Integrated and Sustainable Transport in Efficient Network - ISTEN

DT1.1.2 – Local context analysis for Calabria port system

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Document information

Abstract

The report aims at providing a comprehensive analysis of the port-hinterland chain of Calabria port system with reference to four main commercial ports: Gioia Tauro, Vibo Valentia, Crotone and Corigliano Calabro. Existing bottlenecks pertaining to market, infrastructure, operations, institutional framework and innovative services characterizing the local context are identified through the contribution of relevant stakeholders. On these bases, the analysis finally outlines plausible mid-term scenarios and their possible impacts on the evolution of the local context.

Keywords

Local context analysis, port-hinterland, bottlenecks, scenarios

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* Abbreviations of editor/contributor name

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List of abbreviations and definitions

AGIP - Azienda Generale Italiana Petroli

ASI – Area di Sviluppo Industriale (Industrial Development Area)

ATGT - Auto Terminal Gioia Tauro

BLG – Bremer Lagerhaus-Gesellschaft

CERTH - Centre for Research and Technology-Hellas

CORAP – COnsorzio Regionale per lo sviluppo delle Attività Produttive

EU – European Union

ICO N.V. – International Car Operators N.V.

ICO BLG - International Car Operators BLG

ICT – Information Communication Technologies

ISTEN - Integrated and Sustainable Transport in Efficient Network

MCT – Medcenter Container Terminal

MTO - Multimodal Transport Operator

POT – Piano Operativo Triennale (Triennial Operating Plan)

PRP – Piano Regolatore Portuale (Port Regulatory Plan)

PRT – Piano Regionale dei Trasporti (Transport Regional Plan)

PCCS – Port Calabria Community System

RFI - Rete Ferroviaria Italiana

Ro-Ro - Rolling On, Rolling Off

TEN-T - Trans European Transport Network

TEU - Twenty-foot Equivalent Unit

1 INTRODUCTION

The aim of this Deliverable is to provide an in-depth analysis of Calabria port system.

The Calabrian port system consists of 39 ports of different sizes and functions, distributed along the coastline. In the research activity, related to the ISTEN project, the attention was focused on the four main ports of Calabria: Gioia Tauro and Vibo Valentia on the Tyrrhenian coast, Crotone and Corigliano Calabro on the Ionian coast.

The deliverable consists of three chapters beyond the introduction.

In the second chapter, for each considered port, the characteristics of the local environment are highlighted, providing an overview of the Port-Hinterland chain (geography analysis, markets served, actors involved), analyzing the port-Hinterland chain operations with reference to the infrastructural system of the port and to the land connections that guarantee accessibility by road and rail; to the traffic and cargo served (types, shares and trends) and to the services provided. In the chapter, finally, the ports-hinterland chain governance is described.

Chapter three describes the bottlenecks that, at present, prevent the integration of ports between them and the hinterland. In particular, the impacts of bottlenecks related to markets, infrastructures, port operations, institutions and innovation were identified and assessed.

Finally, chapter four illustrates the potential scenarios for the development of the Calabrian port system in the medium term, highlighting the main development factors and indicating the expected impacts.

A crucial contribution will be represented by the needs and views expressed by the local stakeholders identified as particularly relevant in this context:

- Authorities/decision makers who formally decide on investments for planning infrastructure developments (Port Authority of Gioia Tauro, Municipalities, Regional administrations)
- Private operators which organize and sell transport services and offer transport services in the market; they offer transport services, including handling and warehousing (Shipping Agents, freight forwarders, Rail companies, Haulage companies, Port Terminal Operators, Handling companies);
- Business support organizations that have the aim to study, monitor and suggest action to improve transport and logistics activities in the port hinterland (Chamber of Commerce, UNINDUSTRIA, CORAP);
- Industries/Wholesaler/SMEs which sells/buy raw material or products which require to be transported to the intermediate or final destination.

One-to-one meetings with representatives from each of the above organizations were arranged; they were first given a general presentation of the objectives and activities of ISTEN project, stressing their role and contribution to technical work packages.

A structured questionnaire prepared by CERTH as WPT1 coordinator, was used as a basis to start reasoning with representatives from the organizations, and their input has been assessed and discussed within the ISTEN project team. Their collective contribution has then been integrated in the relevant sections of this report.

2 CHARACTERISTICS OF THE LOCAL ENVIRONMENT

The Calabrian port system consists of a series of ports of different sizes and functions, distributed along the 780 km coastline, partly along the Tyrrhenian side and partly along the Ionian one.

Calabria currently has 39 ports, but the most relevant from a commercial point of view are 18. Along the Tyrrhenian coast from North to South we find: Cetraro, S. Eufemia Lametia, Vibo Valentia Marina, Tropea, Gioia Tauro, Palmi, Bagnara Calabra, Scilla; close to the Strait of Messina: Villa S. Giovanni, Reggio Calabria and going up the Ionian side: Saline Ioniche, Bova Marina, Roccella Ionica, Catanzaro Lido, Crotone, Cariati, Corigliano, Laghi di Sibari (Figure 1).

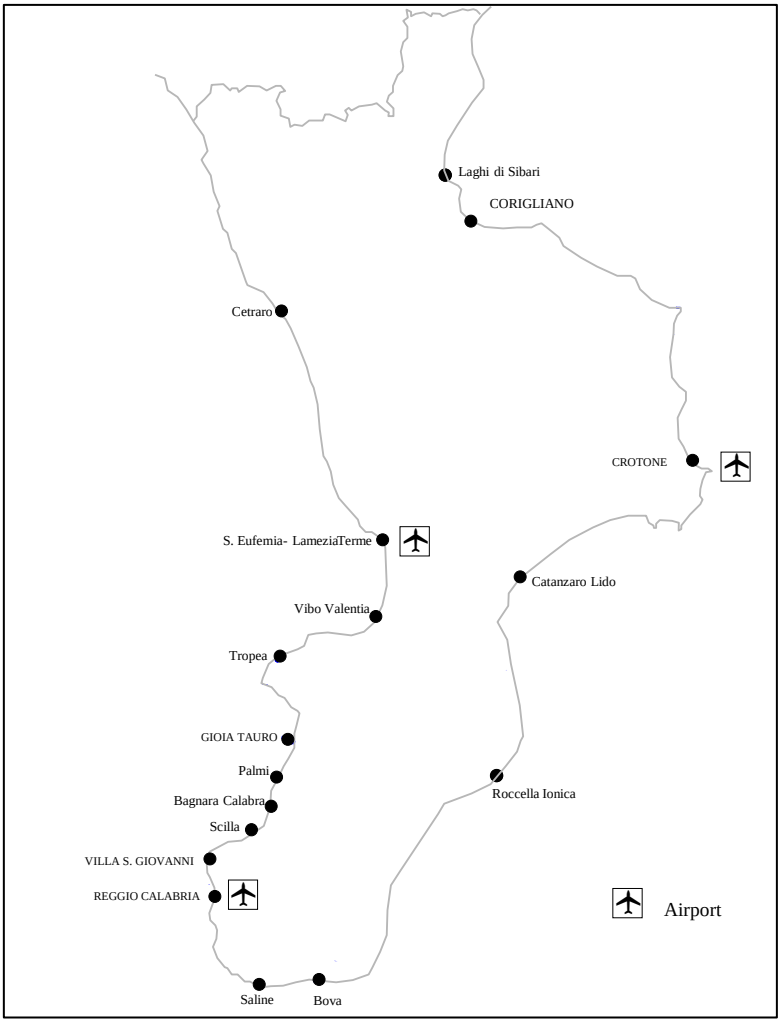

Figure 1: Calabrian Ports

Law 84/1994 has identified the distribution of seaports in categories and classes in Italy, all the Calabrian ports are category II (not aimed at military defence and state security). To class I (of international economic importance) only the port of Gioia Tauro belongs. The ports of Reggio Calabria, Villa San Giovanni, Palmi, Vibo Valentia, Corigliano and Crotone are class II (of national economic importance), while all other ports belong to class III having a regional and interregional economic importance.

The table 1 shows some technical characteristics (prevalent use of destination, surface area of water, depth of the seabed, length of the quays, length of total coastal development, surface areas and possible presence of railway links) relating to the major ports of Calabria.

Table 1: Technical characteristics of the major Calabrian ports

Port	Main Use	Body of water (m^2)	Depth (m)	Quay (m)	Total length of quay (m)	Yard Surface (m^2)	Railway Connection
Cetraro	P - D	112,000	4	900	2,050	1,500	no
Lametia	Pr	n.a.	n.a.	725	n.a.	n.a.	no
Vibo Valentia	**Pr**	**410,000**	**2.5-14**	**1,225**	**2,538**	**49,000**	**yes**
Tropea	P - D	40,000	3-5	235	990	n.a.	no
Gioia Tauro	**T**	**1,732,000**	**14-18**	**5,000**	**n.a.**	**1,200,000**	**yes**
Palmi	P – D	n.a.	3.5-5	n.a.	n.a.	n.a.	no
Bagnara Calabra	P - D	100,000	5-15	600	800	n.a.	no
Scilla	P – D	7,800	5.85	150	210	2,700	no
Villa S. Giovanni	Tr	67,000	3.5-9	362	756	15,600	yes
Reggio Calabria	C – Tr	236,000	7.50	1,885	2,215	75,410	yes
Saline Ioniche	P – D	137,000	2.5	900	n.a.	n.a.	yes
Roccella Ionica	D – P	601,000	3-5	n.a.	n.a.	n.a.	no
Catanzaro Lido	P – D	45,000	n.a.	100	540	n.a.	no
Kroton	**C - P – D - I**	**1,171,700**	**1.8-9**	**3,128**	**4,591**	**63,300**	**no**
Cariati	P	44,600	3.5-4	240	620	6,000	no
Laghi di Sibari	D	430,000	3-3.2	600	12,000	n.a.	no
Corigliano C.	**P - C**	**1,206,000**	**4-12**	**2,150**	**4,905**	**1,500,000**	**no**

P = Fishing **D** = Touristic **C** = Commercial **I** = Industrial **Pr** = Oli Products **T** = Transhipment
Tr = Ferry-boat activity **n.a. =** not available

The ports of Reggio Calabria and Villa San Giovanni are mainly affected by a Ro-Ro traffic that involves the crossing of the Strait of Messina, or the connection between the peninsula and Sicily.

2.1 Port-hinterland chain overview

The Calabria port system includes 4 main commercial ports: Gioia Tauro, Vibo Valentia, Kroton and Corigliano Calabro. The first is very relevant container port. The last three are strategic ports.

2.1.1 Geography

The description of the geography and of the technical characteristics of the ports in question is carried out starting from the port of Gioia Tauro and Vibo Valentia (Tyrrhenian side of Calabria) and continuing with the ports of Crotone and Corigliano Calabro (Ionic side of Calabria).

The port of Gioia Tauro (Figure 2) is located in the province of Reggio Calabria, about 56 km from Reggio Calabria. The port is located inside the Piana Gioia Tauro, which covers a total area of 954 square kilometers and is divided into 33 municipalities that belong administratively to the Province of Reggio Calabria. 27% of industrial activities in the Piana area are concentrated in the municipalities of Gioia Tauro, San Ferdinando and Rosarno. It is precisely in these municipalities that the port area of the port is extended, operational since 1995.

Precisely the port is located 0.5 km from Gioia Tauro, 0.5 km from San Ferdinando and 2 km from Rosarno; in a central position along the coast of the homonymous gulf with exposure of the west entrance identified by the coordinates: latitude 38 ° 26'70''Nord and longitude 15 ° 53'50''Est. The port of Gioia Tauro forms the west side of the quadrilateral formed by the inhabited centers of Gioia Tauro, San Ferdinando, Rosarno and Rizziconi (Figure 2). The main urban centers of reference are:

- Reggio Calabria at 56 Km;
- Vibo Valentia at 32 Km;
- Lametia Terme at 70 Km;
- Catanzaro at 98 Km.

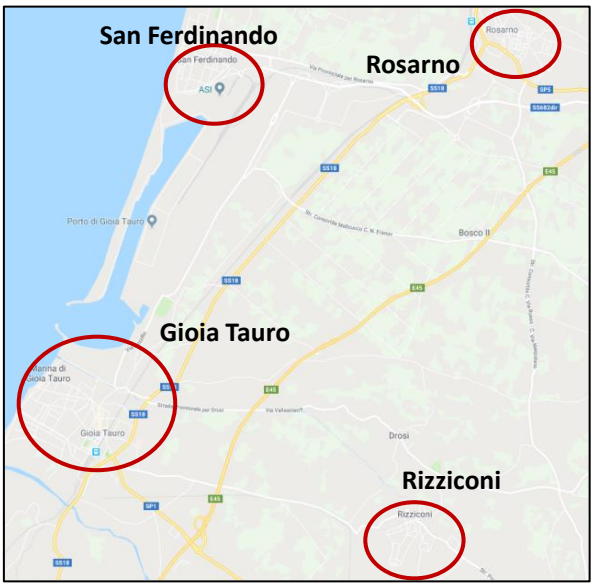

Figure 2: Gioia Tauro Port site

It should also be noted that the port is located in the centre of the Mediterranean at about 1,800 Km (970 nautical miles) from the Suez Canal (Porto Said) and about 1,900 Km (1,000 nautical miles) from the Strait of Gibraltar (Figure3).

Figure 3: Gioia Tauro Port in Mediterranean area

The "logistic system" of Gioia Tauro is spread over a flat area of about 7 million m^2 behind the port and can be decomposed into three macro-areas:

- port areas: 3,200,000 m^2;

- areas of the first industrial zone (CORAP): 600,000 m^2;
- areas of the second industrial zone (CORAP): 3,000,000 m^2.

The detailed map (Figure 4) shows the boundaries of the different areas, the main and secondary viability, the lots assigned in the two industrial areas, the concessions within the port, together with their dimensional and functional characterization.

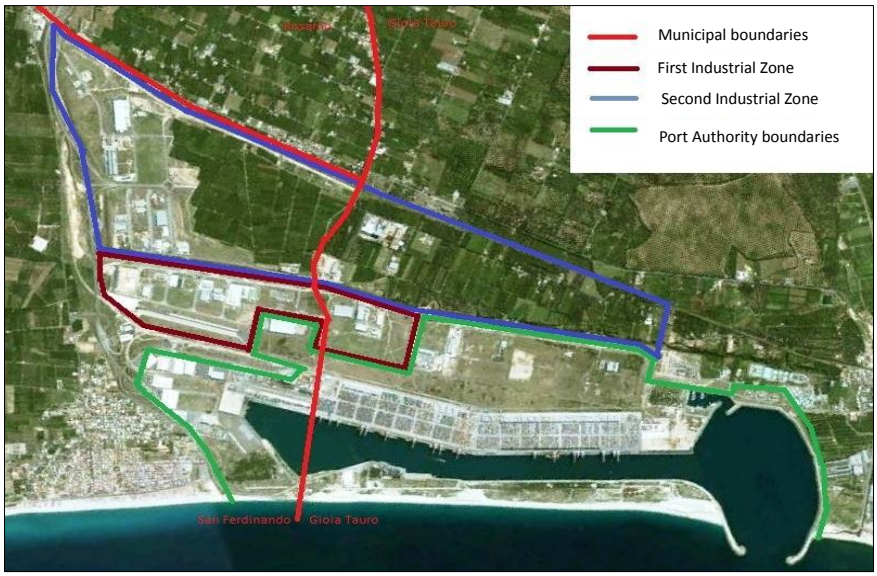

Figure 4: Port of Gioia Tauro and borders

The port has a channel configuration (Figure 5) with an internal water surface of 1,800,000 m^2 located parallel to the coast. The entrance has a useful width of about 200 m, and it is contiguous to it an evolution basin with a diameter of 750 m. In the north it develops the harbor channel of the length of around 3 Km and minimum width of 200 m, in phase of extension to 250 m in the initial part. At the extreme north of the channel is the evolution basin with a diameter of 500 m. The overall length of the quays is 5,375 m, of which 3,395 m for container traffic.

Figure 5: Gioia Tauro Port

It is possible to divide the port into 3 zones, corresponding to the same number of quays that overlook the internal navigation channel:

North quay (Fig 6): the area is granted to the second terminal operator of the port, which deals with the movement of cars. It uses 3 ro-ro ramps and the north pier, for a length of

384 m. The new, larger, available square is 320,000 m^2, which allows the deposit of about 11,000 vehicles.

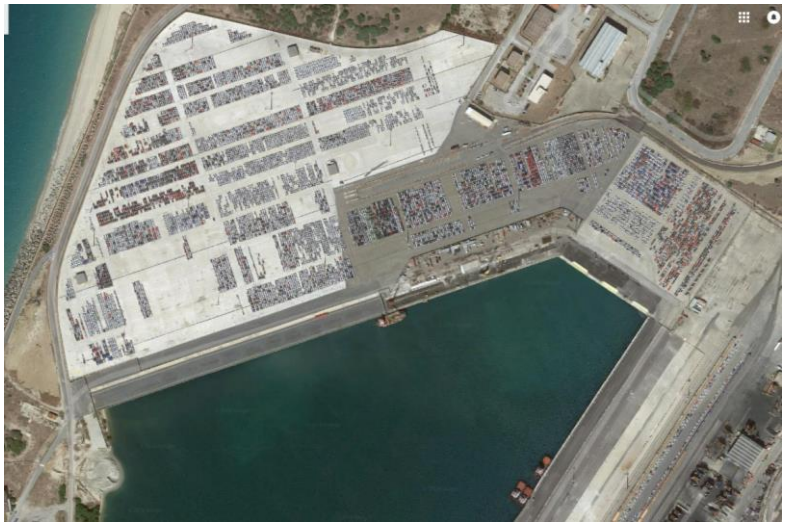

Figure 6: North Quay

Eastern quay (Fig 7): the area is granted to the first terminal operator of the port that handles the handling of containers. The dock is 3,395 m long. The bottom of the canal is organized as follows: for the first 400 m, in correspondence with the quay "high waters" there is a depth of 18 m (maximum depth obtainable); subsequently, for a length of 1,100 m, there is a depth of -17 m and a sub-base of -16 m. The remaining part of the canal is dredged at -14 m. The square in front of the eastern quay covers an area of 1,700,000 m^2, with a capacity of 67,000 TEUs and 2,350 fridge sockets.

Figure 7: East Quay

West quay (Figure 8): the area is largely unused; the exploited area is about 920 m long and about 200 m wide on average. An area of about 7,600 m^2 is used for handling and storage in bulk cement silos, using ships of about 150 m; another, temporarily under construction, consists of a storage area of 10 circular tanks for liquid fuels, for a total of about 42,000 m^3, plus 3 horizontal cylindrical tanks for LPG (liquid propane gas) for a total of about 4,500 m^3. Oil tankers and gas tankers, which should supply the deposit, will not be too large (20,000 GRT) to be able to dock in the external access point, currently being planned. There are three ro-ro berths near the north quay.

Figure 8: West Quay

There is also a service dock near the southern evolution basin, which can hold up to 42 vessels (Fig 9). There is a distribution system that supplies fuels of the type: Exhaust gas oil, National diesel, Green petrol. Moreover, in the service dock (used by the service vehicles, and by the means of the armed forces) there are two floating docks for pleasure boating in concession to as many non-profit associations, and an additional jetty for the mooring of recreational craft. The fishing activity is a stable component of the port, even if it is contained, which uses the service dock for the approach of the vessels.

Figure 9: Tourist Dock

Table 2 summarizes the general information and technical characteristics of the port of Gioia Tauro.

Table 2: General information and technical characteristics of the port of Gioia Tauro

GENERAL INFORMATION			
Country	Italy	Name	Gioia Tauro Port
Place	Gioia Tauro (RC)	Address	Contrada Lamia 89013 Gioia Tauro
Port Authority	Gioia Tauro Port Authority		
Phone	+39 0966 588640	Fax	+39 0966 588617
E-Mail	info@portodigioiatauro.it	Web	www.portodigioiatauro.it
Latitude	38°26'70'' North	Longitude	15°53'50'' East
UN/LOCODE	IT GIT	ETA messages	Required
Medical Point	Present		
Main Activities	Containers handling		
TECHNICAL CHARACTERISTICS			
Dimension	3,200,000 m^2	Architectural Type	Excavation in backcountry
Expansion/evolution Basin (radius)	375/225 m	Maximum ship dimension	>400 m of lenght
Body of water	1,732,000 m^2	Maximum depth	18 m
Landside Surface	2,020,000 m^2 + 3,600,000 m^2 CORAP Areas	Yard Surface	- 1,700,000 m^2 Container - 320,000 m^2 Car Carrier
Total Quays Length	5,575 m	Quays Lenght	- 3,395 Container - 920 m Liquid Bulk - 760 m Car Carrier - 500 m Touristic port
Seabed type	Sandy		
DEPTH (m) (min-max)			
Entrance Channel	20 m	Container quay	14-18 m
Liquid Bulk quay	14 m	Car Carrier Quay	14 m

On the Tyrrhenian side of Calabria, north of the port of Gioia Tauro is the port of Vibo Valentia. The port is located in the Vibo Marina area of the municipality of Vibo Valentia (Figure 10), one of the five provincial capitals of the Calabria region. Near the port (about 4 km south), in the locality of Portosalvo, there is a large industrial area where are located many companies (above all metalwork, advanced tertiary and canning). The port, moreover, is distant about 13 km from an area of the provincial territory dedicated to the production settlements and in which several companies currently operate. The port is about 4 km from Pizzo and 10 km from the city centre of Vibo Valentia.

Figure 10: Vibo Valentia Port Site

The port of Vibo Marina is located 38°43'26" N e 16°07'40" in the Gulf of S. Eufemia and consists of a jetty of overwater or wharf, double-sided quay, (which in the first part forms the internal basin while in the second stretch, oriented to N-NE and in the third part, oriented to E-NE, it forms the outcrop) and from an under-lying quay equipped with a para-oriented wall for N-NW (Figure 11).

Figure 11: Vibo Valentia Port

The surface of the harbor, with a surface of 410,000 m^2, with depths that reach a maximum depth of 11 m, is subject to frequent landfills that often require the use of dredges. On the ground, leaving aside the pleasure docks, there are 1,225 m of operational docks and 49,000 m^2 of surface for the loading and unloading of goods. In particular, the port has 2 quays specialized for petroleum products (238 and 260 m long, with depths of between 2.5 m and 9.4 m); 2 long docks respectively 317 m and 180 m with a depth of 9.4 m intended for handling bulk cargo; of a quay exclusively dedicated to the docking of fishing boats (83 m long, with depths ranging between 1.5 and 2 m). For storage of the goods landed or to be loaded, 6 warehouses are used, for a total capacity of 25,000 m^3, and coastal deposits for oil products with a total capacity of 20,000 m^3. In addition, there are another 4,000 m^2 of surfaces for temporary storage of goods and containers. Table 3 summarizes the general information and the main technical characteristics of the port of Vibo Valentia.

Table 3: General information and technical characteristics of the port of Vibo Valentia

GENERAL INFORMATION			
Country	Italy	Name	Vibo Valentia Port
Place	Vibo Valentia (VV)	Address	-
Port Authority	-		
Phone	-	Fax	-
E-Mail	-	Web	-
Latitude	38°43'26" North	Longitude	16°07'40" East
UN/LOCODE	IT VVA	ETA messages	Required
Medical Point	Present		
Main Activities	Liquid Bulk handling		
TECHNICAL CHARACTERISTICS			
Dimension	459,000 m^2	Architectural Type	Breakwater docks
Expansion/evolution Basin (radius)	-	Maximum ship dimension	>150 m of length
Body of water	410,000 m^2	Maximum depth	11 m
Landside Surface	49,000 m^2	Yard Surface	49,000 m^2
Total Quays Length	1,225 m	Quays Length	1,225 m
Seabed type	Sandy		
DEPTH (m) (min-max)			
Entrance Channel	11.2 m	Oil quay	2.5-9.4 m
Liquid Bulk quay	9.4 m	Fishing activity Quay	14 m

North of Vibo Valentia, but on the Ionic side of Calabria, near the mouth of the river Esaro and close to the town, at 39 ° 5 '10 "North of latitude and 17 ° 7' 38" East of longitude is located the port of Crotone (Figure 12).

Figure 12: Crotone Port Site

The port (Figure 13) consists of two artificial basins, with a surface area of 66,400 and 1,105,300 m^2 respectively delimited by a single piers with a total length of approximately 1,800 m.

Figure 13: Kroton Port

The smallest basin, separated from the larger basin by the Giunti pier, forms the old port of Crotone; it is not used by commercial shipping due to the shallow depth of its seabed (about 5 m) but it is still an excellent shelter for fishing boats, pleasure boats and patrol boats of the Port Authorities, the police station.

The largest basin, on the other hand, is delimited by a submerged pier of about 1 km in length, and constitutes the industrial port. The port has a total of 2,100 m of operational docks. Behind the docks there are 206,000 m^2 of port areas for the activities related to the loading and unloading of goods. In particular, 3 quays are operative, all having a maximum depth of 9 m: the Riva quay, which with its 488 m operating space allows 3 simultaneous approaches for the handling of goods such as zinc minerals, dryers and phosphates; the breakwater pier, 327 m for 3 simultaneous moorings, specialized for the handling of petroleum products and finally the Giunti Dock, 253 m operating for 2 approaches, specialized for handling chemicals and cements. The port also has 3 warehouses with a total surface of 215 m^2 equipped with cold storage for fish storage. Next to the port are located a coastal deposit, consisting of 23 tanks, with a total capacity of 18,000 $m^3$for the storage of phosphorite and 3 tanks with a capacity of 3,000 tons for the storage of sulfuric acid. The port also offers some services such as: piloting, which is mandatory for ships of more than 500 GRT, assistance at berth, always mandatory for ships of more than 500 GRT, and rescue and rescue that is secured by 4 patrol boats of the Port Authority, by 4 tugboats of the Fire Department for the fire service launches foaming always available at berth no. 4 (oil dock).

Table 4 summarizes the general information and the main technical characteristics of the port of Crotone.

Table 4: General information and technical characteristics of the port of Crotone

GENERAL INFORMATION			
Country	Italy	Name	Crotone Port
Place	Crotone (KR)	Address	Contrada Lamia 89013 Gioia Tauro
Port Authority	Gioia Tauro Port Authority		
Phone	+39 0966 588640	Fax	
E-Mail	info@portodigioiatauro.it	Web	www.portodigioiatauro.it
Latitude	39° 5' 10" North	Longitude	17° 7' 38" East
UN/LOCODE	IT CRV	ETA messages	Required
Medical Point	Present		
Main Activities	Bulk (Liquid and Solid) and oils handling		
TECHNICAL CHARACTERISTICS			
Dimension	1,311,300 m^2	Architectural Type	Breakwater docks
Expansion/evolution Basin (radius)	300 m	Maximum ship dimension	>150 m of length
Body of water	1,105,300 m^2	Maximum depth	9 m
Landside Surface	206,000 m^2	Yard Surface	206,000 m^2
Total Quays Length	2,100 m	Quays Lenght	2,100 m
Seabed type	Sandy		
DEPTH (m) (min-max)			
Entrance Channel	9	General Cargo Quay	nd
Liquid Bulk quay	nd	Solid Bulk Quay	nd
Quay for State Ship	5.5	Oil Quay	1.8 - 3

North of Crotone, still on the Ionian side of Calabria, is Corigliano Calabro, one of the largest centers in the province of Cosenza, extending from the last slopes of the Greek Sila towards the Ionian Sea for 196 km^2, occupying a good part of the Sybaris. Corigliano stands on three different heights: the village, 219 m above sea level; the Scalo at 34 m above sea level; the Schiavonea fraction at sea level. The port was built in the homonymous Gulf about 4 km respectively from the town of Schiavonea (south) and the industrial area (north). The port is also about 6 km from Corigliano Scalo, about 10 km from Corigliano Calabro and about 15 km from the centre of Rossano (Figure 14).

Figure 14: Corigliano Port Localization

The port, built entirely within the coastline (Figure 15), consists of a surface of water of 1,206,000 m^2. Access is via an entrance, 200 m wide (12 m depth), beyond which there is an expansion basin with a diameter of about 600 m (12 m depth), bounded by two wharves: the North Pier in length of 137 m and the South Pier in the length of 370 m.

Figure 15: Corigliano Port

From the expansion basin there are two long docks, respectively, 1,510 m and 470 m, with depths ranging from 7 to 12 meters, close to which there are about 300,000 m^2 of square. The length of the operational docks is 2,150m, compared to the 4,905 total available but for which the completion and tooling works have not yet been completed. Table 5 summarizes the general information and the main technical characteristics of the port of Corigliano Calabro.

Table 5: General information and technical characteristics of the port of Corigliano Calabro

GENERAL INFORMATION			
Country	Italy	Name	Corigliano Port
Place	CORIGLIANO CALABRO (CS)	Address	Contrada Lamia 89013 Gioia Tauro
Port Authority	Gioia Tauro Port Authority		
Phone	+39 0966 588640	Fax	+39 0966 588617
E-Mail	info@portodigioiatauro.it	Web	www.portodigioiatauro.it/
Latitude	39° 40' 15" North	Longitude	16° 31' 30" East
UN/LOCODE		ETA messages	
Medical Point			
Main Activities	Fishing and commerce		
TECHNICAL CHARACTERISTICS			
Dimension		Architectural Type	Excavation in backcountry
Expansion/evolution Basin (radius)	300 m	Maximum ship dimension	
Body of water	1,206,000 m^2	Maximum depth	12 m
Landside Surface		Yard Surface	300,000 m^2
Total Quays Length	4,905 m	Quays Length	2,150 m
Seabed type	Sandy and muddy		
DEPTH (m) (min-max)			
Channel	12	Container Quay	NO
Liquid Bulk Quay	NO	Solid Bulk Quay	NO
Car-carrier Quay	NO	General cargo Quay	12
Gas tankers Pier	NO	Oil Quay	NO
Passenger Quay	7	Fishing activity Quay	4- 12 m
Quay for State Ships	4		

2.1.2 Traffic operations and volumes

Gioia Tauro port has a central location in the trades among Asia, the Mediterranean Sea and the East Coast of the United States (Figure 16). For this reason, the port has a relevant role in intercontinental maritime traffic. Its location represents a meeting point between the East-West sea lanes and Europe. In relation to international trade fostering the route of the Suez Canal, the port has potentialities in relation to large communication plans and business development.

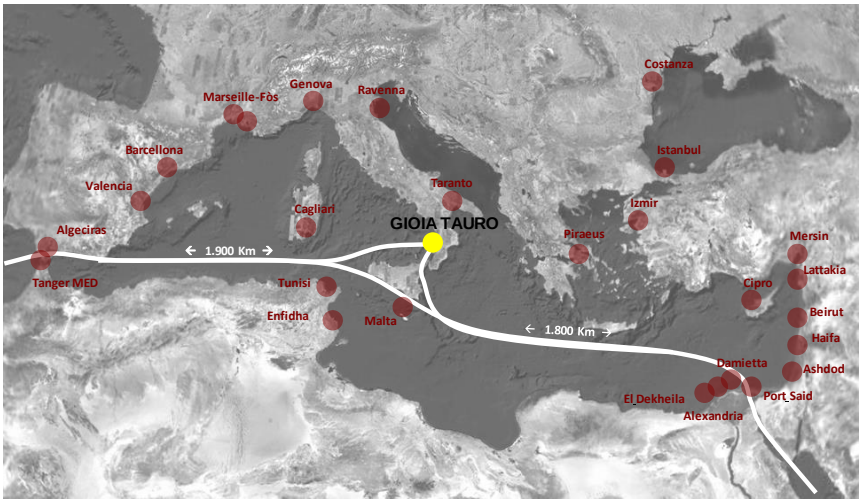

Figure 16: Gioia Tauro Port in the Mediterranean sea

The port of Gioia Tauro is affected by a complex system of international relations that link it with the main world economic areas (with a preference for Asian ones):

- ***Black Sea*** – Novorossijsk, Costanta, Burgas, Ilychevsky, Odessa;
- ***Far East and Oceania*** - Sydney, Melbourne, Adelaide, Fremantle, Singapore, Shanghai, Dalian, Xingang, Busan, Ningbo, Chiwan, Yantian, Xiamen, Qingdao, Nansha, Tanjung Pelepas, Vung Tau, Yokohama, Vostochniy;
- ***Indian subcontinent*** - Colombo, Nhava Sheva, Mundra, Karachi, Hazira;
- ***Central and South America*** - Suape, Rio de Janeiro, Santos, Buenos Aires, Montevideo, Rio Grande, Navegantes, Itapoa, Cristobal, Balboa, Freeport, Veracruz, Altamira;
- ***Mediterranean Sea*** - Mersin, Iskenderun, Beirut, Limassol, Alexandria, Ravenna, Trieste, Venezia, Capodistria, Piraeus, Izmir, Evyap, Gemlik, Istanbul, Tekirdag, Gebze, Aliaga, Ancona, Livorno, Genova, Sines, Fos Sur Mer, Barcelona, Valencia, Tripoli, Palermo, Khoms, Misrata, Haifa, Ashdod, Porto Said, Bari, Pozzallo, Rijeka, Ploce, Bar, Durres, Catania, Antalya, Napoli, Tekirdag, La Spezia, Civitavecchia, Algeciras, Malta, Beirut, Haifa, Las Palmas, Thessaloniki;
- ***Middle East*** - King Abdullah, Salalah, Jebel Ali;
- ***North America*** – Montreal, Long Beach, Oakland, Vancouver, Seattle, Port Everglades, Houston, New Orleans, Miami, New York, Boston, Baltimore, Norfolk, Savannah, Charleston;
- ***North Europe*** – Felixstowe, Amburgo, Antwerp, Le Havre, Rotterdam, Londra GP;
- ***South Africa, West and East Africa*** - Pointe des Galets, Port Louis, Dijbouti, Dakar, San Pedro, Lome, Tin Can Island, Cotonou.

In this market context, the port of Gioia Tauro, with a throughput about 3 millions of TEU/year, is one of the main transhipment port in the Mediterranean sea and the first port in Italy considering only TEU traffics (30% of the 10 million TEUs in Italy).

The potential market of Vibo Valentia, Kroton and Corigliano ports is represented by local and regional territories with their specific production and consumption (the great part connected to agriculture).

It should also be noted that the port of Vibo Valentia is connected to the Middle East and North Africa, which are the reference markets of the US Group of General Electric operating in the nearby industrial area of Portosalvo.

The traffic affecting the considered Calabrian ports are illustrated below in the following order: Gioia Tauro, Vibo Valentia, Crotone and Corigliano Calabro.

The traffic affecting the port of Gioia Tauro mainly concerns the transhipment of Container (at the terminal MCT) and of cars (at the ATGT Terminal). The MCT container terminal became operational in 1995 and its business developed at a rapid pace, assigning to the port, in a short time, the leading role in the Mediterranean in the transhipment sector. From 16,034 TEUs moved in 1995, after just 3 years, more than 2 million TEUs have passed, up to over 3.4 million TEUs in 2008. From 2008 onwards, the port of Gioia Tauro showed signs of loss, due both to the opening of new ports that have superior logistical advantages, and to a number of other economic and social factors. It should be noted that in the last 5 years the large international terminal operators have progressively oriented their interests towards the ports of the southern shore of the Mediterranean (Port Said and Tangier Med). Compared to 2010, the transhipment activity of the port of Gioia Tauro in 2011 recorded a decline of about 19%, due essentially to the abandonment of the port by the Maersk group, the Danish company that alone moved about a quarter of all the port volume of container traffic. In the years after 2011 the trend of traffic at the node showed a fluctuating trend

reaching a peak in 2013 with about 3 million movements and its minimum in 2017 with just 2 and a half million containers moved (Figure 17).

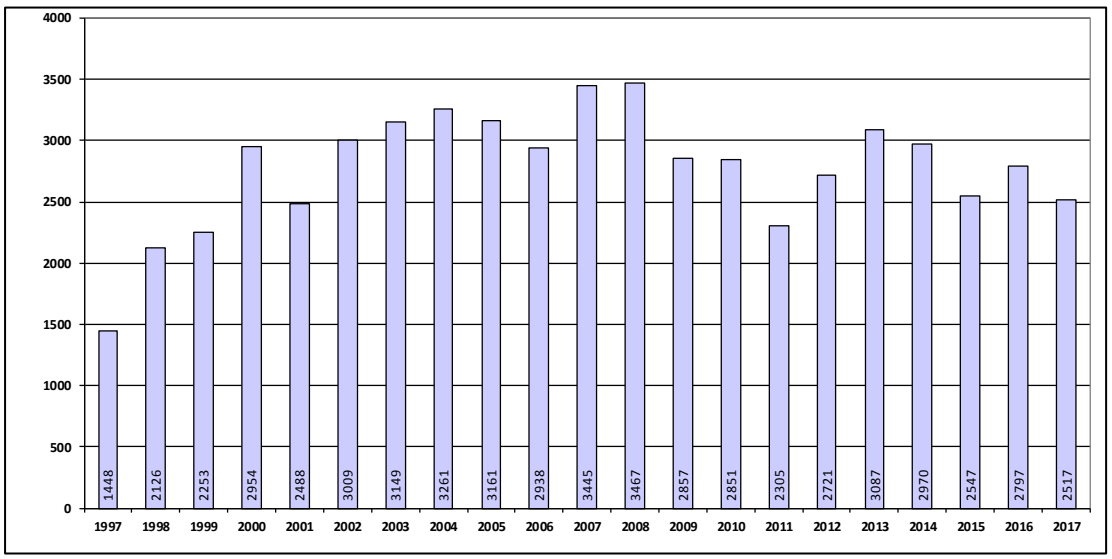

Figure 17: Container traffic volumes evolution (TEUS * 1000) in Gioia Tauro port

Figure 18 shows the trend in the number of container ships that landed at Gioia Tauro from 1995 to 2017. In the years between 1997 and 2008, the number of ships landed at Gioia Tauro remained, on average, on the 3,000 units with a peak in the 2002 which records 3,276 landings. The number of ships landed began to decrease from the year 2009, until reaching a historical low in 2011 with 1,454 container ships landed. It is clear that the trend in the number of ships landed at Gioia Tauro reflects the decrease in container traffic recorded from 2011 onwards.

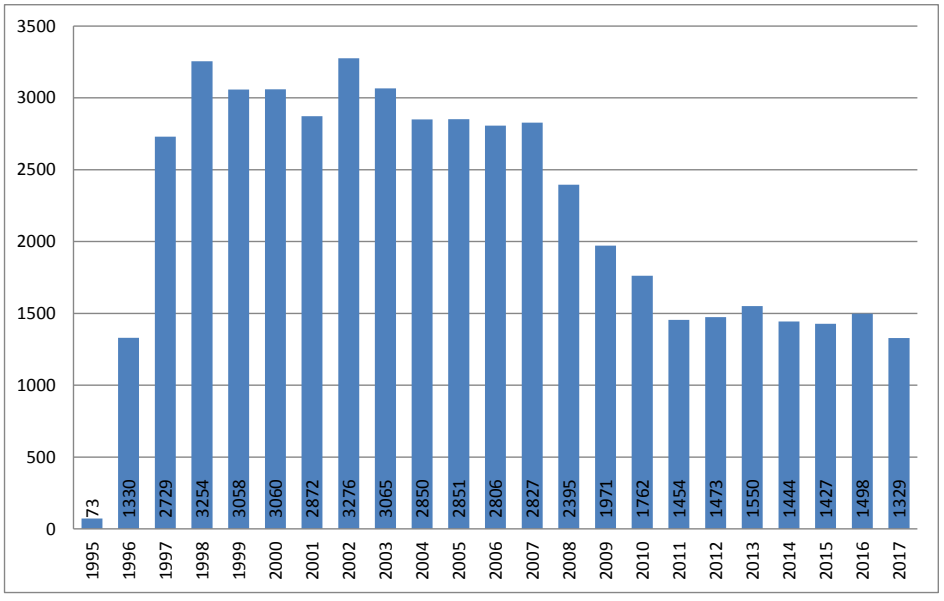

Figure 18: Container Ships landed in Gioia Tauro port

Figures 19 and 20 show respectively the number of passenger cars and the number of ships landed at the car terminal, managed by ICO-BLG, from 2012 to 2016. The number of passenger cars refers to the number of cars entering and leaving the terminal by sea (transhipment inbound and outbound transhipment) as well as the number of cars

driven by land (landside received and landside delivery). After a peak in 2013 with about 220,000 movements of cars (+ 75.52% compared to 2012) and 153 ships landed (+ 15.75% compared to 2012), the traffic suffered a strong setback with a downward trend that in 2016 recorded a number of movements 10 times lower than in 2013 and 3 times lower than in 2015 (-65.3%). Naturally, this trend is reflected in the data on the number of Ro-Ro ships landed at Gioia Tauro.

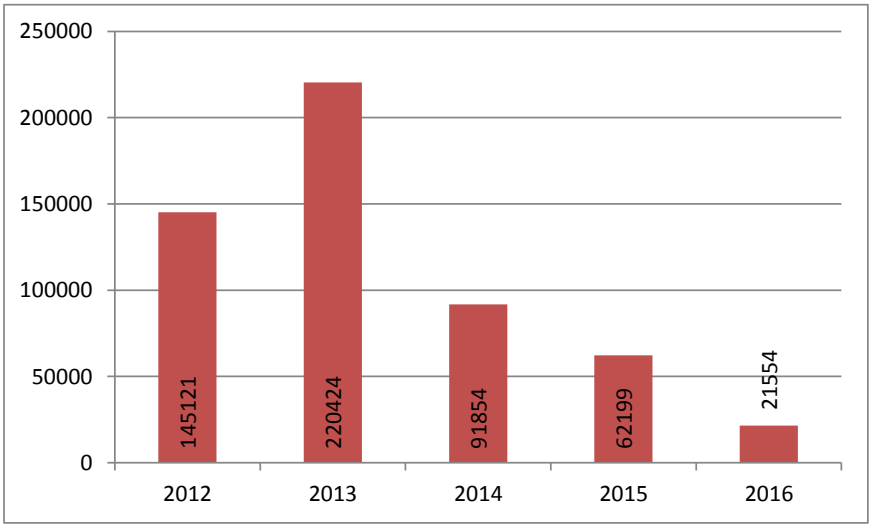

Figure19: Car Carrier traffic volumes evolution in Gioia Tauro port

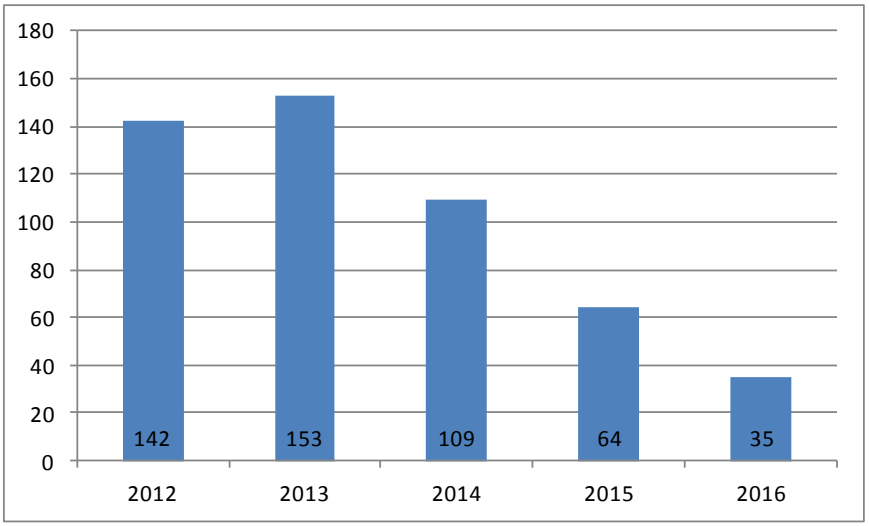

Figure 20: Ro-Ro Ships landed in Gioia Tauro port

The port of Vibo Valentia is affected by discrete commercial flows closely related to production activities and industrial settlements in the province of Vibo Valentia. The incoming commercial traffic consists mainly of fuels and gas destined for coastal deposits and the factories present in the area of Vibo Marina, while the outgoing traffic is essentially represented by industrial products coming from the neigh boring industrial area. Annually the port handles about 800 thousand tons of goods between solid bulk and liquid bulk. At present (Tab. 6), the Vibo Valentia dock receives an average of 18 tankers per month of the average capacity of 4,000 tons of finished product landed (fuel for transport and heating). In addition, every 2-3 weeks, a tanker that discharges bituminous oil is pumped to the port and is pumped through an oil pipeline into the AGIP tanks. The industrial activity for the

unloading of grains is limited to the docking of 4 ships per month. On average, the mercantile activity related to the transport of heavy structural work and machinery for the petrochemical industry involves the arrival of 3-4 ships a month that load products from the nearby industrial area of Portosalvo, located in the immediate hinterland at approximately 4 km south of the port. The shipment of bulk cement and bulk clinker produced by the Italcementi Portosalvo plant generates an average of 2 vessels per month.

Table 6: Cargo served in Vibo Valentia Port

Operator	Product	Ship Frequency (Ship/month)	Landing/Boarding
AGIP Basalti Energia srl Meridionale Petroli srl	Fuel for transport and heating	18	Landing
AGIP	Bituminous oil	2-3	Landing
	Corn	4	Landing
General Electric	Petrochemical products	3-4	Boarding
Italcementi	Bulk cement and clinker	2	Boarding

The handling of the Crotone port concerns both industrial products and commercial products; commercial activity is also linked to grain traffic and to the movement of cement. In particular 35% of the traffic involved in the port is due to international navigation and 65% to Ro-Ro navigation (Figure 21). Typically, the goods handled consist of 87% of bulk cargo, 11% of various components and 2% of dangerous goods (Figure 22).

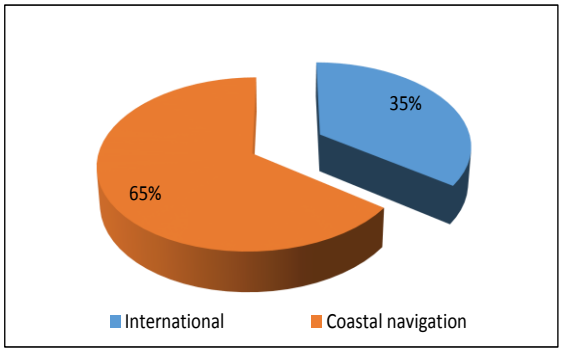

Figure21: Traffic in Crotone port

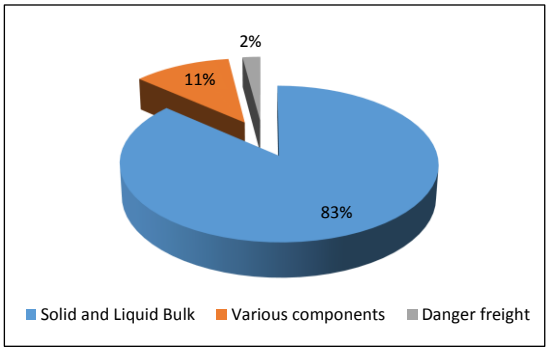

Figure22: Freights handling in Crotone port

Figures 23 and 24 show respectively the trends of the quantities of goods (thousands of tons) handled and the number of ships landed at the port of Crotone from 1998 to 2016.

Over the last few years, the trend of goods traffic affecting the port of Crotone has undergone a decrease: this finds its main motivation in the termination of some important production companies operating in the nearby industrial area. In 2016 the port was mostly used by solid bulk carriers, 50% of which were flying the foreign flag, and by OFF-SHORE ships to service the gas extraction platforms. The biomasses, the aeolian components, the fertilizers, the granulated slag, the iron silicate, are the goods transited by Crotone in 2016.

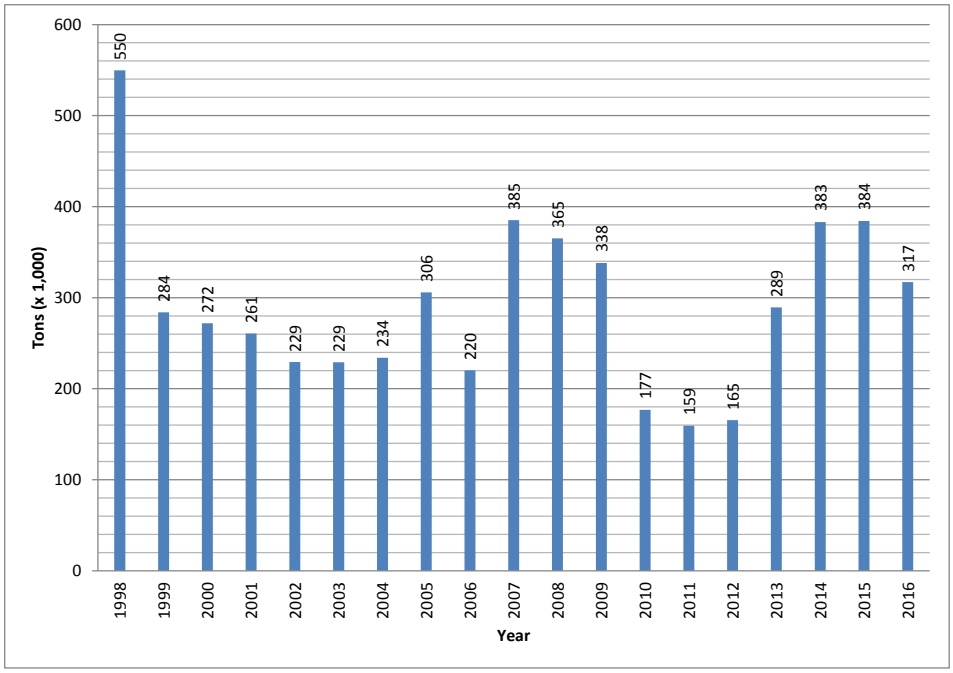

Figure 23:Traffic volumes evolution in Crotone port

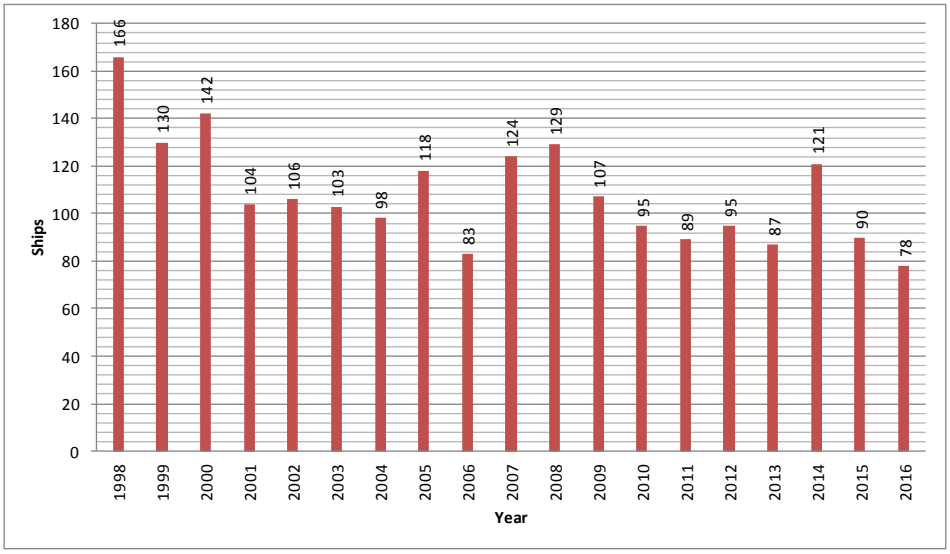

Figure24: Ships landed in Crotone port

Altogether the volumes of goods moved in 2016 showed a decrease compared to the previous year (- 17.4%), to which corresponded a decrease in the number of hits by commercial shipping carriers (- 13.3%). It should be emphasized that in 2016 the commercial traffic that involved the port concerned only the unloading of goods (imports) direct on the provincial and regional territory, no boarding operations were recorded (export).

Similarly to the port of Gioia Tauro, the port of Corigliano Calabro was built to boost the industrialization of the entire region; in particular, it should have been destined for the petrochemical industry). Currently, the port has modest commercial functions (minerals and cereals), industrial (cement) and oil, while fishing activity is flourishing. Figures 25 and 26 show respectively the trends of the quantities of goods (thousands of tons) handled and the number of ships landed at the port of Corigliano Calabro from 2004 to 2016. The volumes of traffic, still modest compared to the real potential of the port, register a substantial under-utilization of the port infrastructure. From 2002 to 2016, the movements at the port

involved an average of 330,000 tons of goods. But in 2004 there was a peak with the movement of about 1 million tons of goods (31% boarded and 69% disembarked) for 152 ships moored. The following years have recorded a decrease in traffic up to a minimum reached in 2012 with only 64,000 tons of goods handled. In the year 2016, 57 ships, mainly bulk carriers, have climbed the port, which produced 223,467 tons of goods handled, of which 42,800 tons were embarked and 180,667 tons landed. Compared to the previous year, an increase of 173.50% was recorded in the volumes of goods handled due to a significant increase in landed goods (wood to feed the thermoelectric power plants powered by biomass, clinker and iron silicate for neigh boring cement plants). Currently the only commodity sector that originates from the port is iron scrap.

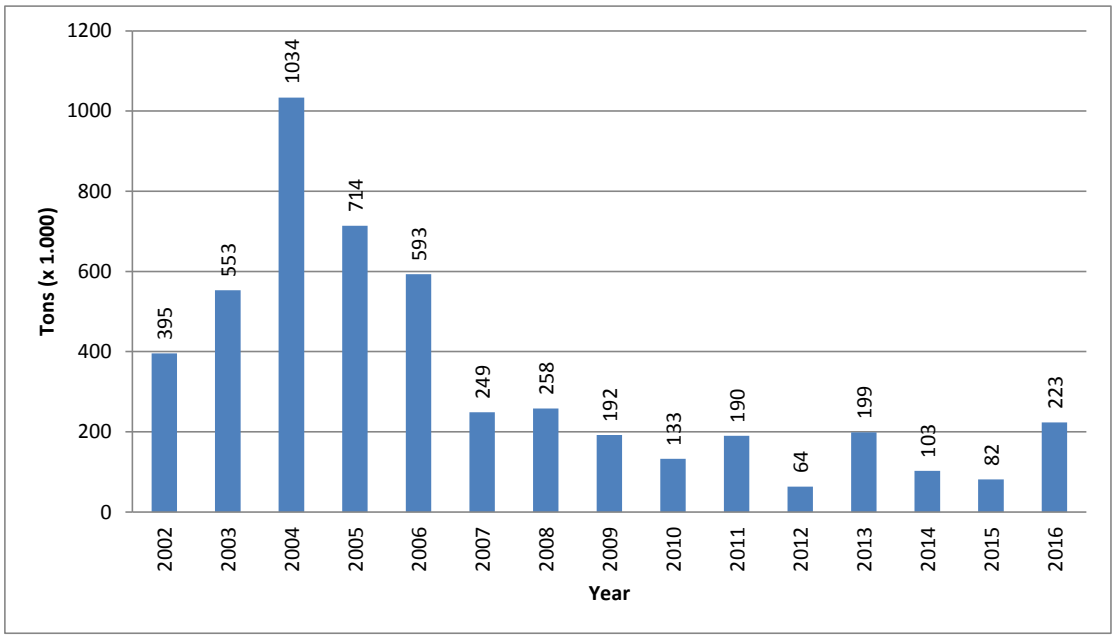

Figure25: Traffic volumes evolution in Corigliano port

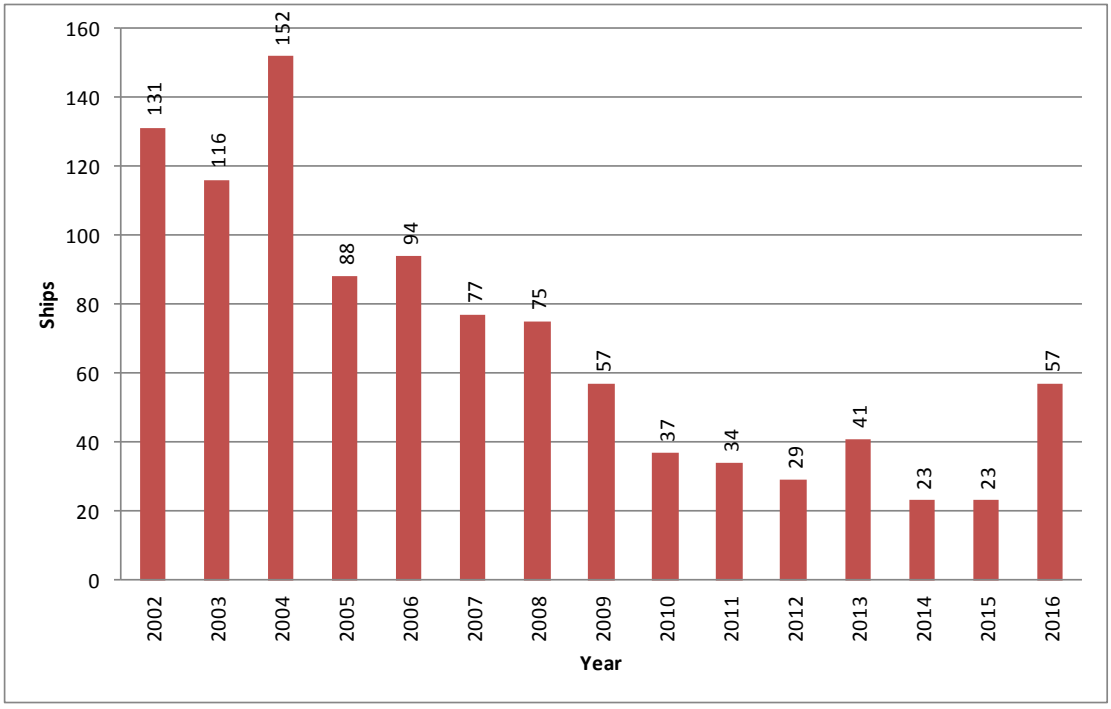

Figure26: Ships landed in Corigliano port

2.1.3 Main actors involved (private and public)

The main actors involved can be divided into two group:

- institutional stakeholders as the Calabria Region, the Metropolitan city of Reggio Calabria, the city local administration where the ports are located, the Gioia Tauro Port Authority;
- economic as the Chamber of Commerce of Reggio Calabria and its extension at regional level (Unioncamere), industrial representative in Calabria (Confindustria; Unindustria), Logistics and Transport Operators.

The public and private actors involved in the logistics chain of the Calabria port system are listed below:

- Gioia Tauro Port Authority (Calabrian and Strait Port Authority System);
- Customs Agency;
- Harbor Masters Office/Coast Guard;
- Maritime Health Office;
- Phytosanitary Office;
- Financial Police;
- State Police;
- State Prefecture;
- Freight forwarders;
- Shipping agents;
- Terminal operators;
- Rail transport operators;
- Road transport operator;
- Multimodal Transport Operators (MTO).

In particular the Port Authority of Gioia Tauro has a territorial competency on the ports of Gioia Tauro, Crotone, Corigliano Calabro, and also Palmi and Villa San Giovanni (Figure 27).

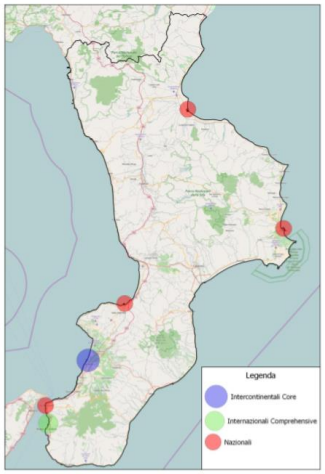

Figure27: European and national Ports in the port Authority of Gioia Tauro

The Legislative Decree 169 of 4 August 2016 entitled "Reorganization, rationalization and simplification of the regulations concerning the Port Authorities referred to in the Law of 28 January 1994 provides for a reorganization of the Italian ports governance with the establishment of fifteen Port System Authorities which will replace the current 24 Port Authorities (Figure 28) In particular, the port authority of the Calabrian and Strait system

includes, in addition to the ports already mentioned, the ports of Vibo Valentia, Reggio Calabria and Messina.

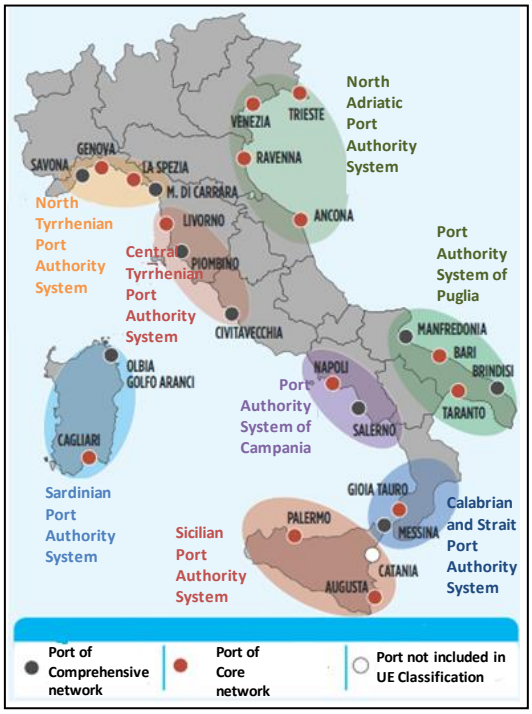

Figure28: New Italian port System

There are three main commercial and economic actors involved in Gioia Tauro: MCT, BLG e SOGEMAR.

The main activity of the port, the transhipment of containers, is carried out by the company Medcenter Container Terminal (MCT) of the Contship Italia group, which is 66% owned by Eurokai and 34% by Eurogate. MCT officially established itself in the port of Gioia Tauro in November 1993 and in September 1995 the first ship was docked at the port marking the beginning of the transhipment activity. Through the Goia Tauro terminal Contship Italia has revolutionized the logistics chain of the Mediterranean, becoming the first company able to meet the needs of the maritime sector, which requires large port infrastructures and efficient handling services.

The second activity in order of importance, is represented by the movement of cars. The car terminal of Gioia Tauro was founded at the end of 1999 with the establishment of the company BLG Automobile Logistics Italia S.r.l. (BLG Italia) by the BLG Logistics group in Bremen (Germany), the European leader in vehicle handling. In 2007, the company ICO BLG Italia was established. ICO BLG is the result of the participation between the company BLG Italia (50%) and the ICO N.V.(50%). In 2015 the ICO N.V. sells its shareholding to the shareholder BLG Italia. In June 2016 the company Automar S.p.A., participated by Bertani S.p.A., Grimaldi S.p.A. and Mercurio S.p.A., holds 50% of the shares of the company ICO BLG Italia whose company name is changed to AutoTerminal Gioia Tauro S.p.A. (ATGT).

With the entry of the new partner, the ATGT Company has started a promising activity of car logistics by land (car carriers and trains) and by sea.

The current traffic concerns the movement of vehicles arriving at Gioia Tauro by ship, train, car transporter and re-embarked mainly by ship with US and European destinations. Currently, 90% of the activity concerns FIAT vehicles that arrive at GT from the Melfi production plant by train and / or car transporter.

Today, with an area of 320,000 m^2 with a storage capacity of about 18,000 vehicles, the terminal is equipped to manage integrated logistics services for cars and commercial vehicles. About 100,000 m^2 of the aforementioned area also enjoys the status of customs warehouse. The area is equipped with n. 3 railway tracks for boarding / disembarking cars. A technical center (2,400 m^2) provides services including inspection, optional installation, repair and painting.

As regards the management of services and activities in the railway sector, the Gioia Tauro port over the years has seen the action of various subjects, today the only operating company is SOGEMAR. SOGEMAR, an intermodal branch of the Contship Italia group, was established in 1959 as a General Warehouse for the storage of goods, and since 1990 has contributed to the expansion of Contship Italia's freight transport business. The primary activities are: transport by rail (block trains), road transport and management of intermodal terminals. SOGEMAR is also able to offer top-level value added services in supply chain management, warehouse storage and customs procedures. In 1995 the SOGEMAR started its activity within the Port of Gioia Tauro, reaching a peak in 2006 with 90,000 TEUs.

Numerous activities are carried out in the port of Vibo Valentia: the transportation and storage of petroleum products; the transport and deposit of agricultural and industrial products; shipbuilding and storage. The fuel transport operators are AGIP spa (Eni Group), Basalti Energia srl and Meridionale Petroli srl (Sensi Group). Overall the AGIP, Basalti Energia and Meridionale Petroli depots represent loading stations for approx. 110 tankers, most of which are located in Vibo Marina, which distribute the product on the regional market all year round. Concerning the transport and storage of industrial products, the port of Vibo Valentia represents the reference point (for the supply of raw materials and distribution of finished products) for important companies located in the nearby industrial area of Portosalvo. In particular, through the port, the US Group of General Electric distributes refrigerants and related accessories, steel bases, tanks and other heavy carpentry products to the markets of North Africa and the Middle East. Another economic operator of reference for the port is Italcementi S.p.A boarding bulk cement and bulk clinker. Finally mention must be made of the Southern Calce S.p.A., located in the industrial area of Marcellinara located in the province of Catanzaro (about 65 km from the port), which through the port is supplied with clinker. On the port area there are 6 shipyards for the construction and repair of fishing boats and pleasure boats, 3 of which are located inside the port and 3 in the industrial area of Portosalvo. The shipyards located in the port are the Mangione shipyard, Cantiere Mandrea and the Marnav shipyard. These shipyards use slipways and external storage spaces.

Many companies gravitate in back port of Crotone and Corigliano Calabro. For example Saggese and CTC TRASPORTI operate in the field of freight intermodal transport and logistics; Ausimare Srl is a maritime agencies, VREMAR offers port maritime services for off-shore platforms.

2.2 Port-hinterland chain operations

2.2.1 Existing infrastructure (relevant for port-hinterland connections)

The port of Gioia Tauro is a core network port belonging to Trans European Network and in particular to:

- the Scandinavian-Mediterranean TEN-T infrastructural corridor, that is implementing and is planned to complete in the 2030 (TEN T, corridor 5);
- the Central North-South Rail Freight commercial Corridor, that will be implemented by the end of 2015 (RFC, corridor 3).

At regional level, the port is served by the road system (Figure 29) made up of the Statale 18 Naples - Reggio Calabria at 0.1 km and the A2 Salerno - Reggio Calabria motorway at 3 km, connected to the port with the east bypass still lacking link with the motorway junction.

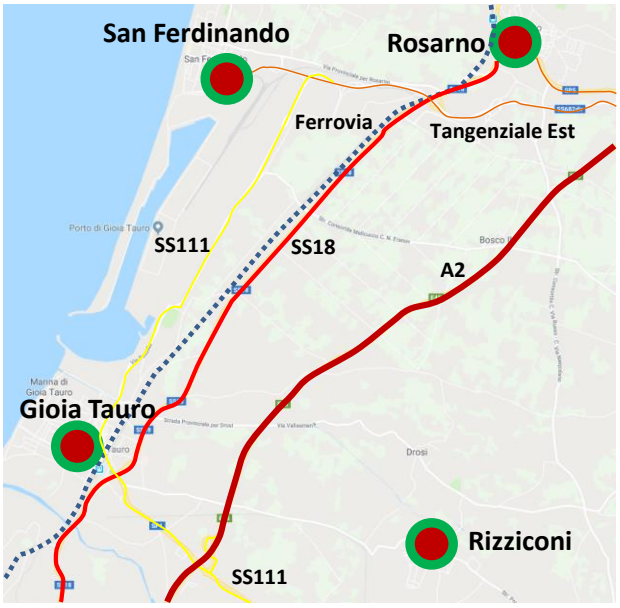

Figure29: Road system of Gioia Tauro port

The East ring road connects the port and the cities of San Ferdinando, Rosarno, Gioia Tauro. The road has the following characteristics: two lanes for each direction of travel with traffic divider, total width 21 meters (10.5 m for each direction of travel), with lighting only near the junctions. The road allows the splitting of urban traffic from the port, increasing the efficiency of the port and improving the urban quality of the neigh boring towns. It is also considered strategic, because it is able to allow, in a future perspective, the diversification of Ro-Ro passenger and short sea traffic from commercial and industrial ones.

As for the connection between the port and the city of Gioia Tauro, the situation is still critical; in fact, users coming from the south to reach the container terminal must use the SS 111 that crosses the inhabited centre of Gioia Tauro and then join the SS 18 through the crossroads Sbaglia.

The normal use is served by a roadway with two-way traffic and with lanes not separated by traffic dividers, moreover it is characterized by a narrow width of about 8 meters, which is not very easy to use near the railway underpass as it forms a bottleneck in the already restricted single carriageway, by not allowing double-way deflection.

The latter, the underpass, is located on the road connecting the SS 18 and Via Pozzillo, the main road (15 meters wide - without lighting) that serves as a link between the "equipped axis" (width 10-12 meters, served as public lighting) and the end of the stretch of the Tangenziale Est.

From the railway point of view, the port of Gioia Tauro is served by the Tyrrhenian coast line, Naples-Reggio Calabria, classified as part of the national fundamental network. The line is characterized by high traffic density and high quality of the infrastructure, is double-track, electrically powered and allows operating speeds between 50 and 100 km/h. The height of the gauge, in the section of line falling in the area, is 3,940 mm (coded FS P/C32); the maximum values of the longitudinal slopes are between 1.1% and 1.3%; the maximum permissible axle load in the railway section in question is 22.5 tons/axle, or 8 tons/m (FS D4 coding); finally the potentiality of the line is about 160 trains/day.

As for the Adriatic corridor, also of interest for the port container traffic of Gioia Tauro, RFI has planned measures to eliminate problems of shape (expansion of some tunnels) and capacity. The connection to the Adriatic railway line can take place through the Lamezia Terme – Catanzaro Lido and Paola-Sibari crossroad lines which connect to the Ionian railway which continues to Taranto. Lastly, the Taranto-Bari railway line guarantees the connection between the Ionian and Adriatic coasts of Puglia (Figure 30).

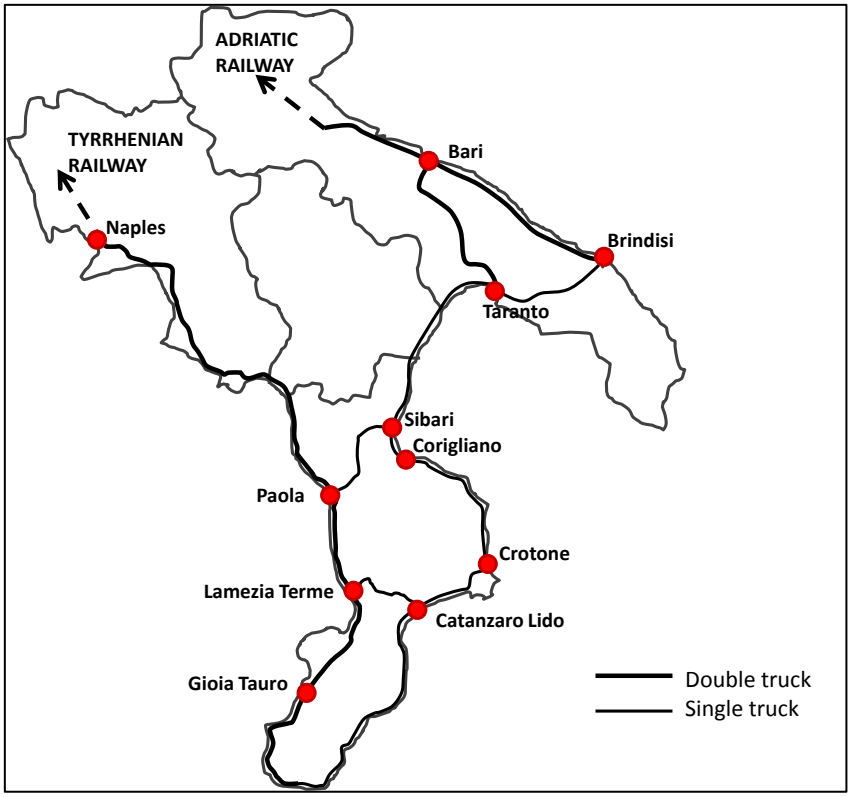

Figure 30: Gioia Tauro Railway connections

More closely, the railway connection system serving the port of Gioia Tauro is located within the customs area, but externally to the boundary of the maritime domain and consists of an area connected to the national RFI network including:

- entrance to the customs area located along the link road that leads to the Rosarno station (4 km away);
- San Ferdinando station;
- 7 arrival / departure tracks;
- pick-up / delivery tracks;
- selection rails, locomotive release, etc .;
- connections to internal terminals;
- 600 m operating boom;
- freight.

The connection area is in turn connected with the internal railway terminals to the MCT (container) and ATGT (automobiles).

The railway infrastructure outside the state and customs borders also includes a branch that leads from the Rosarno junction to the area on which a first freight village was built to meet the needs of the "second industrial zone" (Figure 31).
The railway terminal inside the ATGT concession is made up of 2 tracks of 500 m long tracks, which are used to make up the train that is set up by means of a reach stacker type of crane.

Figure 31: Current railway structure in the port of Gioia Tauro

Trains directed to the port of Gioia Tauro, whether coming from the north or south, are conveyed through the Rosarno station to the station of S. Ferdinando, where the composition and decomposition of the wagons in the convoy takes place. The San Ferdinando became "station" on 10/12/2006 and it represents the node of the connections to the different port terminals (pickup and delivery).

From a local point of view, the Calabrian port, in a south-west direction, is connected to the Rosarno station through a railway connection of about 4 km, consisting of 2 tracks, one of which is electrified.

The San Ferdinando station equipped with a bundle of 13 tracks of which:

- n° 1 track, the furthest west (sea side) with respect to the track beam, called "zero", not electrified, intended to stop trains and connected to the track only on the North side has a length of 800 m;
- n° 1 track, electrified but not adequate for the arrival / departure of trains, used for handling in the yard;
- n° 7 electrified circulation tracks equipped with switches controlled by an ACEI device. The tracks have a length of 700 m and are used for arrival / departure of trains;
- n° 4 non-electrified tracks used to carry out handling, selection and stop the wagons.

The length varies from 280 m up to 420 m. The easternmost track (mountain side) allows entry into the railway track of the amount. The binary beam is made within the state property and outside the area owned by the Port Authority. Another track intended for the handling of trains is installed along the area owned by the Port Authority. Initially the track continued in a straight line, at a later time it was moved by about 150 m to the East, then creating an inflection, to allow the expansion of the MCT yards (Figure 32).

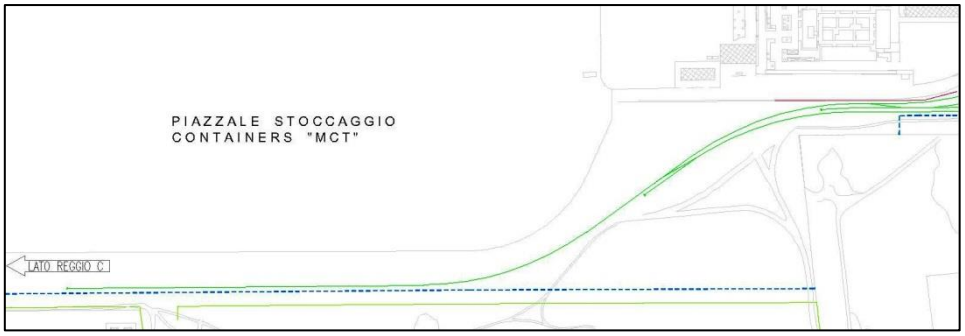

Figure 32: New position of binary beam

A gateway in the port of Gioia Tauro is under construction (40 Mn €). The aim is to connect the port to core railway network. The project has been assigned to SOGEMAR company in November 2015. Works are completed and the gateway should operate from the next months (Figure 33).

Figure 33: The gateway project for Gioia Tauro Port

Figure 34 provides a synoptic overview of the connections of the port of Gioia Tauro relevant for the connection with the regional territory and the hinterland.

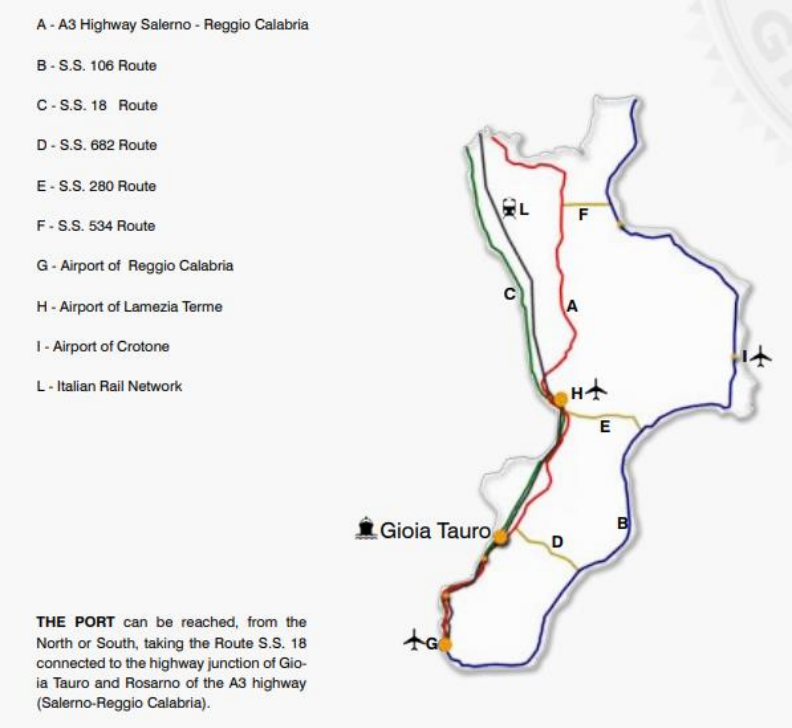

Figure 34: Road and railway connection of Gioia Tauro port (Source Port Authority, 2013)

For what concerns the port of Vibo Valentia, the accessibility to the motorway A2 Motorway, which has a total of five junctions serving the entire provincial area, is through the outputs of Vibo Marina-Pizzo to the North, distant 12 km, and S.Onofrio-Vibo Valentia 15 km away. A further link road is represented by the provincial Pizzo-Maierato which leads directly to the S.Onofrio-Vibo Valentia motorway junction. The road connections with the main centers of the province are assured, however, by the SS 522 that connects the port to the town of Tropea (25 km) and to the tourist area of Ricadi-Capo Vaticano, on the one hand, and to the town of Pizzo, on the other (4 km). The connection with the center of Vibo Valentia is via the SS 18 and, crossing the industrial area of Portosalvo, through the provincial road to Triparni (Figure 35).

Figure 35: Road system of Vibo Valentia port

Access to the railway network of the port area, instead, takes place through two railway stations: the Vibo-Pizzo station on the main Naples-Reggio Calabria line, 4.5 km away and the Vibo Marina station, for passenger and freight transport, on the secondary stretch

Lamezia-Terme -Rosarno-Gioia Tauro, 400 m from the port. The port itself is connected by a double-track railway line, currently not active and in a poor state of maintenance but potentially reactivable, which passes through the built-up area and reaches the Pola, Tripoli and Bengasi docks. The connection with the FS line takes place at the station of Vibo Marina which has rails for goods wagons and yards for the storage and sorting of cargoes. The nearest intermodal centre is instead that of Lamezia Terme, also managed by the Ferrovie dello Stato S.p.A.

The port of Crotone, however, is accessible by land through the S.S. 106 Ionic and the S.S. 107 Silana-Crotonese. The port is not far from the Ionian railway line (about 1 km from the station of Crotone). Figures 36 and 37 show the road and rail links serving the port.

Figure 36: Road and Rail system of Crotone port

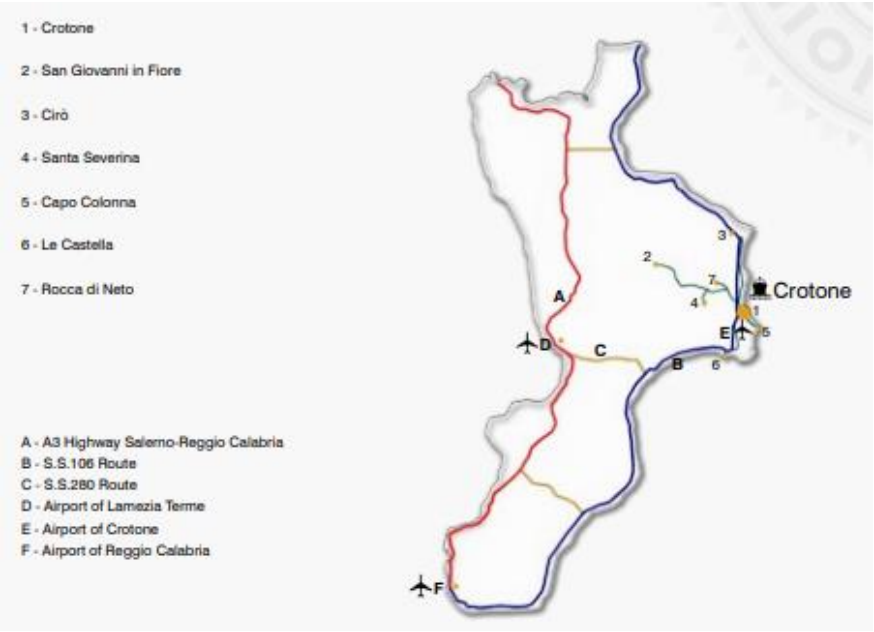

Figure 37: Road and railway connection of Crotone port (Source Port Authority, 2013)

The port of Corigliano Calabro is directly connected to the S.S. 106 Ionic through an independent junction, while the A3 Salerno - Reggio Calabria motorway can be reached via S.S. 106. The nearest railway station is that of Corigliano Scalo (5 Km) to which the port is not connected by any track (Figures 38 and 39).

Figure 38: Road and Rail system of Corigliano port

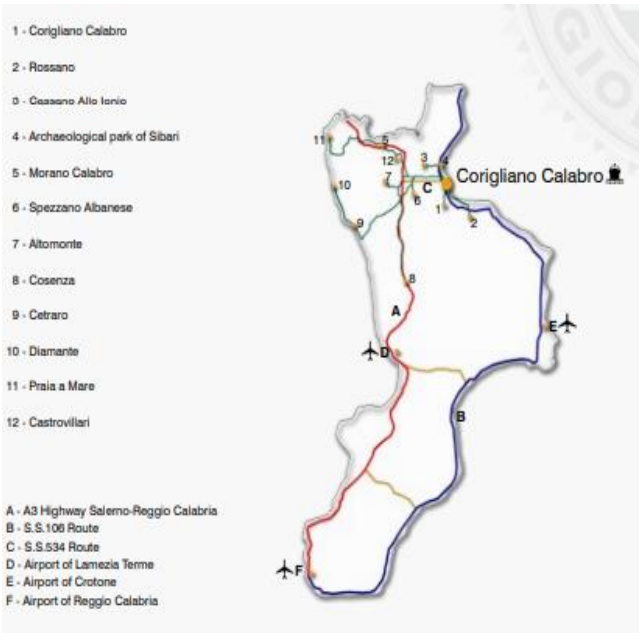

Figure 39: Road and railway connection of Corigliano port (Source Port Authority, 2013)

2.2.2 Services provided by the main actors involved in port-hinterland connections operations

Table 7 offers a synoptic overview of the services offered in the Calabrian ports of Gioia Tauro, Vibo Valentia, Crotone and Corigliano Calabro, distinguishing between sea side services, land side, useful services for connections with the hinterland and other services.

Table 7: Service Provided in Calabrian ports

Port	Sea Side	Land Side	Hinterland connection	Other Facilities
Gioia Tauro	Pilotage Towage Mooring Bunkering	Freights Handling	SOGEMAR (Railway Operator)	Police Carabinieri Guardia di Finanza Border police Customs Fire Department Weather Service Medical Point Supervision
Vibo Valentia	Pilotage Towage Mooring Bunkering	Freights Handling		Guardia di Finanza Fire Department Harbor Master Medical Point Divers Weather Service
Crotone	Pilotage Towage Mooring Bunkering	Freights Handling		Fire Department Customs Harbor Master Medical Point Divers
Corigliano	Pilotage Towage Mooring Bunkering	Freights Handling		Police Guardia di Finanza Fire Department Customs Harbor Master Port Authority

In all the ports analysed, the "sea side" services concern the piloting, the trailer, the mooring and the bunkering or the refuelling of the ship (fuel, water, energy). On the other hand, the "land side" services essentially concern the handling of goods arriving / departing from / to the port, which is treated with specific means depending on its characteristics (Table 8). It should also be noted that in the ports of Vibo Valentia, Crotone and Corigliano, characterized by an intense recreational activity (especially during the summer), a series of services are offered to boats (repair) and to people (toilets, showers, refreshment points) , telephone booths, etc.).

As for the services to ensure connections with the hinterland only in Gioia Tauro there is a railway service operator who, with difficulty, is able to guarantee some sea-iron intermodal services.

The specialized services of safety and prevention in the ports are guaranteed by the Fire Brigade, responsible for the emergency and rescue fire-fighting sector; by the Guardia di Finanza agents who, in support of the customs service, take care of the control of the goods; by the State Police to which the Frontier Police is added at the Port of Gioia Tauro); from customs (where present).

Table 8: Equipment of Gioia Tauro, Vibo Valentia, Crotone and Corigliano ports

Port	Operator	Equipment
Gioia Tauro	MCT	– 27 Gantry Cranes (9 Mega post Panamax and 18 Super post Panamax) – 1 Harbor Mobile Crane – 16 Skeletal Trailers (55 tons) – 12 Multitrailer Train (5 trailers each) – Multitrailer Tractors – 12 Rolltrailers (40 -80 tons) – Rolltrailers with gooseneck (40-80 tons) – Reach Stackers (45 tons capacity) – 2 Reach Stackers (40 tons capacity) – 2 Reach Stackers empty loader (8 tons capacity) – 6 Front Stackers empty loader (8 tons capacity) – 1 Fork Lift Ro-Ro – 1 Fork Lift (6 tons) – 7 Fork Lift (3 tons) – Fork Lift (2.5 tons) – 95 Straddle Carrier – 10 Terminal Tractor – 1 Lift Platform – 2 Goosneck
	BLG	
	SOGEMAR	
Vibo Valentia		– 1 Harbor Mobile Crane (7.5 tons) – 2 Harbor Mobile Crane (14 tons) – 1 Harbor Mobile Crane (36 tons) – 3 Mechanical shovels (1 tons)
Crotone		– 2 pneumatic system for cement handling – 4 pipeline – 2 Harbor Mobile Crane (100-250 tons/h) – 1 Harbor Crane to load sacks with conveyor belt (range 250 tons/h) – 2 elevators – 2 Redler elevators ; – 1 Fork Lift (4 tons) – 1 Fork Lift (5 tons) – 2 Mechanical shovels
Corigliano		– 4 Harbor Mobile Crane

2.3 Port-hinterland chain governance

At present the ports of Gioia Tauro, Crotone, Corigliano and Vibo Valentia are managed by the Port Authority of Gioia Tauro.

With reference to the ports governed by the Port Authority of Gioia Tauro, Figure 40 summarizes the chain of governance with reference to responsibilities, coordination and network initiatives.

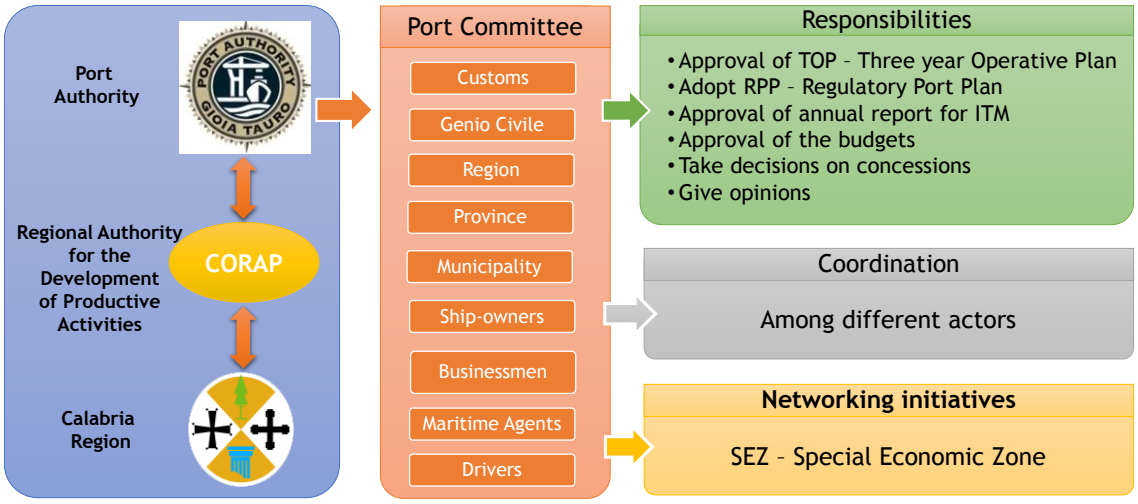

Figure 40: Chain governance of Gioia Tauro, Crotone and Corigliano ports

In port management, the Port Authority interfaces with the Region through the CORAP and finalizes the management activities with the structure of the Port Committee

The Region has legislative, administrative, financial/fiscal and regulatory powers. Among these, it approves the General Urban Plans, which periodically defines the scope (residential, commercial or industrial) of the territorial areas.

CORAP has the role of promoting the establishment of industries, handcrafts and service business in the competence area, by expropriating lands, collecting concession fees, making available infrastructure and equipment, and providing services and consultancies.

The Port Authority is a public-economic body with the tasks of "direction, planning, coordination, promotion and control of port operations" (Article 6 of Law 84/94). It is responsible for regulating and coordinating port entrepreneurial entities and for planning and directing infrastructure investments.

The port committee is composed of a head of customs services representing the Ministry of Finance; from a civil engineering manager for maritime works, representing the Ministry of Public Works; by a delegate of the regional council; by a delegate from the province; by mayors of the municipalities where the ports are located; by a delegate from the chamber of commerce, industry, crafts and agriculture; from shipowners, entrepreneurs, shippers; maritime agents and advisers, hauliers operating in the port area.

The specific institutional functions of the Port Committee are:

- approve the three-year operational plan, subject to annual review, concerning the development strategies of port activities and the interventions aimed at ensuring compliance with the set objectives;
- adopt the port regulatory plan;

- approve the annual report on the promotional, organizational and operational activities of the port, on the management of services of general interest and on the maintenance of the common parts in the port area;
- approve the budget, the variation notes and the final account;
- deliberate on the concessions;
- expressing opinions.

In Calabria Region the coordination of the industrial areas is entrusted to CORAP. It is a public economic instrumental body of the Calabria Region. CORAP is entrusted with the functions of development and enhancement of the production and industrial areas, exercising all the functions previously assigned to the individual Consortia for the Development of industrial areas by Law n. 38 of 2001 as well as the functions delegated to it and instrumental in the development of productive, industrial, economic and service activities.

CORAP's roles are:

- to monitor compliance with regional, national and European law, particularly with reference to environmental issues;
- to approve modifications to the Urban Plan of the industrial area;
- to implement infrastructural works within the port area.

It should also be addressed that the process for setting up the Special Economic Zones (SEZ) was activated. In 2018 the Italian Parliament has approved a decree to create a SEZ in Italy. SEZ could give incentives and advantageous conditions in terms of duties, taxes, financial and administrative aspects including the industrial area. These incentives and favourable conditions aim to promote the development for the companies already in the area, the employment and the integration in the SEZ of new companies, even international ones. The Calabria Region has approved a strategic plan where SEZ is individuated for the region. The area around the port of Gioia Tauro is the core of Calabrian SEZ. Other areas complete the Calabrian SEZ. The other ports included in the port system of Gioia Tauro (Corigliano, Crotone, Villa San Giovanni, Vibo Valentia) are included in the SEZ.

Principal benefits connected to SEZ include investment stimulus and incentives for economic operators. With the aim of supporting the mid and small companies that operate in the SEZ, the Calabria Region, in full compliance with the applicable dispositions regarding state aids, will create operating incentives for a up to 3 year tax period. The implementation standards in order to access to the benefits are defining by the Italian government.

3 BOTTLENECKS TOWARDS BECOMING AN INTEGRATED HUB

Freight transport and logistics similarly to most of the modern industry systems are multi-governance ones. This requires the set up and functioning inter-institutional cooperation processes and agreements. The coordination and integration of different stakeholders, their competences and skills in a single logistics chain whose operation is determined by the availability of infrastructure components as well as machinery, productive as well as procedural and administrative elements. For these reasons it is important to identify the market, infrastructural, operational, institutional and innovative bottlenecks that create problems within the logistics and transport chain and in the relations between ports and hinterland.

The bottlenecks, present in the Calabrian port system and in particular in the ports of Gioia Tauro, Vibo Valentia, Crotone and Corigliano, have been identified and analysed through the contribution of relevant stakeholders. The stakeholders have shared different views and perspectives depending on their specific business environment and the level of integration within the port-hinterland system. According to local stakeholders, the existing bottlenecks have clear impacts on the competitiveness of the port-hinterland system.

The identification of the main bottlenecks and of their impact on port-hinterland system are shown below, distinguishing between the ports of Gioia Tauro, Crotone, Vibo Valentia and Corigliano.

3.1 Market bottlenecks

Gioia Tauro:

The main limit of the port of Gioia Tauro is represented by the fact that it is a port exclusively linked to transhipment and therefore vulnerable to the decision-making system of the major international ocean carriers and the competition of other Mediterranean ports. The mono-functionality of the port did not allow to extend to the surrounding territory the benefits of an economic nature, which remained limited to the narrow port area. Large container ships arrive in the port, unload their containers, which are loaded on feeder ships that leave for local distribution. A complex of activities that takes place within the port area without any connection with the economic and social activities of the Hinterland.

Crotone:

The main problems related to the markets that are found in the port of Crotone can be summarized in the following points:

- the lack of commercial connections with the prospective Balkan countries and with the Eastern Mediterranean countries;
- goods traffic characterized only by imports (at the port of Crotone only ships arrive for the supply of raw materials from the companies located in the port hinterland).

Vibo Valentia:

The main problems related to the markets for Vibo Valentia port are related to the limited dimensions of port, the difficulty in land connection, especially with industrial areas and main national network (motorway and railway). The position of the port does not encourage the market attraction.

Corigliano:

The main problems related to the markets for Corigliano port are related to the modest land connection, especially with main national network (motorway and railway), and an insufficient marketing activity addressed to attract freight maritime traffic flows, in particular from East and South Mediterranean Sea.

3.2 Infrastructural bottlenecks

Gioia Tauro:

The Port of Gioia Tauro is configured as a high-capacity terminal thanks to the port infrastructures, the wide spaces available, the ample and technologically advanced equipment for handling the goods of which the terminal operators present at the port are equipped. However, the Port is not very well connected to the territorial context due to the inadequacy of road and rail links (which are still undergoing modernization).

The planned direct connection between the port and the Gioia Tauro junction of the A2 motorway is missing, as well as completion of the electrification of the railway link to the national network.

It is also necessary to point out the limits of the regional railway network which is not suitable for handling large containers (high cube) due to problems related to the infrastructure (gauge, rails, etc.) if not to the detriment of transfer times and costs handling. The critical issues related to connections with other transport networks strongly penalize intermodality and sea-land integration.

The current operational configuration of the port of Gioia Tauro, in the back-port areas, lacks the presence of logistic infrastructures that are able to produce logistic activities with high added value so that the port can also open up to different productive realities within a concrete and wider development project involving the retro-port territory and the regional and inter-regional hinterland.

Vibo Valentia

The port of Vibo Valentia presents numerous infrastructural problems that affect its operation and competitiveness. These critical issues concern both the port area and the system of connections with the territory.

In the port area we highlight:

- the silting phenomena, frequent during the winter season, affecting the entrance channel and the quays placed along the overflow pier, require a continuous dredging of the seabed;
- the low draft of the port does not allow access to large vessels and limits the expansion of volumes of commercial traffic;
- the serious infrastructural and structural deficiencies of the quays and aprons generate functional problems;
- the lack of quays in the northern part makes this area of the port unusable.

Regarding the system of connections with the territory, the absence of adequate infrastructures between the port and the road and rail networks is observed.

In particular, the road connection to the primary network (Highway A2), which takes place through the SP 12 is particularly uncomfortable due to the type of route (excessive slope and tortuosity) of the distance (17 km), infrastructure shortages and heavy vehicle traffic direct to coastal establishments and fuel depots. The railway connection between the port area

and the railway station of Vibo Marina, although existing, has not been used for some time and is in critical condition.

To the above limitations are added urbanistic constraints, as the port is completely incorporated in the urban context. This precludes any possibility of expansion of the port area.

Crotone:

The critical infrastructures of the port of Crotone concern both the port area and the road and rail connections. In the port area there are:

- silting phenomena with a consequent decrease in the depth of the seabed and the need for continuous dredging operations;
- infrastructural deficiency conditions of the piers and docks (the old port of the port, wharves of the breakwater piers and the port of the new port, new port docks).

As regards the system of connections serving the port, the inadequacy of the road network is highlighted above all in terms of the connection with the nearby industrial area and the lack of a railway connection dedicated to the port.

These critical issues constitute a deterrent from the point of view of an insertion into the Adriatic corridor of the port of Crotone, as a port with a cabotage and international commercial vocation.

Corigliano Calabro:

At present, the infrastructures in the port area are not complete, the basic plant equipment are also lacking, such as lighting, signalling, sewage system, gas and electricity distribution network that are clearly undersized or completely absent in some areas. of the port.

The port is heavily penalized by the lack of a railway connection and the inadequacy of the connection with the main road network (State Road 106) represented by a dirt road and difficult to access for heavy vehicles. The nearest railway junction is that of Corigliano Scalo (5 Km) to which the port is not connected by any track.

These critical infrastructures represent a strongly penalizing element that involves a considerable reduction in the capacity of the port, also with a view to the possible activation of permanent connections with Greece and a possible inclusion of the port in the direction of commercial traffic along the Adriatic corridor "of which it can represent, together with Crotone, the Calabrian reference point.

3.3 Operational bottlenecks

Gioia Tauro:

The operational bottlenecks of the port of Gioia Tauro are mainly linked to the lack of logistics and railway operators that guarantee the creation of an integrated logistics hub, able to enhance the intermodality and create a relationship with the surrounding territory.

However, this criticality is closely linked to the critical issues found on other levels (markets, infrastructures, institutions) and which make the port lacking competitive capacity (high transfer times and high handling costs) in intermodal transfers (sea - road and sea - rail).

It should also be noted that the customs office at the port has limited operations: it does not operate night service (from Monday to Friday 8:00 am/6:00 pm), Saturday is only open until 13:00 and on Sundays it is closed.

Besides Customs agency has been implementing the so-called “Customs Single Window” (Sportello Unico Doganale). However, stakeholders stressed that the system is far from being implemented at its full extent.

In the everyday practice, stakeholders remark also that the Customs agency tends to follow a quite restrictive interpretation of the applicable regulations and this affects the timeframe to take into account in order to perform all relevant procedures.

The stakeholders highlight long times linked to the control of goods through container scanning procedures. This control is currently performed by the MCT inside the container terminal. They ask to have scanner tool managed out the MCT Terminal and by Customs in order to improve the operational performance.

Vibo Valentia – Crotone - Corigliano:

The operational difficulties of the ports of Vibo Valentia, Crotone and Corigliano are mainly connected to the critical infrastructures that are found both in the port area and in road and rail connection systems. All this constitutes a deterrent for sector operators (terminal operators, commercial operators, logistics operators) and determines the absence of both operators for the management of port areas and goods handling services and transport operators to guarantee the services of connection with the hinterland and the other Calabrian ports.

In addition to Crotone there are problems related to the pollution of the seabed in a significant part of the port that make it inaccessible and therefore not usable in large areas.

In addition, local stakeholders complain of poor operations due to weak governance at the Port Authority level.

3.4 Institutional bottlenecks

Gioia Tauro:

The main critical issues at the institutional level that, at present, are found in the port of Gioia Tauro can be summarized in the following two points:

- from May 2014 the Port Authority of Gioia Tauro is managed by an extraordinary commissioner; it translates into an operational slowdown, a weak institutional presence on a national and international scale, in the absence of a interlocutor for stakeholders;
- the presence of various bodies and institutions, which play an important role within the port-territory complex (Ministries, Port Authority, Consortium of industrial areas, Region, Railways, etc.), has given rise to a decision-making system scarcely effective characterized by conflicts of competences, slowness and bureaucratic delays;
- CORAP which should manage in a unitary and coordinated way the pre-existing ASI (Industrial Development Area) is not yet fully operational.

All the difficulties detected in relation to the Port Authority in the port of Gioia Tauro also concern the other ports of the system (Vibo Valentia, Crotone and Corigliano Calabro)

Vibo Valentia:

Currently the port does not have a structure that in the field of commercial and institutional marketing, is able to enhance local resources, to put them among themselves "in a system" so that they can jointly increase and strengthen the few activities present, as well as attract them new.

Corigliano

The institutional criticalities of the port are, at present, linked to the infrastructural situation of the node. In fact, the port infrastructure has not yet been completely completed and part of the works already carried out, lacking testing, are not operational and therefore cannot be used by any interested commercial subjects.

3.5 Innovation bottlenecks

Telematics solutions are very important to simplify the administrative procedures related to multimodal transport. ICT real time information initiatives can be implemented even between nodes to monitor and increase the effectiveness and efficiency of the logistics chain and its basic operations. Still, these seem to be more local or in any case associated to the network of operations of single Multimodal Transport Operators rather than “open” and integrated at the wider national and European transport system scale.

In general the stakeholders’ assessment on services provided is not satisfactory in terms of innovation contents. The level of digitalisation of internal management tools and digital staff, skills are very diverse among organizations and sometimes they are completely absent. The automation of vehicles and operations is considered necessary to guarantee the efficiency and effectiveness of port services and connections with the hinterland. Innovation gaps have an impact on the efficiency and competitiveness of the whole logistics chain.

For many years there is the possibility to create an inland port that can aggregate local businesses and key institutions, to contribute to the development of the hinterland exchanges in southern and national scale. The hypothesis aims to give Gioia Tauro the role of strategic hub for the catchment area including Sicily and Calabria.

4 MEDIUM-TERM SCENARIOS

The design of the scenarios depends on the development strategies at different scales. In particular, plan and program tools, community projects and other tools that could influence the scenario structure should be considered. It is possible to distinguish these elements on three geographical scales:

- National:
  At national level it is necessary to consider references of community and national strategies on economic development and development of transport networks (plans and programs on an international, European and national scale). Besides, in terms of ports planning, the reform of the governance of port network authorities is a crucial point.
- Regional:
  The regional planning tools are made from the Transport Regional (Piano Regionale dei Trasporti – PRT) and the Plan for the implementation of the Calabrian port. The plans set targets and provide programmatic guidelines of the regional transport and the structure of the Calabrian port system. They proposes the achievement of strategic objectives through the implementation of actions, of infrastructural material and immaterial measures, regulatory and management. Besides, at regional level, investment for the adaptation of the Ionian railway line, the processes for the activation of the SEZ and the establishment of the CORAP have been activated. SEZ will provide incentives and advantageous conditions in terms of duties, financial and administrative aspects including the industrial area. While the CORAP aims to coordinate and manage regional industrial areas (ex ASI).
- Local:
  Local planning tools in the port area are to be identified in the Port Master Plan (Piano Regolatore Portuale - PRP) and the Three-year Operational Plan (Piano Operativo Triennale - POT). The PRP refers to the long-term planning of ports, while the POT gives a view of the effective operational development covering a period of three years.

4.1 Main factors to influence future development

According with the local context analysis developed in the previous Chapters, the future development at the Calabria port system is expected to be influenced by several elements which relate to infrastructure, innovation as well as market and industry developments. These factors are summarised below with reference to two different time-horizons: short term, up to 2025, and mid-term afterwards, up to 2030:

- **Market**
  - ***Short term***:
    - improvement of the existing operations thanks to new commercial agreements and strategies by the commercial stakeholders involved in the maritime and hinterland logistics chain;
  - ***Mid term***:
    - development of logistics areas in the back-ports for the introduction/expansion of value added logistics services and operations;

- extension of the port system catchment area to the whole South of Italy, in relation to both the automotive and commercial flows related to agri-food and engineering production;
- operating entry in New Silk Maritime and Railway Road;
- activation of New maritime links with the south and east of the Mediterranean, in particular in the Ro-Ro field.

- **Infrastructure**:
  - ***Short term***:
    - improvement of the railway connection to the Ionian-Adriatic network (new and/or completion);
    - upgrade/completion of docks, piers and yards and construction of any new quays in the smaller ports (Vibo Valentia, Crotone, Corigliano Calabro).
  - ***Mid term***:
    - upgrade of road and rail infrastructures connecting to the regional and national hinterland;
    - various actions are planned at local level:
      - in the case of Gioia Tauro: construction of the southern connection to the motorway and functional completion of the railway link to the national network; construction of new Ro-Ro quays on the west pier and/or on the area next to the Gioia Tauro city (south side of the evolution basin);
      - in the case of Crotone and Corigliano Calabro railway and road connection infrastructures; decontamination of the port site;
      - in the case of Vibo Valentia, upgrade of the roadway connection between the port and the motorway, improvement of accessibility in urban areas;
    - implementation of logistic infrastructures in the back-port areas;
    - implementation of the Calabria port System Project, as well as improvement of the road and rail last mile connections, new Ro-Ro terminals developed in the ports.

- **Operational**
  - ***Short term***
    - establishment of a fully operational single window customs;
    - full operation of the SEZ;
    - increase the competitive capacity in intermodal transfers also through innovation and infrastructure; inter alia, displacement and efficiency of the container controls through a scanner at the port of Gioia Tauro;
    - simplification and speeding up of procedures related to the transfer of freights and interaction between the various actors in the supply chain, also through ICT tools.
  - ***Mid term***:

  - creation of an integrated logistics hub, able to enhance intermodality and create a relationship with the surrounding territory (interport activation and CORAP);
  - increase the competitive capacity in intermodal transfers also through innovation and infrastructure;
  - push for the automation of the handling functions inside the port terminals.

- **INS-Institutional:**
  - ***Short term***:
    - new Port Authority System;
    - designation of the President of the System Port Authority;
    - activation of the Special Economic Zone (SEZ);
    - development and implementation (by decision makers) of planned infrastructures and technological solutions;
    - processes speeding by different public entities or national infrastructure managers; or that may require the disclosure of information and data between private operators and commercial bodies.
  - ***Mid term***:
    - development and implementation (by decision makers) of planned infrastructures and technological solutions;
    - processes speeding by different public entities or national infrastructure managers; or that may require the disclosure of information and data between private operators and commercial bodies.
- **INN-Innovation**:
  - ***Short term***:
    - simplification and speeding up of procedures related to the transfer of freights and interaction between the various actors in the logistics chain, through ICT tools;
    - creation of a PCCS - Port Calabria Community System that brings together the actors involved in logistics and freight transport on a regional scale;
    - Establishment and operation of a shared platform for ICT at the service of the PCCS.

  - ***Mid term***:
    - introduction of an integrated management system on a local scale that includes improvement of the Fast Corridor. Concept solutions towards more logistics platforms;
    - implementation of advanced technologies for the automation of different operational functions, in particular automation of container handling operations inside the Gioia Tauro terminal;

- enhancement of the leading role for the port system of Calabria as a container hub, Ro-Ro and Ro-pax in the Mediterranean context and in particular as a primary node on the Silk Road.

4.2 Scenarios' formulation

The formulation of the scenarios is carried out taking into account the factors that influence the future development of the Calabrian port system. In particular, aspects related to the evolution of the market and traffic (MAR), aspects related to the role of the port authority and institutions (INS), aspects related to the operation of port nodes (OPE) and aspects related to technological innovation of physical and documental functions (INN) were considered. The aspects related to the adaptation and improvement of infrastructures are transversal.

Table 9 presents a summary of the factors that determine the development and of the related potentially generated variations.

Table 9: Development factors and related variation

	MAR - Market	**OPE - Operative**	**INS - Institutional**	**INN - Innovative**
1	Trade routes to Calabria port system show a decrease	Operations in port & hinterland processes have a slight increase	Institutions play a weak role as hinterland corridor's promoter	Emerging tech solutions require high costs and long time to be developed
2	Trade routes to Calabria port system remain unchanged	Operations in port & hinterland processes have a firm increase	Institutions play a strong role as hinterland corridor's promoter	Emerging tech solutions still imply high development costs but become more readily available
3	Trade routes to Calabria port system show an increase			Emerging tech solutions still imply long time to be developed but costs decrease
4				Emerging tech solutions' development costs and time are acceptable

The combination of development factors and relative generated variations allows to identify a multiplicity of possible scenarios. The examined ones are listed below

- SCENARIO A = 3MAR + 2OPE + 2INS + 2INN
- SCENARIO B = 3 MAR + 1OPE + 1INS + 1INN
- SCENARIO C = 1 MAR + 2OPE + 2INS + 4INN
- SCENARIO D = 2 MAR + 1OPE + 1INS + 3INN

The first (Scenario A) is an "optimistic" scenario in relation to the various factors of influence; it corresponds to an ideal case in which the results largely satisfy the positive expectations.

Scenario B corresponds to a system that fails, in operational, institutional and innovation terms, to fully grasp the potential of a market growth trend ("pessimistic" scenario).

Scenario C corresponds to a system in which market shares are reduced, but it responds well in operational, institutional and innovation terms ("prudential intermediate" scenario).

Scenario D corresponds to a system that maintains pre-existing market shares, responds gradually in terms of technological innovation, but is lagging behind in the adjustment of operations and on the institutional level ("intermediate waiting period" scenario).

4.3 Expected impacts of alternative scenarios

In general the expected impacts consist in the improvement of the Calabria port system and in its integration and full operation in the Adriatic-Ionian region.

In particular, the expected impact of scenario A is two-fold: on one hand, the Calabria port System's competitiveness is likely to be enhanced by an extended catchment area and strengthened intermodal connections to consolidated and new markets. On the other, the local port-hinterland chain risks facing difficulties in handling rapidly growing traffic volumes considering that the infrastructural investments necessary to improve its capacity require time and considerable financial resources.

The conservative assumptions of scenario C and D would allow governance and technological innovations to evolve in parallel to optimize existing services and improve relations among the different actors of the logistics chain.