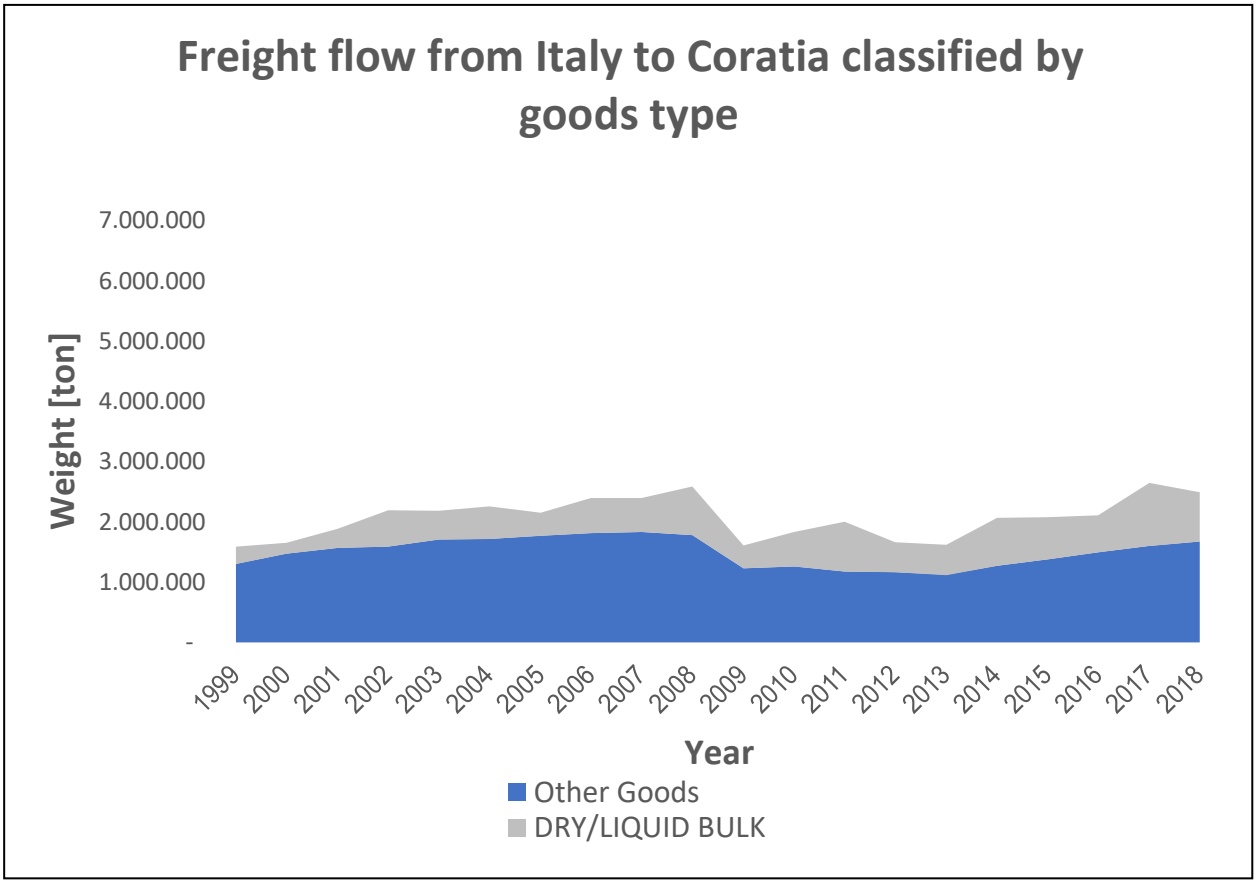

Figure 23 Freight traffic flow from Italy to Croatia classified by Cargo type

Looking at the charts, is possible to notice that the trend of the total goods travelling from Italy to Croatia was almost stable in the period of 2002-2008 especially for general cargo. however, for dry/liquid bulk the trend is fluctuating a lot during the past 20 years and reached its peak in the year of 2017 Figure 23.

By looking to the previous two charts we can notice that the volume of DRY/LIQUID Bulk exports from Croatia to Italy is higher than the exports from Italy to Croatia. Also, we can see

that the total Other Goods exports from Italy to Croatia used to lower than the exports of the same goods type from Croatia to Italy.

5.2.4 Trend of the freight flows classified per transport system between Italia and Croatia

In the following charts is reported the trend of freight flows classified per transport system between Italy and Croatia in the period of 1999-2018.

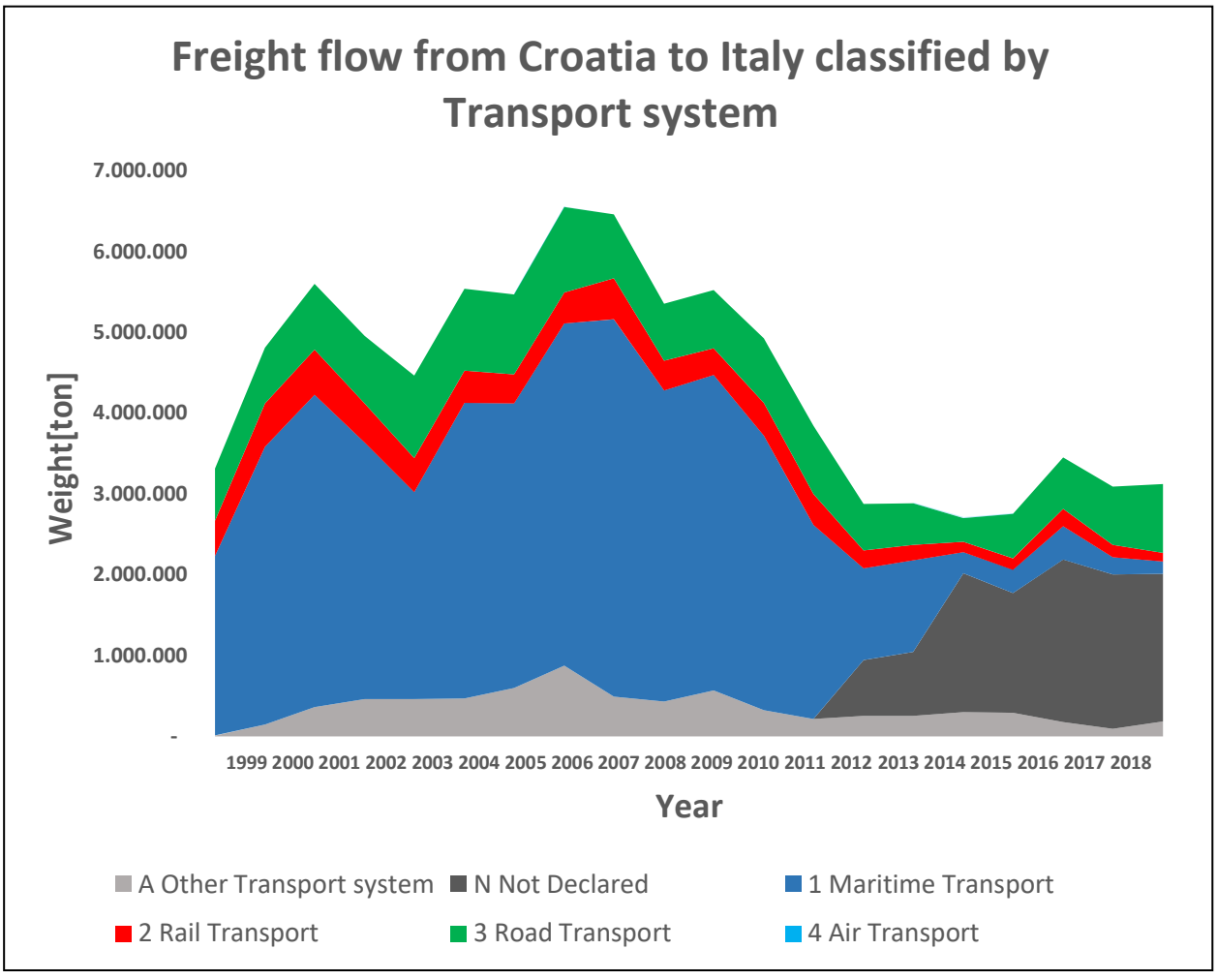

Figure 24 Freight traffic flow from Croatia to Italy classified by transport system

Looking at the charts, is possible to notice that Maritime transport is the most used transport system to move goods between Italy and Croatia in the period of 1999-2013 and after the year of 2013 a dramatic fall happened in the usage of Maritime transport and the big share was for non-declared transport systems Figure 24.

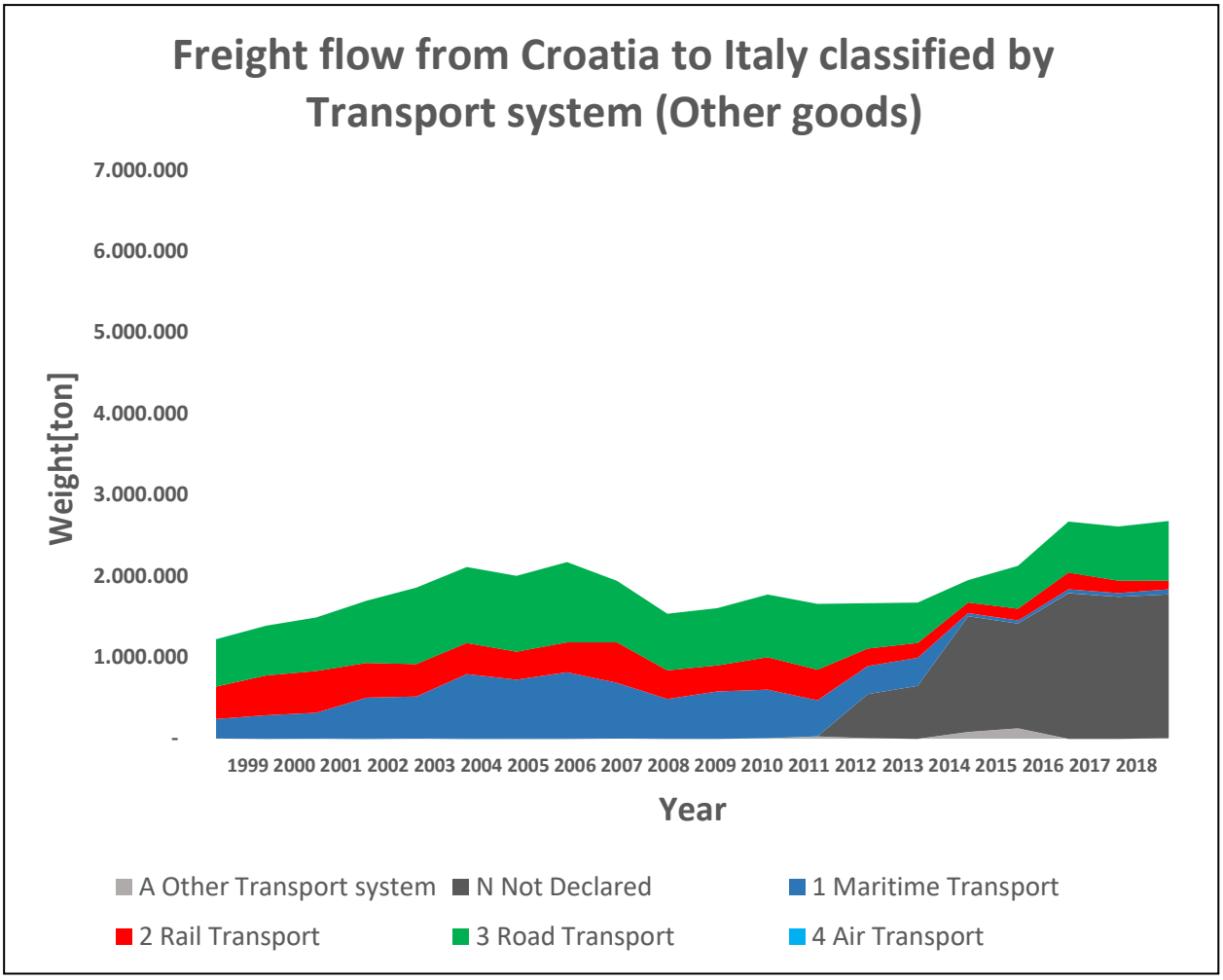

Figure 25 Freight traffic flow from Croatia to Italy classified by transport system (Other goods)

Looking at the charts, is possible to notice that Maritime transport was the most used transport system to move goods between Italy and Croatia in the period of 1999-2013 and after the year of 2013 its difficult to know exactly what happened because of the big share of Not Declared

transport systems. The total weight of freight has been increased from 1.25 million ton to 2.75 million ton during the past 20 years Figure 25.

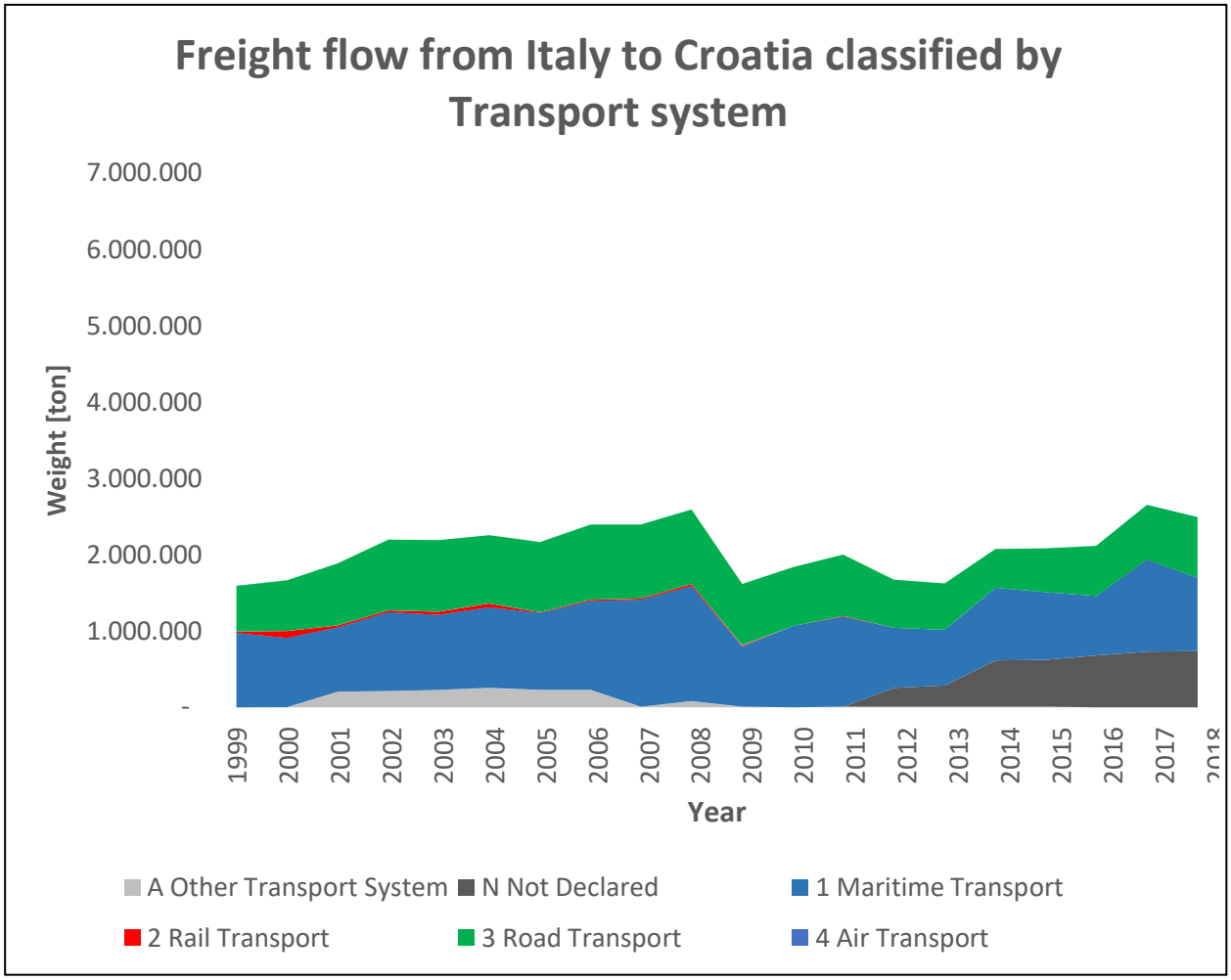

Figure 26 Freight traffic flow from Italy to Croatia classified by transport system

Looking at the charts, is possible to notice that Maritime transport is the most used transport system to move goods from Italy to Croatia in the past 20 years. The usage of Rail transport has been decreased a lot during this period. We can also notice that Road transport is the competitor for maritime transport Figure 26.

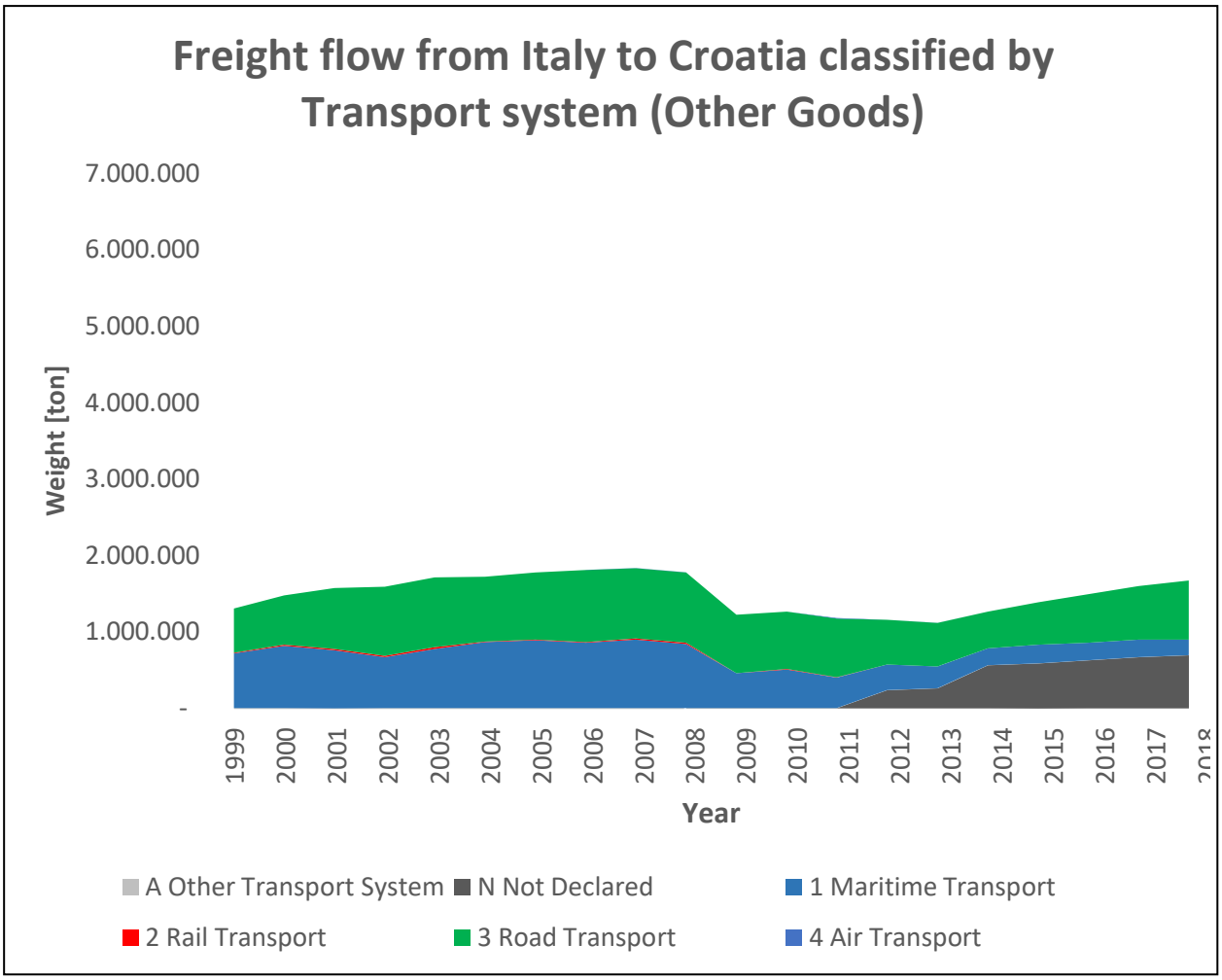

Figure 27 Freight traffic flow from Italy to Croatia classified by transport system Other Goods)

Looking at the charts, is possible to notice that usage of Maritime transport to move general cargo from Italy to Croatia has been decreased in the past 10 years. However, the trend of using Road transport to move general cargo was almost stable during the past 20 years Figure 27.

5.2.5 Trend of the total freight flows between Italian Macro Regions and Croatia

In the following chart is reported the trend of freight traffic flows from Croatia to Italian macro regions in the period of 2014-2018. The study has covered five Macro Regions in Italy.

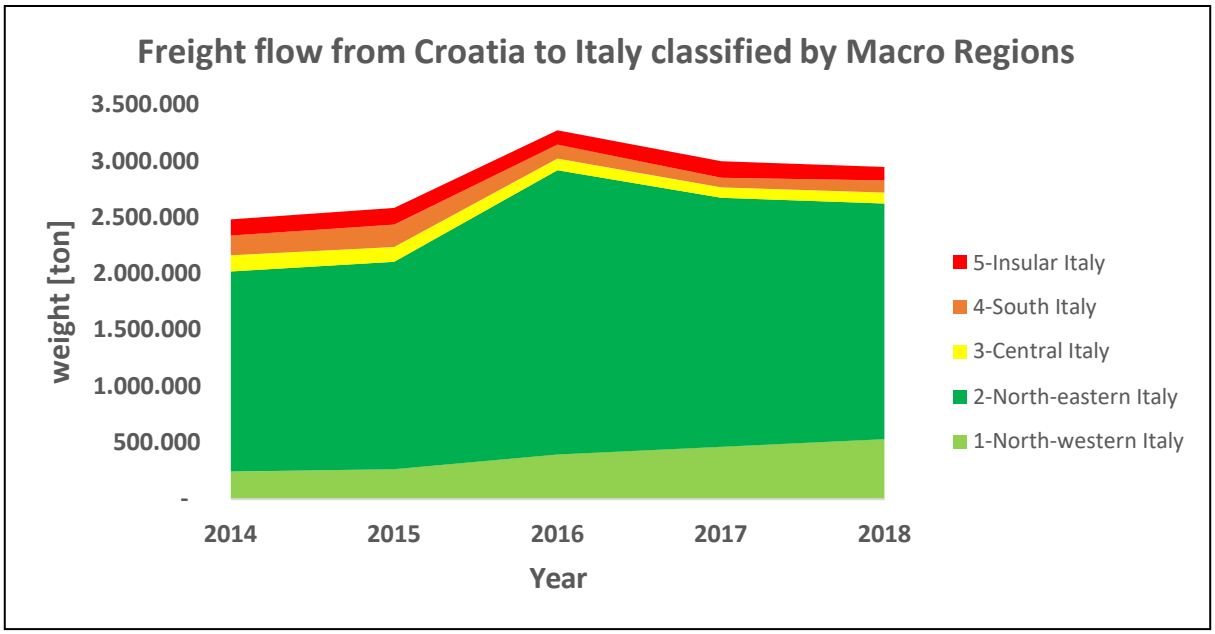

Figure 28 Freight traffic flow from Croatia to Italian Regions

Looking at the charts, is possible to notice that most of the goods coming from Croatia to Italy are concentrated in the north-east region, while the rest is distributed to the other regions Figure 28.

In the following chart is reported the trend of freight flows from Italian macro regions to Croatia in the period of 2014-2018 for the Italian Macro Regions.

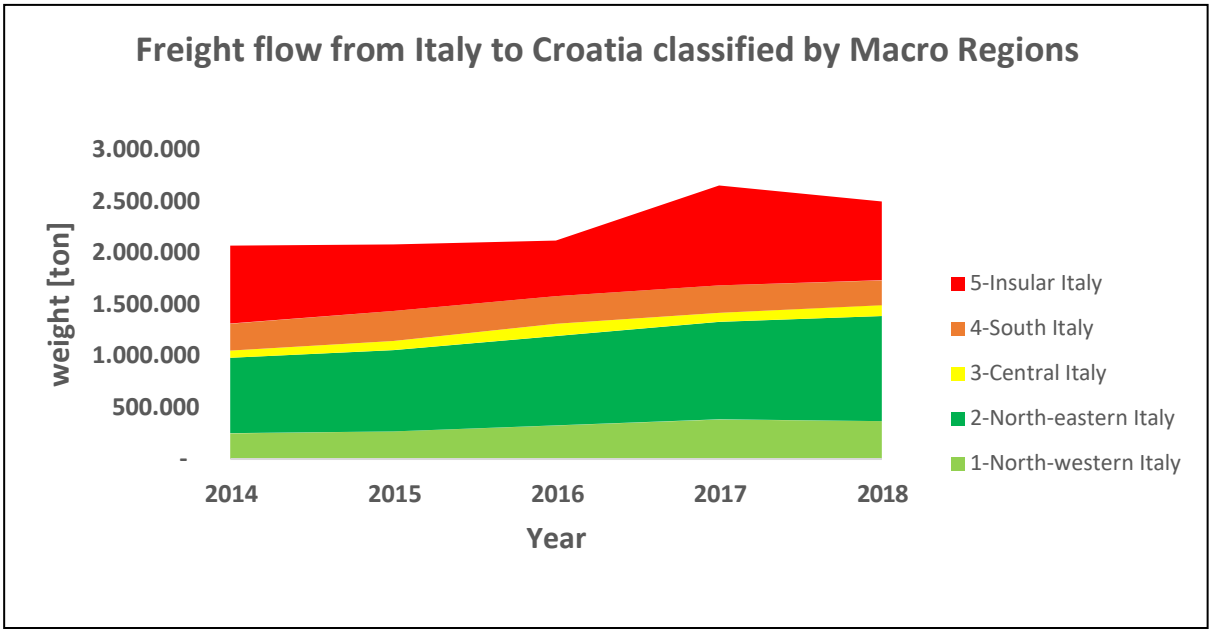

Figure 29 Freight traffic flow from Italian Regions to Croatia

Looking at the charts, is possible to notice that the two largest export regions from Italy to Croatia are North-east Italy and Insular Italy. We can also notice that the export from North-East region reached its peak in the year of 2018 with total weight of 2.75-million-ton Figure 29. while for the south, north-eastern and north-western regions maintain steady rate Figure 29.

5.2.6 Trend of the freight flows classified per goods between Italian Macro Regions and Croatia

In the following charts is reported the trend of Bulk goods from Croatia to Italian macro regions in the period of 2014-2018.

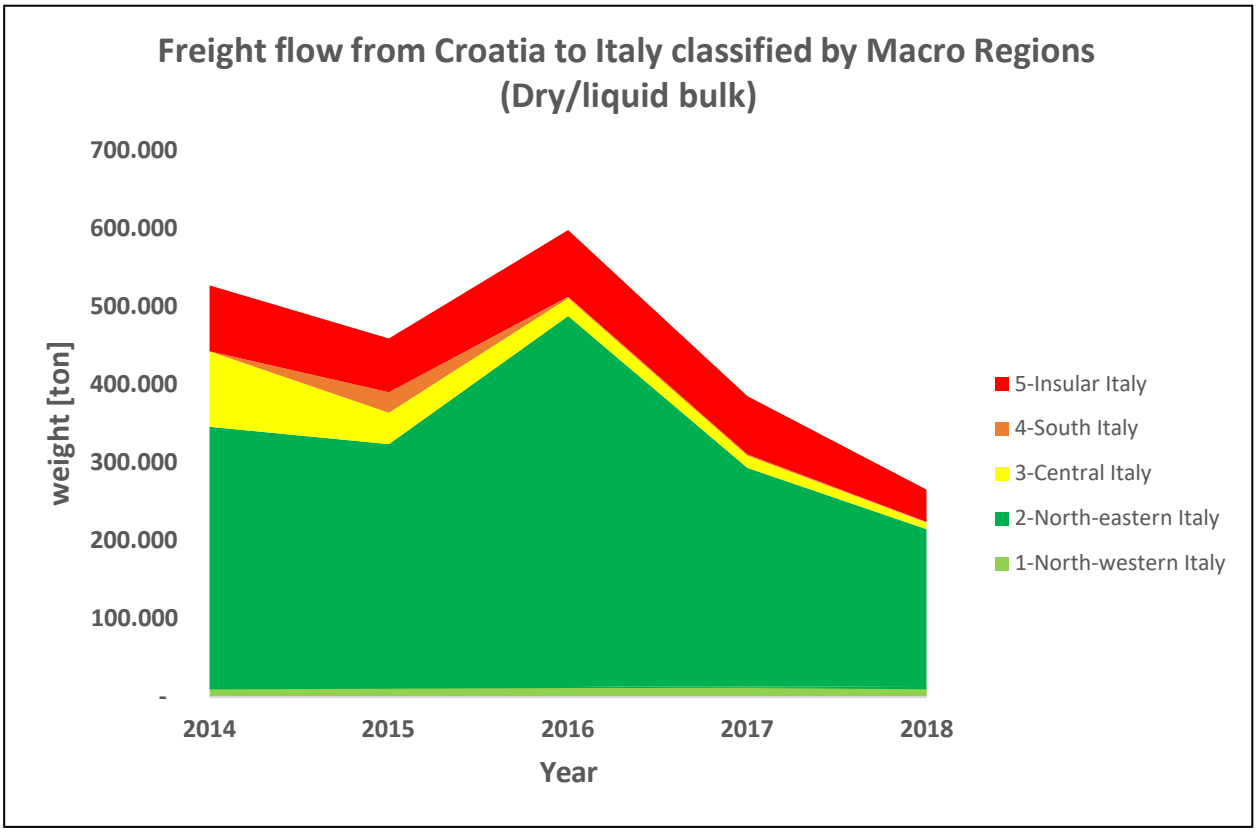

Figure 30 Freight traffic flow from Croatia to Italian Regions (dry/liquid bulk)

Looking at the charts, is possible to notice that most of the Bulk Cargo coming from Croatia to Italy are concentrated in the north-east region, while the rest is distributed to the other regions. We can also notice that the trend for the North-East region has been decreased during the past two years Figure 30.

In the following charts is reported the trend of Bulk goods from Italian macro regions to Croatia in the period of 2014-2018.

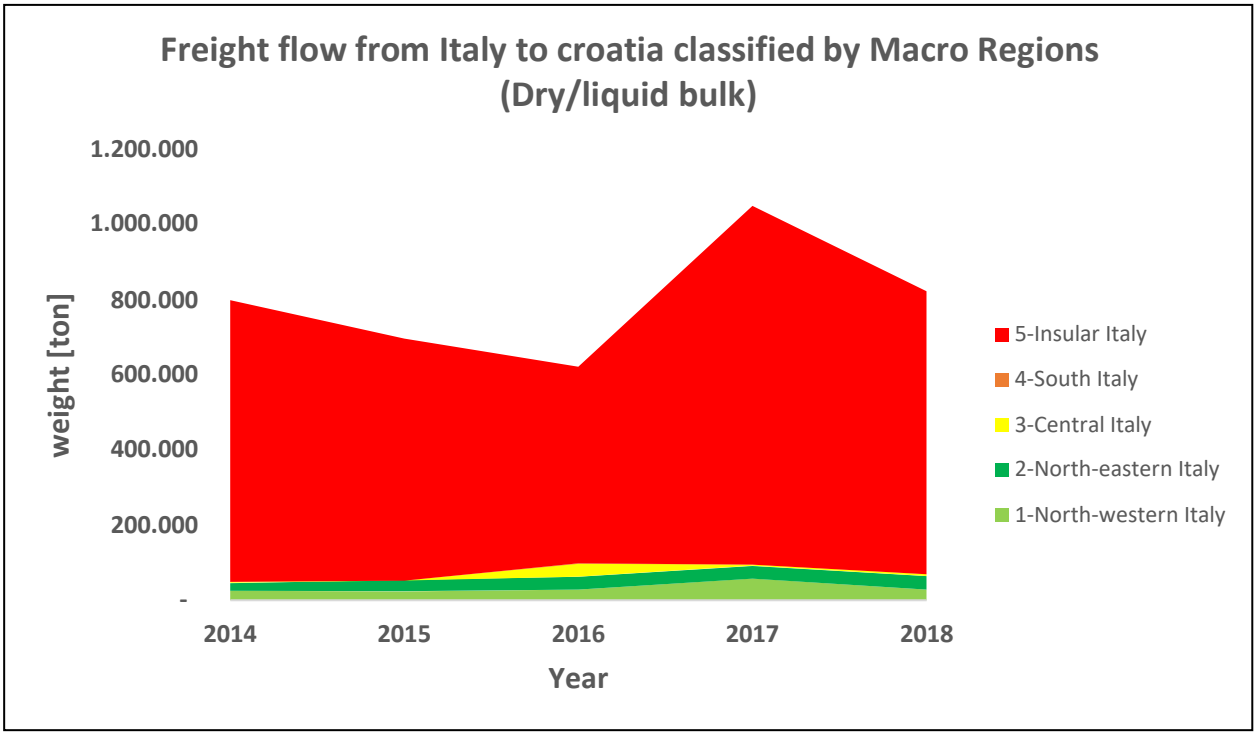

Figure 31 Freight traffic flow from Italian Regions to Croatia (dry/liquid Bulk)

Looking at the charts, is possible to notice that the largest export region for Bulk goods from Italy to Croatia is Insular Italy and reached its peak in 2017 Figure 31.

In the following charts is reported the trend of Other goods from Croatia to Italian macro regions in the period of 2014-2018.

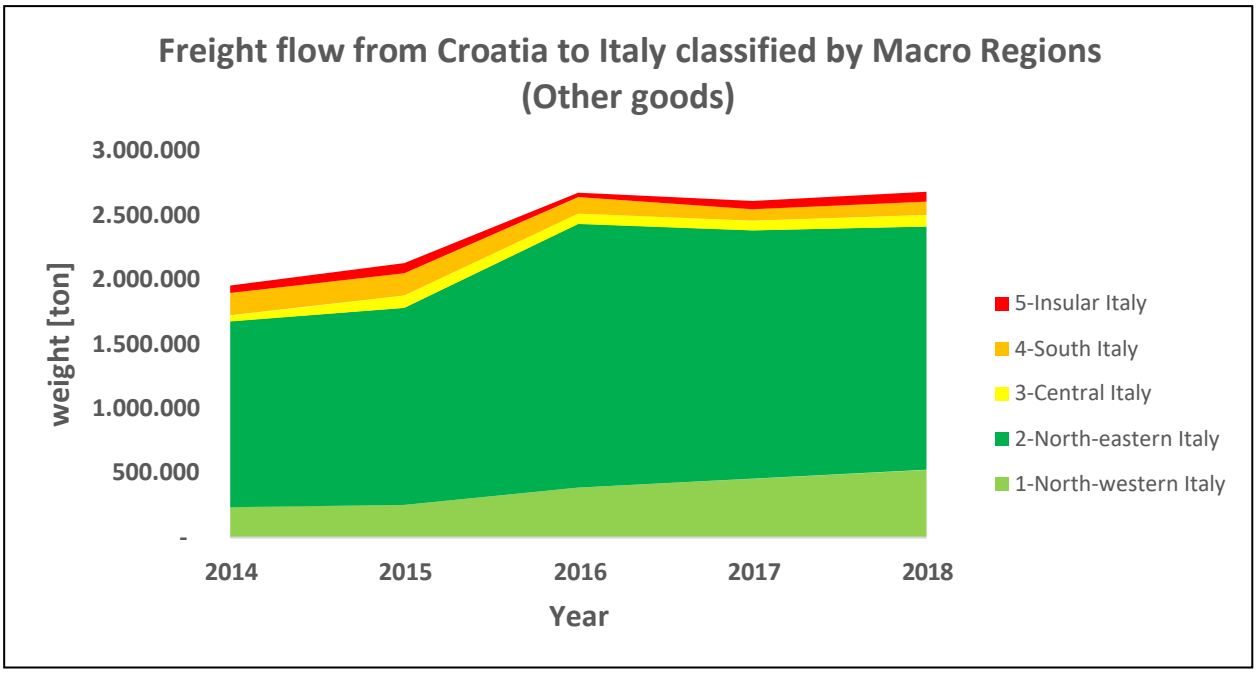

Figure 32 Freight traffic flow from Croatia to Italian Regions (Other Goods)

Understanding the charts, is possible to notice that most of the Other goods coming from Croatia to Italy are concentrated in the north-east region, while the rest is distributed to the other regions. We can also notice that the trend for the North-East region has been increased during the past two years Figure 32.

In the following charts is reported the trend of General goods from Italian macro regions to Croatia in the period of 2014_2018.

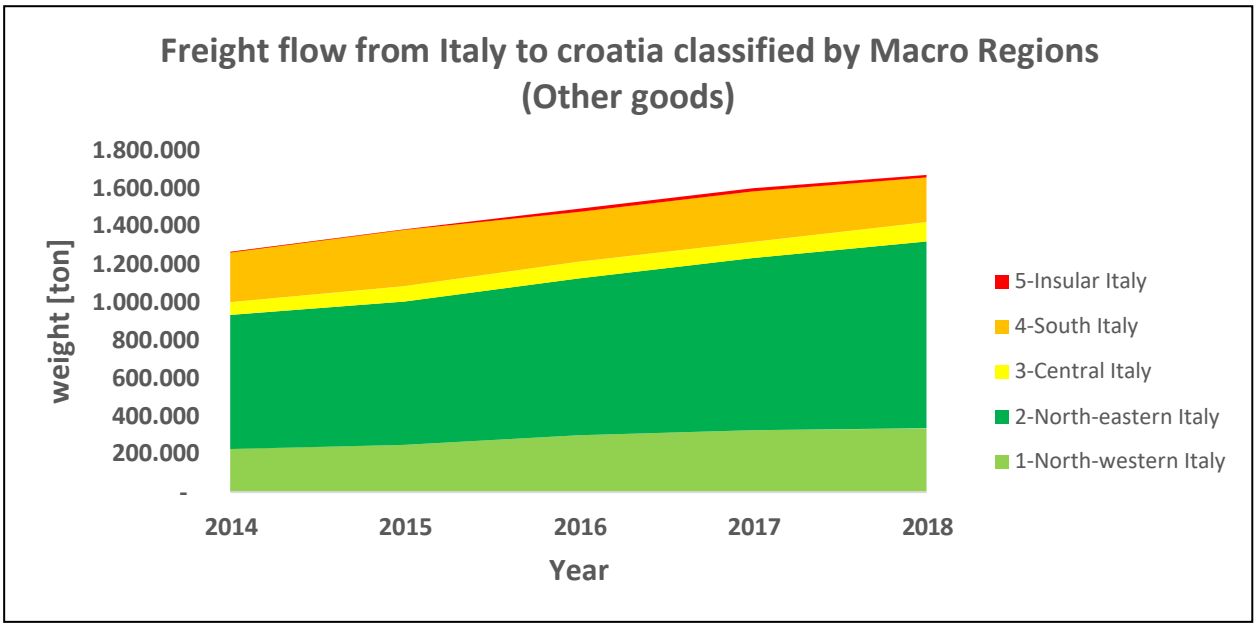

Figure 33 Freight traffic flow from Italian Regions to Croatia (Other Goods)

Looking at the charts, is possible to notice that Other goods moving from Italian ports to Croatia has been increased during the period from 2014 to 2018. Also, we can see that the big share of exports Is from North-Eastern and insular regions Figure 33.

5.2.7 Trend of the Total Freight Traffic Flows between Italia and Serbia/Bosnia-Herzegovina/Montenegro/Kosovo

In the following charts is reported the trend of freight traffic flow (General Cargo) from Croatia to neighbouring countries to Italy in the period of 2005 to 2018.

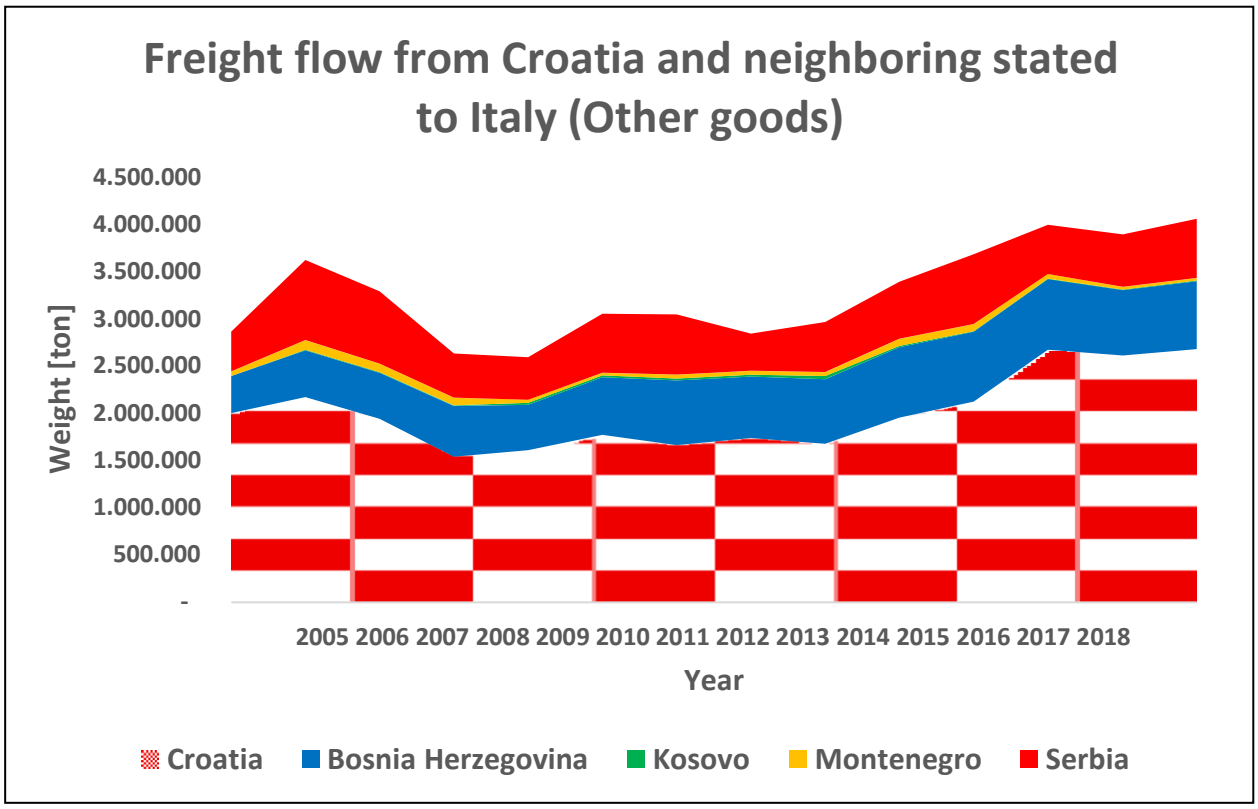

Figure 34 Freight traffic flow from Croatia and neighbouring countries to Italy (Other goods)

Looking at the charts, is possible to notice that freight traffic flow between Croatia and Italy was fluctuating between 2008 and 2013 then the flow started to increase gradually till 2018.
We can see that Croatia has the biggest share of export to Italy while Serbia and Bosnia Herzegovina have almost the same traffic volume Figure 34.

In the following chart is reported the trend of freight traffic flow Other Goods from Italy to Croatia and neighbouring states in the period of 2005-2018.

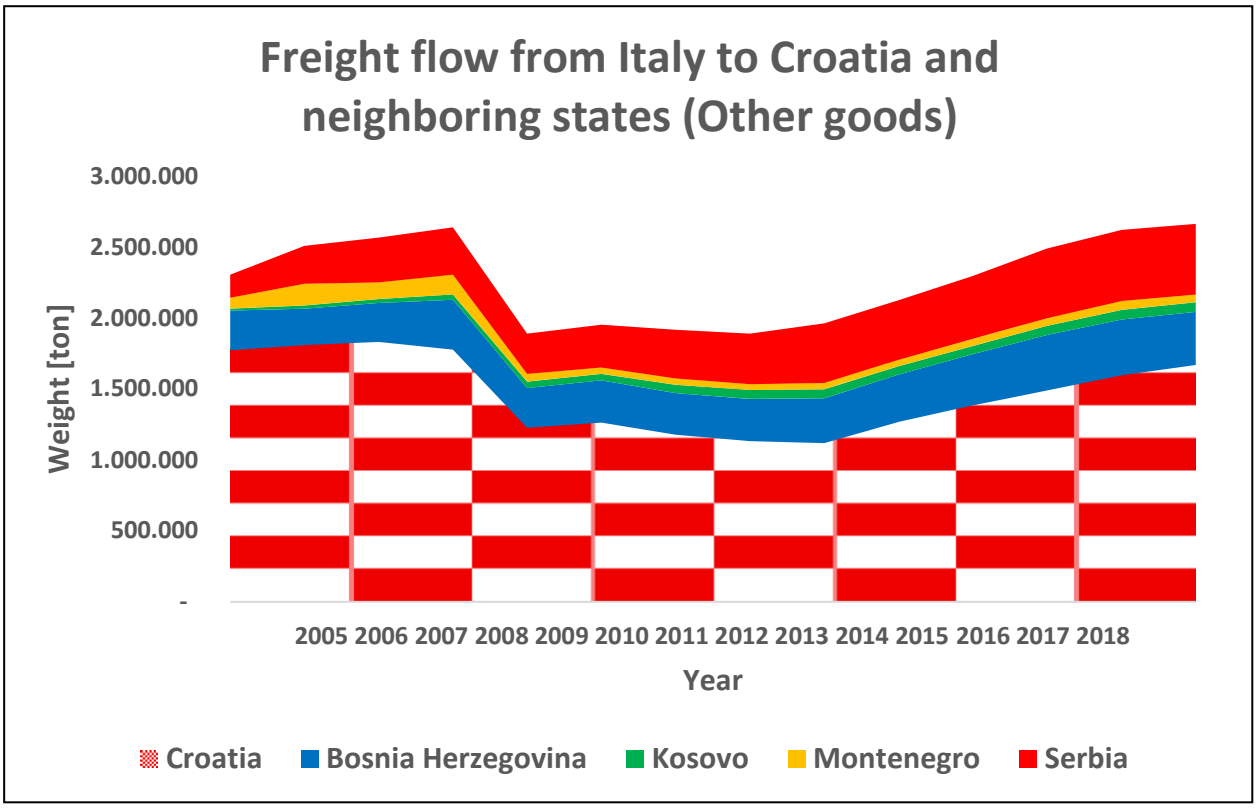

Figure 35 Freight traffic flow from Croatia and neighbouring countries to Italy (Other goods)

Looking at the chart, is possible to notice that Italy's exports fluctuated a lot during the study period. Also, we can see that Italy's largest exports go to Croatia and its very high with comparison to Italy's exports to the neighbouring countries. Italy's exports to Croatia reached its peak in the year of 2017 Figure 35.

5.3 Current Freight Traffic Flows between Italian and Croatian Ports

In this section of the report, the traffic data extract from RAM data base are elaborated in order to study current freight traffic flows between Italia and Croatia.

5.3.1 Freight traffic flow between Ancona port and Croatian ports

In the following chart is reported the maritime traffic flow between port of Ancona and Croatian ports classified by Cargo type. Cargo has been classified into Liquid Bulk, Solid Bulk, Containerized traffic, RO-RO traffic and Other General cargo.

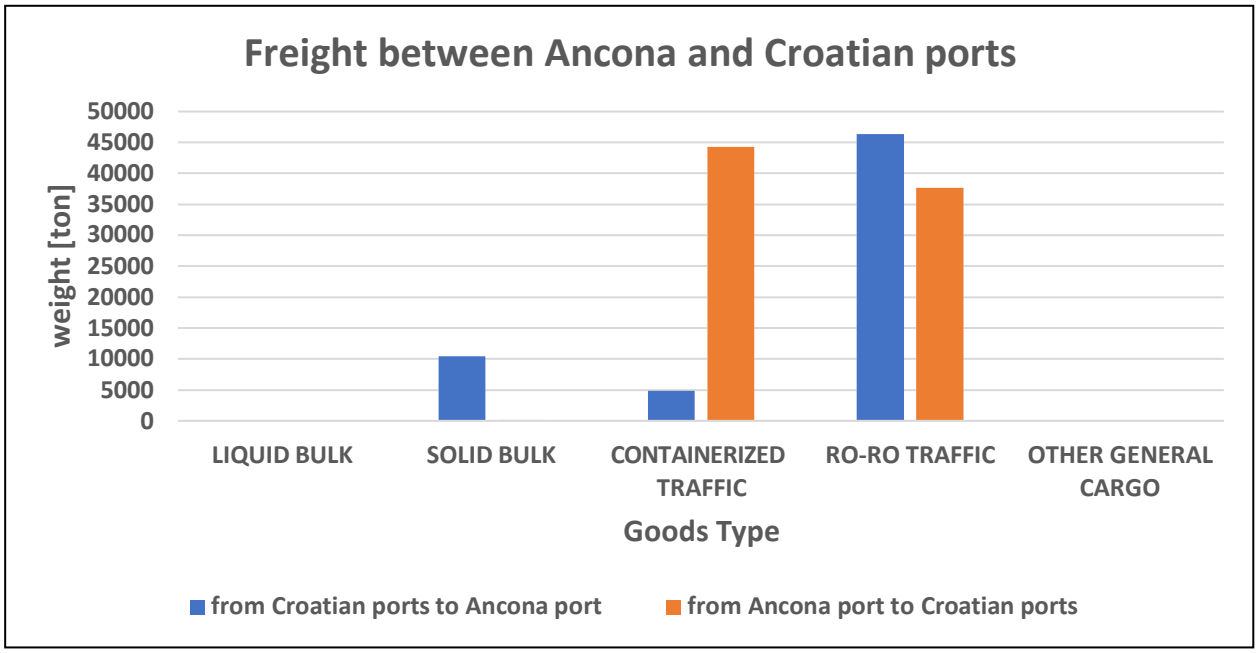

Figure 36 Freight traffic flow between Ancona port and Croatian ports

Looking at the chart, is possible to notice that there is a very high RO-RO Traffic between Ancona and Croatian ports with comparison to the other Cargo type. We also can notice that there is a large number of Containerized Traffic moving from Ancona port to Croatian ports.

On the other side there is no liquid or other general cargo moving between Ancona port and Croatian ports Figure 36.

5.3.2 Freight traffic flow between Bari port and Croatian ports

In the following chart is reported the maritime traffic flow between port of Bari and Croatian ports classified by Cargo type. Goods have been classified into Liquid Bulk, Solid Bulk, Containerized traffic, RO-RO traffic and Other Goods.

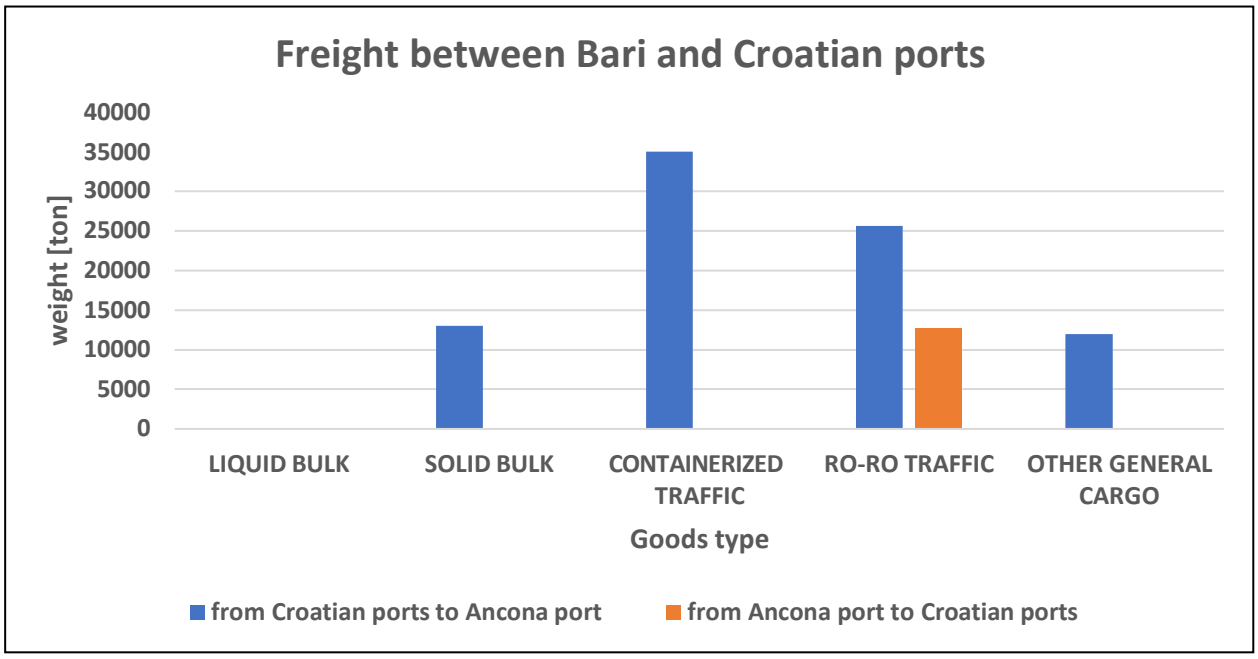

Figure 37 Freight traffic flow between Bari port and Croatian ports

Looking at the charts, is possible to notice that there is a very high Containerized Traffic coming from Croatian ports to port of Bari. There is no traffic flow from Bari Port to the other ports except for RO-RO traffic. We also can notice that there are many RO-RO Traffic between Bari port and Croatian ports Figure 37.

5.3.3 Freight traffic flow between Venice port and Croatian ports

In the following chart is reported the maritime traffic flow between port of Venice and Croatian ports classified by Cargo type. Cargo has been classified into Liquid Bulk, Solid Bulk, Containerized traffic, RO-RO traffic and Other General cargo.

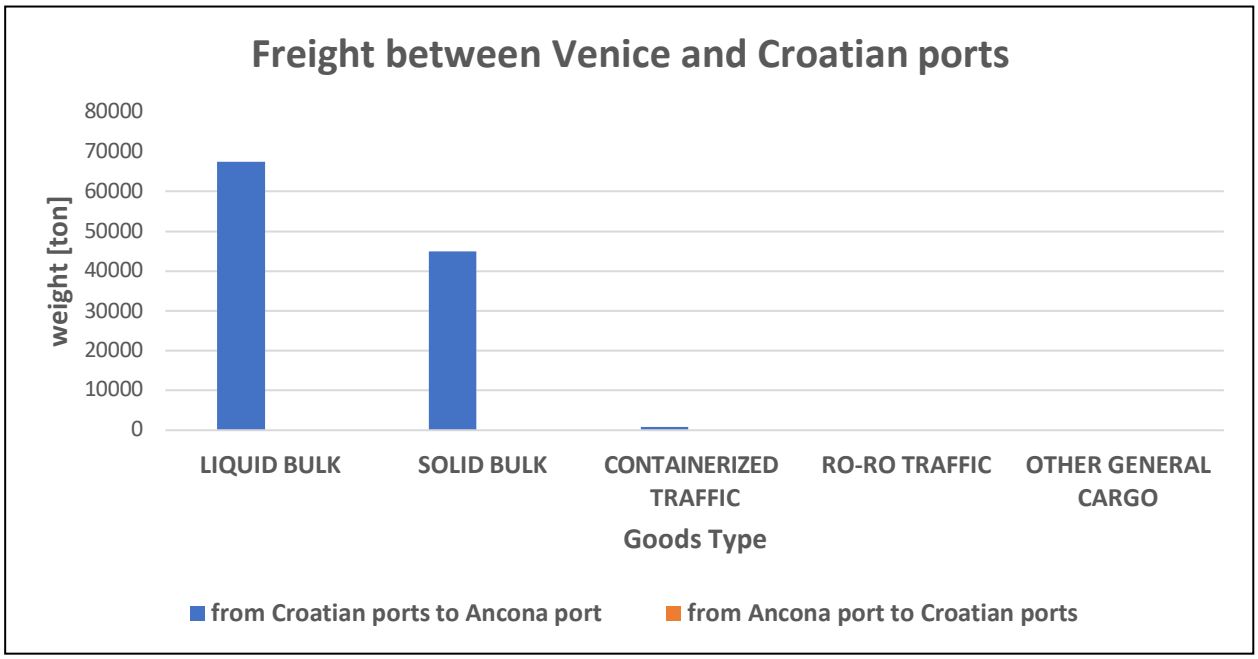

Figure 38 Freight traffic flow between Venice port and Croatian ports

Looking at the charts, is possible to notice that there is a very high Liquid/Sold Bulk coming from Croatian ports to port of Venice. We also can see that there is no Maritime traffic flow from Venice port to Croatian ports Figure 38.

5.3.4 Comparison of Maritime traffic share between Italian ports

In the Following charts we will introduce a comparison of maritime traffic flow between Italian ports to Croatian Ports and the opposite direction from Croatian ports to Italian in order to have a better idea about traffic share between different ports.

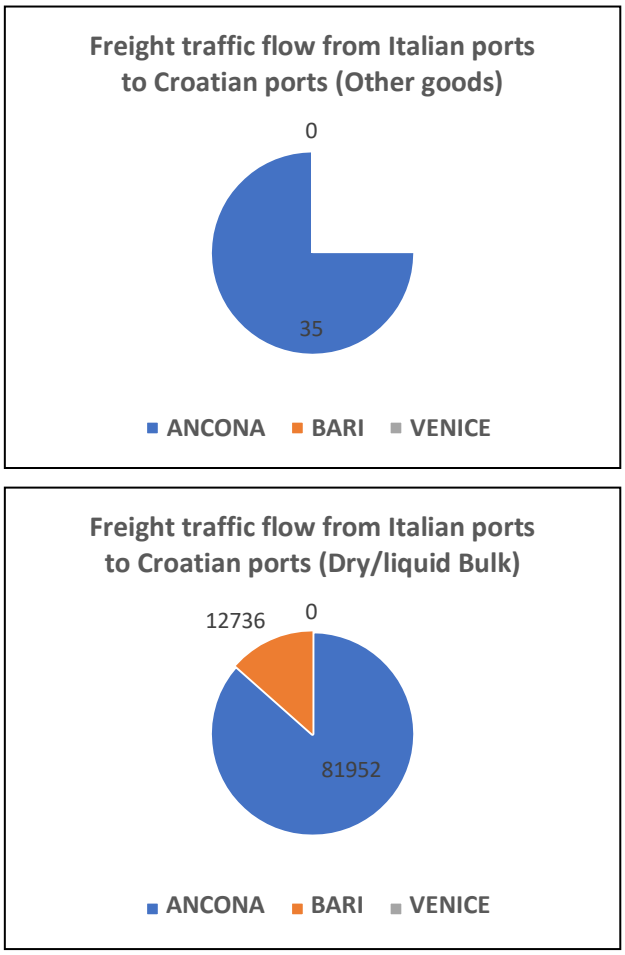

Figure 39 Maritime traffic share between Italian ports

Looking at Figure 39 we can notice that the only port in Italy which export General cargo to Croatian ports is Ancona port with total traffic flow equal to 35 tons in the year of 2018. Also, we

can see that 87% of (Bulk Cargo) from Italians ports to Croatian comes from Ancona port then 13% from Bari port while Venice port has no flow.

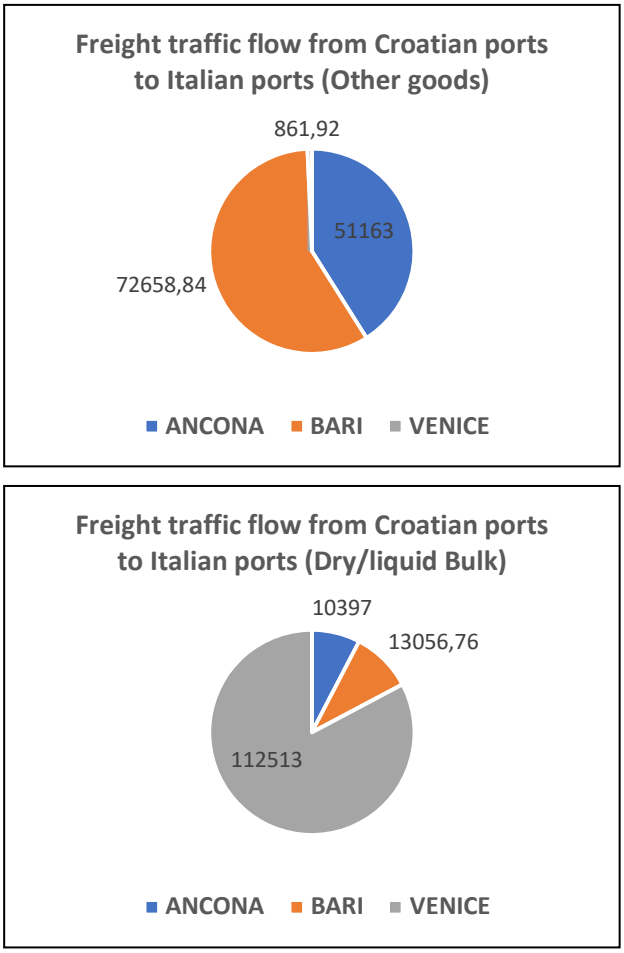

Figure 40 Maritime traffic share between Italian ports

Looking at Figure 40 we can notice that most of Bulk Cargo coming from crotian ports to Italy are going to port Venice, while both ports of Bari and Ancona have small share. It is clear that the majortity of (General Cargo) coming from Croatian ports to Italy went to Bari port with sixty per cent of the total flow. Nearly thirty seven per cent of the total flow went to Ancona port, while less than three per cent went to Venice port.

5.3.5 Ro-Ro and Ro-Pax Connections

According to traffic data which has been extracted from RAM data base we can see that we have RO-Pax connections between Italian ports and Croatian ports. We have one segment between Ancona port and Split port operated by SNAV and this line has a weekly frequency equal to 4 [A/R] and weekly capacity = 3400 [ML], also we have another line between the same two ports but operated by Jadrolinija and has a weekly frequency= 4 [A/R] and weekly capacity= 3966 [ML].

We have a RO-Pax connection between port of Bari and port of Dubrovnik. This line is operated by Jadrolinija and has weekly frequency= 3 [A/R] and weekly frequency= 3966 [ML].

ORIGIN PORT	DESTINATION PORT	SEGMENT	OPERATOR	WEEKLY FREQUENCY [A/R]	WEEKLY CAPACITY [ML]
Ancona	Split	Ro-Pax	SNAV	4	3400
Ancona	Split	Ro-Pax	Jadrolinija	3	3966
Bari	Dubrovnik	Ro-Pax	Jadrolinija	3	3966

Table 7 current supply for RO-RO and RO-PAX between Italy and Croatia

5.4 Estimation of the Current Modal Split

As we saw in figures(9,10,11and12) from division (4.2.3) discussing the trend of the freight flows classified per transport system between Italia and Croatia.

We were able to extract specific data concerning the share of Cargo moved by Maritime transport, in detail as the following table shows:

Other goods 2018	Total traffic flow [ton/year]	Maritime traffic flow [ton/year]	Maritime traffic flow Share [%]
North Italy	859.068	37.930	1%
North Italy	2.876.219		
Central Italy	189.434	133.115	70%
South Italy	342.074	85.395	25%

Table 8 Maritime traffic flow of General cargo 2018

Finally, Figure 41 provides an overview about the current model split between Italian macro regions and Croatia in freight transport. It explains the principles of the modal split between maritime transport mode and the other transport modes.

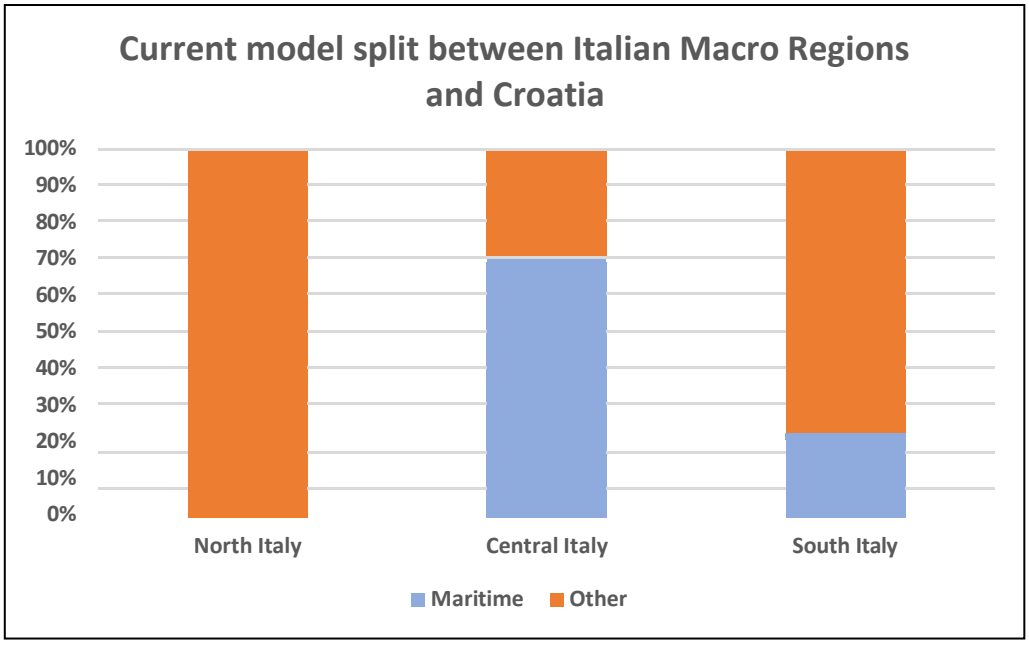

Figure 41 Current Model split between Italian Macro regions and Croatia

Looking to the graph we can notice that the most dominant mode of transport in freight transport Italian north regions and Croatia is maritime transport with 70 %. While the share of maritime transport between South regions and Croatia is 25 %.

6 ANALYSIS ON POTENTIAL MARKET FLOWS AND PROJECTION OF FUTURE FREIGTH TRAFFIC FLOWS BETWEEN ITALIAN-CROATIAN PORTS

In order to assess potential market for Adriatic ports traffic flows, it is desirable to elaborate the general data of maritime, road and rail flows between Italy and Croatia, which would enable to determine the potential customers of maritime services of individual partner ports. Cross border road traffics are analyzed. Also, International trade statistics are taken into consideration as well, not only the trade concerning Italy and Croatia, but their neighbors and others whose trade may reflect on transport across the Adriatic.

6.1 Definition of Gravitation Areas for Partner Project Ports

In this chapter is defined a specific gravitational area (G.A.) for each port related to Italian-Croatian routes. These gravitational areas are needed to elaborate and aggregate national and regional statistics into port statistics.

- Port of Venice gravitational area includes Italian Northern Regions;
- Port of Ancona gravitational area includes Italian Central Regions;
- Port of Bari gravitational area includes Italian Southern Regions;
- Port of Split and Port of Ploče gravitational area includes south of Croatia, Bosnia-Herzegovina West of Serbia, Montenegro.

In picture Figure 42 there is a representation of the Gravitational Areas.

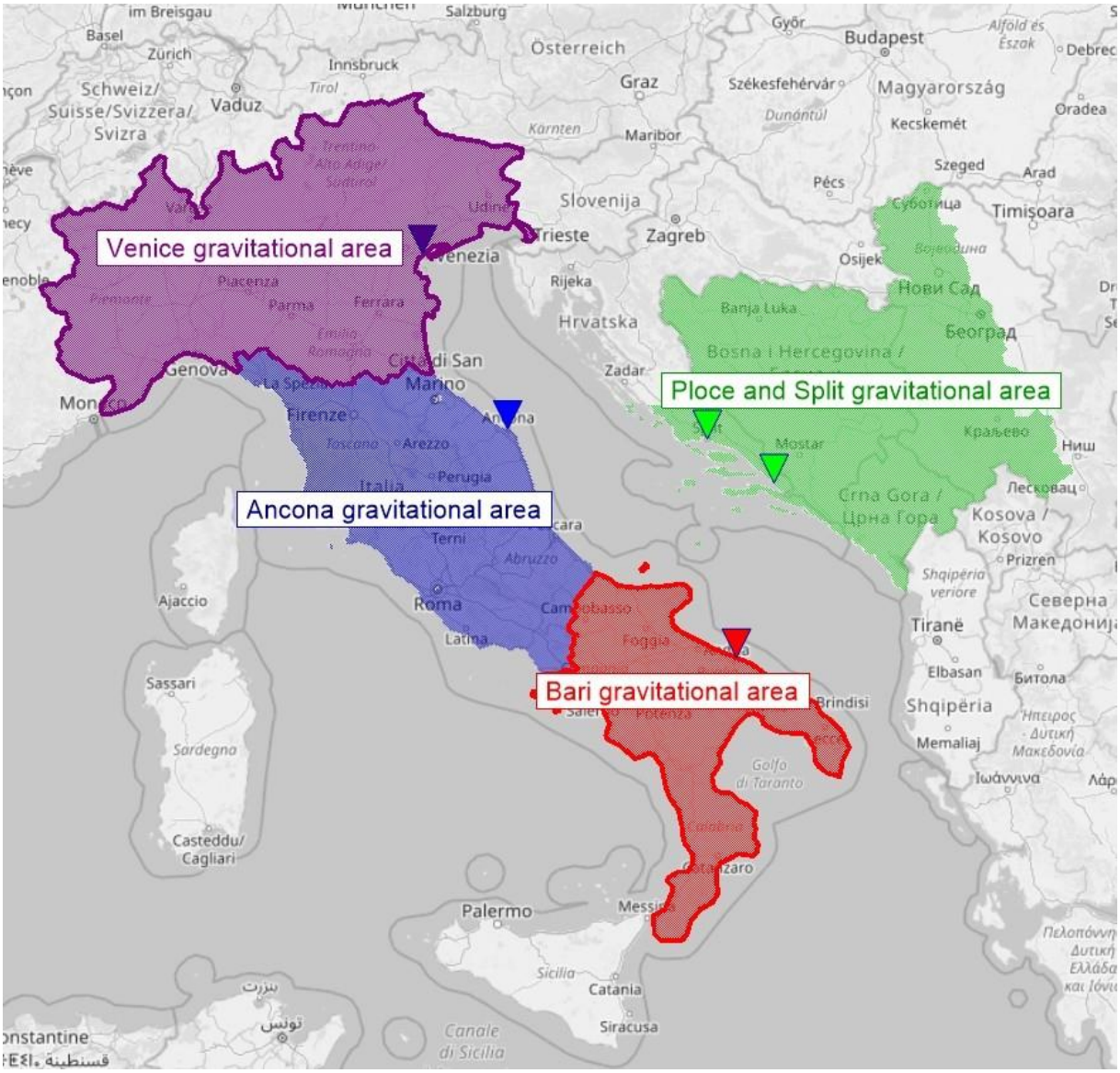

Figure 42 Gravitational areas of the Partner Ports (in red Port of Venice, In Orang Port of Ancona, in Yellow Port of Bari, In Green Port of Split and Ploce).

6.2 Estimation of the current Potential Market Flow between Port Gravitational Areas

Using the freight traffic flows recorded by the Coeweb DB for year 2018, it was possible to reconstruct the total traffic flows between the following Project Routes:

1. Between G.A. Port of Venice and G.A. Ports of Split/ Ploče (direction a and b);
2. Between G.A. Port of Ancona and G.A. Ports of Split/ Ploče (direction a and b);
3. Between G.A. Port of Bari and G.A. Ports of Split/ Ploče (direction a and b).

The results are shown in the next **Error! Reference source not found.**:

Routes/Direction ID	Project Routes	Dry/liquid bulk [ton]	Other goods [ton]
1a	Venice to Split/ Ploče.	14.036	559.422
1b	Split/ Ploče.to Venice	99.979	1.130.416
2a	Ancona to Split/ Ploče.	1.138	61.886
2b	Split/ Ploče to Ancona	4.511	51.919
3a	Bari - Split/ Ploče	89	144.398
3b	Split/ Ploče - Bari	464	62.037
Total	Total	120.217	2.010.078

Table 9: Bulk and Other goods traffic statistics on Project Routs.

From the table we can see that “other goods” volume between Port of Venice C.A. and Ports of Split/Ploče C.A. is more than 85% of the total “other goods” traffic between Italian and Croatian ports.

In 2018 “other goods” moving between Split/Ploče and Venice reached 1.68 million ton from total 2.0 million of total traffic flow volume. While Bari – Split/Ploče route is almost not used in bulk cargo.

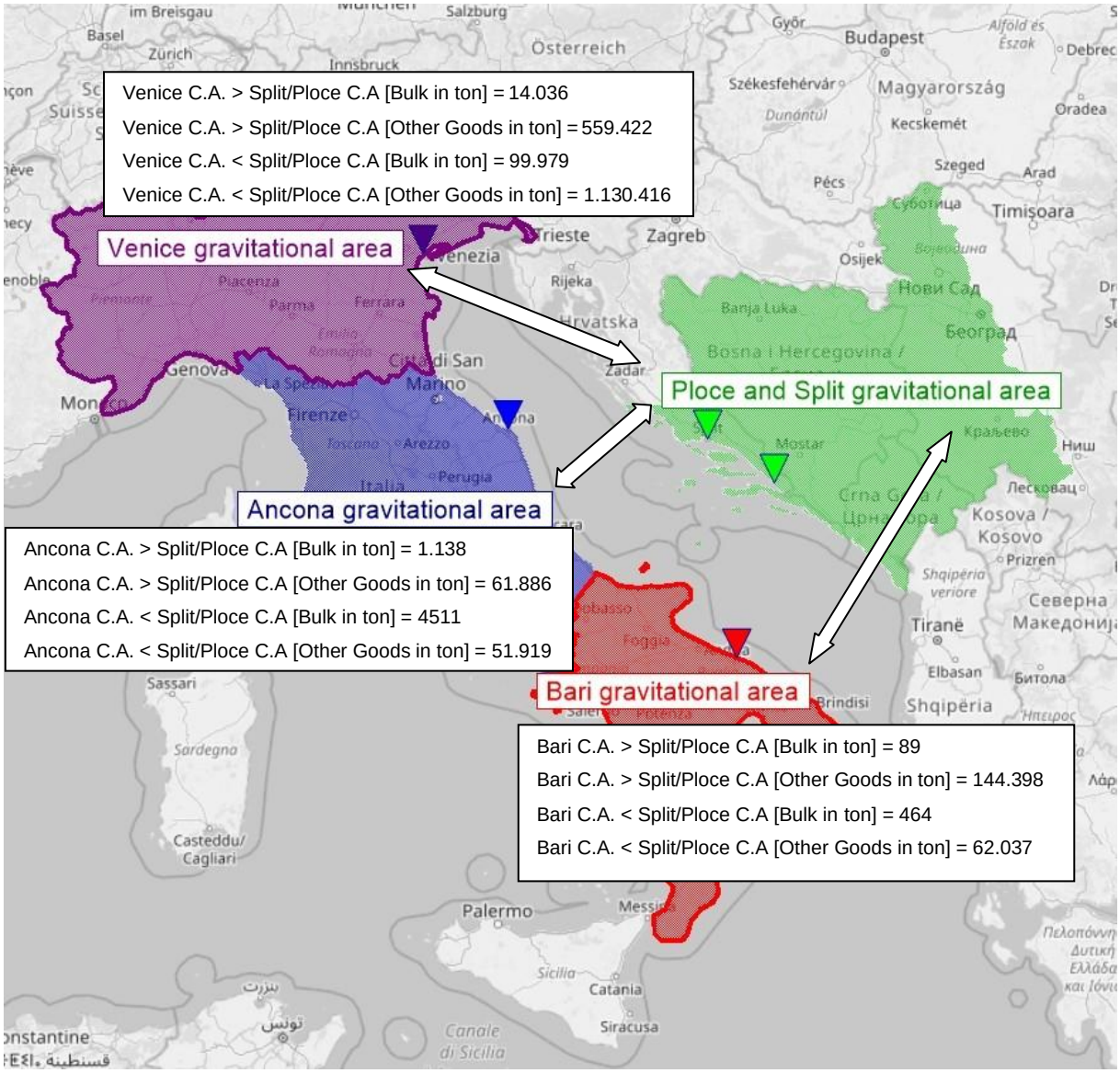

Figure 43 Routes between Italian and Croatian ports

6.3 Future trend of the GDP for Italy and Croatia

The following chart shows Italy and Croatia GDP growth forecast 2019-2024. The data used has been taken from IMF: World Economic Outlook (WEO) Database.

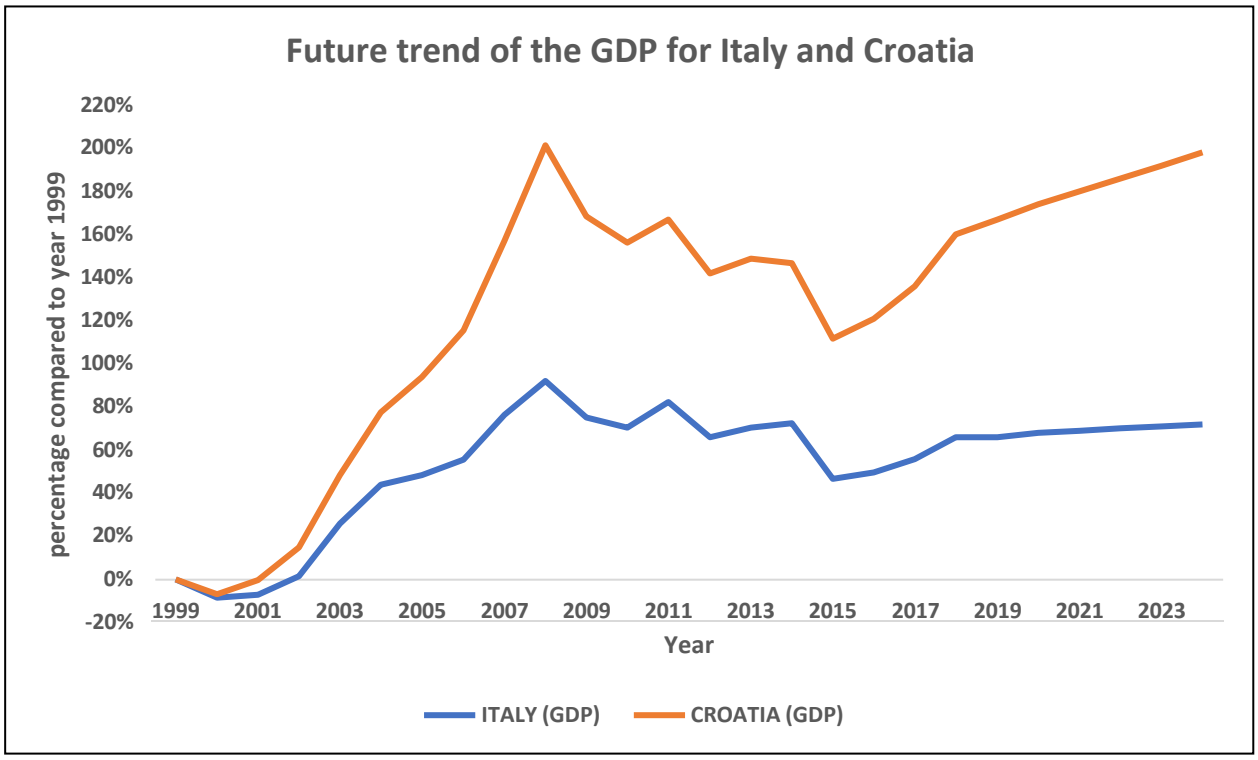

Figure 44 Future trend of GDP for Italy and Croatia

IMF expect the real GDP growth in Italy to continue the decrease in 2019 and then it will have a slight increase in 2020 and it will continue with this trend until 2024. On the other hand, IMF expect the real GDP in Croatia to keep increasing with approximately 2% each year.

Year	ITALY(GDP)	Growth	CROATIA(GDP)	Growth
2024	2,148,159M.$	72%	69,653M.$	198%
2023	2,134,286M.$	71%	68,274M.$	192%
2022	2,121,978M.$	70%	66,935M.$	186%
2021	2,109,322M.$	69%	65,494M.$	180%
2020	2,094,660M.$	68%	63,959M.$	174%
2019	2,075,976M.$	66%	62,399M.$	167%
2018	2,073,902M.$	66%	60,806M.$	160%
2017	1,946,890M.$	56%	55,201M.$	136%
2016	1,869,970M.$	50%	51,623M.$	121%
2015	1,833,200M.$	47%	49,519M.$	112%
2014	2,155,150M.$	72%	57,683M.$	147%
2013	2,131,160M.$	70%	58,158M.$	149%
2012	2,073,970M.$	66%	56,549M.$	142%
2011	2,278,380M.$	82%	62,399M.$	167%
2010	2,129,020M.$	70%	59,866M.$	156%
2009	2,190,700M.$	75%	62,712M.$	168%
2008	2,402,060M.$	92%	70,465M.$	201%
2007	2,206,110M.$	76%	60,110M.$	157%
2006	1,944,260M.$	56%	50,387M.$	116%
2005	1,855,660M.$	48%	45,347M.$	94%
2004	1,800,200M.$	44%	41,523M.$	78%
2003	1,572,350M.$	26%	34,668M.$	48%
2002	1,270,430M.$	2%	26,868M.$	15%
2001	1,163,110M.$	-7%	23,290M.$	0%
2000	1,144,880M.$	-8%	21,774M.$	-7%
1999	1,250,170M.$	0%	23,374M.$	0%

Table 10: Bulk and Other goods traffic statistics on Project Routs.

6.4 Estimation of the Future Trend of the Potential Market Flow and Modal Split

In the following figures, we plotted the Historical data traffic flow between north, central and south Italy and Croatia in the period 2014 - 2018.

Then we did linear regression analysis on the data in order to come up with linear equation to help us forecasting the potential traffic flow volume between Italy and Croatia in the future and have a better look on the trend of the potential market flow.

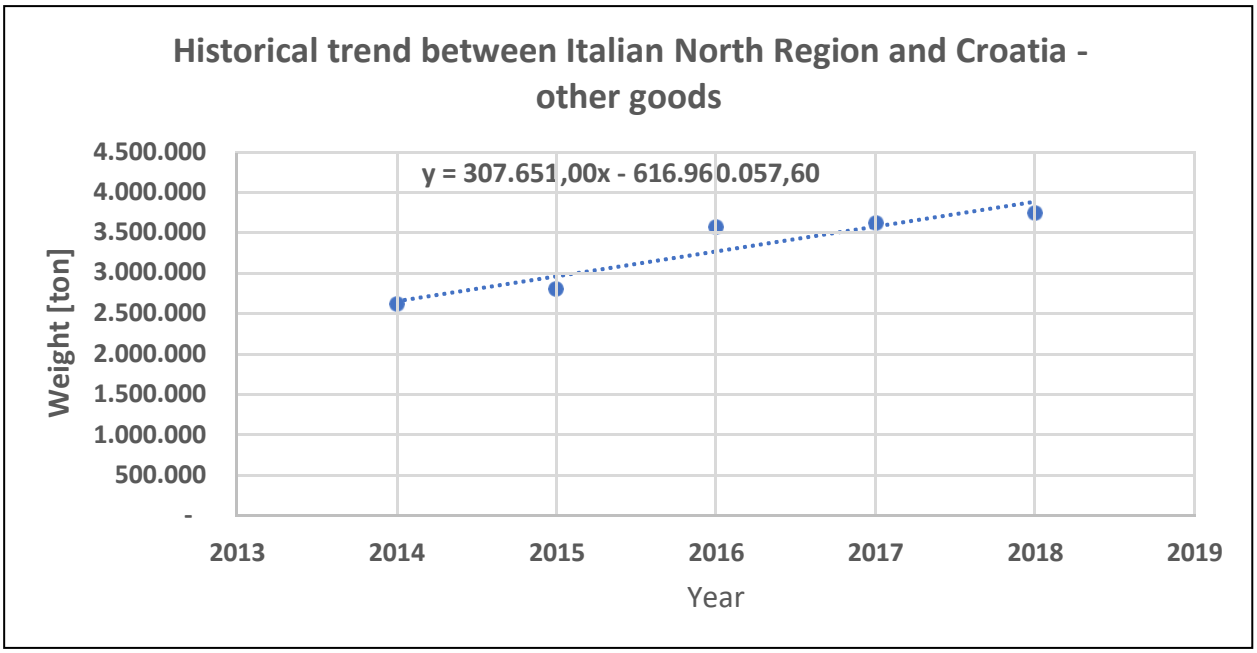

Figure 45 trend of potential market flow between North Italy and Croatia

Looking at Figure 45 we can see that actual traffic flow rose suddenly from 2.5 million ton in 2014 to 3.5 million 2016 then there was moderate increase until 2018

The overall flow had a general positive trend during the period 2014-2108.

There was a relevant positive variation of +11.61% per year from 2.5 million ton in 2014 to around 4 million ton in 2018.

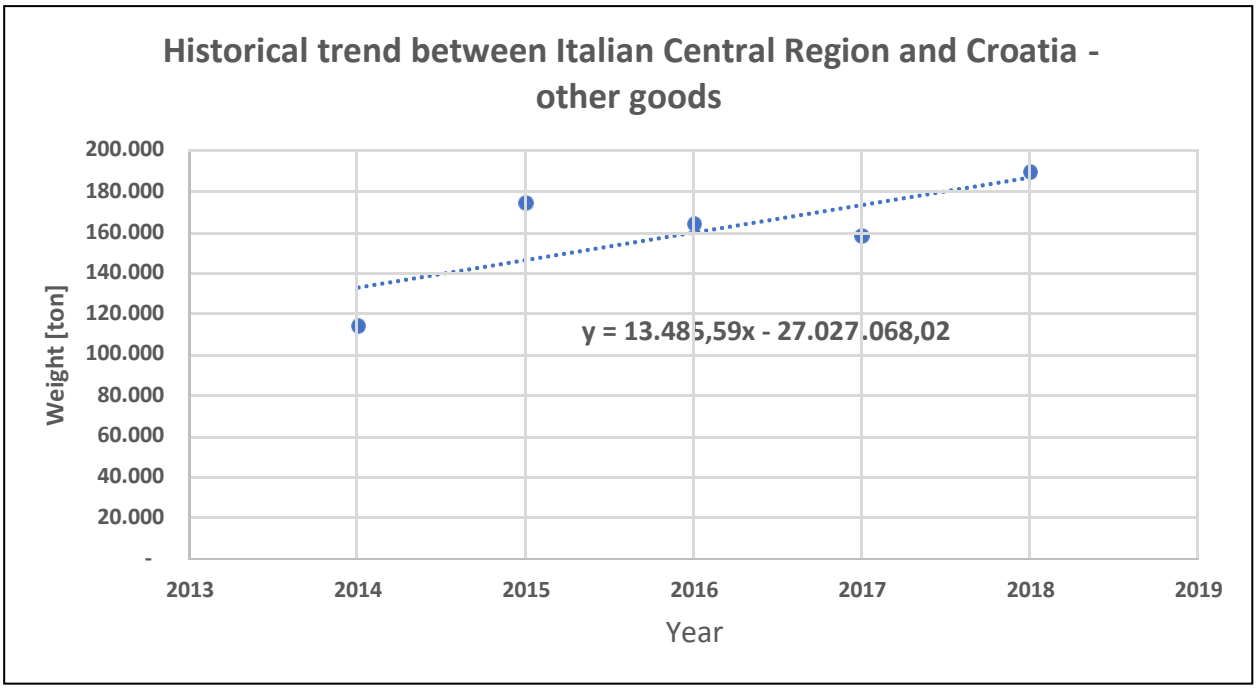

Figure 46 trend of potential market flow between Central Italy and Croatia

Figure 46 showing the trend from central Italy (Ancona Port) to Croatia from 2014 to 2018 we can see that the original traffic flow statistics shows a booming raise from year 2014 to year 2015 then slightly decrease in 2016 and 2017 to reach its all-time high in 2018.

Then after doing regression analysis we found that the trend is increasing gradually with steady rate started from around 135 thousand ton and reached 190 thousand ton in 2018.

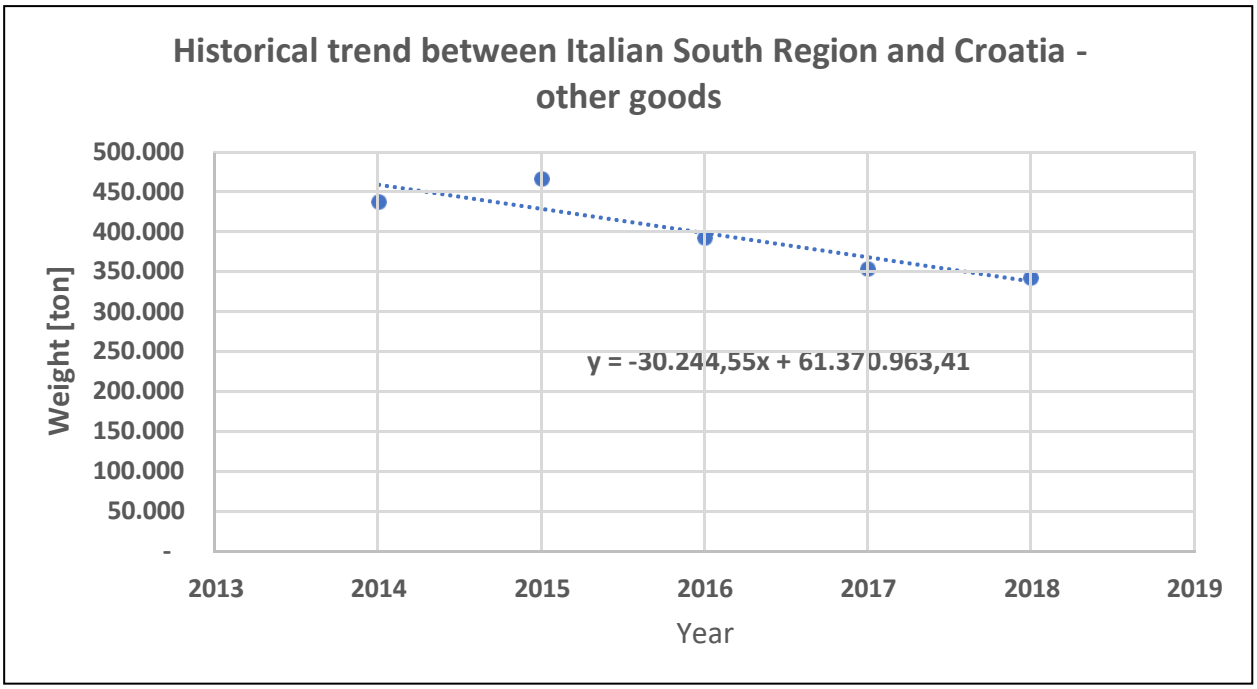

Figure 47 trend of potential market flow between South Italy and Croatia

Looking at Figure 47 of south Italy region (Bari port) we can see that the trend is dramatically decreasing from 2014 to 2018 started from around 450 thousand ton reached roughly 340 thousand tons.

Although the traffic was increasing first in 2015 but then it collapsed quickly to reach lowest in 2018.

It's clear that the fright flow between Italian south regions and Croatia is not following the increasing trend of the other Italian regions.

In the following graph we used the equations we got from regression analysis in order to forecast the future trend of the potenial market for the routes between italian and croatian ports and have a better look at the future of maritime transportation system between italian and croatian ports. We used the previos equations to estimate the traffic flow in the period 2018 - 2025.

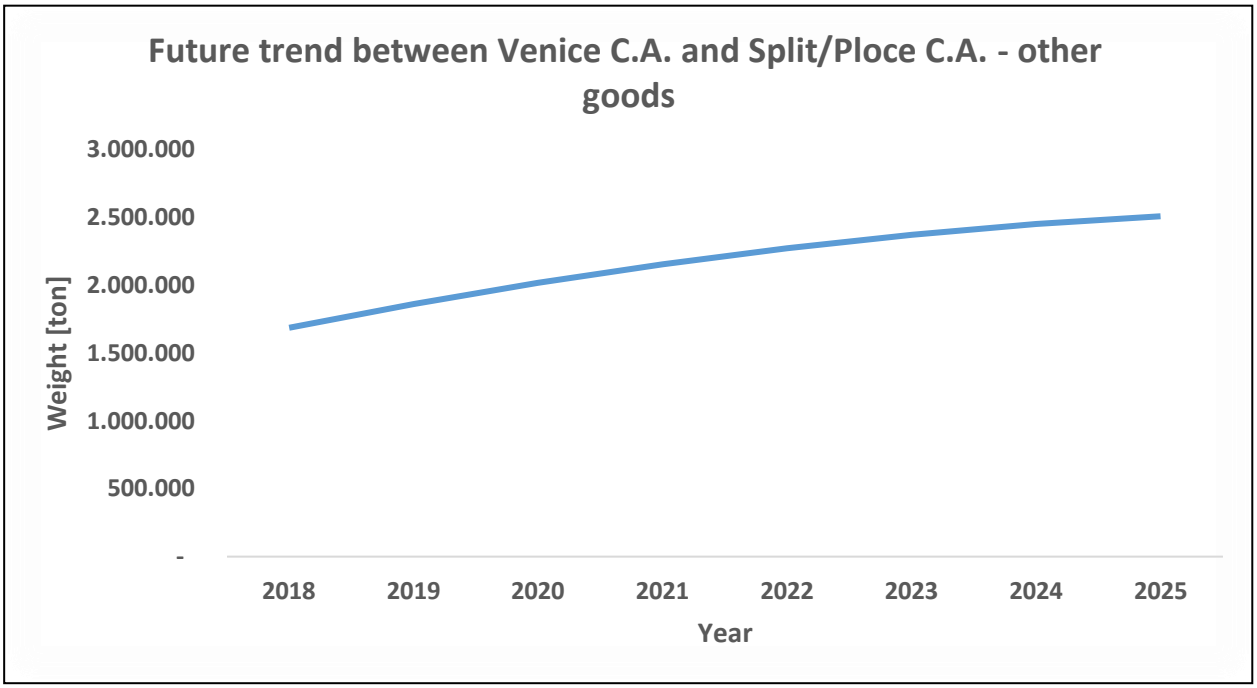

Figure 48 future trend of potential market flow between Venice Gravitational Area and Split/Ploče Gravitational Area

Looking at Figure 48 we can notice that the traffic flow from Venice to Split/ Ploče has the biggest potential growth factor of 12% and this route has the largest share of traffic between Italy and Croatia. It's expected to continue its growth from 1.7 million in 2018 to reach around 2.5 million ton by 2025.

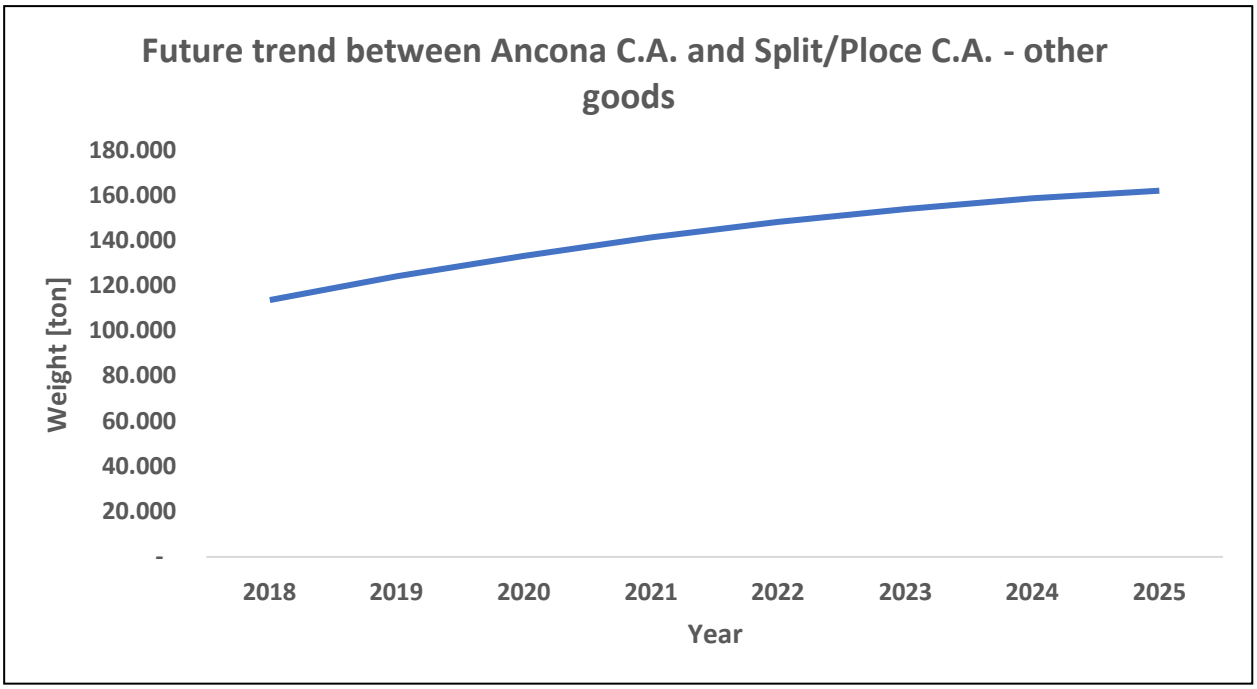

Figure 49 future trend of potential market flow between Ancona Gravitational Area and Split/Ploče Gravitational Area

It can be seen from Figure 49 that also the trend of General Cargo moving between Ancona and Split/ Ploče is very promising and in continuous progression. It will continue its steady growth over years reaching 160 thousand ton in 2025 from 117 thousand in 2018 with a growth factor of 10%.

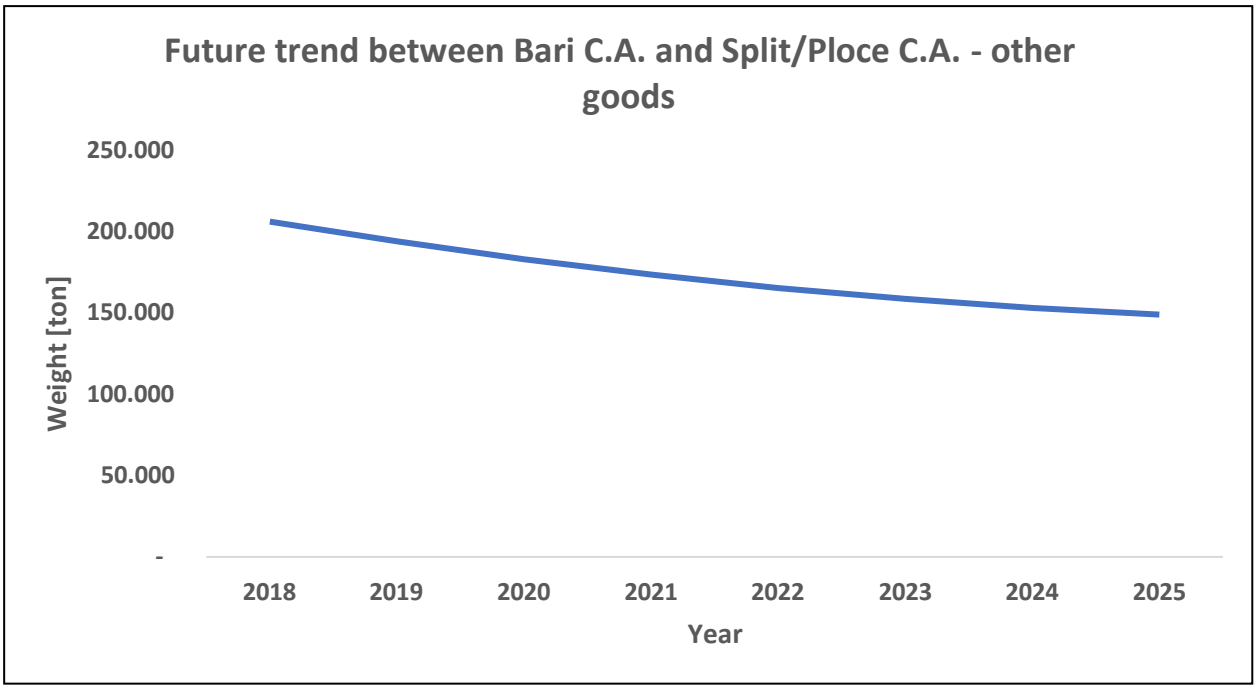

Figure 50 future trend of potential market flow between Bari Gravitational Area and Split/Ploče Gravitational Area

On the other hand, Figure 50, shows the trend of the route between Bari port and split/ Ploče ports and the expected changes on traffic volume.

The traffic flow is expected to have decrease each year by 6.6% and the total traffic flow will decline from around 200 thousand ton in 2018 to reach 150 thousand ton in 2025.

7 POTENTIAL UNDESIRABLE EFFECTS AND POINTS OF CONGESTION

Current points of congestion

- **Port of Venice:** Increasing traffic between the Port of Venice and Croatia will not bring any big, undesirable, effect to the Port of Venice or its surroundings.
- **Port of Ploče:** it could be said that for the current cargo flow, port of Ploče has satisfactory infrastructure. The problem with congestion on the road can be seen only in summer months with the influx of tourist. However, since city of Ploče is not a great touristic destination, congestion is not a major problem in city itself, but it can be a major problem on the motorway A1 and the surrounding roads and border crossings.
- **Port of Split:** The port is limited with available space for expansion and potential investments. Furthermore, the rail and bus terminals are also situated in the port area which creates congestion especially in the season period.
- **Port of Bari:** Lack of dedicated berths for container ships - Insufficiency of state-owned areas for temporary storage of containers - Impossibility of handling containerized dangerous goods**.**
- **Port of Ancona:** there is not a direct connection between the highway and the port and the road passes through urban and inhabited areas. Moreover, the capacity of road infrastructure as well as the number of lanes in terminal roads and connections with highway network are considered insufficient by Central Adriatic Ports Authority to bear the potential road traffic flows generated by the increase of freight and passenger traffic. With regard to the railway network, the actual infrastructure is not suitable to dispatch maximum allowed quantities of the train at once. Moreover, a ramp for the loading/unloading of trucks on the railway is absent.

Possible Solutions

- **Port of Venice:** additional parking space for would-be passengers, to be made available in the Marittima-San Basilio-Santa Marta area, would greatly help in smoothing their flow.
- **Port of Ploče:** it could be said that the port of Ploče has a good infrastructure, especially if we took into consideration soon to be new entrance terminal, that will be directly connected with highway network.
- **Port of Split:** indicating the existence of the two-way traffic passing through the port area the creation of the points of congestion and traffic jams on the access roads to the port should not be unexpected.
- **Port of Bari:** more docks should be built to increase the possibility of approaching commercial ships, the use of docks could be better regulated,
  we should continue to monitor the purposes of the areas granted in concession for the movement of goods, excluding the possibility of being used as storage areas if not for temporary use, regulating access in operating areas, optimizing the spaces used for traffic, in order to prevent prolonged parking of vehicles for loading / unloading bulk goods. some of the container parking and control activities should be moved to areas behind or physically connected with the enlargement of the customs area
- **Port of Ancona:** In order to implement the port infrastructures, different interventions have been planned. The Three-year Operational Plan 2017-2020 (Piano Operativo Triennale), by Central Adriatic Ports Authority, lists the solutions presented in the Ancona Port Regulatory Plan, originally approved with the decree. n. 1604 on 14/07/1988 and afterwards updated several times. The main aim of the Plan is to adapt port infrastructures and capacities to the growing traffic flows through the extension of port areas, improvement of land and sea accessibility, optimization as well as requalification and specialization of existent spaces.

8 CONCLUSIONS

After the analysis of the historical trend of freight traffic flows from Italian Macro-Regions and Countries in the Gravitational Area of Ploče/Split Port (Croatia, Bosnia-Herzegovina. Montenegro, Serbia), it is clear a growing trend in the last 5 years. The growing trend is more relevant from/to Italian Nord and Central Regions.

Additionally, analyzing other economic indicators (e.g. GDP of Italy and Croatia) is possible to notice that from 2015 to 2018 there is a constant economic growth.

These data demonstrate that there is a solid and growing transport demand across the Adriatic Sea. The development of a solid multimodal network between the Partner Ports (with new connections and services) is essential to attract a relevant part of the freight transport demand into sustainable transport systems, reducing the all-truck transport share.