# PORT OF TARANTO

# THREE-YEAR OPERATIONAL PLAN 2023-2025

Strengths Weaknesses Opportunities Threats

Port Network Authority of the Ionian Sea

Port of Taranto

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Acronym

AFID - Alternative Fuels Infrastructure Directive

AI – Artificial Intelligence

ANAC - National Anti-Corruption Authority

BI – Business Intelligence

BRI - Belt and Road Initiative

BWD - Bathing Water Directive

CCUS - Carbon Capture, Utilization and Storage

CDM - Clean Development Mechanism

CDP - Carbon Disclosure Program

CII - Carbon Intensity Indicator

DEASP – Port System Environmental Energy Document

EEDI - Energy Efficiency Design Index

EEOI - Energy Efficiency Operational Indicator

EEXI - Energy Efficiency Design Index for existing ships

ELCC - Environmental Life Cycle Costing

ESG - Environmental Social and Governance

ETD - Energy Taxation Directive

ETS - Emission Trading Scheme

EU – European Union

FDI - Foreign direct investments

FTZ – Free Trade Zone

GDP – Gross Domestic Product

GO – Guarantee of Origin

HBD - Habitat and Bird Directives

IMO – International Maritime Organization

IRENA - International Renewable Energy Agency

JI - Joint Implementation

LCA - Life Cycle Assessment

LCC - Life Cycle Costing

LCSA - Life Cycle Sustainability Assessment

LNG - Liquefied Natural Gas

MARPOL - International Convention for the Prevention of Pollution from Ships

MEPC - Marine Environment Protection Committee

MOU – Memorandum of Understanding

MSP - Maritime Spatial Planning

NAP - Nitrates Plan

NGEU - European Commission's Next Generation EU

NPG - New Public Governance

NPM - New Public Management

NRRP – Recovery and Resilience Plan

OECD - Organization for Economic Co-operation and Development

OPS - Onshore Power Supply

P.A.I. - Hydrogeological Structure Plan

PCS - Port Community System

PESTEL – Political, Environmental, Social, Technological, Ecological, Legal

PIAO – Integrated Plan of Activities and Organization

PNA – Port Newtork Authority

PPTR - Regional Territorial Landscape Plan

PRG – General Master Plan

PRP – Port Regulatory Plan

PTA - Water Protection Plan

RCCL - Royal Caribbean Cruise Ltd

RPFL - Regional Plan of Freights and Logistic

SDG - Sustainable Development Goal

SECA - Sulphur Emission Control Area

SEZ– Special Economic Zone

SIN - Sites of National Interest

SLCA - Social Life Cycle Assessment

SRM - Stakeholder Relationship Management

SUA - Single Administrative Desk

SWOT/TOWS – Strengths, Weaknesses, Opportunities, Threats

TEN-T - Trans-European Transport Network

TEU - twenty-foot equivalent unit

TOP – Three-year Operational Plan

UNFCCC - United Nations Framework Convention on Climate Change

UTI – Unità di Trasporto Intermodale

WFD - Water Framework Directive

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## PRESIDENT'S INTRODUCTION

*With the adoption of the 2023-2025 Three-Year Operational Plan (TOP), the PNA of the Ionian Sea intended to regenerate and give new boost to the strategic approach that the Authority will carry out over the next three years. This through careful and far-sighted planning that, thanks to a lively action of co-planning with the network of stakeholders, aims to give the port-community of the Ionian port the most concrete and generative opportunity for sustainable growth.*

*The path taken towards the new TOP has certainly benefited from what the Authority had already capitalised on in the previous three-year period, during which the PNA carried out its institutional mission by promoting initiatives and projects that opened up the Port to different and renewed scenarios and new governance approaches. The above also strengthened Taranto's role as a sustainable and dynamic port city which, thanks to its Port, has seen the completion and creation of numerous territorial actions based on the enhancement of the culture of the sea as an identity value underlying the* ***port-city*** *link.*

*This strategic approach will be further strengthened over the next three years, both through activities to support logistics - by leveraging modern, interconnected and interoperable port, rail and road infrastructure - and thanks to the continuation of the actions that the Authority has already launched to make the port the protagonist of the ecological and energy transition.*
*The synergy with the operators of the Ionian port cluster will also make it possible to further enhance the role of intermodal hub that the Taranto port boasts in the Mediterranean scenario by continuing the internationalisation processes, with the aim of stimulating the vocation of local businesses and strengthening a single vision of the port as a strategic driver enabling import/export activities.*

*Looking ahead to the new three-year period, the PNA, while waiting for a definitive solution to the complex issue related to the ex-Ilva steel plant, will proceed in its action by following the long wave of value creation, contributing to the generation of new opportunities and initiatives and intercepting every driver capable of supporting growth opportunities, not only for the local territory, both in terms of economic growth as well as social, cultural and tourism development.*

*Taranto, 6th April 2023*

*The President*

*Prof. Avv. Sergio Prete*

# CHAPTER 1. THE CONTEXT: ECONOMIC SITUATION, POSITIONING, AND PLANNING FRAMEWORK OF THE PORT NETWORK AUTHORITY OF THE IONIAN SEA - PORT OF TARANTO

This Chapter provides an overview of the "as-is" situation of the Port of Taranto, setting the framework of reference for developing the Three-Year Operational Plan (TOP) 2023-2025. It assesses key elements such as the available resources, the potential strengths and weaknesses of the port compared to competitors, and the development strategy and mission that guided past activities. In conjunction with Chapter 2 (PESTEL Analysis), it allows the formulation of a SWOT Analysis and the resulting TOWS matrix.

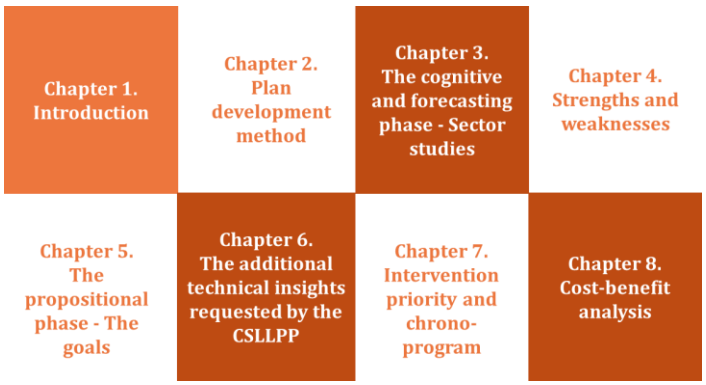
The Chapter briefly discusses the main planning documents of the PNA of the Ionian Sea (*Port Master Plan - PRP and Port System Environmental Energy Document - DEASP*). It also outlines the strategic and infrastructural context of the various programmatic-type interventions, and the braod array of aspects discussed in previous planning documents (*Three-Year Operational Plan 2020-2022 and Integrated Plan of Activities and Organization 2023-2025*), providing information on the past actions and interventions of the PNA. This analysis supports the formulation of the mission of the Port Network Authority and the individual interventions to be implemented (Chapter 5) in the new Plan horizon (2023-2025).

## 1.1. THE PLANNING FRAMEWORK OF THE PNA OF THE IONIAN SEA – PORT OF TARANTO

### 1.1.1. The Port Regulator Plan (PRP)

The Port Regulator Plan (PRP) of the PNA of the Ionian Sea – Taranto Port (November 2021) plans the strategic actions related to the infrastructural, functional, and operational development of the port, with a view to the economic development of the territory and the sustainable growth of the community. The PRP is articulated in eight chapters, related to the territorial and socioeconomic context and, subsequently, proceeds with the identification of the infrastructural interventions necessary to achieve the operational and development goals of the territory.

Figure 1. Structure of the Port regulatory Plan – November 2021.




*Source: Authors' elaboration.*

#### 1.1.1.1. Territorial context and the port-city relationship

The PNA of the Ionian Sea – Port of Taranto is an administrative entity mostly coinciding with a single port structure. Therefore, the PRP benefited from concentrating the resources of the PNA and, consequently, the strategies on a single port of historical importance in Southern Italy.

The PRP defined goals for the subsequent actions and interventions considering the exogenous factors related to the territorial and geographical context. The goals that the PNA pursued in the predetermined 10-15 years time frame had been defined in the Guidelines elaborated by the Port Network Authority (approved at the port Committee meeting on 10.07.2002).

In line with these, the goal of the PRP was: "*to plan the infrastructural, functional and operational development of the port by playing a role in driving economic growth of the territory and improving the environmental and social livability of the citizens*."

This primary objective was further detailed in specific objectives covering two categories, one focusing on the "Operational Port" and one on the "City-Port Interaction" (Figure 2). These goals consider the operational development of the port by targeting both increase in traffic and optimal use of available space. The historical evolution of the port of Taranto shows how the port has facilitated industrial traffic, closely linked to the hinterland and the areas immediately adjacent to it, and historically important location decisions related to heavy industries such as Ex ILVA, ENI, CEMENTIR, etc. The port of Taranto used to be considered a "Company Port" which, since 2001, has extended its portfolio of activities towards container traffic with a focus on sea-sea transhipment activities.

Figure 2. Macro categories of the PRP goals.


*Source: Authors' elaboration.*

The port area is not limited to a place for the transit of goods, but a location focused on the integration of commercial, logistical, and industrial functions, that increase the attractiveness of the entire port and dry port area and generate progressive community development. The involvement of the community and the relationship between the port and the territory requires the balancing of sometimes conflicting legitimate interests. The port network authority is challenged to consider the potential tension between various objectives when defining its plans and strategies.

In this regard, it is essential to consider the benefits produced by the development of the Port of Taranto for the entire port community and neighbouring areas. The economic effects of the Port of Taranto do not end exclusively within the port areas, as a port of great socioeconomic and historical value exerts a significant impact on the development of the local community. This demands a systemic vision of the port as a hybrid actor with strong links with private stakeholders, developing an innovative port ecosystem and targeting sustainable growth serving local industries and the socioeconomic welfare of local communities. This important consideration, which is included in the 2020-2022 Three-Year Operational Plan, should also form a cornerstone in the formulation of the 2023-2025 Three-Year Operational Plan.

The relationship between the city of Taranto and the Port is wider than the generation of employment and the economic benefits associated with port activities. The port-city interface can benefit from synergies associated with the integration of the activities and infrastructure located on state property with all those indirectly related to port activities. In this regard, the port reform Law[1] prescribes that the latter must, in any case, be identified by the PRP and the intended use planned by that planning tool. From this perspective, the use of these areas and the related implementation rules are the competence and responsibility of other administrations (such as the municipal administration), with which the work of the port network authority must be perfectly synchronized, to have a complete picture of the

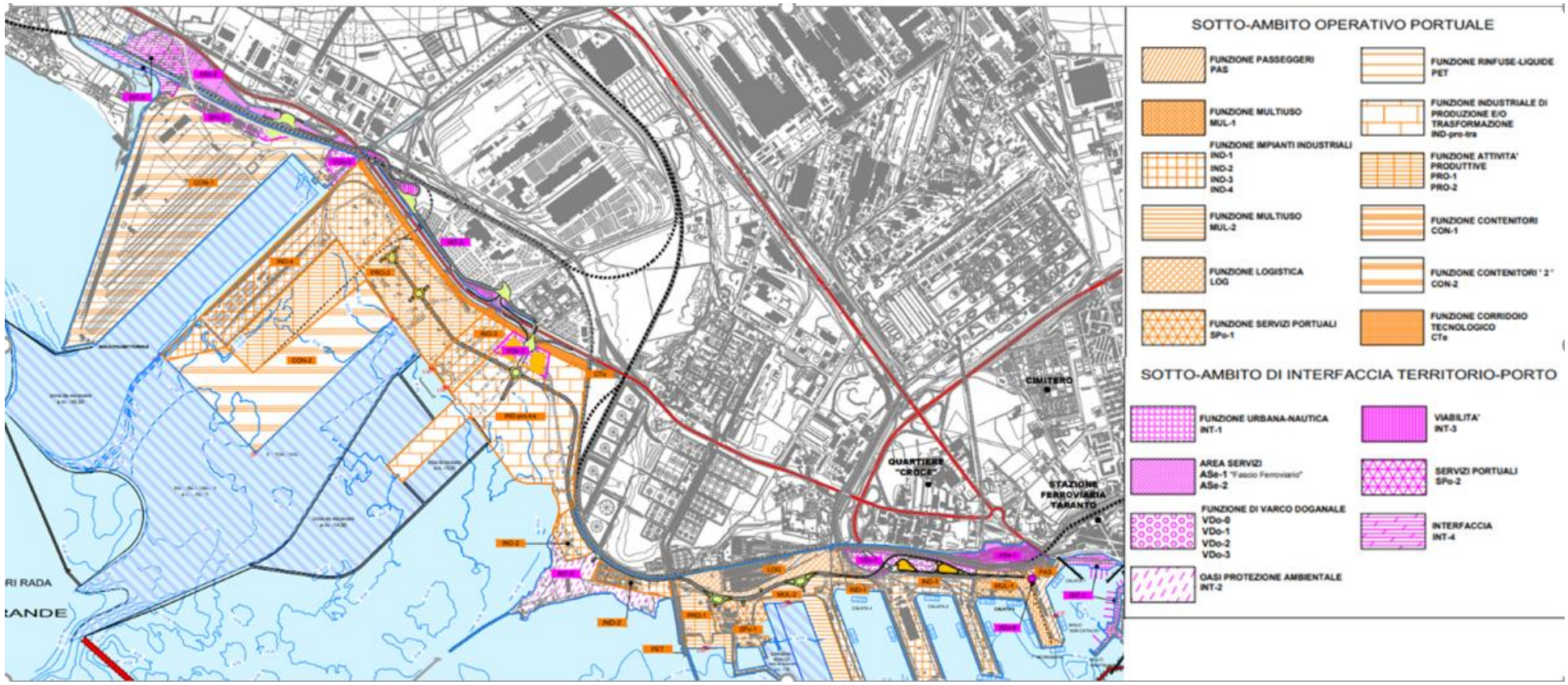
[1] Law N° 84 of 28.01.1994 "Reorganization of legislation on port matters.".

constraints and development opportunities of the port. In the case of the PNA of the Ionian Sea, the municipal administration has actively contributed to identifying the port/city interfacing areas, integrating all the restrictions and development opportunities dictated by other spatial planning tools into the interventions provided by the Port Master Plan. The areas affected by the collaboration between the port network authority and the Municipal Administration are mainly those adjacent to the port (Table 1 & Figure 3).

Following the approval - Regional Council Resolution N.1384 of 23/07/2019 by the Puglia Region - of the Variant to the PRG ex art. 16 of LR 56/1980, concerning the new Master Plan of the Port of Taranto, the Port and the Municipality, at the close of 2019 signed an agreement aimed at the elaboration of the Executive Urban Plan preparatory to the start of tenders for works on the waterfront area, whose final drafts were completed in 2021.

The Urban Executive Plan of the INT-1 area was subsequently adopted by Resolution of the City Council no. 9 of 29 June 2022.

Figure 3. Spatial Plan of the port-city connections and general areas.




*Source: Panel C2.12 "General summary planimetry", PNA of the Ionian Sea – Port of Taranto.*

Table 1. Port -City Connections per Zone.

| Area | Short decriptions | Destination of use /Function |
|---|---|---|
| **Station to "Mar Piccolo" zone** | The area, having a total size of about 30 hectares, has great potential, with particular regard to both location (it constitutes the end point of a series of infrastructures such as railways, port, and highways) and scenic importance (it overlooks the Mar Piccolo and overlooks the Old Town). | Craft, manufacturing, shipbuilding and residential |
| **"Via della Croce" zone** | The zone of "Via della Croce", having a total size of about 38 hectares, is located behind the railway station and is composed of settlement types heterogeneous of which it retains distinctive features and problems, with particular reference to the fact that it is an area of the industrial periphery. | Residential, productivity |
| **The industrial zone of "Via Metaponto e via S. Brunone"** | The area comprises two non-contiguous and very different areas- the industrial zone of Metaponto Street and S. Brunone-which it is deemed appropriate to systematize into a single area, especially because of economic and financial sustainability. | Productivity, industrial, place of worship |
| **Darsena Taranto and neighbouring city areas** | This is a port area (the "Darsena Taranto") consisting of the INT-1 area and the PAS area (outside the customs belt). The common element of the constituent parts of this area is its urban function. | Urban |
| **"Punta Rondinella"** | It is an area that falls under the criteria defined in Article 3.15 – archaeological zones- of the current territorial urban plan for the landscape of the Region of Puglia, as (PUTT/P), since it is a reported "cultural asset" of recognized relevant scientific interest, in accordance with Title I of Legislative Decree 490/1999as amended and supplemented. | Archaeological zone |
| **The coastline of the old city** | This is a stretch of coastline subservient to the city. | // |
| **Tara river area** | The Tara River area is located at the western end of the port area (defined as INT-4), straddling the railway line, bordered by the the Polysector Pier, the Ase-2 area, the territory outside, and the Tara River, which is intended to be restored and redeveloped as a result of environmental problems that have manifested themselves since the construction of the "Molo Polisettoriale" with the displacement of the mouth of the Tara River. | // |
| **Distripark** | These areas are not included in the port area at the moment (as indicated by the act of Municipal agreement n. 166/06), reserving full responsibility for functional, urban, and infrastructural planning for the city administration. | // |
| **Eco Industrial Park** | These areas were handed over to the PNA with minutes of 4 November 2022, signed by the Harbour Master's Office, the "Agenzia del Demanio" (State Property Agency) and the PNA itself, pending completion of the procedure to extend the territorial jurisdiction of the PNA.<br>Within the framework of the NRRP, in order to favour the development and competitiveness of the areas, the primary infrastructure and road and rail accessibility intervention was financed. | |

*Source: Authors' elaboration based on data within the Port Regulator Plan PNA of the Ionian sea – Port of Taranto, November 2021.*

### 1.1.1.2. The intended use of the maritime State Property areas of the Port of Taranto.

The intended use of Taranto Port's State Property, includes (Figure 4):

- ✓ Terminals for industrial use (dry and liquid bulk);
- ✓ Container terminals;
- ✓ Areas for commercial use;
- ✓ "Darsena services".

Figure 4. Intended use of port areas.


*Source: Port of Taranto profile – Port of Taranto, 2021.*

Concerning the areas for industrial use, the Port of Taranto benefits from the presence of two operators: (a) ENI S.p.A. and (b) Acciaierie d'Italia, which are active respectively in the refining of petroleum products and the production and trading of steel products (Figure 5).

- ✓ ENI S.p.A. has under concession a 1,100 m jetty with 2,220 m berths for loading and discharging crude oil, refined products and by-products, the transshipment of which is done through a pipeline system that connects the jetty to the refinery;
- ✓ Acciaierie d'Italia has four piers (No 2, 3, 4 and 5) and one jetty (No 3) with a total length of 4,589 m and a maximum draft of 25 m. The operational areas at its disposal cover a total area of 931,000 m².

Figure 5. Location of industrial areas.

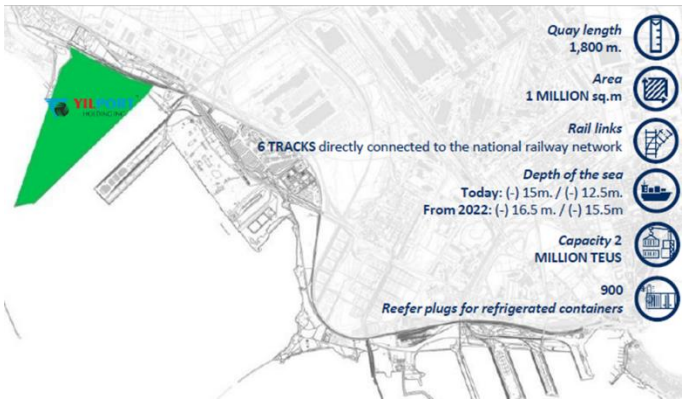
*Source: Port of Taranto profile – Port of Taranto, 2021.*

The container terminal was concessioned in 2019 to SCCT – *San Cataldo Container Terminal S.p.A.*, a subsidiary of the multinational company Yildrim Holding S.A.[2]. This concession has a duration of 49 years. The terminal size is about 1 million m². The berths offer a draft which, on completion of the dredging work, will be of 16.5 m allowing the largest container ships with a unit capacity of about 24,000 TEU to visit the terminal (Figure 6). The terminal's handling capacity amounts to 2-2.5 million TEU, and the terminal is equipped with about 900 electrical outlets (plug-in) for possible future development of the container reefer sector. The port has equipped the area with modern facilities for loading/unloading

[2] The YILDIRIM Group, which currently operates mainly in Asia, Europe, and America, has developed a dense network of companies active in 11 sectors, providing one-stop-shop solutions such as: metal production, fertilizer and chemical production, port terminal management, energy, coal and coke production, logistics services, shipping services, shipbuilding, industrial construction, real estate development, and private equity funds.

container trains, including a five-track bundle connected directly to the national rail network on the west side. The equipment features two rail-mounted gantry cranes. The estimated transit time[3] for containers on rail from the Port of Taranto to Central Europe (Munich-Riem terminal) amounts to about 30 hours. Furthermore, the area is well connected to the national road network, thanks to its proximity to the first freeway route, which is only 15 km away and does not generate any "bottlenecks" risks.

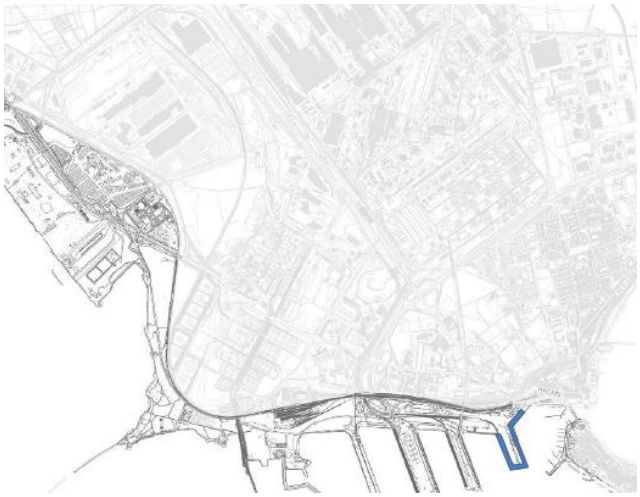
Figure 6. Location of the container terminal




*Source: Port of Taranto profile – Port of Taranto, 2021.*

In April 2021, the PNA of the Ionian Sea concessioned the cruise terminal to *Taranto Cruise Port* (TCP), a company controlled 100% by the leading international cruise terminal operator Global Ports Holding). The aim is to develop the facility into a leading cruise terminal in the Ionion/Adriatic area. The port infrastructure dedicated to cruise berths includes the "MoloSan Cataldo", "Primo Sporgente Ponente" and Levante, Calata 1, and Calata 2 (Figure 7). Featuring 5 berths of different sizes, Taranto Cruise Port can safely host even the world's largest cruise ships for transit and turnaround operations. The eastern quay has a length of approximately 360 m and a draught of 8 m and 6.5 m, while the western quay has a length of 339 m and a draught of 10 m. Extraordinary maintenance work will be carried out shortly to restore the depths to 9.50 m on the eastern side of the San Cataldo Pier, as per the approved PRP.

Figure 7. Location of the cruise terminal.



*Source: Port of Taranto profile – Port of Taranto, 2021.*

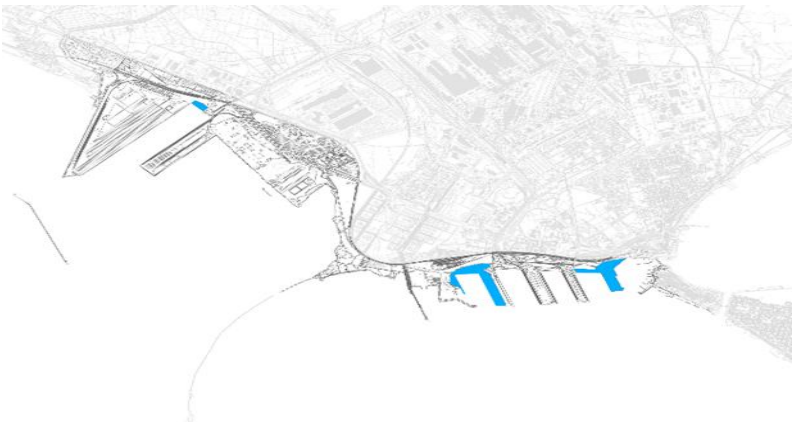
[3] The transit time identifies the transport time, from loading of the departing vehicle to delivery to the final receiver.

Finally, the port area also includes several “free commercial docks”. The total area of these docks is 200,000 m² and the length of the quay is 1,610 m (Figure 8). The following authorized port undertakings operate on these quays (Calata 1, 1° Sporgente levante, 1° Sporgente ponente, 1° Sporgente testata, Calata 2 e 4° Sporgente ponente):

- ✓ Castiglia S.r.l.
- ✓ De.Tra.Sud S.r.l.
- ✓ Ecologica S.p.a.
- ✓ Italcave S.p.a.
- ✓ Marraffa S.r.l.
- ✓ Peyrani SUD S.p.a.
- ✓ Taras Terminal S.r.l.
- ✓ Triton S.r.l.

These enterprises use the areas mentioned above to handle multiple types of goods, including aluminium, coils of aluminium, frozen fish, cement, metal carpentry, machinery, plant engineering, wind turbines and blades, iron ore, clinker, fertilizer, and various goods.

Figure 8. Location of the accessible quays.



*Source: Port of Taranto profile – Port of Taranto, 2021.*

### 1.1.1.3. Infrastructural intervention and implementation.

The strategic objectives identified by the PRP (November 2021) prioritise adjusting the port’s infrastructure to ensure efficient and effective operational management of the expected increase in demand, especially in the cruise and bulk segments. The PRP has foreseen a considerable number of concrete interventions that are already underway. These interventions are seen as fundamental preconditions for achieving the objectives also predetermined at the operational level within the TOP 2020-2022 (including the 2021 and 2022 revisions).

The infrastructural works underway, already included in the 2020-2022 TOP, and those to be implemented will enable the improvement of competitiveness in the transport of liquid bulk, general cargo, containers, Ro-Ro, and cruises.

The PNA was also the beneficiary, within the framework of the National Recovery and Resilience Plan (NRRP), of funding for various infrastructure works in the Port of Taranto on different assets. These interventions are aimed at the *'Development of maritime accessibility and resilience of port infrastructure to climate change*' and the '*Electrification of quays'*.

The first categories of interventions include the construction of the "*New breakwater protecting the harbour outside the Taranto roadstead - western stretch*" and the "*New breakwater protecting the harbour outside the Taranto roadstead - eastern stretch*".

With regard to cold ironing, on the other hand, the PNA was the beneficiary of funding sources for the construction of a cold ironing plant at the public quays of the Port of Taranto, at the Molo Polisettoriale and finally at the oil wharf.

In addition, the PNA, again in the NRRP framework and specifically under Measure M5C3 - investment 4 *'Infrastructural interventions for Special Economic Zones (SEZ)*' has obtained financing for the construction of the '*Primary infrastructure and road and rail accessibility Eco Industrial Park area'*.

For the above-mentioned interventions, planning and authorisation activities are underway.

With Decree no. 117 of 17.10.2022, the PNA adopted the three-year programme 2023-2025 and the annual list of public works 2023, drawn up in compliance with the provisions of Ministerial Decree no. 14 of 16.01.2018.

The interventions under execution are as follows:

1. Interventions for the dredging of 2.3 mmc of sediments in the Molo Polisettoriale area and for the construction of a first lot for the reclaimed land for the "V Sporgente" extension;
2. Multi-purpose service centre for port uses at the San Cataldo wharf (Falanto Building);
3. Collection and collection network for rainwater in the common areas of the port and water and sewage network.

With regard to improving the efficiency and optimisation of existing infrastructures, in 2022 the Global service for the management of artefacts and services of general interest in the Port of Taranto continued, in order to optimise the time and cost of maintenance work on roads and yards, buildings and artefacts, green areas, electrical systems, lighting systems, and the maintenance and management of water and sewage networks, the industrial water network and the stormwater network.

By Decree No. 117 of 17.10.2022, the PNA adopted the three-year programme 2023-2025 and the annual list of public works 2023, drawn up in accordance with the provisions of Ministerial Decree No. 14 of 16.01.2018.

There are several interventions that the PNA intends to carry out and which are aimed at upgrading the existing infrastructure structure. These include:

- ✓ Completion of the works for the redevelopment of the mooring quay in "Calata V" in the harbour of Taranto, the start of which is imminent;
- ✓ Demolition and reconstruction of the open deck in C.A.P. of the San Cataldo Pier on the western side;
- ✓ Refurbishment of the wave protection works in the Port of Taranto and Taranto Roadstead.

In addition, the following interventions were completed:

1. Taranto harbour plate. The project includes the construction of five works: the road to the Piers, the Logistic Platform, the extension of the "IV Sporgente", the dock to the west of the "IV Sporgente" and the dredging mud containment tank;
2. Rectification, widening and structural adjustment of the eastern quay of the San Cataldo Pier and "Calata 1" of the Port of Taranto;
3. Reconstruction of the reinforced concrete deck of the uninhabitable head of the San Cataldo Pier;
4. Buildings for logistic accommodation of technical-nautical services in the area behind the service dock of the Port of Taranto
5. Redevelopment of the quay and yards at the root of the Molo Polisettoriale - adaptation of the bulk terminal area.

For the interventions to be carried out in the period 2023-2025, it is appropriate to refer to the three-year planning of public works (Table 2).

Table 2. Interventions to be implemented in the next three years.

| Action | Year | Priority | Budget |
|---|---|---|---|
| NEW OUTER DAM TO PROTECT THE PORT OUTSIDE TARANTO - WESTERN SECTION | 2023 | 1 | 35.000.000,00 |
| CONSTRUCTION OF THE NEW EASTERN CORRIDOR | 2023 | 2 | 3.500.000,00 |
| COMPLETION OF THE REDEVELOPMENT OF THE MOORING QUAY IN TARANTO PORT | 2023 | 1 | 2.100.000,00 |
| NEW OUTER DAM TO PROTECT THE PORT OUTSIDE TARANTO - EAST SECTION | 2023 | 3 | 20.000.000,00 |
| CONSTRUCTION OF THE SURFACE CAR PARKS ADJACENT TO THE EAST PASSAGE AND ADAPTATION OF THE FURNITURE OF THE PLATFORMS AT THE ROOT OF THE SAN CATALDO PIER | 2024 | 2 | 7.000.000,00 |
| FORMER TORPEDO-BOAT STATION - DECOMMISSIONING FROM MILITARY USE, RECOVERY/CULTURAL-TOURIST DEVELOPMENT OF THE "FORMER TORPEDO-BOAT STATION" AREA IN THE SMALL SEA OF TARANTO WITH SIMULTANEOUS REALLOCATION OF FUNCTIONS OF THEM.M. - 1. LOT | 2024 | 1 | 22.000.000,00 |
| Original news Realization of the new barracks of the guard of finance in the port of Taranto | 2024 | 2 | 6.000.000,00 |
| RESURFACING OF WAVE PROTECTION WORKS IN TARANTO HARBOUR AND TARANTO HARBOUR | 2024 | 2 | 25.000.000,00 |
| REDEVELOPMENT AND EXTENSION OF THE REEF DAM TO PROTECT THE FIRST AND SECOND PROTRUDING PORTS OF TARANTO | 2024 | 1 | 12.000.000,00 |
| REDEVELOPMENT OF THE PORT WATERFRONT | 2024 | 2 | 28.000.000,00 |
| DEMOLITION AND RECONSTRUCTION OF THE OPEN DECKS IN C.A.P. ON THE WEST SIDE OF PIER SAN CATALDO | 2024 | 1 | 28.000.000,00 |
| Realization of a plant of cold ironing near the public docks of the port of Taranto; | 2024 | 1 | 35.000.000,00 |
| Realization of a plant of cold ironing near the polisettoriale pier in concession to SCCT in the port of Taranto; | 2024 | 1 | 12.000.000,00 |
| CONSTRUCTION OF A COLD IRONING PLANT AT THE OIL PIER, CONCESSION TO ENI IN THE PORT OF TARANTO; | 2024 | 1 | 8.000.000,00 |
| FORMER TORPEDO STATION - SAILING CENTRE AND COMMERCIAL PORT REDEVELOPMENT | 2024 | 2 | 127.000.000,00 |
| PRIMARY URBANISATION OF AN ECO-INDUSTRIAL PARK IN TARANTO | 2024 | 2 | 50.000.000,00 |
| DEVELOPMENT OF AREAS OUTSIDE THE MULTIPURPOSE BUILDING AND CONNECTING WITH THE NEW SAN CATALDO PIER | 2024 | 2 | 900.000,00 |
| RE-FLOWERING AND EXTENSION OF THE CLIFF DAM TO PROTECT THE DOCK WEST OF THE PROTRUDING IV | 2025 | 1 | 12.000.000,00 |
| DEMOLITION OF THE OVERPASS AND REDEVELOPMENT OF THE AREA BEHIND THE THIRD PROJECTING PART OF THE PORT OF TARANTO | 2025 | 3 | 1.200.000,00 |
| ENVIRONMENTAL REMEDIATION FREE AREAS IN THE HARBOUR: HOT SPOT REMOVAL OF RFI ADJACENT SITES | 2025 | 3 | 1.500.000,00 |
| ENVIRONMENTAL REMEDIATION FREE AREAS IN THE HARBOUR: REMOVAL OF HOT SPOT NORTH GATE | 2025 | 3 | 700.000,00 |
| **Total** | | | **436.900.000,00** |

*Source: Three-year public works programme, PNA of the Ionian Sea.*

In order to complete the upgrading of port infrastructures and areas directly or indirectly related to the port's activities, the PNA of the Ionian Sea has included the construction of the Eco Industral Park, located in the area behind the Molo Polisettoriale of the Port of Taranto, as well as the extension of the oil wharf and the railway and road development plans of RFI (Rete Ferroviaria Italiana) and ANAS among the interventions included in its planning.

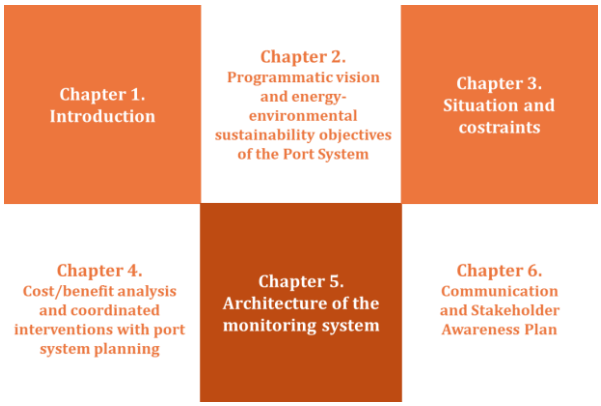
### 1.1.2. The Port System Environmental Energy Document (DEASP) and its updates

The current strategic planning of the PNA of the Ionian Sea concerning energy and environmental issues constitutes a fundamental input for the development of the TOP 2023-2025. Related actions are key for increasing the competitiveness of the port through innovation and sustainability. The current state of port planning is the reference for preparing the TOP 2023-2025. Thus, it is essential to detail the existing morphological-functional characteristics and the strategic management aspects related to energy and environmental matters.

The "Smart Port" and "Green Port" concepts guide existing investments aiming at a sustainable port development perspective. The emphasis is on respecting the marine ecosystem and efficient energy management, with an increasing priority given to clean and renewable energy production and consumption. The focus is also on the possible contributions of the port in realizing the circular economy paradigm aimed at waste reduction and more efficient management of material cycles. These are already seen as critical drivers for the sustainable development of the Port of Taranto and are worth considering as essential elements in defining the development strategy and the mission of the PNA of the Ionian Sea as well as the strategic goals of the Plan and the interventions/actions planned for the next three years within this TOP 2023-2025.

The Port System Environmental Energy Document (DEASP) 2022 of the PNA of the Ionian Sea details priority measures to improve energy efficiency and promote the production/use of renewable energy in the port area. This document also provides information regarding the main public and private stakeholders operating within the port, considering their respective concessions and the existing environmental constraints affecting the area. The six chapters of the DEASP introduce the institutional context (Chapter 1), define the programmatic strategy and energy-environmental sustainability objectives of the PNA of the Ionian Sea (Chapter 2), consider the current work status and constraints (Chapter 3), provide a cost-benefit analysis of the planned energy and environmental actions (Chapter 4), detail the architecture of the energy and environmental monitoring systems developed by the PNA of the Ionian Sea (Chapter 5) and present the communication and awareness plan for reaching out to the port stakeholders (Figure 9).

Figure 9. Structure of the Port System Environmental Energy Document (DEASP).




*Source: Authors' elaboration.*

In view of advancing Port of Taranto as a "Smart" and "Green" port, the port network authority strengthened its internal expertise through technical-specialist advice on strategic energy-environmental studies and tangible and intangible investments that support the decarbonization of port activities by entrusting RINA Consulting to update the Energy and Environmental Planning Document (DEASP - Revision 2022).

The port area used at operational level is not limited to the land within the port but extends to all the intermodal connections existing in the surrounding territories. The DEASP analysis sheds light on the Port's energy balance and the opportunities to reduce the environmental impact of its activities. Regarding the road and rail connections between the Port of Taranto and the adjacent areas, Figure 10 lists the main links that influence the land accessibility of the port.

Figure 10. Port of Taranto: road and rail connections.


*Source: Authors' elaboration.*

The main constraints that emerged from the above-mentioned technical analysis are as follows:

- ✓ As established, by the Regional Territorial Landscape Plan (PPTR) the port areais included in the Coastal Territories Area, partly subject to Hydrogeological Constraint;
- ✓ The Hydrogeological Structure Plan (Piano di Assetto Idrogeologico: P.A.I.) of the Region of Puglia identified forms and elements related to geomorphological and hydraulic risks;
- ✓ A portion of the Port Network area is affected by hydrogeological constraints as revealed by the PUTTP assessment.
- ✓ Regarding the Water Protection Plan (Piano di Tutela dell'acqua: PTA), it appears that the perimeter does not fall within any area of "Special Hydrological Protection Zone" while it does fall within areas perimeter as "areas vulnerable to saline contamination"
- ✓ Concerning the Nitrates Plan (NAP), the area of the port network is not included in the perimeter of the designated vulnerable zones, not even in light of the re-perimeter referred to in DGR No. 1332 of August 4, 2021;
- ✓ Regarding Sites of National Interest (SIN), the area in question falls within the perimeter of the SIN.
- ✓ Regarding Seismic Risk, the Taranto area falls in Seismic Zone 3: "Zone with low seismic hazard, which may be subject to moderate shaking."

The DEASP (2022 revision) begins with the examination of the programmatic strategy of the Port of Taranto as defined by the TOP 2020-2022 (2021 Revision) which sets five key objectives:

1. Innovation;
2. Port & territory;
3. Environmental sustainability;
4. Physical infrastructure & competitive factors;
5. Institutional accountability.

The DEASP identifies innovation; energy efficiency; production and consumption of energy from renewable sources; and the development of alternative fuels and LNG, as the key elements to achieve the energy and environmental goals of the port network authority. Setting the strategy and goals for energy and environmental sustainability of the port, the current revision of the DEASP places particular emphasis on the need to plan for energy resource management that minimizes greenhouse gas and $CO_2$ emissions and targets the reduction of the energy consumption of all vessels calling at the port.On-shore

power supply (OPS, also known as cold ironing) emerges as a key tool in pursuing these goals. Upgrading and developing LNG storage and bunkering infrastructure for marine and land propulsion is also one of the planned actions. The current energy-environmental planning also includes the reduction of energy consumption of buildings, facilities, terminal equipment and the port infrastructure and the development of incentive measures to implement energy efficiency works and renewable energy production facilities. Furthermore, the port network authority identified significant potential in the electrification of operations and mobility to reduce air and noise pollution. Therefore, it is recommended to incentivize the conversion of transport used within the port areas from traditional fossil fuel power to electric power.

In line with the "Vision 2030" (as formulated in the TOP 2020-2022 Revision 2021), the DEASP pursues the goal of the "Port of the future" as a horizon capable of supporting the revitalization of the port in the region of Puglia and its repositioning in the international port context. In this vein, the documentation dedicated to the energy and environmental planning of the PNA of the Ionian Sea highlights the development of new models of innovation and sustainable growth aimed at strengthening the relationship between the port, the old city, and the industrial area, thereby defining an effective process of urban, environmental, and sociocultural regeneration. Furthermore, grounding on the principles of the "circular economy" and the sustainable development goals (SDGs) set by the UN 2030 agenda, it recommends fostering the development of new business models capable of combining Taranto's maritime tradition with sustainability paradigm.

The "Port 6.0" model defined in the 2022 revision of TOP 2020-2022 identifies innovation, sustainability, intermodality and logistics, internationalization, territorial marketing, and training and collaboration with research centres as the main drivers for the competitive growth of the port of Taranto. Four of these six drivers are related to the management of energy and environmental matters (innovation, sustainability, intermodality and logistics, training and research centers). For the TOP 2023-2025, it is worthwhile to consider the continuation of the pursuit of the development models identified in the previous TOP and the achievement of the energy and environmental objectives set by the DEASP.

The PNA of the Ionian Sea has already proceeded with the estimation the carbon footprint of the Port of Taranto, based on a process of stakeholder engagement carried out by the port network authority. During 2021, the Port Network Authority administered a questionnaire to concessionaires, consignees and companies authorized to carry out operations and services in the port areas to estimate/quantify their total electricity consumption. The findings suggest that in 2021 the electricity consumption was 25,415 MWh of which 1,565 MWh was the consumption by the port network authority. The electricity consumption of all concessionaires combined amounted to 23,850 MWh. Most of the electricity consumption is related to port services (61%), mainly due to the use of electric-powered handling equipment. In addition, 30% of the measured electricity consumption is attributable to external lighting. The remaining 9% relates to buildings (indoor lighting and air conditioning) and others (that is a residual category that includes the types of consumption not included in the previous categories).

Energy consumption related to resident vessels (both small vessels and those performing authorized functions within the port), in 2021 (the last available year) was estimated to be about 937,939 liters, of which about 7,000 litres was gasoline and the remaining part diesel fuel[4].

According to traffic data reported in Paragraph 1.3.1, about 80 % of the total commercial traffic in the Port of Taranto consists of cargo ships (general cargo, liquid bulk and dry bulk). Consequently, these

[4] To provide a comprehensive and detailed analysis of the energy balance related to the shipping sector in the Port of Taranto, the analysis considered ships calling at the port for cargo loading/unloading operations. The analysis also took into consideration total berth time in port and their nautical maneuvering time when entering and leaving the port, in order to quantify their energy absorption (in terms of fuel consumption) during the port call and during maneuvering.

types of ships affect more than 80% of the total fuel consumption. Table 3 shows the trends of consumption of individual merchant vessel categories compared to the total vessel consumption generated within the Port in the three-year period 2019-2021.[5]

Table 3. Consumption trends related to ships in port (by ship types compared to total consumption).

| Cargo typology | 2019 | 2020 | 2021 |
|---|---|---|---|
| Container | 0.19% | 0.97% | 0.69% |
| Dry bulk carriers | 14.73% | 9.98% | 15.22% |
| General Cargo | 4.01% | 3.04% | 4.89% |
| Liquid bulk Ships | 68.22% | 67.66% | 61.81% |
| Others | 2.71% | 1.03% | 0.07% |
| Passenger/Cruise | 0.27% | 5.47% | 5.35% |
| Ro Ro Cargo | 0.04% | 0.03% | 0.00% |
| Tug | 9.82% | 11.81% | 11.97% |
| Yacht | 0.00% | 0.00% | 0.00% |
| **Total** | **100.00%** | **100.00%** | **100.00%** |

*Source: Authors' elaboration.*

Table 4 lists the consumption data for electricity, land uses, and marine propulsion by converting them into tons of oil equivalent (TEP). It provides an overall view of the most energy-intensive activities (in terms of primary energy) within the Port of Taranto. The most significant contribution to energy consumption comes from marine propulsion (resident and scailing ships), accounting for more than 80% of the total. Next in importance is electricity, an energy carrier divisible into: buildings, external lighting, port services and other (about 10%), and land-based means, i.e., transport and handling equipment (7%).

Table 4. Conversion of Port Consumption to Oil Equivalent Tons (TEP).

| Object | | UoM | Consume | TEP | Incid. TEP on the total | Incid. Consumption on the total |
|---|---|---|---|---|---|---|
| Power Electric | Buildings | MWh | 1,420 | 120 | 6.98% | 0.06% |
| | Lighting external | MWh | 7.275 | 625 | 36.34% | 0.29% |
| | Services Dockers | MWh | 15.435 | 1 | 0.08% | 0.61% |
| | Other | MWh | 1.285 | 110 | 6.40% | 0.05% |
| Uses earthlings | Diesel | liters | 1,536,514 | 1 | 0.08% | 60.81% |
| | Gas | liters | 11.322 | 10 | 0.58% | 0.45% |
| | Generating set | liters | 1.178 | 1 | 0.06% | 0.05% |
| Means seafarers | Resident Vessels - Diesel | liters | 930,938 | 830 | 48.26% | 36.85% |
| | Resident Vessels - Gasoline | liters | 7,000 | 6 | 0.35% | 0.28% |
| | Climbing Ships - Diesel | ton | 14.217 | 15 | 0.88% | 0.56% |
| **Total consumption** | | - | **2,526,584** | **1,720** | **100.00%** | **100.00%** |

*Source: Port System Environmental Energy Document (DEASP), Port Network Authority of the Ionian Sea..*

In line with EU and international[6] requirements, the primary goal of the DEASP is to reduce $CO_2$ and other GHG emissions. In this respect, the assessment of the carbon footprint provides a snapshot of the

[5] The total energy consumed per load type was calculated taking into consideration three variables: Energy used; Energy consumed for manuevering operations; Energy consumed at berth.

[6] In line with the 2015 Paris Agreement, regarding the reduction of greenhouse gas emissions, in April 2018 the IMO established a strategy to reduce average carbon intensity by 40% by 2030 and cut overall CO2 emissions by 50% by 2050 (compared to 2008 levels). At the community level, a target has been set to reduce transport-related

existing situation and is the primary tool for monitoring the progress towards the achievement of the strategic objectives intended by the DEASP[7]. In Port of Taranto, the collection of data for the calculation of the "Carbon Footprint" for the years 2019, 2020 and 2021 led to the estimate that more than 60% of GHG emissions were caused by the activities of liquid transport tankers even though these vessels do not constitute the largest volume of traffic. The vessel time at berth is responsible for most emissions (over 80%) related to commercial shipping. The port network authority has identified corrective measures and operational actions to mitigate the environmental impact of the operations carried out at the port. Table 6 provides a brief description of the different types of activities distinguishing between "actions in progress", "actions being planned," and "long-term actions", but also identifying those affected by the respective measures and estimating the investments required per action.

Table 5. Planned actions within the DEASP, revision 2022 (Preliminary Budget).

| Type of intervention | | Subject interested | Estimated Preliminary Investment |
|---|---|---|---|
| **Interventions in progress realization** | Wind farm | Concessionaires | - |
| | Recharging stations | PNA | - |
| | PV system logistics platform. | Concessionaires | - |
| **Interventions in progress - programming** | Cold ironing Docks Public | PNA | € 35,000,000 |
| | Cold Ironing PierMulti-sectoral | PNA | € 12,000,000 |
| | Cold Ironing JettyOils | PNA | € 8,000,000 |
| | Lighting External | PNA | € 400,000 |
| | LightingExternal | Concessionaires | € 800,000 |
| | LightingInternal | PNA | € 12,000 |
| | LightingInternal | Concessionaires | € 150,000 |
| | PV plant shelters wharf pol. | PNA / MoloPol. | € 360,000 |
| | Plant PV building integrated site PNA | PNA | € 65,000 |
| | PV plant building- integrated buildings conc. | Concessionaires | € 2,000,000 |
| **Interventions long-term** | LNG | PNA | - |
| | Green Hydrogen | PNA | - |
| | Electrification resident ships | Concessionaires | - |
| | Electrification of land vehicles | Concessionaires | - |
| | PV plantfloating | PNA | - |

*Source: Port System Environmental Energy Document (DEASP), PNA of the Ionian Sea.*

## 1.2. THE PROGRAMMING FRAMEWORK

### 1.2.1. The Three-year Operational Plan (2020-2022)

The Three-Year Operational Plan (TOP) 2020-2022 is a port planning document with a three-year time horizon, defining the institutional, strategic, organizational, and operational plans of the Port Network Authority. Formulating the new TOP 2023-2025 of the PNA of the Ionian Sea benefits from a review of the previous three-year period. The ex-post analysis and the examination of the state of implementation of TOP 2020-2022 and its revisions allow to understand which objectives and interventions/implementation actions might be prioritized in the next three years and the related definitions of the mission and objectives of the port network authority, namely the increase of the competitiveness of the Port of Taranto, the growth of the collective value of the port for the local

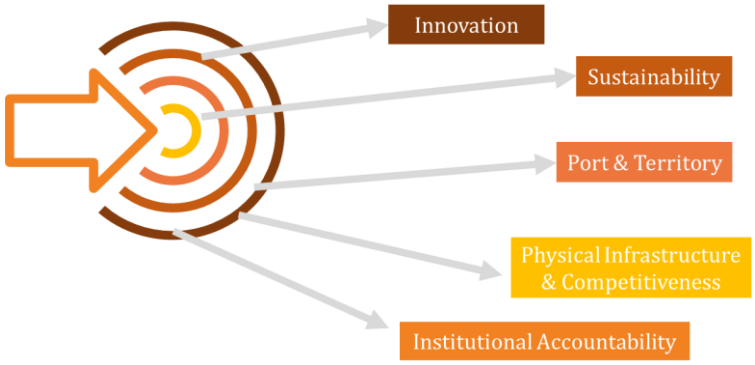
emissions by 90% by 2050, and as part of these measures, the "Green Deal" promotes the development of sustainable alternatives to fossil fuels.

[7] In the case of the Port of Taranto for 2019, complete data sets are available that can be considered "steady state." For the following two years, the incidence of the COVID-19 pandemic heavily affected the Port Network's ordinary operations and, consequently, the overall emissions budget, which therefore cannot be considered representative of the actual scenario.

community[8] , the development of an innovative port ecosystem, etc., in line with what is defined by the port planning documents of higher level mentioned above[9].

Currently in force, the TOP 2020-2022 sets five priority objectives (Figure 11).

Figure 11. Priority objectives of the 2020-2022 TOP.




*Source: Authors' elaboration.*

These priorities are accompanied by 20 plan actions envisaged in the latest version of the TOP 2020-2022:

1) The realisation of the "Future Port Innovation Hub" and the promotion of innovation in port and logistics.
2) The digitalisation of the Port.
3) One-stop administration (Sportello Unico Amministrativo - SUA).
4) Development of a Port Community System (PCS).
5) Raising the security levels of the port area and of the neighbouring industrial areas and, possibly extend security to the SEZ (Special Economic Zone) area.
6) Energy supply from renewable sources and the development of alternative fuels and LNG.
7) Development of sustainable mobility in the port area.
8) Development of the circular economy paradigm.
9) Innovative governance to position Taranto as a sustainable port city.
10) : (Re)building links and relationships between the port and the city through the materialisation of a new territorial identity based on the culture of the sea.
11) Development of a "Port exhibition center" and implementation of a "Modular system of educational/tourist visits of the port reality."
12) Plan of interventions for the regeneration of the "leisure/environmental" areas in the port and urban areas – redevelop the waterfront as a physical and social infrastructure capable of generating new configurations and design dimensions.
13) Efficiency and optimisation of port services.
14) Efficiency and optimisation of existing infrastructure and implementation of new strategic infrastructure.
15) Attracting iinvestments for developing the Ionian Special Economic Zone (SEZ) and the Free Trade Zone (FTZ) of the port of Taranto.

[8] In this sense and in line with the provisions within the Integrated Plan of activities and organization (PIAO) 2022-2024 the PNA of the Ionian Sea will also take into consideration the issues related to the generation of public value as defined within the PIAO.

[9] The TOP 2020-2022 was realized in collaboration with "Studi e Ricerche per il Mezzogiorno (SRM)" and was revised at the end of 2021 (Approved by Resolution No. 16/2021 of the PNA of the Ionian Sea Management Committee on 12/21/2021) and at the end of 2022 (Approved by Resolution No. 18/2022 of PNA of the Ionian Sea Management Committee on 12/20/2022).

16) Enhancement of the role of the port of Taranto within the TEN-T network corridors.
17) Promotion and marketing to support the logistics-industrial-maritime cluster of the Port of Taranto and the launching of the "Ionian Cruise Cluster."
18) Prevention of corruption and personal data protection.
19) Reorganisation of the PNA's internal resources through interventions to implement, enhance and empower human resources.
20) International relations and institutional communication including the upgrade of the web portal and social channels.

#### 1.2.1.1. Context analysis of the Port of Taranto in the Southern Italy areas

In the framework of the 2020-2022 programming period (TOP 2020-2022 - Revision 2021 and Revision 2022), the PNA of the Ionian Sea experimented with new forms of execution of its mission through the use of participatory practices and the development of projects with innovative content aiming, above all, to bring the institution closer to the social and economic activities of the city of Taranto. These developments require further planning, adequate response measures, and flexible and forward-looking transport policies that can anticipate changes and mitigate the related risks.

In this regard, the analysis conducted by the PNA of the Ionian Sea within the framework of drafting the TOP 2020-2022 (in its original formulation) emphasised the different success factors of the main ports at the national and Mediterranean level. In particular, the generation of high-value-added services and the establishment of logistic functions in a SEZ zone guaranteeing partial or total tax exemption for the flow of goods. Following the concession of the container terminal to Yilport Holding, it was foreseen to position the port at the centre of the Ionian SEZ by developing businesses via a dry port (inland port) whose production would be linked to port traffic.

The port has an infrastructure heritage and a geographical position that support the further development towards one of the main European commercial ports, making it a hub for traffic between Asia, Europe, and North America, as well as a connecting port with North Africa and Eastern Europe. In this regard, one of the main strategic goals has been to increase European connectivity through the completion of TEN-T networks and nodes that include "core" ports, both for transshipment and gateway traffic. Additionally, investments in last-mile delivery, management and control systems, and the strengthening of synergies between the CTE (European Territorial Cooperation), EUSAIR (EU Strategy for the Adriatic and Ionian Region), and SIE funds (European Structural and Investment Funds) are planned, mainly on the following two corridors:

- ✓ Scandinavian-Mediterranean Corridor with Taranto playing a core port role;
- ✓ Baltic-Adriatic Corridor.

Given the current transport scenario in the Mediterranean area and the new global challenges that require further growth of the national transport system's intermodal capacity, the update of the TEN-T networks would represent significant opportunity, enabling the port to increase competitiveness.[10]

Therefore, the intention of the PNA has been to develop commercial traffic by encouraging the development of dry port areas through logistics support activities, and counterbalance the decline in traffic caused by dependence on *pure transhipment*. Furthermore, the implementation of multi-modal transportation and the modal shift towards rail transportation, even through the use of the Grottaglie cargo terminal, would strengthen this potential.

According to the TOP 2020-2022, it is worth developing strategies and tools related to the following:

[10] This topic is an integral part of the PESTEL analysis, with particular attention to the political context (P) component referred to in paragraph 2.2.2.

- ✓ Monitoring markets - this includes (i) constant monitoring markets, with particular reference to China, the United States, and the MENA[11] area, to diversify the market that the port intends to serve; and (ii) identifying local dynamics and needs of businesses in Puglia (destination of exports and origin of imports).
- ✓ Logistics development: actions are aimed at developing logistics services, such as developing the dynamic reefer sector.
- ✓ Ro-Ro traffic: consider the potential of Ro-Ro traffic following an analysis of the catchment area and the examination of the possibility to shift some connections currently offered by road transport to maritime Ro-Ro services.

#### 1.2.1.2. Development policies of the port network: hinterland and foreland.

The captive area of the Port of Taranto includes the regions of Puglia, Basilicata, and Molise. As indicated in the TOP 2020-2022 (original version of 2020), these regions account for approximately 5% of the national value added and almost 8% of the total of enterprises in Italy. The respective contribution to foreign trade is 3%, highlighting a significant gap compared to the contribution of the rest of the country.

Targeting the expansion of the captive area to include businesses in other regions (such as Abruzzo and Campania), it is notable that the impact of these regions on the Italian economy is particularly high in agriculture, reflecting a production structure still strongly focused on this sector. In terms of technological-production supply chains, the automotive, textile, and furniture sectors are particularly relevant in the area, with a considerable impact on long-distance import/export flows.

The reference area for the port is Puglia, which maintains a particularly important role in Southern Italy, accounting for about 25% of the value-added and international trade of Mezzogiorno. Puglia is the third most economically important region in South Italy, following Campania and Sicily. Puglia accounts for approximately 80% in terms of value-added and businesses. Its share of foreign trade is lower (73%).

The main international market for the captive area of the port of Taranto is North America. This is mainly due to the automotive Lucano and aerospace trade in Puglia. Analyzing the entire captive area, the value of exchange operations to/from Taranto port amounts to €3.3 billion. In addition, the handling of oil and petroleum products also enhances trade with areas closer to Europe and North Africa.

Non-EU European countries are the second market linked with the captive hinterland of the port via maritime trade. Trade with these countries generates an exchange of €1.7 billion, while the rest of the handled goods are intra-EU maritime trade (to/from EU countries) and reaches €1.2 billion. Spain, for example, is a leading reference market for handling metallurgical products, olive oil, automotive components, and agricultural products, all linked to Puglia production centers.

As for the Far East, in particular the ASEAN countries, commercial exchanges mainly concern olive oil and agricultural products traded with the region of Puglia. Among the most relevant segments, clothing, and furniture (especially with China), aerospace products (Japan), and the fashion industry (India) can also be mentioned. The Chinese "Belt and Road Initiative" (BRI) generates an exchange of €2.8 billion. consisting of the second major market linked with the area.

#### 1.2.1.3. State of the Art: Planned actions.

The priority interventions of the TOP 2020-2022 (confirmed in the 2021 and 2022 revisions) stem from a decision-making process carried out by the PNA of the Ionian Sea - Port of Taranto that took into consideration the peculiarities of the port. They included the establishment of the Ionic Special Economic Zone (SEZ) and its implications for the development of the port and the related port community. In this context, the identified challenge for the SEZ is to systematically address aspects that often hinder investments related to developing the needed infrastructure and facilities. Designed as a

[11] The term MENA is an acronym for 'Middle East and North Africa', often used to refer to a broad region, stretching from Morocco to Iran, which includes most of both the Middle Eastern states and the Maghreb.

connection between entrepreneurial initiatives and the port, a SEZ is designed to attract investments that put logistics in synergy with manufacturers. They demand the support of the banking sector to ensure support by private and public investors, who would be interested in transforming it into a strategic initiative for the local and potentially the national economy.

Another initiative reported by the TOP 2020-2022, to increase investment and attractiveness of the port of Taranto, is the establishment of the Free Trade Zone (FTZ). The jurisdiction area (Figure 12) is already approved by the National Director of the Customs and Monopolies Agency, and includes a territory that is not considered part of the EU customs territory, with the consequent exemption from the requirement of payment of VAT and customs duties. The TOP 2020-2022 also envisaged the establishment of functional zones for the storage and warehousing of goods and the control of goods entering and leaving the checkpoints.

The establishment of the FTZ in the Port of Taranto, whose management and operation is entrusted to the PNA, was born with the intention of giving economic and employment recovery to the Port of Taranto.

The customs facilitation tools provided by the Community legislation in force, allow the holding, storage, and handling, in the most favourable conditions, of goods in a foreign state under suspension of customs taxes (duty, VAT, excise duties and border surtaxes) without time limitations, dealing with what should be customs clearance operations in ordinary storage conditions.

The Port Network Authority of the Ionian Sea is given the faculty to assign the areas - 11 perimeter and authorised by the Customs and Monopolies Agency - to those who intend to have productive settlements with the assumption that they will create economy and employment.

Therefore, to this end, the Authority has been entrusted with an important role, to attract and make it attractive for economic operators to settle in the FTZ areas, present in the Port of Taranto, providing the most favourable conditions for those who come to invest corporate capital.

For years, PNA has been carrying out a great work of 'restructuring' of the port, an image that has always been considered to have only an industrial vocation, whose intent today is instead also directed towards different attractions, such as the FTZ, to be offered in a new port scenario strongly pushed towards digitalisation through simplified logistics procedures and interoperability between the administrations involved.

The possibility of using areas under the FTZ regime has aroused great interest: several applications have been received, some of which are soon to be assigned. Therefore, structural, technological, and computerised works are being carried out to grant the areas in the best conditions of operability and safety.

For the economic operators that are going to settle in the FTZ areas, in order for them to make the best use of the investments, whose aim is to create an economy and employment, it is necessary and vitally important to operate in an efficient and well-connected port, whose procedures for the movement of goods, vehicles and people take place with fast and advanced processes.

All the work being done gives hope and creates the conditions for the FTZ to play a major role in the future development of the port and not only for the next three years.

Figure 12. Identification of the Ionic Free Trade Zone.


*Source: Three-Year Operational Plan 2020-2022, PNA of the Ionian Sea, 2022.*

The conditions, advanced by the previous three-year programming via the implementation of 20 strategic actions identified in the TOP 2020-2022 allow for a detailed examination of the main activities started/realized/completed. Table 6 details each strategic action, the status of the related interventions, and the predictions of activities to be carried out in the 2023-2025 triennium. This review ensures the interaction and linking of the two subsequent three-year programming period, i.e., the planning period of the TOP 2020-2022 and that of 2023-2025.

Table 6. State of the art of actions of the Three-Year Operational Plan 2020-2022 (2022 Revision).

| Potential reference target for 2020-2022 | Action title | Activities carried out (end of 2022) |
|---|---|---|
| **Innovation** | 1. Creation of the " Future Port Innovation Hub " and promotion of innovation in the port and logistics sector. | - Launch of the first call for start-up with selection of 7 start-ups/scale ups<br>- Development of 4 pilot projects<br>- Start of preliminary activities for the launch of the second call for start up |
| | 2. Digitalization of the institution. | Performance " and " Operational<br>Cartography " modules - Integration with the modules developed within the ambit of the Single Administrative Desk (SUA)<br>- Implementation of the Agenda digital |
| | 3. Single Administrative Desk (SUA). | - Completion of the digitalization activities of the front - office administrative procedures - Activation of the back - office platform |
| | 4. Port Community System (PCS). | - Conclusion of the first release of the PCS<br>- Testing forms of interoperability with the Customs Agency and with RFI<br>- Preparation of a BI module and identification of datasets to be made available on the Authority's portal |
| | 5) Raising the security levels of the port area and the neighboring industrial areas to possibly extend also within the SEZ (Special Economic Zone). | - Signing of a protocol in agreement with the ASI<br>Consortium - Signing of another protocol in agreement between the ASI Consortium and the three-municipality involved<br>- Presentation of a new proposal to the Ministry of the Interior planning for distribution of activities and budget -<br>Ministry approval of the Interior from the form planning and admission, to all intents and purposes, of the ASI Consortium in the project partnership. |
| **Sustainability** | 6. Procurement of energy from renewable sources and development of alternative fuels and LNG. | - Obtaining Of resources of the NRRP for the electrification of the docks<br>- Start of relamping work of lighting external<br>- Start of partnership with RINA Consulting SpA for the definition of project financing activities<br>- Search for private entities for the definition of PPPs to support the activity |
| | 7. Development of sustainable mobility in the port area. | - Installation of the planned system (such as electric columns) |
| | 8. Development of the circular economy paradigm. | - Third-party audit to maintain ISO 14001 certification<br>- Participation in European projects such as ECOWAVES<br>- Launch of port user awareness campaigns on separate waste collection issues<br>- Organization of courses for staff internal<br>- Update of the waste collection and management plan of the port of Taranto |

| | | |
|---|---|---|
| | 9. Innovative governance to configure Taranto as a sustainable port city. | - Signing of a Protocol of Understanding with the Guardia di Finanza of Puglia for the management of NRRP resources<br>- Creation of surveys aimed at involving stakeholders in the drafting of programming and planning documents<br>- Publication of the most relevant news on the PNA website<br>- Formalization of the first Report of Sustainability of the PNA of the Ionian Sea<br>- Update of the DEASP |
| **Port and territory** | 10. Port & city: (Re)building of ties and relationships with the territory through the materialization of a new territorial identity based on the culture of the sea. | - Participation in numerous events bringing the community closer to the Port<br>- Organization of visits training at the port |
| | 11. Development of the " Port Exhibition Center " and creation of a " Modular system of educational / tourist visits of the port reality ". | - Opening to the public of the initiative " Open Port "<br>- Physical location of the Open Port in the multipurpose center "Falanto" |
| | 12. Plan of interventions for the regeneration of " Leisure/environmental " areas in the port and urban areas: the waterfront as a physical and social infrastructure capable of generating new design configurations and dimensions. | - Continuation of the collaboration with the Municipality of Taranto for the design of the Waterfront<br>- Adoption of the Plan Town planning Executive and start of the preparatory process for final approval |
| **Physical infrastructure and competitiveness** | 13. Efficiency and optimization of port services. | - Startup Of a survey for the evaluation of the current offer of services<br>- Start of the activities aimed at the study comparative for the identification of factors of competitiveness at national and European level |
| | 14. Efficiency and optimization of the existing infrastructure and implementation of new strategic infrastructures. | - Start of interventions For The dredging of 2.3 mmc of sediments in the Molo Polisettoriale area and for the construction of a first lot<br>for the reclaimed reservoir functional to the expansion of the V protruding - Start of activities of the Center multi-purpose services for port uses at theMolo San Cataldo (Falanto building) - Start of<br>network construction activities of collection and drainage of rainwater in the common areas of the port and water mains |
| | 15. Attraction for investments: Ionian Special Economic Zone (SEZ) and Free Trade Zone (FTZ) of the port of Taranto. | - Startup discussions on the regulation and operation of the FTZ<br>- Start of the activities necessary for the functioning of the FTZ - Signing of the protocol in agreement with the Extraordinary Government Commissioner of the Ionian SEZ<br>- Integration of some functionality and organization of the back office for practices SEZ |
| | 16. Enhancement of the role of the port of Taranto within the corridors of the TEN-T network. | - Participation in online events such as the Connecting Europe Days<br>- Analysis of the state of the art of similar projects at European level |

| | | |
|---|---|---|
| | 17. Promotion and marketing, support to the logistic-industrial-maritime cluster of the Port of Taranto and launch of the " Ionian Cruise Cluster ". | - Participation in events and fairs for the enhancement of the cruise terminal<br>- Renewed partnerships with EU and non-EU ports (e.g. Port Of Shenzhen)<br>- Award Recognition like " Destination of the year " (Seatrade Cruise Award) |
| **Institutional accountability** | 18. Prevention of corruption, performance, and protection of personal data. | - Definition of actions for verifying and updating privacy protection procedures<br>- Integration with other priority interventions for inclusion from the protection issues _ from the privacy and security informatics |
| | 19. Reorganization of the internal resources of the PNA through interventions of implementation, enhancement, and empowerment of human resources. | - Sending a survey to identify personnel training needs<br>- Payment of 986 hours of training for internal personnel<br>- Definition of a training plan for personnel |
| | 20. International relations and institutional communication also through the web portal and social channels. | Collaboration activities with the main sector associations national (e.g., Assoporti and ALIS)<br>- Development of new one's partnership agreements with private operators - Digital and web activities marketing |

*Source: Authors' elaboration based on Three-Year Operational Plan 2020-2022, PNA of the Ionian Sea, 2022 (Rev. 2022).*

### 1.2.2. The Integrated Plan of Activities and Organization (PIAO) 2022-2024

The Integrated Activity and Organization Plan (PIAO) 2022-2024 of the Port Network Authority of the Ionian Sea - Port of Taranto, is a single planning and governance document that brings together the following tools to support port decision making:

- ✓ Performance Plan;
- ✓ Corruption Prevention and Transparency Plan;
- ✓ Personnel Needs Plan;
- ✓ Organizational Plan for agile Work (POLA).

In its current form, the PIAO incorporates the above-mentioned planning and port governance tools, articulated in four sections (Figure 13). The document provides information about the characteristics of the PNA of the Ionian Sea and examines aspects related to the port's performance in terms of the ability to create public value, the achievement of the operational objectives established within the Performance Plan, and the presence of the adequate preventive measures with regard to anti-corruption. The PIAO also examines topics related to the organisation of "human resources" and the development of "human capital" at the port, identifying measures and techniques for monitoring the progress on the set related objectives.

Figure 13. Structure of the Integrated Plan of Activities and Organization.


*Source: Authors' elaboration.*

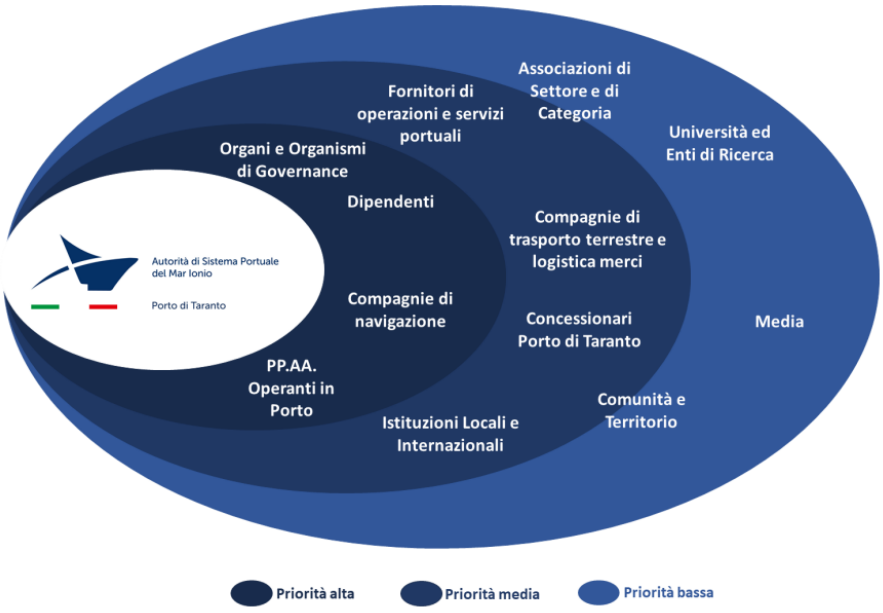
#### 1.2.2.1. The objectives of the PIAO and their integration with TOP

The PIAO 2023-2025 underlines the objectives of the TOP 2020-2022 and is taken into account for setting the objectives of TOP 2023-2025. Understanding the general principles that inspire the document as well as the strategic objectives and actions provided in the PIAO is a relevant precondition to define better the mission underlying the programming of the next three-year plan, as well as the choice of introducing plan specific strategic objectives and functional actions to ensure the improvement of the performance evaluation tools of the PNA of the Ionian Sea, especially in terms of measuring the contribution to the growth of the community.

Notably, the PIAO provides for the development of the "generating public value" paradigm, considering this is more central than the themes of performance evaluation and the introduction of management practices inspired by other objectives. *Public value* is understood as the "*overall level of economic, social, but also environmental and/or health well-being, of citizens, enterprises and other stakeholders created by*

*a public administration with respect to a baseline or starting level*"[12]. The actions necessary to increase the produced public value for the Ionian territory are planned by the Port Network Authority as detailed in the PIAO. In this regard, the PNA is called upon to carry out functions that promote the economic and social development of the territory and enhance the demands of external stakeholders. It is also asked to be responsible for the well-being of its internal stakeholders such as the employees of the organization, as well as all private and public entities that populate the Ionian port cluster - as identified in the 2021 Sustainability Report (Figure 14).

Figure 14. The mapping of PNA of the Ionian Sea's stakeholders based on their level of relevance.




*Source: Sustainability Report 2021, PNA of the Ionian Sea - Port of Taranto.*

There is a strong interdependence between the current TOP 2023-2025 and the PIAO 2022-2024, which becomes even clearer considering that the Port Network Authority had already identified within the previous TOP 2020-2022 the basis for developing the general and specific objectives related to the generation of "public value," leaving the identification of actions/interventions aimed at achieving said objectives to the forthcoming TOP.

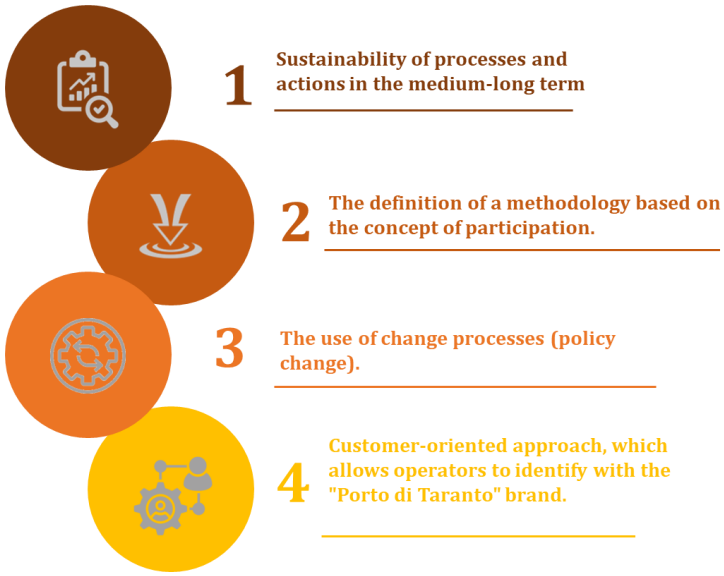
In this context, the policies of the Port Network Authority for the generation of public value refer to the general objective of coordinating the PNA's programmatic framework with its development strategy and mission with the governance and compliance principles established by the Sustainable Development Goals (SDGs) identified by the UN. Thus, the present TOP 2023-2025, also considers the global dynamics of the port and shipping sector and the deadlines related to the trans-European transport networks envisaged in the Agenda 2030 of the International Association of Port Cities (AIVP) of which the PNA is a member of the Board of Directors. In this vein, four main elements and impact indicators to consider in the 2023-2025 programming for creating public value are (Figure 15):

1) The sustainability of processes and actions in the medium-long term.
2) The use of a participatory methodology for involving internal and external stakeholders in the relevant consultations.
3) The introduction of functional processes that promote change.

[12] Moore, M. (1995). Creating Public Value – Strategic Management in Government. Cambridge: Harvard University Press.
Guidelines DPR no. 81 of June 24, 2022, "Regulation identifying the compliance requirements related to Plans absorbed by the Integrated Plan for Activity and Organization."

4) The use of a customer-oriented approach.

Figure 15. The elements for defining the strategy of creating public value.




*Source: Authors' elaboration.*

Concerning the different modes of interaction and dialogue with stakeholders, please refer to the section ***Stakeholder Engagement: Participatory Processes as a Driver of the Public Value Generation Strategy*** of the aforementioned PIAO.

### 1.2.2.2. The ESG (Environmental, Social, and Governance) paradigm in creating public value.

The Management Committee of the PNA of the Ionian Sea, with Resolution No. 17/17 of 15 December 2017, approved the proposal of the new Organisational Plan transmitted to the Supervising Ministry for approval.

The Supervising Ministry, by note prot. M_INF.VPTM. 7543 of 19 March 2018, approved, pursuant to art. 9, paragraph 5, lett. i), of Law no. 84 of 1994, the **Organisational Plan** of the PNA for a total of **70 units**, subdivided as follows as shown in Table 7.

Table 7. PNA of the Ionian Sea's Organizational Plant.

| Organizational Plant |
|---|
| n°5 - Directors |
| n°3 - "Quadri A" |
| n°6 - "Quadri B" |
| n°7 - First level |
| n°11 - Second level |
| n°20 - Third level |
| n°16 - Fourth level |
| n°2 - Fifth level |
| **Total 70 units** |

*Source: PNA of the Ionian Sea.*

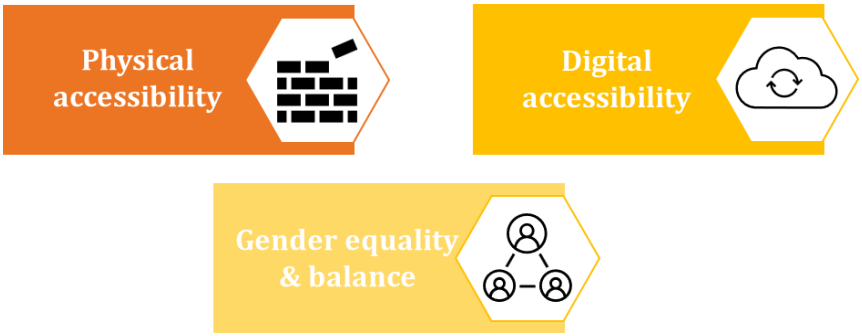
The strategy for creating public value defined by the the Ionian Sea Port Sytem Authority is based on adopting the "ESG identity" paradigm (Environment, Social, Governance), to be achieved through the use of activities and development plans specific to Corporate Social Responsibility (CSR), in line with the Agenda 2030 of the United Nations. In this context, the PNA has detailed the 17 objectives

(Sustainable Development Goals - SDGs) defined by the Agenda 2030, identifying possible actions to be implemented. These actions have been included in the Sustainability Report 2021. Consequently, the PNA has also identified specific GRI (Global Sustainability Reporting) indicators to monitor its ESG actions.

The adopted ESG principles involve a series of concrete interventions lying in three main directions (Figure 16):

- ✓ Physical accessibility – that includes measures and interventions aimed at overcoming architectural barriers in private, public, and privately owned buildings open to the public, with the aim being to eliminate any discriminatory components that could jeopardize the effective dissemination of public value produced by initiatives launched at the operational level.
- ✓ Digital accessibility – that identifies possible activities for the recognition and protection of the community's right to benefit from the information and communication technology services provided by the public administration and/or any public utility.
- ✓ Equal opportunity and gender balance – via activities upgrading governance methods through advancing new policy-making dynamics and by providing for the active involvement of all stakeholders.

Figure 16. The development guidelines of the ESG paradigm - PNA of the Ionian Sea.

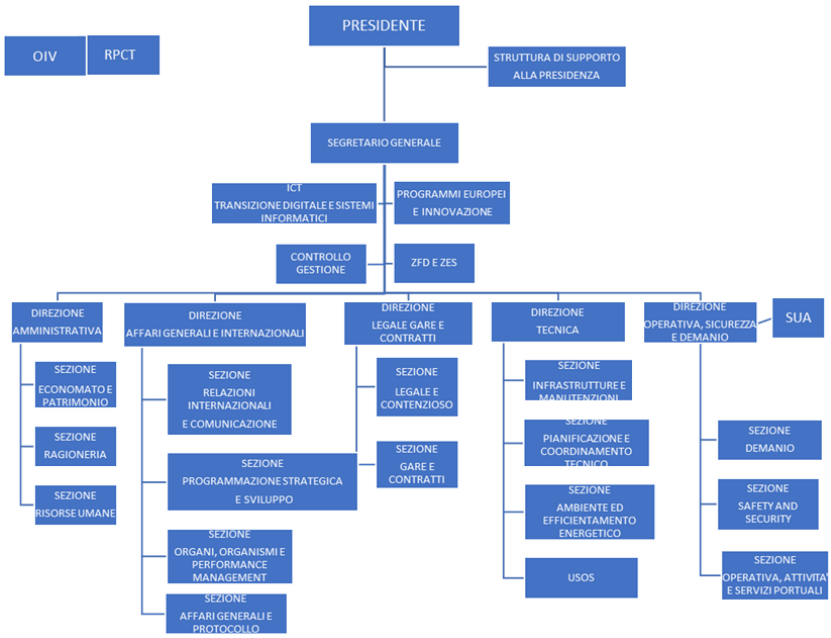



*Source: Authors' elaboration based on Port of Taranto PIAO 2022-2024.*

With a Collaboration Agreement of July 2022, the PNA of the Ionian Sea joined the 'ESG Workshop - Environmental Social Governance' the Intesa Sanpaolo initiative planned for the whole country and dedicated to SMEs aiming to improve their sustainability profile by initiating the transition towards ESG objectives and investments in sustainable and circular economy projects.

The current organisational structure was defined by President's Decree No. 13/2022 of 27.01.2022:

Figure 17. PNA of the Ionian Sea's organisational structure.




*Source: PNA of the Ionian Sea.*

The workforce at the date of approval of the Organisational Plan consisted of 46 employees, distributed as shown in Table 8:

Table 8. Staff of the PNA of the Ionian Sea.

| **Pianta organica approvata dal Ministero al 19.03.2018** | **Dotazione organica effettiva al 31.12.2017** |
|---|---|
| n° 5 - Dirigenti | n°5 Dirigenti |
| n° 3 - Quadri A | n° 1 - Quadri A |
| n° 6 - Quadri B | n° 6 - Quadri B |
| n° 7 - 1° livello | n° 1 - 1° livello |
| n° 11 - 2° livello | n° 6 - 2° livello |
| n° 20 - 3° livello | n° 9 - 3° livello |
| n° 16 - 4° livello | n° 16 - 4° livello |
| n° 2 – 5° livello | n° 2 - 5° livello |
| **Totale 70 unità** | **Totale 46 unità** |

*Source: PNA of the Ionian Sea.*

At 31.12.2022 considering the retirement and the recruitment made the organic budget is as follows: as shown in Table 9.

Table 9. Current staff of the PNA of the Ionian Sea.

| **Pianta organica approvata dal Ministero al 19.03.2018** | **Dotazione organica al 31 dicembre 2022** |
|---|---|
| n° 5 - Dirigenti | n°4 Dirigenti |
| n° 3 - Quadri A | // |
| n° 6 - Quadri B | n° 6 - Quadri B |
| n° 7 - 1° livello | n° 6 - 1° livello |
| n° 11 - 2° livello | n° 11 - 2° livello |
| n° 20 - 3° livello | n° 18 (*) - 3° livello |
| n° 16 - 4° livello | n° 15 - 4° livello Full Time -1 unità p.t. 32 ore |
| n° 2 – 5° livello | n° 1 - 5° livello |
| **Totale 70 unità** | **Totale 61 unità f.t. – n. 1 unità p.t. 32 ore** |

*Source: PNA of the Ionian Sea.*

The PNA, engaged in the realization of the works inserted in the NRRP and the relative Complementary Fund, uses, moreover, of:

- ✓ no. 3 units hired on a fixed-term basis, employed within the SOSW (Special Office for Strategic Works), recruited - pursuant to art. 1, co. 14 of Decree-Law no. 80 of 9 June 2021, "Urgent measures to strengthen the administrative capacity of public administrations functional to the implementation of the National Recovery and Resilience Plan (NRRP) and for the efficiency of justice" converted with amendments by Law no. 113 of 6 August 2021 - through the use of current competition rankings;
- ✓ no. 2 units in administration intended for the performance of activities related to the operation of the established FTZ of the Port of Taranto in accordance with L. 1602019, art. 1, co. 316, lett. b).

Therefore, the number of staff as at 31.12.2022 was 67, broken down as follows:

- ✓ 61 employees hired on a full-time permanent basis;
- ✓ 1 employee hired on a permanent part-time basis at 32 hours per week;
- ✓ 3 employees on temporary contracts;
- ✓ 2 employees on temporary contracts.

In addition, in January 2023, a further unit assigned to the Legal/Tenders and Contracts Directorate was hired on a fixed-term basis, for activities related to the implementation of infrastructure projects eligible for funding from the resources of the National Recovery and Resilience Plan (NRRP) and related Supplementary Fund, recruited through the use of current competition rankings (art. 1, co. 14 of Decree-Law No. 80 of 9 June 2021, 'Urgent measures to strengthen the administrative capacity of public administrations functional to the implementation of the National Recovery and Resilience Plan (NRRP) and for the efficiency of justice' converted with amendments by Law No. 113 of 6 August 2021).

The professional development of PNA's employees, understood as continuous training, is inspired by the following values:

- ✓ **staff enhancement**: training as a tool for the development of staff skills has as its ultimate aim the enhancement of employees as a strategic resource of the organisation;
- ✓ **continuity**: training must be understood as a permanent method to ensure the constant adaptation of employees' professional skills;
- ✓ **equality and equal opportunities**: training is designed and offered to all employees in relation to the actual training and professional needs identified;
- ✓ **participation**: the training process must provide for moments and methods of involvement of employees in its various phases: detection of training needs, feedback on courses (satisfaction), collection of proposals for improvement, reports;
- ✓ **sharing**: the planning of training provision is shared with managers;
- ✓ **adequacy**: training courses must be chosen on the basis of the training needs of the employees' professional skills and the organisation's objectives, ensuring a proper balance between transversal and specialist/sector training, between refresher training and training for professional development;
- ✓ **effectiveness**: training must be constantly monitored and evaluated also with regard to its outcomes in terms of satisfaction, impact on the work, etc.;
- ✓ **efficiency**: training must also be provided on the basis of a careful assessment and weighting between the quality of the training offered and its cost, and therefore the different training offers must also be examined from this perspective.

PNA of the Ionian Sea training is aimed at the following objectives:

- ✓ **strengthen-update existing skills**, both for the professional development of employees as a whole, and to enhance excellence;
- ✓ **accompany** the induction processes of newly hired or recruited staff, to transfer technical, regulatory, and procedural knowledge closely linked to the operations of the role, and to foster cultural growth;
- ✓ **optimise** the ability to harmonise training and work activities;
- ✓ **consolidate** the evaluation system of training interventions, not only with regard to the satisfaction or learning of participants, but above all to the verification of the results obtained with regard to the activities carried out in the work environment.

In addition to what has already been said, the Authority is proceeding to the modification of the current organic plant - approved by the Ministry of Infrastructure and Transport with note no. 7543 of 19.03.2018 - in qualitative / quantitative terms to meet the need to optimize the use of public resources available and to pursue the objectives of organizational performance and the provision of better services to the community.

A quantitative and qualitative study was carried out in order to identify the actual needs of staff, obviously taking into account the institutional tasks assigned to the PNA.

Quantity in the sense of determining the numerical quota necessary to ensure the fundamental functions, divided by sub-quotas determined by the homogeneous set of activities or by processes to be managed. Qualitative in the sense of providing it with reference to types and professional skills «better responding to the needs of the administration itself, also taking into account the emerging skills due to the evolution of the work organization and the objectives to be achieved».

The proposal to modify the organic plant will be submitted to the approval of the Management Committee pursuant to art. 9, paragraph 5, lett. i), of L. n. 84 of 1994 e smi. whose resolution will be sent for approval to the Ministry of Infrastructure and Transport.

## 1.3. POSITIONING OF THE PORT OF TARANTO IN THE ITALIAN CONTEXT

Following the analysis of the institutional framework and the current state of port planning and programming related to the PNA of the Ionian Sea - Port of Taranto, this Paragraph outlines the current positioning of the Port of Taranto in relation to the national and international port context, considering the main areas of port activity and the historical trend of related traffic. It then provides a brief overview of the port's economic performance.

### 1.3.1. Analysis of goods and passenger traffic

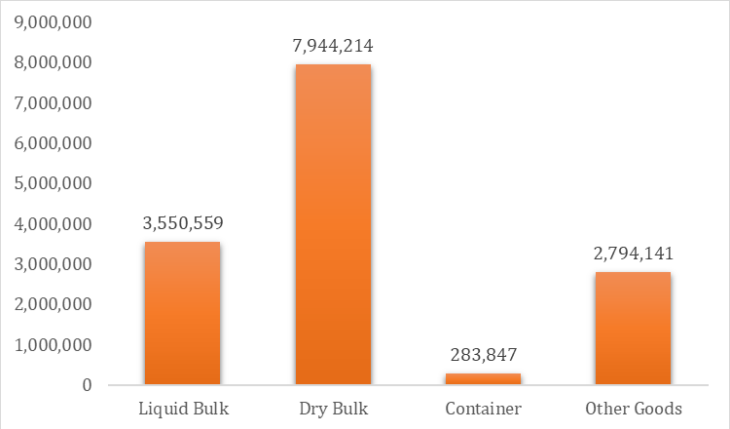
#### 1.3.1.1. Location of the port and positioning with respect to national and international logistics-transport systems.

The Port of Taranto benefits from a strategic geographic location: it is located along the Suez-Gibraltar route and is part of the TEN-T network as the terminal node of the land-rail segment of the Scandinavian-Mediterranean Corridor and is included in the maritime connection node of the corridor with “La Valletta”.

#### 1.3.1.2. Terminals and main types of traffic at the Port of Taranto.

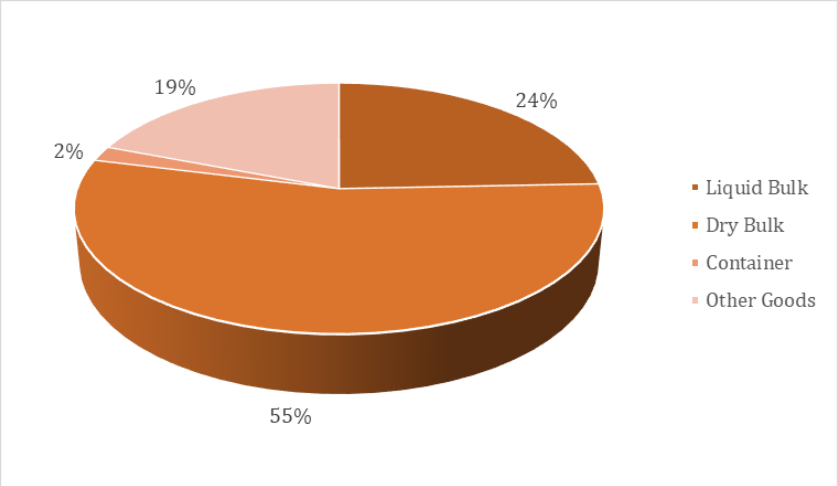
In 2022, the Port of Taranto handled 14,572,761 tons of goods, mainly consisting of solid bulk cargo (7,944,214 tons), liquid bulk cargo (3,550,559 tons) and general cargo (2,794,141 tons) (Figure 18 and Figure 19). The maritime container throughput amounted to 26.269 TEU. Some 108,810 cruise passengers transited through the Port of Taranto in 2022.

Figure 18. Goods traffic at the Port of Taranto by category in tons (2022).




*Source: Authors' elaboration based on PNA statistics – 2022.*

Figure 19. Individual commodity traffic at the Port of Taranto (2022).




*Source: Authors' elaboration based on PNA statistics – 2022.*

The flows of goods and people are the result of port activities carried out at the 5 terminals currently operating and under concession, namely:

- ✓ the container terminal "SCCT - San Cataldo Container Terminal";
- ✓ an industrial terminal for liquid bulk "Eni S.p.A." and two solid bulk terminals including a steel terminal "Acciaierie d'Italia" (distributed along four protrudings and one quay) and a cement terminal "Cemitaly S.p.A." (located at the root of the 4th protruding and in the area behind the quay between the 4th and 3rd protrudings);
- ✓ the cruise terminal "Taranto Cruise Port".

The current traffic data (in 2022) do not provide a precise picture of the current positioning and future development trajectories of the Port of Taranto. This is because the port in 2022 had not yet benefited from the effects related to its recent strategic repositioning with respect to both some historical Business Strategic Areas (ASA) for the development of the Port of Taranto and some new ASA areas traditionally outside the scope of the current port activities. In this regard, it is essential to consider the current state of port planning of the PNA of the Ionian Sea in order to understand the factors that are expected to have a short-term impact on the dynamics of port traffic. To this end, the main information relates to total state property areas, state property areas under concession, state property areas still to be granted (with an indication of the intended use destinations), existing operational terminals, terminals under construction/upgrading, etc., and planned terminals.

Table 10. Details of land use and concessions.

| Landing place name | Concessionaire | Tons max | Operational Area (sqm) | Cargo handling |
|---|---|---|---|---|
| Calata 1 (Quay 1) | - | 20.000 | 1.800 | Miscellaneous |
| 1° Sporgente levante | - | 25.000 | 1.600 | Miscellaneous |
| 1° Sporgente Ponente | - | 25.000 | 13.00 | Miscellaneous |
| Testata 1° Sporgente | - | 2.000 | - | Miscellaneous |
| CALATA 2 (Quay 2) | - | 22.000 | 30.000 | Miscellaneous |
| 2° Sporgente Levante | Acciaierie d'Italia S.p.A. | 130.000 | 9.000 | Iron ore |
| Testata 2° Sporgente | Acciaierie d'Italia S.p.A. | 40.000 | - | Ships technical stop |
| 2° Sporgente Ponente | Acciaierie d'Italia S.p.A. | 40.000 | 10.600 | Steel materials |
| CALATA 3 (Quay 3) | Acciaierie d'Italia S.p.A. | 12.000 | 4.000 | Ferroalloys - Loppa |
| 3° Sporgente Levante | Acciaierie d'Italia S.p.A. | 45.000 | 10.800 | Steel materials |
| Testata 3° Sporgente | Acciaierie d'Italia S.p.A. | 30.000 | 13.400 | Fuel - tar |
| 3° Sporgente Ponente | Acciaierie d'Italia S.p.A. | 45.000 | 12.200 | Steel materials |
| CALATA 4 (Quay 4) | - | 12.000 | - | Miscellaneous |
| 4° Sporgente levante radice | Cemitaly S.r.l. | 6.000 | - | Cement loading |
| 4° Sporgente Ponente | Acciaierie d'Italia S.p.A. | 350.000 | - | Iron - coal discharge |
| Testata 4° Sporgente | Acciaierie d'Italia S.p.A. | 2.000 | - | Bitumen loading |
| Pontile Petroli | ENI S.p.A. | 20.000 | - | Oil products |
| Campo Boe AGIP | ENI S.p.A. | 300.000 | - | Crude oil unloading |
| 5° Sporgente/Molo Ovest | Acciaierie d'Italia S.p.A. | 45.000 | 631.300 | Steel products |
| Calata 5 (Quay 5) - Molo polisettoriale | - | - | 1.000.000 | Miscellaneous |

*Source: PNA of the Ionian Sea.*

As at 31.12.2022, the port areas are broken down as shown in Table 11:

Table 11. Area division.

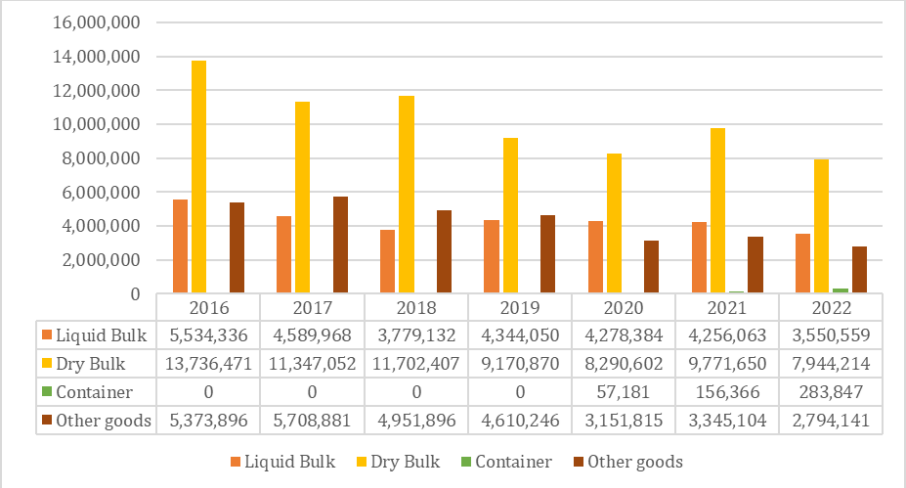
| Area | Surface area/Length |
|---|---|
| Concession areas. | 2.146.000 mq |
| Non-concession areas. | 2.389.000 mq |
| Concession docks. | 13.052 m |
| Non-concessionary docks. | 1.821 m |

*Source: PNA of the Ionian Sea.*

### 1.3.1.3. Evolution of freight and passenger traffic.

The evolution of **traffic volumes** in recent times highlights the heterogeneous dynamics and trends with reference to the main commodity categories. In general, there is a succession of increases and drastic reductions in the total tons moved, and a significant downward trend in traffic due to the port's strong dependence on traditional industrial activities (such as Ex-ILVA) located inside or near the port, which have been in a phase of suffering or crisis for years.

Figure 20. Trends in freight traffic from 2016 to 2022 at the Port of Taranto.




| | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|
| Liquid Bulk | 5,534,336 | 4,589,968 | 3,779,132 | 4,344,050 | 4,278,384 | 4,256,063 | 3,550,559 |
| Dry Bulk | 13,736,471 | 11,347,052 | 11,702,407 | 9,170,870 | 8,290,602 | 9,771,650 | 7,944,214 |
| Container | 0 | 0 | 0 | 0 | 57,181 | 156,366 | 283,847 |
| Other goods | 5,373,896 | 5,708,881 | 4,951,896 | 4,610,246 | 3,151,815 | 3,345,104 | 2,794,141 |

*Source: Authors' elaboration based on data from the Port Network Authority of the Ionian Sea.*

In 2016, the tons of solid bulk handled by the Port of Taranto reached their peak over the examined time horizon, at about 14 million tons, before decreasing in the following two years to 12 million tons. Since 2019, this negative trend has intensified, as in the next four years, the tonnage of solid bulk handled by the Port of Taranto remained below 10 million tons. Similar developments were recorded in the liquid bulk and general cargo sectors, for which movements have been alternating increases/decreases in recent years, but with an evident negative evolutionary trend.

As for **container traffic**, the concession of the terminal to SCCT in 2019 led to the start of a repositioning process of the terminal in the central Mediterranean, with the gradual achievement of significant traffic goals. Starting in 2020, the year of the operator's actual entry into service, the Port of Taranto has observed a growth trend, from 5,512 TEU in 2020, 11,841 TEU in 2021, to 26,269 TEU in 2022.

The Table 12 shows the annual variations of traffic for each merchandise category, highlighting the need for a reconsideration of the strategic positioning of the Port of Taranto based on a different mix of port assets and activities.

Table 12. Year-on-year comparison of individual commodity categories - Port of Taranto.

| Goods type | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|
| Liquid Bulk | - | -17.06% | -17.67% | 14.95% | -1.51% | -0.52% | -16.58% |
| Dry Bulk | - | -17.39% | 3.13% | -21.63% | -9.60% | 17.86% | -18.70% |
| Container | - | - | - | - | - | 173.46% | 81.53% |
| Other goods | - | 6.23% | -13.26% | -6.90% | -31.63% | 6.13% | -16.47% |

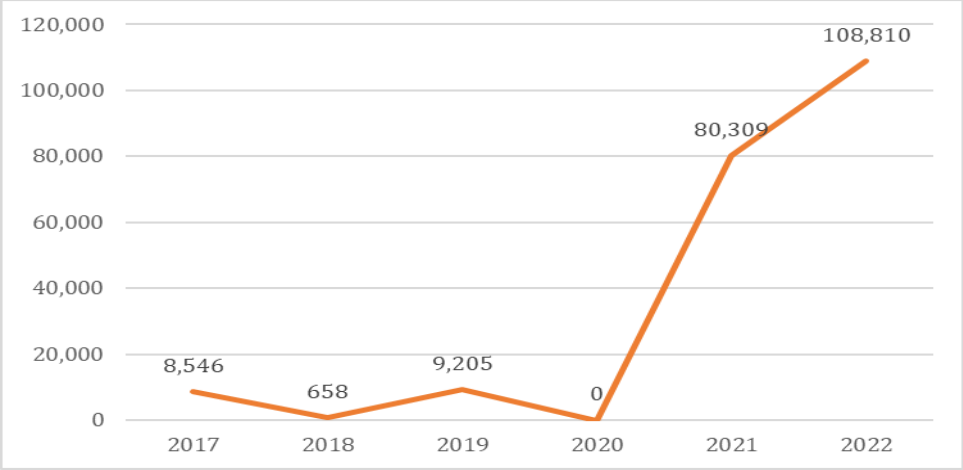
*Source: Authors' elaboration based on data from the PNA of the Ionian Sea - Port of Taranto.*

In line with the rest of the world's cruise ports, cruise activities in Taranto were halted in 2020, with a restart in cruise activities .in 2021. Since then, the port began to benefit and record an increased

number of passenger movements and calls. Accoding to available data, the port recorded 28 calls and more flows of over 100,000 passenger movements in 2022.

Cruise traffic in both 2021 and 2022 is multiple times the one that occurred in the pre-pandemic period (2017-2019). A major cause is that the port has proceeded to a 20-year concession for the management of the cruise terminal. The operator is Taranto Cruise Port, a company established by Port Operation Holding S.r.l. and Global Ports Melita Ltd, controlled by Global Ports Holding Plc, the main independent global cruise terminal operator. The signing of the aforementioned concession agreement allowed the Port Network Authority of the Ionian Sea to initiate a strategic change aimed at qualifying the port of Taranto as an international cruise destination defining a value proposition that translates into the pay-off "A destination beyond your imagination". With the promotion and dissemination activities of the "Taranto brand", the aim is to achieve further development of cruise traffic.

Figure 21. Passenger traffic (cruises) trend from 2017 to 2022 at the Port of Taranto.




*Source: Authors' elaboration based on data from the PNA of the Ionian Sea.*

### 1.3.2. Benchmark analysis of the port of Taranto compared to the national port system.

#### 1.3.2.1. Cargo traffic at the port of Taranto compared to the Italian port system.

The events that the Italian economy faced in recent years have greatly affected both the trade flows affecting the national port system and those related to the Port of Taranto (Table 13). The implications of the COVID-19 pandemic were added to the effects arising from the Russia-Ukraine conflict, which made the geo-political context of reference even more complex in the first part of 2022. Starting from the second half of 2022, encouraging signs can be seen with reference to the recovery of world trade with positive effects also on the dynamics of sea traffic affecting the national port system.

Data for the first nine months of 2022 (the latest period available) updated to Dec. 22, 2022, as reported by Assoporti, indicate a recovery trend in port traffic volumes with the prospect of outperforming the volumes handled during pre-COVID-19-year 2019. Table 13 shows the performance of the different sectors in Italy in the January-September period between 2019 and 2022, showing, in all cases, general growth in volumes.

Table 13. The Italian port system: dynamics of cargo and passenger traffic

| Year | Liquid bulk tons. | Dry bulk tons. | Container | Ro-Ro | Others | Hinterland | Transhipment | TEU | Local passengers | Ferry passengers | Cruise passengers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | tons. | tons. | tons. | number | number | number | number | number | numbers |
| 2019 | 182.808.394 | 59.661.023 | 111.302.797 | 112.189.824 | 23.368.829 | 7.210.640 | 3.573.035 | 10.783.675 | 37.604.888 | 17.976.530 | 11.982.267 |
| 2020 | 156.887.905 | 49.287.746 | 114.311.231 | 106.327.466 | 16.392.742 | 6.614.309 | 4.072.842 | 10.687.151 | 22.167.565 | 9.643.156 | 640.936 |
| 2021 | 163.807.537 | 56.800.474 | 117.012.416 | 122.572.786 | 20.419.763 | 7.195.426 | 4.101.293 | 11.296.719 | 27.428.618 | 13.485.308 | 2.442.143 |

*Source: Authors' elaboration based on PNA statistics – Port of Taranto.*

With regard to cargo (dry bulk, liquid bulk, and various cargo), a total of 372.5 million tons were handled in the first nine months of 2022 (+3.4% compared to 2021 and +2.7% compared to 2019). Of these, 171.3 million tons were bulk cargies (73% liquid bulk and 27% dry bulk), and 201.2 million tons belonged to general cargo category.

Considering containers, 8,827,829 TEU were handled in the first 9 months of 2022, a growth of +9.5 percent compared to 2019 (8,059,431 TEU). In terms of tonnage, a total 95.5 million tons of goods were transported via container in all Italian ports. In the same period in 2019, 83.3 million tons of cargo were transported by container. Container traffic for the first 9 months of 2022 in Italian ports increased by +5.2% over the corresponding period.

Different evolutionary dynamics emerge for "gateway" and "transhipment[13]" container traffic activities. While the direct/ incoming traffic to/from the hinterland (gateway) achieved a growth of about +5% with 5. 592,189 TEUs handled in the first nine months of 2022 compared to 5,326,228 TEUs for the same period in 2019, transhipment traffic (transhipment) shows a particularly favourable evolution with an increase in TEUs handled by the national port system of +22.3% especially due to the performance of the Medcenter Container Terminal in Gioia Tauro acquired by MSC.

The Ionian Sea - Port of Taranto handled in the first nine months of 2022 (11,102,745 tons) and 1,868 TEU handled[14] (Table 14). The Port of Taranto, therefore, currently facilitates 2.98% of the tons of cargo handled by the national port system and only 0.02% of the container traffic taking place in Italy.

Concerning Ro-Ro cargo, the data show a particularly positive evolutionary dynamics of traffic in the first nine months of 2022, with total handling of 93,293,105 tons which represents a significant 14% increase compared to the first nine months of 2019, when the sector had generated volumes of 81,944,314 tons.

[13] A gateway port represents the continental gateway for ocean shipping traffic. It is firmly connected to the overall logistics system through modern road and rail networks, which can ensure fast and efficient transfer of containers from ship to final destination, and vice versa. A trashipment port, concerns container handling by the same mode of transport: ship/ship. It is characterized by large yards, as containers may have to wait days before being transferred from one ship to another.

[14] It should be noted that, as reported within paragraph 1.3.1.3 in the entire 2022, 26,269 TEUs were handled. However, in order to ensure homogeneity of analysis when comparing with other national ports, it was necessary to examine values only for the first 9 months of 2022.

Table 14. Port Traffic per individual port system on the total (Jan – Sept 2022).

| PNA | Totale tonn. (2022) | % | Ranking | Total TEU (2022) | % | Ranking |
|---|---|---|---|---|---|---|
| Mar Ligure Occidentale | 50,460,680 | 13.54% | 1 | 2,118,271 | 24.00% | 2 |
| Mare Adriatico Orientale | 45,020,349 | 12.08% | 2 | 667,263 | 7.56% | 5 |
| Mar Tirreno Meridionale-Ionio | 33,682,267 | 9.04% | 3 | 2,595,700 | 29.40% | 1 |
| Mare di Sardegna | 32,302,943 | 8.67% | 4 | 109,684 | 1.24% | 10 |
| Mar Tirreno Settentrionale | 30,098,914 | 8.08% | 5 | 569,306 | 6.45% | 6 |
| Mare di Sicilia Orientale | 24,491,017 | 6.57% | 6 | 39,749 | 0.45% | 13 |
| Stretto | 24,443,053 | 6.56% | 7 | 0 | 0.00% | 16 |
| Mar Tirreno Centrale | 24,325,272 | 6.53% | 8 | 794,646 | 9.00% | 4 |
| Mare Adriatico Centro Settentrionale | 20,785,297 | 5.58% | 9 | 178,666 | 2.02% | 8 |
| Mare Adriatico Settentrionale | 19,222,773 | 5.16% | 10 | 415,015 | 4.70% | 7 |
| Mare Adriatico Meridionale | 14,328,199 | 3.85% | 11 | 52,849 | 0.60% | 12 |
| Mar Ligure Orientale | 14,140,767 | 3.80% | 12 | 1,052,434 | 11.92% | 3 |
| Mar Tirreno Centro Settentrionale | 11,288,341 | 3.03% | 13 | 87,072 | 0.99% | 11 |
| Mar Ionio | 11,102,745 | 2.98% | 14 | 1,868 | 0.02% | 15 |
| Mare Adriatico Centrale | 9,000,263 | 2.42% | 15 | 126,461 | 1.43% | 9 |
| Mare di Sicilia Occidentale | 7,866,689 | 2.11% | 16 | 18,845 | 0.21% | 14 |
| **Totale** | **372,559,569** | | | **8,827,829** | | |

*Source: Authors' elaboration.*

Passenger traffic, including cruise, ferry, and local passengers, in the first 9 months of 2022, also shows recovery compared to previous years but still below the values recorded before the outbreak of the pandemic, with a total number of 48,399,325 passengers transiting Italian ports compared to 51,429,772 in the first nine months of 2019. Local passengers (57.9% of the total) amounted to 28,042,942, up 27.6% compared to the first nine months of 2021 (21,975,102 local passengers) and 6.8% compared to 2019 (26,265,073). Passenger traffic generated by ferries amounted to 13,827,622, thus marking values still below the corresponding period of 2019 (-12.7%) which had recorded 15,845,671 transits instead. As regards cruise traffic (13.5 % increase of passenger movements), the national port system recorded 6,528,761 pax in the first 9 months of 2022, a growth of +358.7 percent compared to the corresponding period of 2021. However, these volumes still appear lower than in the pre-pandemic period (about -30% compared to the first nine months of 2019 when 9,319,028 cruise passengers' movements were recorded).

The current positioning of the Port of Taranto within the national port system is worth considering in light of two key elements:

- ✓ The crisis of the industrial activities that had been the fundamental driver behind the evolutionary dynamics of port traffic in the ports of Puglia;
- ✓ The recent strategic rethinking initiated by the port network authority, which, despite having initiated a series of functional interventions to strengthen the competitive positioning of the port of Taranto on a national and international scale, has not yet been able to realize a concrete increase in overall traffic.

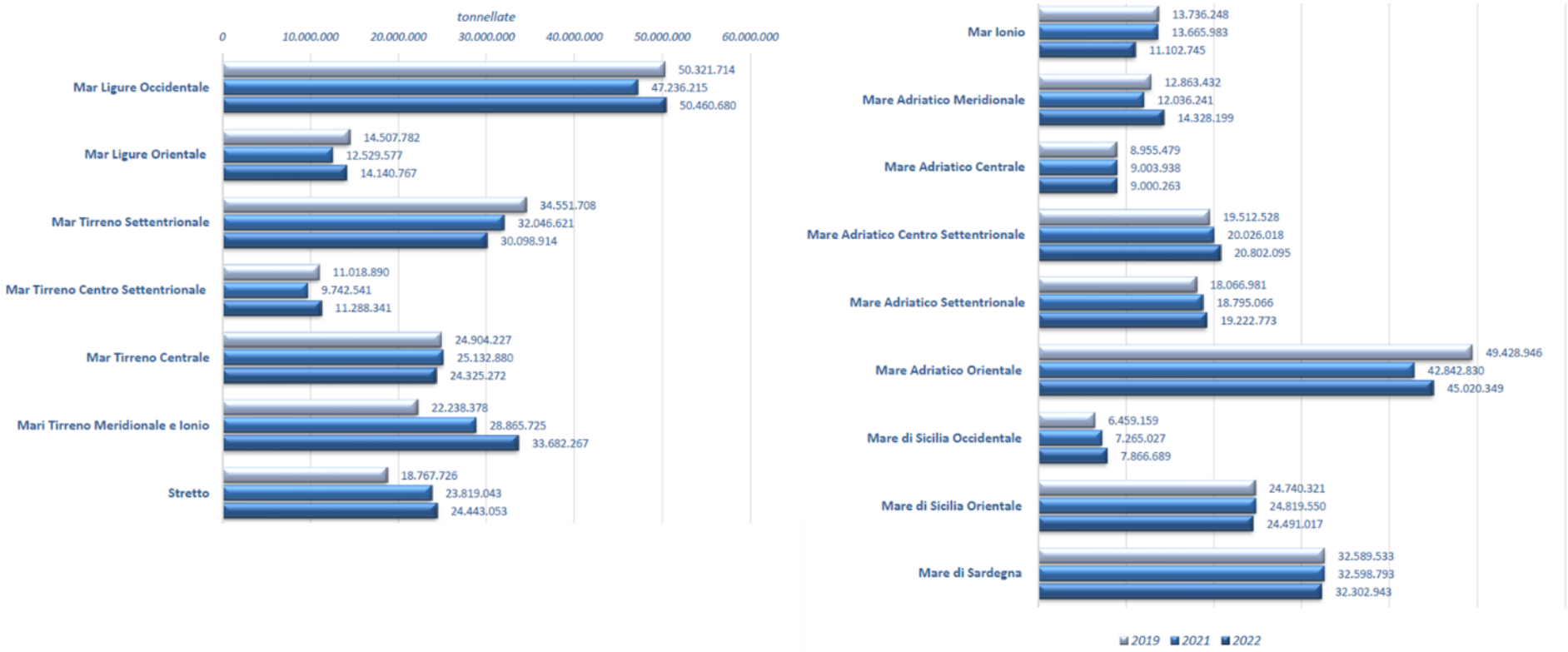
Limiting consideration to the first nine months of 2022, to facilitate comparison with data for the national port system, the PNA of the Ionian Sea handled 11,102,745 tons of cargo (Figure 22). This trend should be traced back to the negative dynamics that characterized the solid bulk sector, which although still constituting the main cargo traffic of the Port of Taranto due to the presence of one of the main factories of the company Acciaierie d'Italia Holdings S.p.A. (Ex-ILVA), appears to be in a condition of crisis that follows from the evolution of the international geo-political context. However, this type of

commodity maintains fundamental to the Port of Taranto. With 6,146,439 tons of dry bulk handled in the first 9 months of 2022, the PNA of the Ionian Sea ranks second nationally, right after the Northern Central Adriatic Sea PNA (8,707,720 tons) even though it is a single-port PNA. In the Mezzogiorno area, the PNA of the Ionian Sea is the leading port for dry bulk cargo handling.

In the liquid bulk sector, the PNA of the Ionian Sea ranks 12th nationally, having handled 2,489,127 tons in the first nine months of 2022. This performance should be attributed to the presence within the Port of Taranto of ENI Refining & Marketing's refinery and its strategic role in distributing petroleum products from southeastern Italy.

In the container cargo market, the traffic levels reached by the port of Taranto are still very modest compared to national ports historically dedicated to containerized traffic, such as Gioia Tauro, Genoa and La Spezia. Taranto port handled 271,136 tons in the first nine months of 2022, representing an increase of about 78% compared to 2021. The number of TEUs handled amounted to 1,868. In the same period the port of Gioia Tauro, the last pure transhipment hub in Italy handled 32,382,110 tons, while the main "gateway" ports in Italy, the ports of Genoa and La Spezia, handled 18,187,850 tons and 8,549,895 tons of containerized cargo respectively.

Figure 22. Trend in total cargo handled (tonnes) by port network authority - Analysis of January-September period for 2019, 2021 and 2022.




*Source: Comparison of traffic data in ports, Assoporti 2022.*

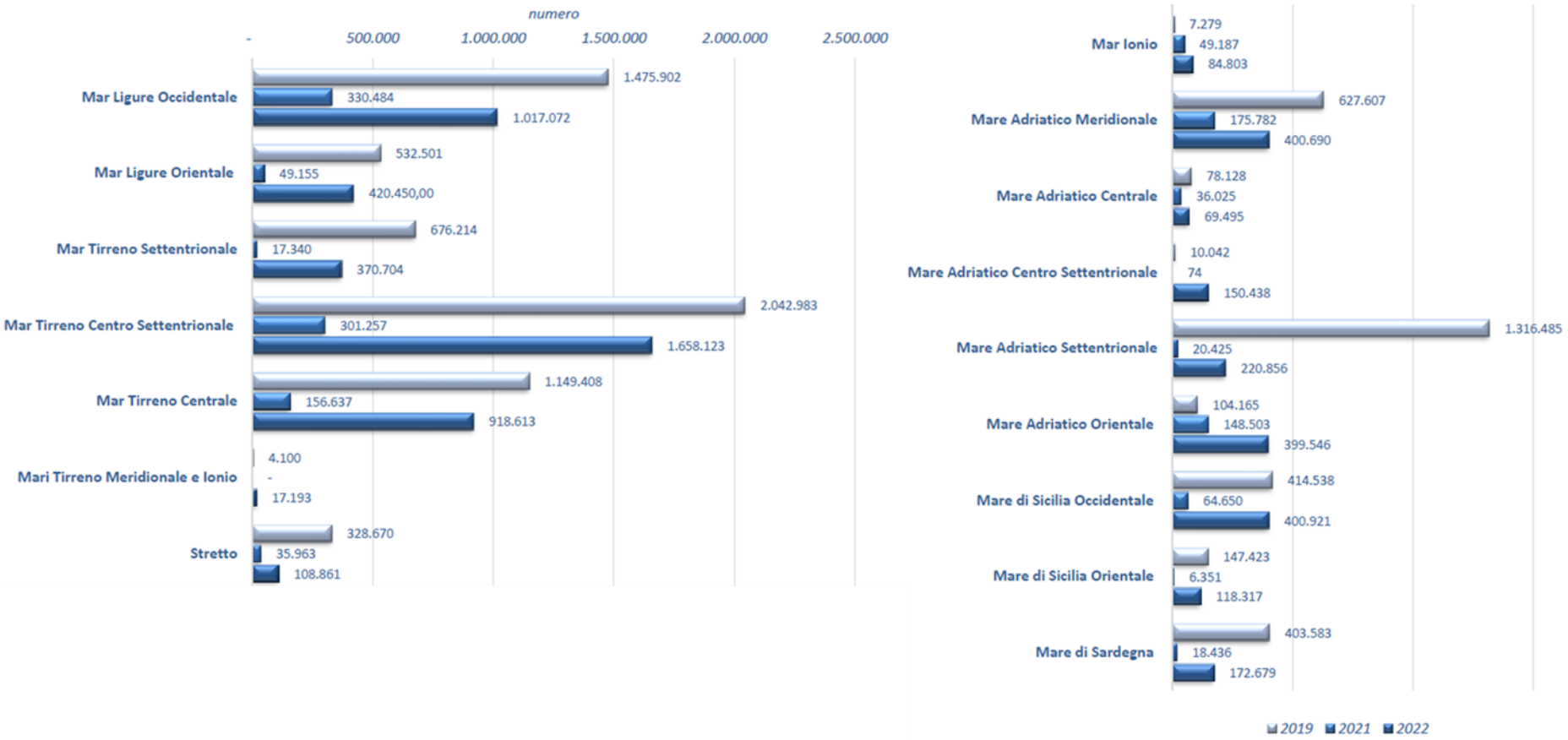
#### 1.3.2.2. Cruise traffic at the port of Taranto compared to the Italian port system.

Cruise activities represent one of the main drivers for development and an important element for repositioning the port on a national and international scale. In this regard, it is worth mentioning that in Semptember 2022 the port of Taranto won the prestigious "Destination of the Year" award at the Seatrade Cruise Awards.

In the first nine months of 2022, cruise passengers facilitated at the port of Taranto were 84,803, i.e., more than 42% from the same period in 2021 (49,187 passengers' movements). (Figure 23). The growth trend can be partially attributed to the recent inclusion of the port of Taranto in the cruise itineraries offered on the market by as many as nine cruise lines (namely, Phoenix Artania, Road Scholar, MSC Cruises, Celebrity Cruises, P&O Cruises, Noble Caledonia, Sea Cloud, Marella Cruises and TUI Cruises).

By 2023, the Ionian port of call plans to grow further as a home port, becoming the embarkation point for Costa Crociere's international passengers. The Italian-flagged company has in fact chosen the port of Taranto, along with that of Catania, for turnaround operations as part of the Costa Pacifica's Mediterranean itinerary. Stopovers are also expected from six further companies: Celebrity Constellation, Norwegian Cruise Line, P&O Cruises, Sea Cloud, Marella Cruises and Noble Caledonia.

Figure 23. Trends in the number of cruise passengers per port network authority - Analysis of January-September period for 2019, 2021 and 2022.




*Source: Comparison of traffic data in ports, Assoporti 2022.*

### 1.3.3. The operational and financial performance of the Port of Taranto.

#### 1.3.3.1. Analysis of the organizational objectives.

In line with the regulatory Decree no. 28 of February 4, 2022, of the Ministry of Infrastructure and Sustainable Mobility, in the Performance Plan 2022-2024, published in January 2022 and subsequently updated in March 2022, the Port Network Authority of the Ionian Sea has defined its own performance objectives (both at the strategic and operational level). This has happened taking into account the national political context in the process of defining sustainability and ecological transition objectives, the planned public investments, and the regulatory measures already implemented or planned in relation to the streamlining of administrative procedures under the authority of the Authority.

In this regard, the five main performance objectives identified in the above-mentioned Plan are also reflected in the strategic objectives defined by the TOP 2020-2022 (Table 15).

Table 15. Organizational objectives and connection with strategic objectives.

| Objective defined in the Performance Plan | Corresponding target in TOP 2020-2022 | Short description |
|---|---|---|
| **Completion and finalization of plan actions related to innovation** | Innovation | Within this objective, the PNA of the Ionian Sea has included some important project strands and concrete initiatives for the definition of an acceleration path on port issues and related to the blue economy. In fact, the issue of digitization will be pursued in its internal and external components, i.e., both the speeding up of the internal information flow and the user interface processes as regards access control and authorization procedures. |
| **Completion and finalization of plan actions related to sustainability** | Sustainability | The goal of sustainability is pursued through the implementation of the concept of "smart green and sustainable port", a priority on a global scale. During 2022, the Authority focused its resources on the concrete implementation of some aspects of its DEASP with particular reference to the issues of energy efficiency, procurement and production in relation to renewable energy sources. |
| **Upgrading and differentiation of port traffic: intermodal traffic, consolidation and further growth of the cruise segment, launch of logistics projects** | Port and Territory | The Port of Taranto increasingly represents a center in which cultural, commercial, industrial, social and human relationships take place and are renewed.<br>Over the next few years, the PNA will focus on the "Port-city" pairing which goes in the direction of "( re )building ties and relationships with the territory through the materialization of a new territorial identity based on the culture of the sea". |
| **Completion of infrastructural interventions planned by 2022** | Physical infrastructure and competitiveness | The Port of Taranto reappears on the global scene with a completely new structure and potential, which places the enhancement of investment and location opportunities at the center of a series of activities that go hand in hand with an intense new season of planning on infrastructural priorities of a port, logistics and tourist and cultural nature. |
| **PNRR: cultural reconversion, towards an approach aimed at giving greater concreteness and dynamism to public action. Strengthening of the governance approach: sustainability report** | Institutional accountability | The awareness of being an Administration with a strong role in building policies with a direct impact on businesses in the ecosystem, on the local economic system and on citizens has over time led to enhancing and making central the activities related to transparency, openness or good governance of the territory and the consequent duty to "account" for one's conduct in the most accessible forms and within the most accessible times. |

*Source: Authors' elaboration based on PNA of the Ionian Sea Performance Plan 2022-2024*

Notwithstanding the resilience to the consequences of the pandemic emergency demonstrated by the Port of Taranto with particular regard to the resumption of traffic, the PNA has availed itself of the instruments introduced by the National Recovery and Resilience Plan (NRRP), based on the European Commission's Next Generation EU (NGEU) programme, and foreseen the financial coverage of a National Plan for the investment of projects consistent with the strategies of the NRRP. These will be financed through the related multi-year budget approved in the Council of Ministers.

In this vein, the planned investments, with particular regard to the development and streamlining of the PNA's internal processes and the organisation of human resources, aim to:

i) accelerate the ecological and digital transition,
ii) improve the training of workers,
iii) achieve greater gender equity.

### 1.3.3.2. Management results and performance analysis

The assessment of the current position of the port of Taranto also requires a brief examination of the recent economic-financial results achieved by the PNA of the Ionian Sea, its current financial capacity, and the funds that are foreseen to be available in the period of the plan (2023-2025). This would enable to define actions and interventions that are also sustainable in economic-financial terms.

The financial data reported in the latest budget approved by the PNA of the Ionian Sea (Final Balance Sheet 2021) and the forecasted budget for 2022, in particular the ordinary revenues and expenditures as well as extraordinary expenses, provide an initial reference for assessing the economic and financial dimensions that characterise the activities of the PNA of the Ionian Sea.

In 2021 the revenues generated by the activity of the Port of Taranto amounted to €54,629,231 or an increase of 27% compared to what had been budgeted (Table 16). Ascertained current revenues amounted to over €27.8 million, capital revenues in excess of €24 million, and revenues from transfers about €2.8 million.

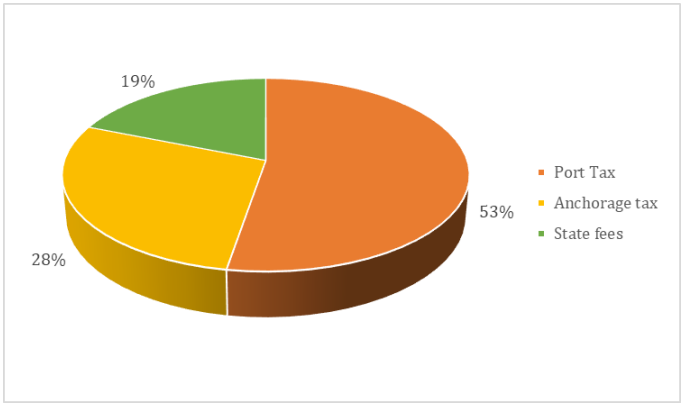
Table 16. Revenue detail 2021.

| ENTRATE | SOMME PREVISTE | SOMME ACCERTATE | SCOSTAMENTO RISPETTO ALLE PREVISIONI DEFINITIVE DI BILANCIO | SCOSTAMENTO PERCENTUALE RISPETTO ALLE PREVISIONI DEFINITIVE DI BILANCIO |
|---|---|---|---|---|
| entrate correnti (Titolo I) | 20.126.511 | 27.832.264 | 7.705.753 | 28% |
| entrate c/capitale (Titolo II) | 17.186.000 | 24.183.836 | 6.997.836 | 29% |
| entrate per partite di giro (Titolo III) | 2.837.500 | 2.613.131 | -224.369 | -9% |
| Totale entrate: | 40.150.011 | 54.629.231 | 14.479.220 | 27% |

*Source: Port of Taranto Financial Report 2021.*

Revenues from ordinary operations, which mainly consist of harbour dues, anchorage fees, and state fees, generating €27,832,264 exceeded the budgeted values (amounting to €20,136,511) by more than €7 million in 2021. This positive variance is also observed in capital receipts, amounting to no less than €24,183,836, compared to the budgeted €17,186,000 (+29%). Lastly, with reference to revenue from giro items, a slight decrease of 9% (€ 2,613,131 ascertained against € 2,837,500 forecast) compared to what was foreseen. The breakdown of ordinary revenue is shown in Figure 24: 53% of revenue generated by port taxes, 28% by anchorage fees and 19% by state fees.

Figure 24. Revenue distribution 2021.




*Source: Port of Taranto Financial Report 2021.*

Table 17. Detail of capital revenue, Statement of Accounts 2021.

| **TITOLO II - Entrate in Conto Capitale** | **€ 24.183.836,00** |
|---|---|
| Entrate per alienazione di beni patrimoniali e riscossione di crediti | € 180.100,00 |
| Alienazioni immobili e diritti reali | € - |
| Alienazioni di immobilizzazioni tecniche diverse e di beni immateriali | € - |
| Realizzo di valori immobiliari | € - |
| Riscossioni di crediti | € 180.100,00 |
| Entrate derivanti da trasferimenti in conto capitale | € 23.995.867,00 |
| Trasferimenti da parte dello Stato | € 23.995.867,00 |
| Trasferimenti da parte delle Regioni | € - |
| Trasferimenti da parte dei Comuni e delle Provincie | € - |
| Trasferimenti da parte di altri Enti del settore pubblico | € - |
| Accensione di prestiti | € 7.869,00 |
| Accensione di mutui | € - |
| Assunzioni di altri debiti finanziari | € 7.869,00 |
| Emissioni di obbligazioni | € - |

*Source: PNA of the Ionian Sea.*

As far as the expenditures are concerned, Table 13 details the expenditures in year 2021. Overall, compared to what had been indicated in the related forecasts, the reported expenditures are decidedly lower, demonstrating the capacity of the PNA of the Ionian Sea to rationalise both current and capital expenditures. The greatest deviation was observed in the case of capital expenditures, for which a total sum of € 71,759,000 had been planned, while in the final balance, only € 34,525,267 resources were committed.

Table 18. Expenditure detail 2021.

| *USCITE* | *SOMME PREVISTE* | *SOMME IMPEGNATE* | *SCOSTAMENTO RISPETTO ALLE PREVISIONI DEFINITIVE DI BILANCIO* | *SCOSTAMENTO PERCENTUALE RISPETTO ALLE PREVISIONI DEFINITIVE DI BILANCIO* |
|---|---|---|---|---|
| uscite correnti (Titolo I) | 14.263.817 | 12.639.441 | -1.624.376 | -13% |
| uscite c/capitale (Titolo II) | 71.759.000 | 34.525.267 | -37.233.733 | -108% |
| uscite per partite di giro (Titolo III) | 2.837.500 | 2.613.131 | -224.369 | -9% |
| **Totale uscite:** | **88.860.317** | **49.777.839** | **-39.082.478** | **-79%** |

*Source: Port of Taranto Financial Report 2021.*

The Management Efficiency Index, derived from the comparison between current own revenues (equal to €27,832,264) and operating expenses (€12,639,441) at the end of 2021 equals to + €15,192,823. The balance shows a positive result in terms of financial autonomy and management efficiency.

The 2022 forecasted budget was slightly lower than in 2021 (€20,984,790 in 2022 vs €22,324,790.00 in 2021), while capital account revenues are estimated to grow by 43% (€24,625,312 in 2022 vs € 17,186,000.00 in 2021). These should lead to total revenues of € 48,707,602.00. When added to the surplus realised in previous years, the oucome leads to a total of € 77,373,232.00 compared to the €40,150,011.00 observed in 2021 and amounting to (Table 19).

Table 19. Detail of expected revenues 2022 and comparison with 2021.

| ENTRATE | Anno 2022 | | Anno 2021 | |
|---|---|---|---|---|
| | COMPETENZA | CASSA | COMPETENZA | CASSA |
| UPB 1.1 - ENTRATE DERIVANTI DA TRASFERIMENTI | 0,00 | 0,00 | 0,00 | 0,00 |
| UPB 1.2 - ENTRATE DIVERSE | 20.984.790,00 | 22.324.790,00 | 20.126.511,00 | 23.101.423,00 |
| **A) TOTALE TITOLO I - ENTRATE CORRENTI** | **20.984.790,00** | **22.324.790,00** | **20.126.511,00** | **23.101.423,00** |
| UPB 2.1 - ENTRATE PER ALIENAZIONE DI BENI | 0,00 | 0,00 | 0,00 | 0,00 |
| UPB 2.2 - ENTRATE DERIVANTI DA TRASFERIMENTI IN | 24.625.312,00 | 52.000.000,00 | 17.186.000,00 | 54.350.064,00 |
| UPB 2.3 - ACCENSIONE DI PRESTITI (F) | 0,00 | 0,00 | 0,00 | 0,00 |
| **B) TOTALE TITOLO II - ENTRATE IN CONTO CAPITALE** | **24.625.312,00** | **52.000.000,00** | **17.186.000,00** | **54.350.064,00** |
| UPB 3.1 - ENTRATE AVENTI NATURA DI PARTITA DI GIRO | 3.097.500,00 | 3.197.500,00 | 2.837.500,00 | 2.933.874,00 |
| **C) TOTALE TITOLO III - PARTITE DI GIRO** | **3.097.500,00** | **3.197.500,00** | **2.837.500,00** | **2.933.874,00** |
| **C) TOTALE AVANZO DI AMMINISTRAZIONE** | **0,00** | **0,00** | **0,00** | **0,00** |
| **C) TOTALE FONDO DI CASSA** | **0,00** | **0,00** | **0,00** | **0,00** |
| **(A+B+C) TOTALE GENERALE ENTRATE** | **48.707.602,00** | **77.522.290,00** | **40.150.011,00** | **80.385.361,00** |
| **D) Utilizzo dell'avanzo di amministrazione iniziale** | **28.665.630,00** | **38.127.442,00** | | |
| **Totali a pareggio** | **77.373.232,00** | **115.649.732,00** | **40.150.011,00** | **80.385.361,00** |

*Source: Port of Taranto 2022-budget.*

Within the scope of its ordinary operations, the PNA expects to maintain current outlays almost constant (€14,716,732 in 2022 and €14,263,817 in 2021), while capital outlays are expected to decrease drastically (€59,559,000 in 2022 and €71,759,000 in 2021), also due to the presence of fewer infrastructural works carried out during the year (Table 20).

Table 20. Detail of planned outputs 2022 and comparison with 2021.

| USCITE | Anno 2022 | | Anno 2021 | |
|---|---|---|---|---|
| | COMPETENZA | CASSA | COMPETENZA | CASSA |
| 1.1 - FUNZIONAMENTO | 6.653.460,00 | 6.802.960,00 | 5.986.213,00 | 6.172.690,00 |
| 1.2 - INTERVENTI DIVERSI | 8.063.272,00 | 10.079.272,00 | 8.277.604,00 | 9.881.561,00 |
| 1.3 - TRATTAMENTI DI QUIESCENZA, INTEGRATIVI E | 0,00 | 0,00 | 0,00 | 0,00 |
| 1.4 - ACCANTONAMENTI A FONDI RISCHI ED ONERI | 0,00 | 0,00 | 0,00 | 0,00 |
| 1.5 - ACCANTONAMENTI A FONDI RISCHI ED ONERI | 0,00 | 0,00 | 0,00 | 0,00 |
| **A1) TOTALE UPB 1 - TITOLO I - USCITE CORRENTI** | **14.716.732,00** | **16.882.232,00** | **14.263.817,00** | **16.054.251,00** |
| 2.1 - INVESTIMENTI | 59.559.000,00 | 95.620.000,00 | 71.759.000,00 | 119.037.129,00 |
| 2.2 - ONERI COMUNI | 0,00 | 0,00 | 0,00 | 0,00 |
| **B1) TOTALE UPB 2 - TITOLO II - USCITE IN CONTO CAPITALE** | **59.559.000,00** | **95.620.000,00** | **71.759.000,00** | **119.037.129,00** |
| 3.1 - USCITE AVENTI NATURA DI PARTITA DI GIRO | 3.097.500,00 | 3.147.500,00 | 2.837.500,00 | 2.964.544,00 |
| **C1) TOTALE UPB 3 - TITOLO III - PARTITE DI GIRO** | **3.097.500,00** | **3.147.500,00** | **2.837.500,00** | **2.964.544,00** |
| **(A1+B1+C1) TOTALE GENERALE USCITE** | **77.373.232,00** | **115.649.732,00** | **88.860.317,00** | **138.055.924,00** |
| **D1) Copertura del disavanzo di amministrazione iniziale** | | | | |
| **Totali a pareggio** | **77.373.232,00** | **115.649.732,00** | **88.860.317,00** | **138.055.924,00** |

*Source: Port of Taranto 2022-budget.*

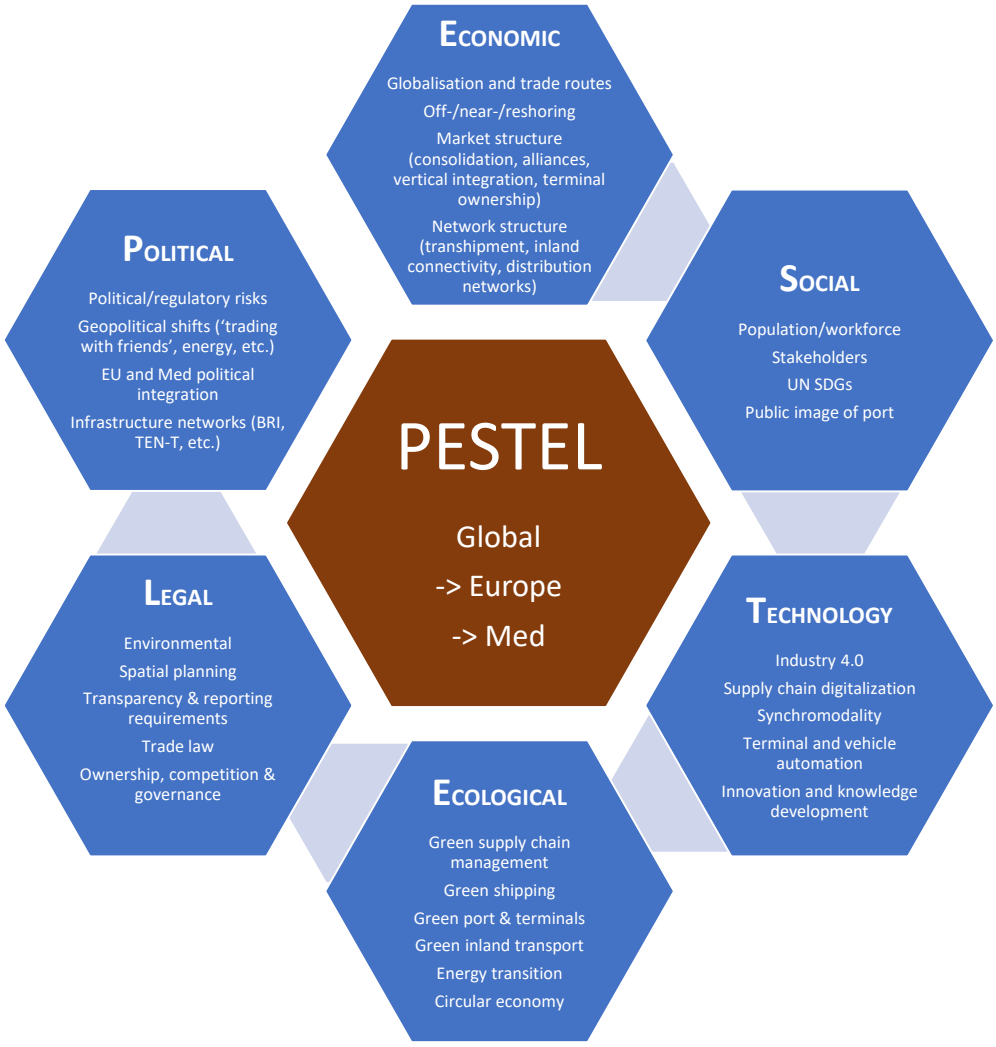
The PNA has planned to carry out interventions for a total amount of €37,760,000 during 2022, partly financed via NRRP funds. In this respect, the National Plan is expected to contribute to the construction of the new breakwater protecting the port outside the roadstead on the western stretch, as envisaged in the Port Master Plan (November 2021). This will improve the protection of the port areas from the wave motion of the dock and its approaches. Other planned interventions, financed exclusively by own resources, include the construction of the new gate to the east, aiming to improve the port-city connection and the completion of the mooring quay redevelopment at Calata V.

# CHAPTER 2. ASSESSMENT OF THE PROSPECTIVE DEVELOPMENT OF THE RELEVANT MACRO ENVIRONMENT (PESTEL ANALYSIS)

## 2.1. INTRODUCTION TO THE PESTEL METHODOLOGY

Seaports are affected by a wide range of developments. This part discusses the main trends and future outlooks which will affect the current and future position of the Port of Taranto in the medium term at a global, Mediterranean, and Italian level. For this purpose, we deploy the PESTEL analysis technique. PESTEL examines macro-environmental factors according to six key types: political, economic, social, technological, ecological, and legal (Figure 25). Rather than getting overwhelmed by a multitude of details, the presented analysis takes a step back to identify the key drivers for change relevant to the port of Taranto, i.e., the factors likely to have a high impact on port-related industries and sectors, and the success or failure of strategies within them. The relevant developments within the PESTEL framework can be related to market/economic and non-market aspects. The non-market environment involves primarily social, political, legal, and ecological factors, but can also be impacted by economic factors.

Figure 25. Factors analysed using the PESTEL methodology.




*Source: Authors' elaboration.*

The objective of the PESTEL analysis is to provide a systemic and integrated vision of the main factors in the macro and business environment of the port of Taranto, in order to identify the drivers and variables that have an impact more significant on the competitiveness and performance of the current

and prospective business portfolio and the activities managed and implemented within the port. This macro context contains elements relevant to the global, European, Mediterranean, and Italian levels. The analysis of the macro-environment related to the Port of Taranto as a whole as well as for containers, and potential passenger/cruise activities combined with a 'lighter' analysis on energy, industry (excluding energy), distribution and warehousing, and bulk and conventional cargo handling.

More in detail, with specific regard to the "energy" sector, the 2023-2025 TOP takes into account the new development strategy of the Port of Taranto with reference to the valorisation of business areas that were once marginal for the port. In particular, the new port planning puts at the centre of the development of the port and of the territory, the valorisation of resources and the exploitation of opportunities that until today have not yet been duly harnessed. In this sense, the analyses underlying the 2023-2025 TOP highlight new possible strategic paths for the development and sustainable growth of the port of call that conceive the Port of Taranto as an innovative Port Energy Hub. From this point of view, it is therefore intended to pursue the growth paths defined within the SMARTPORT - Smart and Sustainable Energy Port project financed under the INTERREG IPA CBC Italy-Albania-Montenegro 2014-2020 Programme, which has the priority objective of improving the energy profile of the Objective Area (Taranto, Termoli, Bar and Vlora), through the adoption of new energy strategies that, based on European standards, combine the use of renewable energy sources, energy saving and smart technologies. In this sense, the DEASP includes many investments to be made with a view to the gradual transition to renewable energy sources (see Paragraph 1.1.2), such as the creation of a complex of ten offshore wind farms (the so-called 'Beleolic' project), the installation of photovoltaic panels on the roofs of some buildings intended for 'energy intensive' activities and on areas that are not currently operational, and the launch of energy efficiency measures such as the relamping of public lighting.

With this in mind, in March 2023 the PNA published a notice aimed at soliciting the market to submit expressions of interest for the identification of a promoter of a PPP, pursuant to Article 183, paragraphs 15 and 16 of Legislative Decree 50/2016, aimed at awarding a concession for the design, construction, operation and maintenance of plants for the production of energy from renewable sources on approximately 90 ha of areas under the PNA 's jurisdiction.

The development of port activities attributable to the logistics and distribution sector becomes a further central theme for the next three-year planning period due to the specific contextual conditions in which the Port of Taranto is located, which is at the centre of the Ionian Special Economic Zone (Ionian SEZ) and the Free Trade Zone (FTZ). From this point of view, the PNA signed the regional Protocol of Understanding for the creation of a first-rate logistics platform in the Mediterranean, which underpins the high development opportunities connected to the location of the Port within the Ionian Special Economic Zone/FTZ as well as with particular regard to the location of Taranto in the Scandinavian-Mediterranean corridor as a "core" port.

More specifically, the logistic platform to be made operational will integrate multiple services supporting logistic and intermodal activities. In detail, on the basis of the services that the logistic platform will have to satisfy, the buildings serving the platform itself have been identified in:

- ✓ Office building, with a gross floor area of approximately 1500sq.m;
- ✓ Room-temperature warehouse, having a gross floor area of about 4500sq.m;
- ✓ Refrigerated warehouse, having a total covered surface area of approximately 5,500sq.m. and a volume of approximately 48,000 cubic metres, it is basically divided into four cells that will be able to store a different temperature from each other in a range from -25°C to +5°C;
- ✓ Caretaker's quarters and refreshments;
- ✓ Garage, with a total covered surface area of approximately 4900 sqm; behind the garage, delimited by the two existing conveyor belts, there will be an uncovered area for storing cars.

As for services, the following have been realised:

- ✓ **A railway terminal**, inside the perimeter of the platform, consisting of four tracks intended for parking rolling stock for loading and unloading trains. These tracks have a length of 613.62 m, 584.74 m, 584.57 m and 650.44 m and are equipped with Cogifer type grooved rails, laid level. Due to the configuration of the Taranto station, this connection allows the constitution of a maximum of two trains per day with a length not exceeding 440m.
- ✓ **A container yard**, with an area of 25,700 square metres.
- ✓ **An internal roadway**, with a length of approximately 750 m.
- ✓ **Numerous facilities** have been built to serve the Platform, such as i) installation of electrical distribution cabins/switchboards and extension of the medium and low voltage network; ii) lighting systems for the entire area and the external perimeter (Lighthouse towers H 25 m and poles H 4.50 m); iii) surveillance systems with video cameras, control room and guardhouse; iv) fire signalling and extinguishing systems including a storage tank; v) construction of water and sewage network and; vi) treatment plants for the Platform's waste water.

Moreover, following the termination of the concession contract with Taranto Logistica SpA (Gavio Group), a number of expressions of interest were received for the management of the entire Piattaforma Logistica compendium. In particular, the company Progetto Internazionale 39 srl presented a strategic planning project for a vast area that envisages investments with a medium (long-term) time horizon. The strategic thinking finds fertile ground in the Taranto area due to the simultaneous presence of an important port area, Grottaglie Airport, a SEZ area and a FTZ. The company Progetto Internazionale 39 S.r.l. intends to realise the project through the establishment of a corporate group, within which leading players in the entrepreneurial field of rail transport, innovative logistics, training, technological innovation, strategic and organisational consulting, medical and scientific research will be included. The initiative will refer to its own activities in freight service and intermodality. A brief in-depth analysis of the issues related to dry and liquid bulk is necessary because of the prevalence of the industrial component within the traffic of the port of Taranto, thanks to the presence of large operators such as Acciaierie d'Italia Holdings S.p.A. (Ex-ILVA) and ENI Refining & Marketing. In this sense, the presence of Acciaierie d'Italia's main plant in the port perimeter - the largest steel mill in Europe - if conceived with a view to sustainable development, represents an important element of competitiveness for local companies in the industrial logistics services sector and an objective of maintaining the port's traffic. Moreover, the refinery owned by ENI Refining & Marketing is, as already indicated in paragraph 1.3.1. perfectly integrated with the production of crude oil due to the direct connection via pipeline with the Val d'Agri oil fields in Basilicata, in which ENI holds the absolute majority.

Finally, it should be noted that, with particular reference to the shipbuilding sector, in July 2022, the PNA signed the programme agreement that will implement the Ferretti Group's settlement in the 'ex Belleli yard' area, a very large space on the coast, very close to state road 106 and the city's port, where the Ferretti Group has launched, together with the government and the Puglia Region, a €200 million programme to build a shipyard for the construction of hulls for luxury yachts.

## 2.2. POLITICAL CONTEXT AND RISKS (P)

### 2.2.1. (Geo)political risks

The macro–dimension of political risk refers to the risks associated with whole countries. Many specialist organisations publish relative rankings of countries' macro political risks (see e.g., the Worldwide Governance Indicators of World Bank including indicators such as Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption). The macro-political risks for ports are currently very much affected by the fast-changing geopolitical situation in the world. Russia and Western countries are getting increasingly disconnected, while there are growing tensions between China's command economy/socialist market economy and the free market economic system. The changing geopolitical

situation in relation to Russia and the associated sanctions (see list of sanctions in Figure 26) has already had far reaching ramifications on port activities in European ports.

Figure 26. Standard & Poor's tracker on Russian sanctions (situation in December 2022)

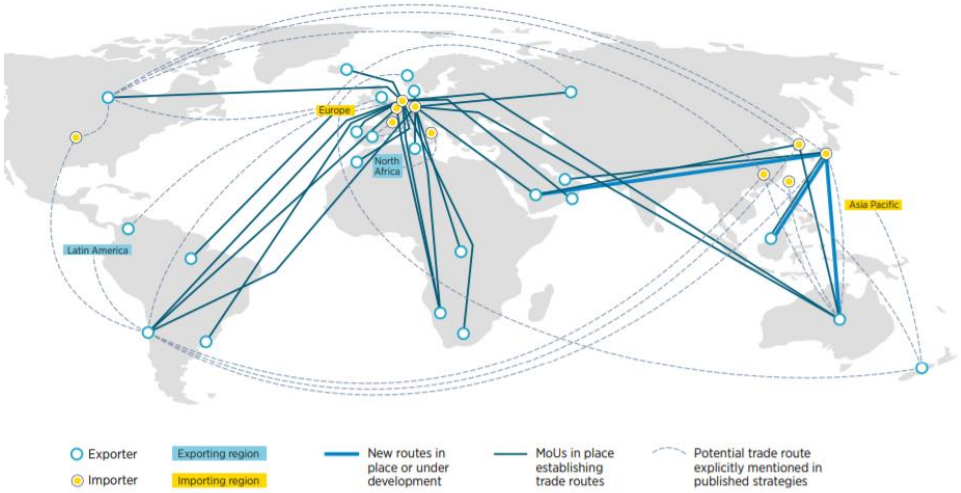

*Source: S&P Global Commodity Insights.*

First, maritime cargo traffic in relation to Russian ports (sanctions) and Ukrainian ports (blockage) has decreased significantly. North European ports have been most affected by much lower cargo volumes to Russian ports such as Saint-Petersburg and Ust-Luga. For example, Hamburg's lower volumes of bulk cargo in 2022 (-6% for dry bulk and -15.2% for liquid cargo) were both directly and indirectly attributable to stiffer sanctions against Russia, while Hamburg's container transhipment traffic to Russia nearly disappeared after the invasion of Russia in Ukraine. The precarious situation in Ukrainian ports such as Odessa has affected ports around the Black Sea and to a lesser extent ports in the Med and North Europe.

Second, the energy crisis that followed has had some wide-ranging effects on volumes handled in European ports. For example, coal handling and LNG traffic grew strongly in quite a few ports as additional stocks were built up due to EU sanctions in connection with the Ukraine-Russia war, while also the grain market was affected by the difficulties in getting Ukrainian grain to the world markets. At the same time, the energy crisis following the Ukraine war has accelerated the energy transition ambitions of the EU which also involves longer-term changes to the geopolitical landscape. The push for a greener production and mobility (partly driven by the objective to lower the EU's energy dependency

on Russia) has intensified the search for minerals and raw materials to produce batteries and other technological components. Quite a few of these mining products can also be found in parts of the world which were less at the forefront of international trade (such as South American countries like Chile and Bolivia). Green hydrogen provides a good example. According to the International Renewable Energy Agency (IRENA), hydrogen is likely to influence the geography of energy trade, further regionalizing energy relations, with the emergence of new centers of geopolitical influence built on the production and use of hydrogen (IRENA, 2022; see also Figure ). At present, over 30 countries and regions are planning for active growth in cross-border hydrogen trade. IRENA estimates that over 30% of hydrogen could be traded across borders by 2050, a higher share than natural gas today.

Figure 27. An expanding network of hydrogen trade routes plans and agreements.




*Source: IRENA (2022).*

Third, the Russia-Ukraine conflict severely impacted the Black Sea cruise market, with spillover effects in the Eastern Mediterranean cruise market. The war halted cruise activity in the Black Sea which is still a no-go zone for cruise lines. The war also affected the cruise markets of adjacent cruising areas bordering the Black Sea, creating a broader uncertainty in the industry, with Eastern Mediterranean recovering recently from a series of geopolitical turbulence (the war in Syria, the Arabic Spring, the failed coup in Turkey, etc.). Indicatively, 21 cruise vessels from 16 brands were scheduled to operate in the Black Sea in 2022. Following the beginning of the war, cruise lines scrapped Russian and Ukrainian ports from their itineraries, while a few weeks later they also cancelled calls in other countries. For example, the port of Trabzon (Turkey) lost all the 32 planned calls for 2022, except one. Apart from the war risk in calling at Black Sea cruise ports, the war has also affected several other parameters of the cruise industry external environment. The rise in energy prices has also affected cruise companies. The sanctions on Russia escalated global economic uncertainty affecting both the cruise passengers source markets and the cruise lines. The war's turmoil will keep affecting the external environment of cruise shipping at least in the medium term. A process of redeploying cruise vessels in Mediterranean regions is underway with some areas being the winners with more cruise calls, while other regions losing cruise calls.

In the current geopolitical climate, geo-economic notions of 'trading with friends' and 'friendshoring' are increasingly used in policy circles. Trading with friends implies a policy focused on supporting trade relations with countries with similar norms and values and/or political systems while discouraging trade with nations that do not belong to this group. Friendshoring involves moving activities from a country which does not have a geopolitically favourable context to a country which is more conforming to certain norms, values and/or political systems.

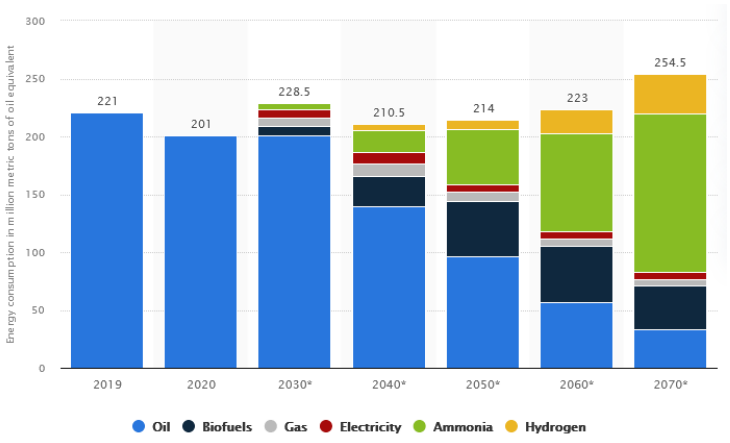
In this realm, the EU has developed several policies to anchor key industries in the EU or decrease the dependence of the EU on non-EU countries. For example, the European Chips Act (see COM (2022) 45 final of 8 February 2022), a European semiconductor law, aims to defend its technological sovereignty: by 2030, the EU aims to produce 20% of semiconductors worldwide, doubling its current share. Similar efforts are made to ensure battery production in Europe.

Traditional economic principles and ideas (such as the unilateral focus on untamed economic growth) have been scrutinized in the past few decades. At supranational level, sustainability goals have been developed. The EU is a frontrunner in the decarbonization of the economy, supported by the Green Deal and Fit for 55 programs. With policies such as Fit for 55 and RePowerEU, the EU is actively supporting sustainability and energy transition, but at the same time also serving political goals of self-sufficiency and economic independence. Indeed, the ambitious energy transition and sustainability goals are flanked by a range of other policies that potentially burden on imports from countries outside the EU. Two examples include the EU Regulation on deforestation-free products and the Carbon Border Adjustment Mechanism (CBAM). CBAM is aimed at preventing 'carbon leakage' by subjecting the import of certain groups of products from third countries to a carbon levy linked to the carbon price payable under the EU Emission Trading Scheme (ETS) when the same goods are produced within the EU. As a result, EU trade policy is expected to somewhat disconnect from countries or regions where sustainability is not high on the agenda and is expected to seek tools such as carbon pricing or other forms of trade barriers to find a level playing field in fair trade relations with such nations.

Italy's dependence on foreign sources of supply is strong: in 2021, domestic energy production has decreased by a total of 3.4% while net energy imports increased by 8.3%. The share of net imports in gross energy availability, an indicator of the country's degree of foreign dependence, increased: from 73.5% in 2020 to 74.9% in 2021. Final energy consumption increased by a total of 11.4% year-on-year (YoY), to 114,781 thousand tons of oil equivalent in 2021. The increase affected all sectors, especially transportation (+22.1%), residential (+8.2%) and industry (+6.7%).

We it comes to the maritime and port domain, a progressive abandonment of traditional fuels in favor of alternative solutions such as gas, electricity, ammonia and hydrogen emerge when considering current vs. future energy mix of maritime operators (Figure 28).

Figure 28. Current and future maritime energy mix.




Source: Statista, 2022.

In this perspective, Italian ports are called to support the progressive withdrawal of fossil fuels, setting up their port infrastructures for the production and supply of new energy sources. There is an urgency for Italian ports to meet the requirements set by the European Green Deal and the recent EU legislative proposals "Fit for 55" for reducing by at least 55% GHG emissions by 2030. Relatedly, port infrastructures generate unprecedented business opportunities with regards to smart and green

technologies. In this respect, as already reported several times within this TOP, the Port of Taranto has launched important initiatives related to the improvement of the "smart" and "green" components in the Port, being perfectly in line with the timeframe envisaged at EU level already by 2025 (see in this sense the "Beleolico" initiative or the allocation of some areas of the container terminal for the assembly and construction of the wind farms planned in Puglia).

In this perspective, the PNA of the Ionian Sea, in order to meet the energy needs of its offices, purchases, through Consip, electricity with the green option, in order to obtain the certification of supply from renewable sources alone, through Guarantee of Origin (GO). MoreoverPNA of the Ionian Sea and Renexia have signed an agreement that previews the purchase of part of the produced electric energy from the wind farm, so that it is destined to the satisfaction and efficiency of quota part of the energetic requirements of the Port of Taranto.

***Take-aways for Port of Taranto***

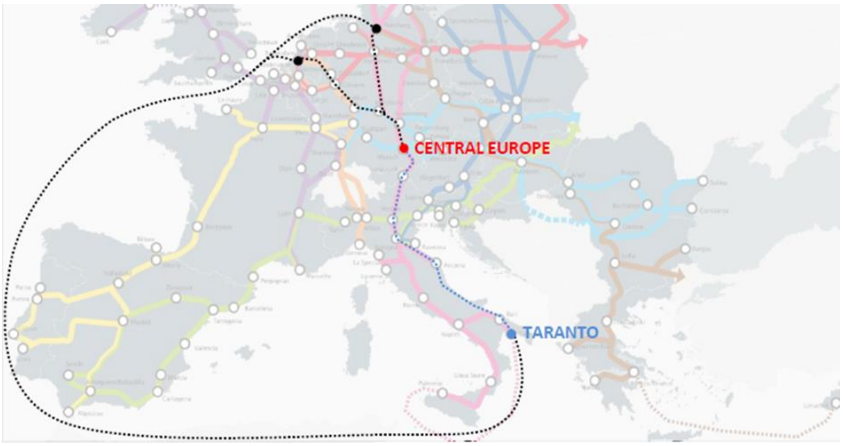
- From a political point of view, seaports are increasingly perceived to be of national strategic interest in energy provision and transition, geopolitical relations, health, etc. This brings a higher chance of political interference at the supranational and national level in choosing appropriate business development options for ports, potentially also in port of Taranto.
- The war in Ukraine and the growing tensions between China's command economy/socialist market economy and the free market economic system create an uncertain geo-economic context for world and regional trade. The political adoption of concepts such as 'trading with friends' and 'friendshoring' can in the medium term generate shifts in origin-destination flows using the port of Taranto, with a growing dependence on traffic relations within the EU, the US/Canada, other western oriented nations, and upcoming nations in the renewable energy landscape. This is particularly relevant to high-tech products, key mining products and renewable energy flows.
- The EU is likely to push through with imposing sustainability criteria on import flows of certain ETS related products. This can have a dual effect on the steel and petrochemical industries in the port of Taranto: (1) Moderate price increases for imports of raw materials (such as iron ore or oil); (2) Moderate price increases for imports of finished steel and chemical products, giving a small support to local production. As it stands at present, the latter price factor is however expected to be quite negligible considering the current high energy cost in Europe.
- The increase in the cost of energy and raw materials will generate a progressive increase in the incidence of energy costs on total production costs with negative impacts on traffics with both Port of Taranto' hinterland and foreland.

### 2.2.2. EU and Med political integration

Part of the political risks are linked to the level of political and economic integration achieved in the EU and the Med region. Higher levels of integration facilitate intra-regional trade and the opportunities to develop the port of Taranto into an intermediate hub in cargo flows. However, a higher level of integration can also give chances to formerly more peripheral ports to vie for a hub position and compete with other ports such as Taranto.

In this perspective, the Port of Taranto, as the "core" port of the Scandinavian-Mediterranean Corridor is in a strategic position, because it is the final rail/road terminal node of this corridor as well as one of the main maritime hubs connecting the corridor with La Valletta (Figure 29).

Figure 29. Port of Taranto: connections with the TEN-T corridors.




*Source: Port Taranto profile 2021, PNA.*

The transit times that characterize the connections between the Port of Taranto and the main destinations in Central Europe are low (about 8 days in the case of combined sea/road transport and about 34 hours in the case of rail transport) determine interesting development opportunities towards these geographical areas.

The political coherence and solidarity among EU member states has been tested many times in the past decade as exemplified by the Brexit, the COVID-19 pandemic, financial crises (linked to government budgeting and the Euro currency), refugee crises (Syria, Ukraine, etc.) and the war in Ukraine. Still, the EU27 remains a solid trading block continuing to boost intra-regional trade.

Next to the level of integration among existing EU member states, potential further accession of new members can have an impact on the ease of trade within the EU and the potential cargo and development options of EU ports such as Taranto.

Also relevant to the port of Taranto are the political-economic relations with Southern Neighbourhood, which includes Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, Syria, and Tunisia. These countries combined represent 4.6% of total EU external trade in 2020. Total trade in goods between the EU and the Southern Neighbourhood countries amounted to 149.4 billion euro (imports 58 billion euro, exports 91.4 billion euro). The long-term objective of the trade partnership between the EU and its Southern Neighbourhood is to promote economic integration in the Euro-Mediterranean area, removing barriers to trade and investment between both the EU and the Southern Neighbourhood countries and between the Southern Neighbourhood countries themselves. The EU considers deepening economic integration between the Southern Neighbours as an essential factor for the socio-economic development of the region. Over the past decades, a network of Euro-Mediterranean Association Agreements established free trade areas between the EU and most of its Southern Neighbours (with the exception of Syria and Libya), and essentially cover trade in goods. Negotiations to create Deep and Comprehensive Free Trade Areas (DCFTAs) have been launched between the EU and Morocco, and between the EU and Tunisia. In 2021, under the new EU Trade Policy Review, the EU has announced a new sustainable investment initiative for interested partners in the Southern Neighbourhood and Africa.

In this perspective, the PNA of the Ionian Sea considers it essential to maintain and consolidate trade relations with the above-mentioned countries, also because of the inevitable economic development of the Southern Neighbourhoods that in the next three years could generate interesting Ro-Ro traffic flows. With respect to these flows, the Port of Taranto is in a privileged geographical position that makes it a candidate to become a logistics hub of reference for the development of the relevant trade relations. At the same time, it is also worth highlighting the possible risks arising from potential competition from

North African ports, especially with reference to container traffic, and in detail in relation to transhipment activities. The Port of Taranto, like the other national ports that carry out transhipment activities, has a diversion distance to the main container traffic routes along the Far East - North Europe backbone that tends to be greater than the average of its North African competitors. In addition, transhipment terminals located in the aforementioned countries may enjoy differential advantages in terms of cost structure (personnel, energy, environmental costs, etc.).

***Take-aways for port of Taranto***

- As a port located in the periphery of the EU, the port of Taranto is likely to be affected more than centrally located ports by the level of integration among existing EU member states and potential accession of new EU member states in the Balkan region or wider Med region.
- The consolidation of Italy's trade relations with North African countries could favor the development of Ro-Ro traffics in the benefit of the Port of Taranto, along these routes.
- In the last decade there has been a strong increase in the competitiveness of North African ports operating in the container business, especially in relation to transshipment activities: this could damage the development of the related port traffic by the Port of Taranto
- The establishment of free trade zones in Southern Neighbourhood countries can undermine the ambitions of the SEZ within the port of Taranto.

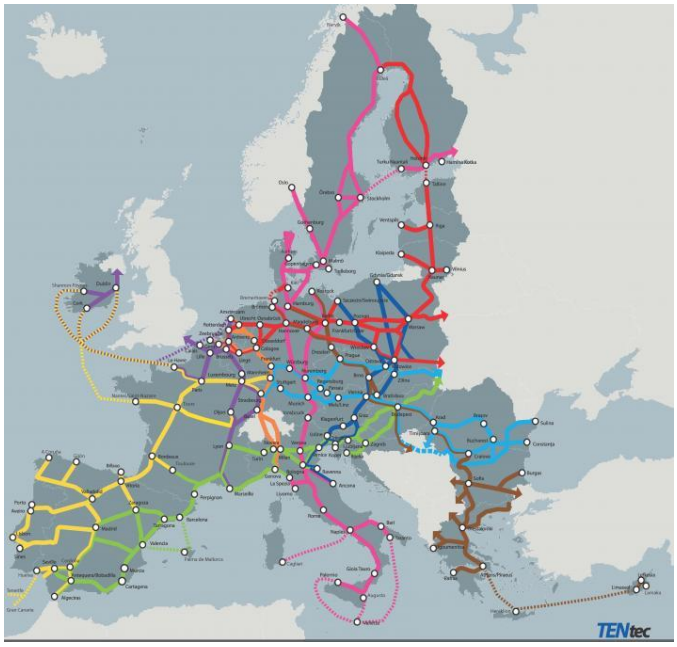
### 2.2.3. Infrastructure policies

Governments develop infrastructure plans that should enhance connectivity among countries and regions and thus enhance trade. We focus on three policies with a potentially (large) impact on (public) infrastructure provision in or in relation to Europe and the Med.

Existing transport corridors by rail, road and inland navigation between the core of the EU, the Baltic, the Mediterranean, East and Central Europe and third countries are likely to grow in importance, whereas a number of new corridors will emerge to deal with growing transport volumes between Member States. The development of these corridors is enhanced by EU policy on the creation of the Trans-European Transport Network (TEN-T) and initiatives of rail operators, megacarriers and other market players to extend their European transport networks. The Trans-European Transport Network (TEN-T) policy (Figure 30) is a key enabler as it addresses the implementation and development of a Europe-wide network of railway lines, roads, inland waterways, maritime shipping routes, ports, airports and railroad terminals. The ultimate objective is to close gaps, remove bottlenecks and technical barriers, as well as to strengthen social, economic and territorial cohesion in the EU.

Besides the construction of new physical infrastructure, the TEN-T policy supports the application of innovation, new technologies and digital solutions to all modes of transport. The backbone of the Core Network is represented by nine Core Network Corridors, which were identified to streamline and facilitate the coordinated development of the Core Network. The current TEN-T policy is based on Regulation (EU) No 1315/2013. In line with the Action Plan included in the Commission's Communication on the European Green Deal, a proposal for a revision of the TEN-T Regulation is ongoing.

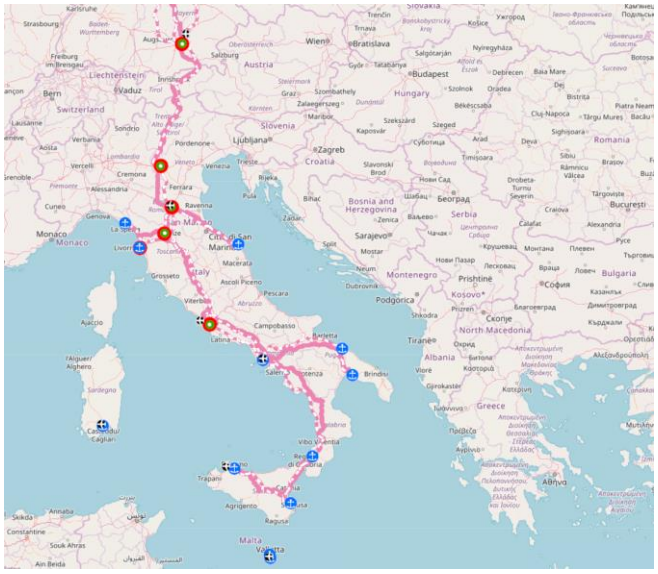
Figure 30. The Trans-European Transport Network (TEN-T).




*Source: European Commission.*

The port of Taranto is the end station on the southeast branch of the Scandinavian-Mediterranean corridor (pink colour in Figure ), one of corridors of the TEN-T. This corridor links up to a handful of other TEN-T corridors in the northern part of Italy.

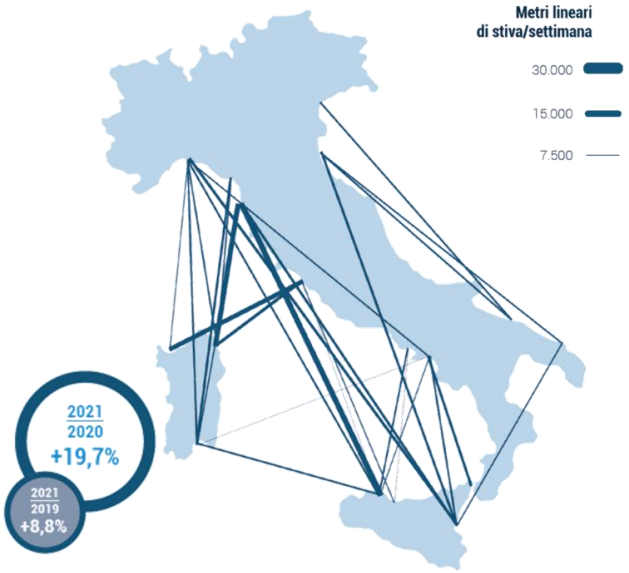
Figure 31. Detail of the southern section of the TEN-T Scandinavian-Mediterranean corridor.



*Source: TENtec - [https://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html](https://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html)*

Within the framework of community policies aimed at increasing the infrastructure equipment for the supporting of the development of ports and major transport nodes, the role of the Motorways of the Sea should also be considered (Figure 32).

Figure 32. Motorways of the Sea.



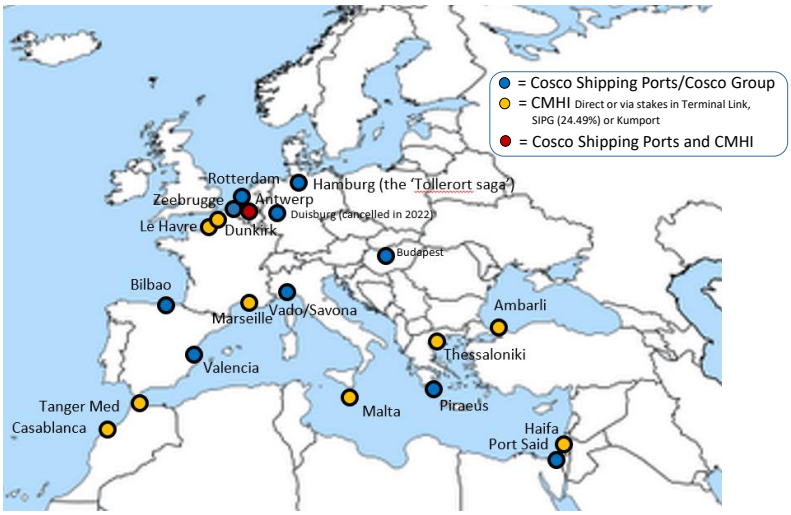

*Fonte: SRM 2022 & Assoporti 2022.*

This national initiative is aimed at concentrating freight flows mainly on maritime routes, carrying out careful analysis activities of the current infrastructural state and defining development interventions capable of reducing road congestion and/or improving the accessibility of island and peripheral regions and states. The planned interventions are part of an overall framework devoted to the reduction of emissions produced by the various modes of transport between the member countries of the Union. The implementation of this initiative in the context of the areas of Southern Italy, can also count on the fact that Italy turns out to be the leading country in Short Sea Shipping in the Mediterranean (market share 37% in the EU).

The Belt and Road Initiative (BRI) was launched in September/October 2013 by President Xi Jinping to foster economic co-operation from the Western Pacific to the Baltic Sea and to break the connectivity bottleneck in Asia through infrastructure investments. The BRI program is a centrepiece of Xi Jinping's foreign policy and domestic economic strategy. The initiative covers a land-based (in essence rail-based) Silk Road Economic Belt (one Belt) including a zone of influence on both sides of the Belt, and a 21st century Maritime Silk Road (one Road). While the BRI offers great potential for economic co-operation and development, its implementation is not without risks or political controversy.

One of the political issues related to the BRI is the involvement of Chinese port operators in European ports (Figure 33). For example, the announcement in late 2022 of Cosco Shipping Ports' intention to take a minority share in the Tollerort terminal in Hamburg resulted in a hefty political debate in Germany on the desirability of having Chinese companies 'running' a German port. In fact, Cosco Shipping Ports will not run the port, but has acquired a 25% share in one of the many concessioned container terminals in the port of Hamburg which happens to be operated by German company HHLA. Key investments in the Med which can be linked to the BRI include the majority shareholding of Cosco Shipping Ports in the Piraeus port authority, the involvement of Cosco Shipping Ports in some terminals Valencia (through Noatum) and Vado Ligure, and the shareholding of China Merchants in quite a few terminals through its minority shareholding of 49% in Terminal Link (majority shareholder is CMA CGM). Chinese investments are also somewhat targeting hinterland corridors, such as the rail corridor between Piraeus and Belgrade. These and the TEN-T corridors act in a way that peripheral ports face less 'resistance' in reaching the natural hinterland of other ports. Major contestable hinterlands are increasingly being served not only by the ports of one region, but by several gateway regions as will be discussed later in this report.

Figure 33. Chinese involvement in European and Med container terminals.




*Source: Authors' elaboration.*

The Port of Taranto is located in a central position with respect to many of the aforementioned investments and therefore it appears relevant to evaluate the potential positive and negative implications that originate from the Chinese infrastructure development policies for the Puglia port.

***Take-aways for port of Taranto***

- Infrastructure provision is very much focused on the creation of gateways and corridors. The performance profile of each of the corridors in terms of infrastructure provision (capacity), transport operations (price and quality of the shuttle services) and the associated logistical control (i.e., the management in a supply chain context) is a key attribute for port competition in Europe.
- The port of Taranto has been included in TEN-T Scandinavian Mediterranean Corridor (Malta). With reference to the revision of the regulation on the guidelines for the development of the trans-European transport network (TEN-T) currently underway, of particular relevance for Taranto is the modification of the Baltic Sea-Adriatic Sea Corridor, which would be extended as far as Bari (in the current maps it ends in Ravenna): through the Bari hub, the Taranto port of call will be directly connected to the north-south axis - crucial for the European and especially the Italian economy - that reaches the northern range also through the Bologna and Verona "inteporti";
- It becomes essential for the Port of Taranto to examine the objectives, included in the national Master Plan for the development of the Motorways of the Sea intended to: i) identify the traffic flows with the greatest attraction for operators in the sector, ii) enhance the destination ports of the flows, iii) overseeing market niches not yet adequately exploited by defining new commercial lines and iv) detecting the needs of current operators.
- China's BRI has already had ramifications on Chinese port investments in Europe, the Med and Italy, next to newly established long-distance rail connections between China and Europe. While the port of Taranto at present does not feature as a key node in the growing BRI-related infrastructure network, its central position in the Med makes the port part of a larger area which continues to attract interest from a Chinese geo-economic perspective.

### 2.2.4. Cruise industry – the political environment

From the cruise industry perspective, the political context focuses mainly on the micro level with policies and regulations that determine the operational environment for cruise companies. Safety and security issues, advocacy for a sustainable cruise industry, accessibility, and environmental protection define the cruise industry's micro political level. On a macro level, the major political developments are the war in Ukraine (see earlier) and the COVID-19 pandemic.

In light of the pandemic, cruise lines have proceeded to operational adjustments, aiming at responding to the needs of cruise passengers by enhancing safety and hygiene standards that international and peripheral organizations have enforced. A major step in this direction has been the development of the European Union's Protocols for cruise ship operations. This policy aims to facilitate the operations of cruise ships in the EU by recommending minimum measures expected to be implemented by all those concerned to achieve and maintain general safety and security standards. This guidance requires extensive operational adjustments onboard cruise ships and on a cruise company level. Many of these hygiene and health safety measures are expected to remain in force in a pandemic-free world. Table 21 presents the group of measures that cruise lines should enforce under the EU cruise protocols. According to CLIA, ocean-going cruise ships are the only type of passenger transportation that should be medicinally prepared to focus on travelers or members in case of an ailment. Therefore, keeping cruise ships clean is the first concern for the industry's sustainability.

Table 21. European Union's Cruise Protocols

| | |
|---|---|
| **Focused inspection on COVID-19 prevention and control for resuming cruise ship voyages by EU Healthy Gateways** | Commitment to immediate reporting to the next port of call of any possible and confirmed cases |
| **Written contingency/outbreak management plan for COVID-19** | Isolation and quarantine capacity on board cruise ships |
| **Arrangements for medical treatment and ambulance services** | Monitoring of epidemiological situations, rules, and restrictions worldwide |
| **Arrangements for repatriation** | Vaccination of passengers |
| **Arrangements for quarantine of unvaccinated close contacts** | Screening of incoming travelers to the country of embarkation |
| **Arrangements for the isolation of passengers or crew members who tested positive for SARS-CoV-2** | Adequate testing capacity for SARS-CoV-2 infection on board or in cooperation with shore-based laboratories |
| **Exclusion policy** | High risk groups |
| **Training of crew about COVID-19** | Information, education and communication |
| **Vaccination of crew members** | Supplies and equipment |
| **Routine testing of crew members** | Screening at embarkation |
| **Testing of passengers on the day of embarkation** | Adequate ventilation |
| **Reporting of symptoms** | Routine testing of passengers |
| **Limiting interaction** | Physical distancing |
| **Personal hygiene measures** | Respiratory etiquette |
| **Preventing droplet transmission by the use of face masks** | Testing of crew members before resuming operations and incoming crew members |
| **Cleaning and disinfection** | Special considerations for cabins |
| **Food safety rules** | Reducing face-to-face interactions |
| **Special considerations at reception** | Reporting |
| **Embarkation/disembarkation** | Management of contacts |

*Source: EU Health Gateways, (2022).*

***Take-aways for Port of Taranto***

- The port of Taranto needs to provide conditions for implementing the hygiene and health protocols developed for tackling the COVID pandemic, which in turn pose operational challenges for the port and require additional CAPEX and OPEX.
- There is a threat that cruise passengers will remain onboard during their visits to a specific destination. Therefore, the port and the destination must provide incentives in order to make disembarkation attractive.

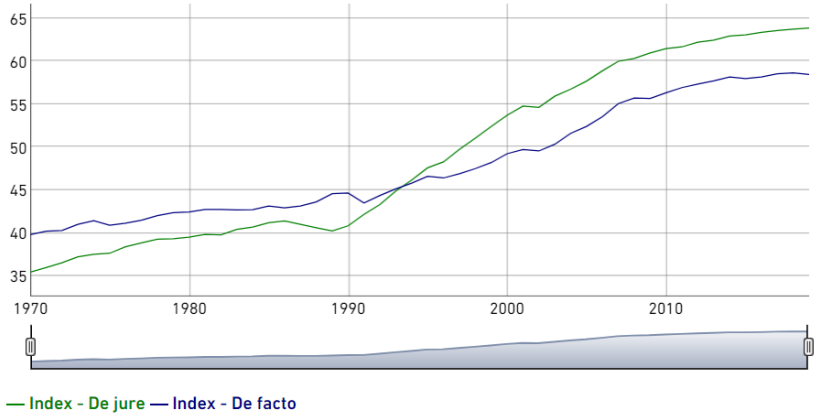
## 2.3. MAJOR ECONOMIC TRENDS AND FACTORS (E)

### 2.3.1. Globalisation and trade routes

The demand for port activities is largely determined by global economic activities and world trade. Global trade is still growing in volume terms although at a lower growth rate than before the 2008-2009

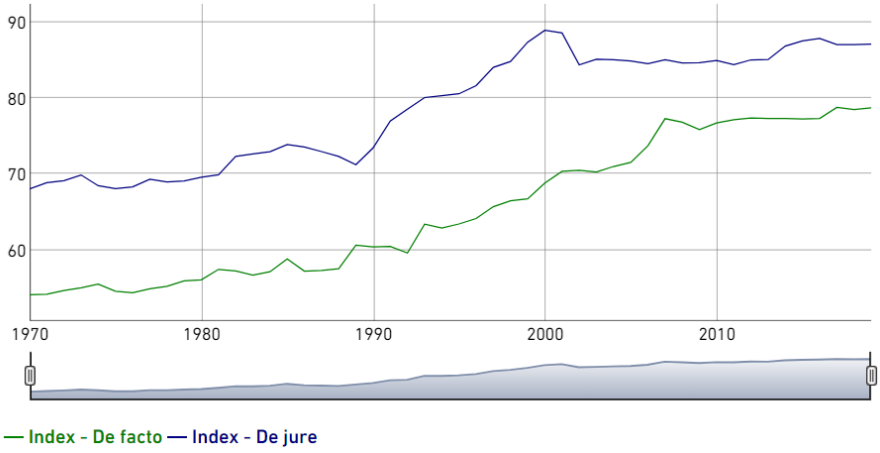
crisis (Figure 34). The KOF Globalization index[15] shows that the globalization trend peaked between the early 1990s and the economic-financial crisis of 2008-2009, but is levelling off since then (Figure 34). This also applies to Italy (Figure 35). On top of this come the shocks and major disruptions negatively affecting global trade, production processes, transit times in global supply chains and the availability of components and finished products. An economic shock can be caused by many different events, some caused by human activity and some simply caused by chance. Figure 36 shows some of the main shocks and disruptions in recent times and their overall impact on global supply chain pressure. Obviously, economic shocks can have a significant impact on bilateral or even global trade, and the demand for and supply of shipping and port activities. Companies and corporations have always had to accept risk-taking as an inherent part of business. The COVID-19 related global supply chain crisis of 2020-2022 and the geopolitical crisis initiated by the war in Ukraine have contributed to political actions and corporate strategies to reduce risks and dependence on certain nations such as China, while embracing notions such as 'trading with friends' and 'friendshoring' (see earlier).

Figure 34. KOF Globalization index – 1970 to 2019 (World)




*Source: KOF Swiss Economic Institute, for data and methodology see* https://kof.ethz.ch/

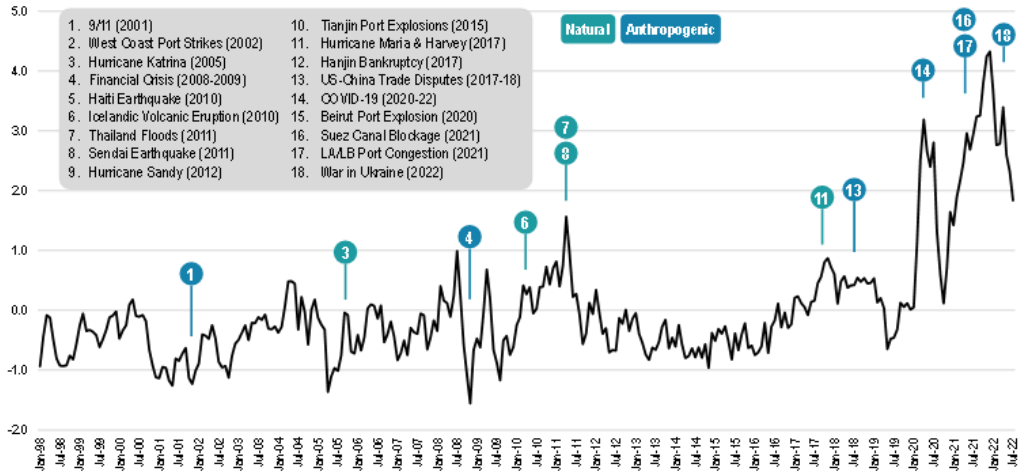
Figure 35. KOF Globalization index – 1970 to 2019 (Italy)




*Source: KOF Swiss Economic Institute, for data and methodology see* https://kof.ethz.ch/

[15]The KOF globalization index measures the entity of globalization initially in 122 countries and increased over time to 185 countries. It is based on the consideration of three pillars both qualitatively and quantitatively: economic globalization, social globalization, and political globalization.

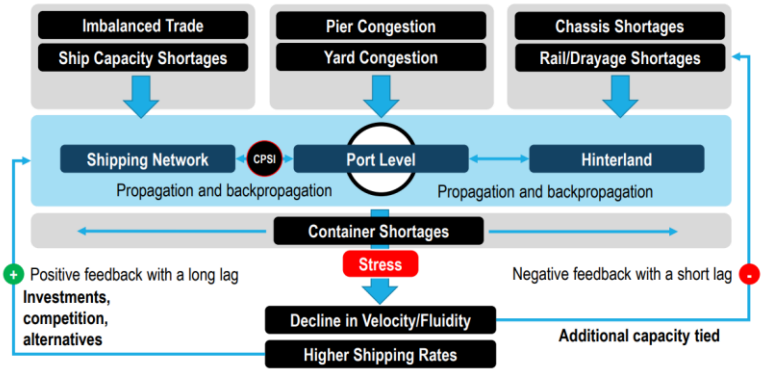
Figure 36. Global Supply Chain Pressure Index (GSCPI) and Major Supply Chain Disruptions.




*Source: own compilation by Notteboom et al. (2022) based on Federal Reserve Bank of New York, Global Supply Chain Pressure Index (GSCPI).*

Considering the specific case of the containerized transport segment, historically of extreme importance to the Port of Taranto, it should be noted that there are multiple factors that make this business extremely volatile and unstable (Figure 37).

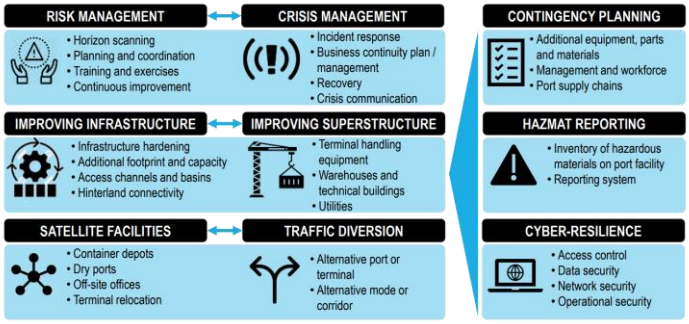
Figure 37 Variables of major impact on container transport.




*Source: Supply chain and logistics trends - challenges and opportunities, UNCTAD 2022.*

In this perspective can be identified a plurality of measures to mitigate the risks associated with market volatility as shown in Figure 38.

Figure 38. Measures for mitigating volatility in the port domain.




*Source: Trends in supply chain and logistics - challenges and opportunities, UNCTAD 2022.*

Short-term prospects on trade in value as reported by major international organizations are rather underwhelming, with low growth prospects for GDP and international trade (see WTO statistics in Table 22). Global trade hit a record USD 32 trillion for 2022, but a slowdown that began in the second half of 2022 is expected to worsen in 2023 as geopolitical tensions and tight financial conditions persist. Also, other major international organisations have revised economic growth forecasts for 2023 downwards due to high energy prices, rising interest rates, sustained inflation in many economies, and negative global economic spill-overs from the war in Ukraine.

The total international maritime trade volume amounted to 10.98 billion tons in 2021 (UNCTAD, 2022). Around two-thirds of global trade in goods takes place in developing countries. Some 60% of global goods loaded (exports) and 70% of goods discharged (imports) are linked to developing countries. Of the 10.65 billion tons of international maritime trade, close to 3 billion tons relates to tanker trade and about 5.2 billion tons to dry bulk (Table 23).

Table 22. Year-on-year growth (%) of merchandise trade volume, 2018-2023.

| | 2018 | 2019 | 2020 | 2021 | 2022P | 2023P |
|---|---|---|---|---|---|---|
| **Volume of world merchandise trade b** | 3.2 | 0.5 | -5.2 | 9.7 | 3.5 | 1.0 |
| **Exports** | | | | | | |
| North America | 3.9 | 0.4 | -8.9 | 6.5 | 3.4 | 1.4 |
| South America c | 0.6 | -1.3 | -4.9 | 5.6 | 1.6 | 0.3 |
| Europe | 1.8 | 0.6 | -7.8 | 7.9 | 1.8 | 0.8 |
| CIS d | 4.1 | -0.1 | -1.7 | 0.5 | -5.8 | 3.3 |
| Africa | 3.2 | -0.4 | -8.1 | 5.2 | 6.0 | -1.0 |
| Middle East | 4.8 | -1.3 | -8.9 | 1.4 | 14.6 | -1.5 |
| Asia | 3.7 | 0.9 | 0.5 | 13.3 | 2.9 | 1.1 |
| **Imports** | | | | | | |
| North America | 5.1 | -0.6 | -5.9 | 12.3 | 8.5 | 0.8 |
| South America c | 4.6 | -1.8 | -10.7 | 25.4 | 5.9 | -1.0 |
| Europe | 1.9 | 0.3 | -7.3 | 8.3 | 5.4 | -0.7 |
| CIS d | 4.0 | 8.3 | -5.5 | 9.1 | -24.7 | 9.4 |
| Africa | 5.5 | 3.1 | -14.7 | 7.7 | 7.2 | 5.7 |
| Middle East | -4.4 | 11.2 | -10.1 | 8.4 | 11.1 | 5.7 |
| Asia | 5.0 | -0.4 | -1.0 | 11.1 | 0.9 | 2.2 |

*a. Figures for 2022 and 2023 are projections: b. Refers to average of exports and imports; c. Refers to South and Central America and the Caribbean; d. Refers to Commonwealth of Independent States (CIS)*

*Source: WTO (2022), Trade growth to slow sharply in 2023 as global economy faces strong headwinds, World Trade Organization, https://www.wto.org/english/news_e/pres22_e/pr909_e.htm*

Table 23. Total tanker and dry bulk trade (2020, in million tons) and share of countries/regions in total exports and imports of specific bulk commodities.

| million tons | | | million tons |
|---|---|---|---|
| Crude oil | 1700 | Iron Ore | 1517 |
| Other tanker trade | 1203 | Coal | 1232 |
| | | Grain | 528 |
| | | Steel products | 354 |
| | | Forest products | 365 |
| | | Other bulk | 1468 |
| **Total tanker trade** | **2903** | **Total dry bulk** | **5464** |

| Steel producers | | Steel users | |
|---|---|---|---|
| China | 56 | China | 56 |
| India | 5 | India | 6 |
| Japan | 4 | US | 5 |
| US | 4 | Japan | 5 |
| Russia | 4 | South Korea | 4 |
| South Korea | 4 | Russia | 4 |
| Turkey | 2 | Germany | 2 |
| Germany | 2 | Turkey | 2 |
| Brazil | 2 | Vietnam | 1 |
| Iran | 2 | Other | 15 |
| Other | 15 | | |

| Coal exporters | | Coal importers | |
|---|---|---|---|
| Indonesia | 35 | China | 20 |
| Australia | 31 | India | 19 |
| Russia | 13 | Japan | 14 |
| US | 5 | South Korea | 10 |
| South Africa | 6 | EU | 6 |
| Colombia | 5 | Taiwan | 6 |
| Canada | 2 | Malaysia | 3 |
| Other | 3 | Other | 22 |

| Iron ore exporters | | Iron ore importers | |
|---|---|---|---|
| Australia | 58 | China | 76 |
| Brazil | 23 | Japan | 7 |
| South Africa | 5 | Europe | 6 |
| Canada | 4 | South Korea | 5 |
| India | 3 | Other | 6 |
| Sweden | 1 | | |
| Other | 6 | | |

| Grain exporters | | Grain importers | |
|---|---|---|---|
| US | 26 | East & South Asia | 49 |
| Brazil | 23 | Africa | 14 |
| Argentina | 11 | South & Central America | 10 |
| Ukraine | 10 | Western Asia | 9 |
| EU | 9 | EU | 9 |
| Russia | 7 | North America | 1 |
| Canada | 6 | Other | 8 |
| Australia | 3 | | |
| Other | 5 | | |

*Source: Authors' elaboration based on UNCTAD (2021)*

China is responsible for more than three quarters of all maritime iron ore imports in the worlds, while Australia and Brazil are the largest iron ore exporters. China, India and Japan combined are responsible for more than half of all coal imports. Asia also dominates in grain imports. China is by far the biggest steel producer in the world, as well as the largest steel user. The balance between steel supply and demand in China has far-reaching ramifications on world steel trade. Steel shortages in China trigger massive exports from the EU and other regions, while overproduction in China risks of resulting in the dumping of (cheap) Chinese steel on western markets. The shares of the EU as a whole or some key EU countries such as Germany in world dry bulk trades are rather modest compared to Asia, and China in particular.

In this regard, Italy in the past decade (since 2013) has consistently recorded trade surpluses, until the steep increase in energy costs caused a decisive increase in the value of imports in 2022, which in fact exceeded that of exports (Table 24). Italy's main exports include basic metals, chemicals, transport equipment and pharmaceuticals, while its main imports are machinery and energy. The main exporting partners are France, Germany, and the United States, while the main importing partners are Germany, France, China and OPEC countries.

Table 24. Italian Trade Balance: 2022.

| Related | Last | Previous | Unit | Reference |
|---|---|---|---|---|
| Balance of Trade | 1445.00 | -2123.00 | EUR Million | Nov 2022 |
| Imports | 55882.50 | 56636.69 | EUR Million | Nov 2022 |
| Exports | 57327.45 | 54579.85 | EUR Million | Nov 2022 |
| Terms of Trade | 89.50 | 88.70 | points | Nov 2022 |

*Source: https://tradingeconomics.com/italy/balance-of-trade.*

The trade of containerized cargo forms another major part of global maritime trade. Global container port throughput experienced an ongoing growth from 36 million TEU in 1980 to 237 million TEU in 2000. It accelerated from 545 million TEU in 2010 to about 849 million TEU in 2021 (UNCTAD, 2021). Some 108 million TEU of this total was handled in European ports. The trans-Atlantic trade route, the cradle of international containerization, is still recording volume growth but its share in global containerized trade continues to erode (Table 25). The shares of the trans-Pacific and Asia-Europe trade routes peaked in 2008 at 18.7% and 18% respectively. After the financial-economic crisis of 2008-2009 these two routes saw a modest decline of their relative shares, despite further volume growth. This implies that non-mainline routes and intra-regional flows are gaining in importance. In particular, intra-regional routes in Asia have seen strong volume growth in the past decade.

Table 25. Share of routes in total containerized container trade (laden containers, in million TEU).

| | 1996 | 2002 | 2008 | 2016 | 2020 | 2021 | 2021 vs. 2016 | 2021 vs. 1996 |
|---|---|---|---|---|---|---|---|---|
| Trans-Pacific | 7.6 | 11.7 | 19.3 | 25.4 | 27.5 | 31.6 | *24%* | *314%* |
| Asia-Europe | 4.8 | 7.7 | 18.5 | 22.1 | 24.1 | 26.5 | *20%* | *450%* |
| Trans-Atlantic | 3.3 | 4.1 | 6.0 | 6.9 | 7.6 | 8.2 | *19%* | *148%* |
| Other | 32.2 | 47.5 | 59.2 | 80.9 | 90.0 | 98.8 | *22%* | *207%* |
| *of which: Non-mainline East-West* | | | | *18.0* | *19.3* | *21.3* | *18%* | |
| *North-South* | | | | *11.1* | *11.9* | *12.9* | *16%* | |
| *South-South* | | | | *15.5* | *18.4* | *20.7* | *33%* | |
| *Intra-regional* | | | | *36.2* | *40.4* | *43.9* | *21%* | |
| Total | 48.0 | 71.0 | 103.0 | 135.3 | 149.2 | 165.1 | *22%* | *244%* |

| | 1996 | 2002 | 2008 | 2016 | 2020 | 2021 |
|---|---|---|---|---|---|---|
| Trans-Pacific | 15.9% | 16.5% | 18.7% | 18.8% | 18.4% | 19.1% |
| Asia-Europe | 10.0% | 10.9% | 18.0% | 16.3% | 16.1% | 16.1% |
| Trans-Atlantic | 6.9% | 5.7% | 5.8% | 5.1% | 5.1% | 5.0% |
| Other | 67.1% | 66.9% | 57.5% | 59.8% | 60.3% | 59.8% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% |

*Source: own compilation based on UNCTAD (2021) and MDS Transmodal.*

Table 26 shows sea trade by Italian region distinguishing between imports and exports. At the national level, the main "supplier" area is East Asia, while the main outlet market is North America. With reference to Puglia, where the Port of Taranto is located, sea traffic in imports is mainly from non-EU European countries, while that in exports is largely directed to North America.

In terms of commodity categories, import/export flows to/from the Region of Puglia mainly concern products from the steel sector, the traditional core business of the port of Taranto, which, however, has been affected in recent years by the crisis of the local steelworks.

Table 26. Import-Export maritime traffics per Italian Region.


*Source: Port Infographics 2022, Assoporti & SRM.*

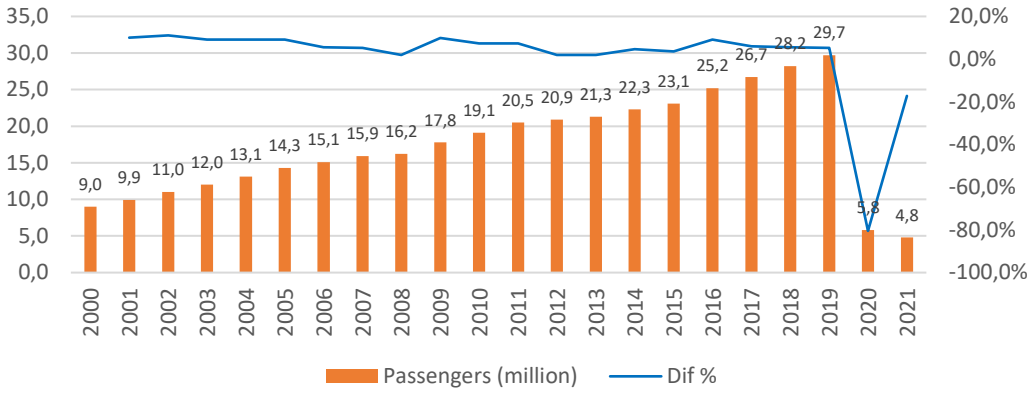
Take-aways for port of Taranto

- Globalization is levelling off but bringing new trade linkages with emerging countries. World trade will feel a growing impact of the rise of emerging economies beyond China (such as Vietnam, Bangladesh, East Africa, etc.) supported by favourable demographics in these countries. Thus, 'old' trade relations of the port of Taranto do not necessarily persist in the medium to longer term, and new trade relations might emerge.
- The war in Ukraine has given rise to an emerging new world order where Russia and Western countries are getting increasingly disconnected in political and economic terms. At the same time, growing pressures between China's command economy/socialist market economy and the free-market economy are expected to further trouble trade relations between China and the western world.
- The risks for economic shocks make long-term growth projections becoming more unstable. Risk assessment and mitigation is vital for port activities. Unpredictable trade-related conditions demand a resilient, flexible, and adaptive port strategy that can adjust to uncertainty and change.
- For the Port of Taranto there are major risks associated with the crisis in the iron and steel sector and the dependence of port traffic on the production activity of the "Acciaierie d'Italia" company.

### 2.3.2 Globalization of the cruise industry

In 2019 cruise is transformed from a minor industry serving less than five million passengers in the early 1970s to one serving almost 30 million passengers and generating over 160 million passenger movements in world cruise ports. The cruise industry experienced continuous growth despite several situations that threatened the industry, such as the 2007-2008 global economic crisis and the Costa Concordia grounding in 2012.

Figure 39. Cruise passengers' development and CAGR: 2000-2021.




*Source: Cruise Lines International Association, CLIA (2022).*

North America is the major cruise passenger source market, with more than half of the total cruise passengers per year coming from this geographical region. In 2019 it contributed 52,2% of the total passengers onboard a cruise. Beyond North America, strong demand for cruising comes from Europe, representing the second major source market (24,5% of the total passengers), followed by Asia (12,7%) and the Australia-New Zealand-Pacific region (4,6%). Finally, South America generates 3,2% of global cruise passengers.

The outbreak of COVID-19 was the first consequential crisis of a significant scale that modern cruise shipping faced. In February-March 2020, COVID-19 outbreaks associated with three cruise ship voyages caused more than 800 confirmed cases among passengers and crew. As a result, the industry voluntarily suspended worldwide operations, which lasted approximately 18 months. Due to COVID-19 pandemic the cruise industry lost 80,5% of cruise passengers in 2020, a traffic volume that brought the industry back to the late-1990s. Additional cruise traffic was lost between 2020-2021, resulting in a combined reduction of 83,8% in cruise traffic between 2019-2021. As a result, the industry lost $77 billion in global economic activity and 518.000 jobs were affected (CLIA, 2021). As final global data for 2022 are still under review, the two major cruise corporations (Carnival Corporation & Royal Caribbean) have already announced 12.3 million guests for 2022 and a more positive bookings record for 2023.

At the beginning of 2023, however, it is evident that this reversal was only temporal. In conditions of the pandemic, the cruise industry has proven its resilience. The restart of operations in mid-2020 was followed by a transitional period in 2021 and a progressive return to business in 2022. The current year (2023) is expected to be the year cruise activity will return to the pre-COVID-19 levels. Cruise lines have resumed operations worldwide, steadily returning to at least the level of activities observed in the pre-pandemic period. In addition, several cruise ports or terminal operators have announced expectations for a further increase in hosted activities. The magnitude of this return indicates that the faster growth pace than that of other transport or tourism industries remains. In the Port of Taranto, in particular, the PNA issued a 20-year concession in 2020 to Global Ports Holding for the management of services in favour of cruise passengers embarking, disembarking, and transiting in the Port of Taranto, making the Ionian port of call part of a global network of cruise terminals managed by an independent international

operator; this contributes to making Taranto a privileged destination to be included in the cruise lines' itineraries, with positive effects on cruise traffic for the port.

The industry's global growth rate is stable, despite global, regional, or local economic cycles. Today, the strong consumer interest, the shift of younger people - including Millennials and Generation X – to spend vacation time cruising, the increasing interest of travel agents in selling cruises, the increase in choices of destinations and itineraries, the modernisation of the fleet, the amenities offered onboard and ashore (shore excursion) and the overall product on offer, lead to estimation of sustainable economic growth. The Cruise Lines International Association estimates that the industry will reach the pre-COVID cruise passenger volumes by 2024, and continue to grow.

This trend confirms the remarkable dynamism and resilience of the cruise industry compared to the economic, social, political or other crises that regularly provoke the tourism sector. The cruise fleet renewal is a prerequisite for the industry's growth, and the cruise industry is expecting a solid reinforcement of the cruise fleet with almost 20% of new cruise passenger capacity (compared with the existing volumes) to be added by 2027.

In recent times, the structure of the demand side for cruises has changed significantly. From a service aiming mainly at older and high-income population target groups, cruise became a mass consumption product, attracting younger cruisers, and the mid/lower income population. A decrease in cruise prices due to economies of scale attributed to the construction of bigger cruise ships. Also, the development of new cruise products increased the market penetration of cruise through the development of niche target populations.

The industry has been fundamentally supply based; the ships are built, and the customers are found to fill them through various marketing and discounting strategies. The possibility for cruise ship operators to successfully follow a supply push strategy makes the cruise industry quite different from other shipping markets, such as container shipping. Hence, in most shipping markets, shipping activity is a clearly derived trade activity, and demand is rather price inelastic.

***Take-aways for port of Taranto***

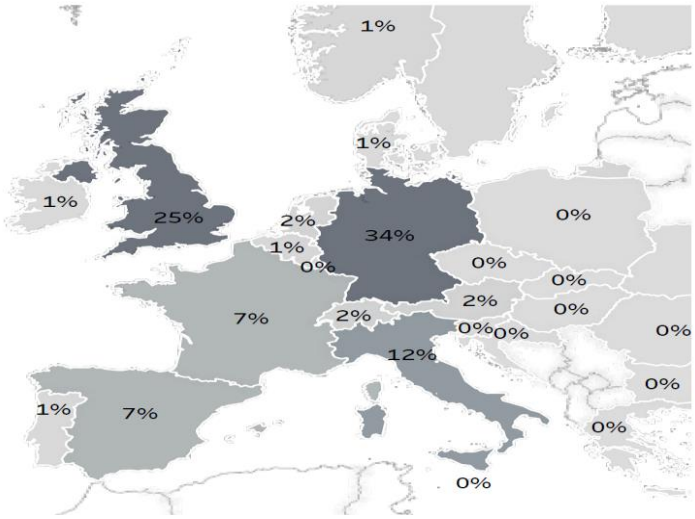
- The (almost) uninterrupted cruise market increase is an opportunity for the port of Taranto to develop those strategies that will enable it to attract more cruise passengers.
- Cruise activities growth is taking place through specialization. The 20-year concession contract signed in 2020 with Global Port Holding for the management of services in favour of cruise passengers embarking, disembarking, and transiting in the Port of Taranto, includes Taranto's port of call in a global network of cruise terminals managed by an independent international operator; this contributes to making Taranto a privileged destination to be included in the cruise lines' itineraries, with positive effects on cruise traffic for the Port.
- Increasing cruise traffic will require additional capacity in cruise ports and thus capital investments.

Cruise is a comparatively popular vacation product in Western European countries. Figure 40 shows the cruise passenger source countries in Europe as a percentage of the total volume of European cruisers in 2019 according to CLIA Europe (2019). Western European countries generated 95.5% of the European cruise passengers in 2019, and Eastern European countries contributed the remaining 4.5%.

Germany is the major cruise passenger source market. In 2019, 2.587.000 Germans decided to cruise. The UK and Ireland were the second biggest market (1,992,000 passengers), followed by Italy (950,000 passengers), Spain (553,000 passengers) and France (545,000 passengers). These data suggest that, despite the growth observed in the first two decades of the 21st century, cruising has, for the moment, achieved a low penetration throughout Europe and an even lower one in Eastern European countries. The latter occurs even though many Eastern European and adjacent countries are significant cruise

destinations (e.g., Greece, Turkey, Croatia, Cyprus etc.). Cruise as a maritime tourism product has significant growth margin potential in the European market.

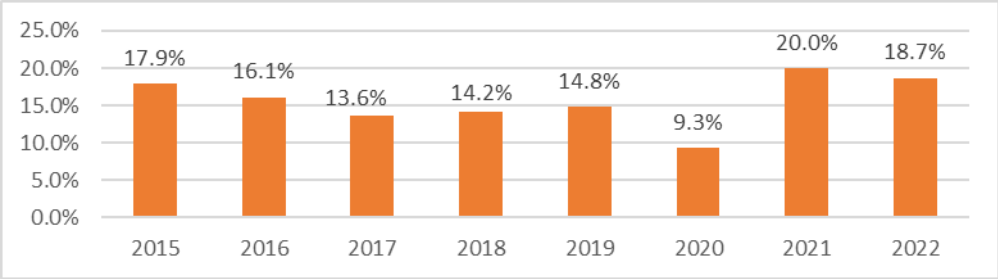
Figure 40. Cruise Passengers Source Markets in Europe (% for 2019).




*Source: CLIA Europe (2019).*

Figure 41 shows the percentage of the world fleet capacity (in terms of passengers) deployed in the region.

Figure 41. Percentage of world cruise fleet capacity deployed in the Mediterranean.




*Source: Cruise International News (2022).*

The European cruise market consists of numerous cruise destinations in several countries. Combined with the geographical convenience produced by the short distance between ports and destinations, it provides plenty of options for cruise lines' itinerary building.

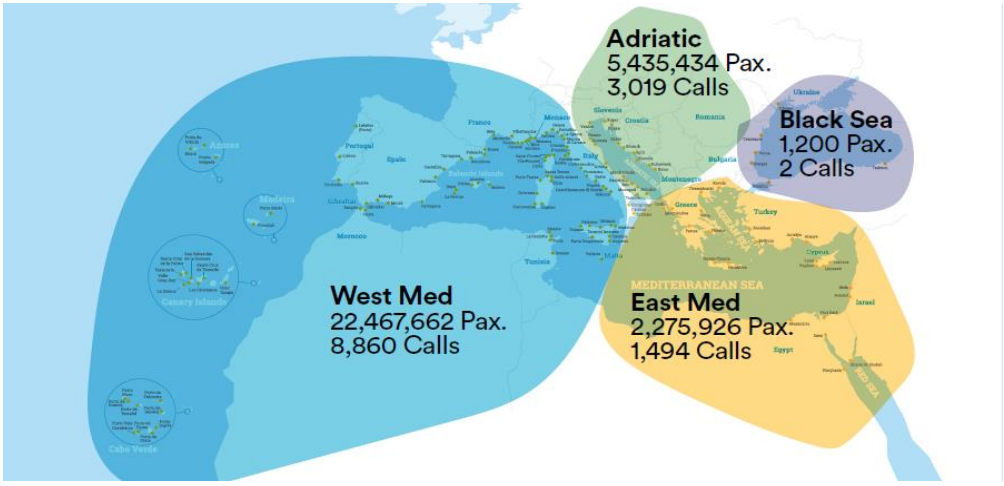
In 2019, the last year of cruise normality before the pandemic, ports in the Adriatic Sea hosted almost 5.5 million passengers and over 3.000 cruise calls (see Figure 42). The Western Med region hosted the most cruise passengers' traffic and calls. It must be noted that approximately 60 ports facilitate 50% of the total passenger traffic at the ports of the Med and its adjoining seas.

The Adriatic Sea ports, including Taranto, facilitate 17.5% of the cruise passenger movements in the region. Ports in the West Med facilitate 74.9% of the total cruise passenger movements, while the East Med host 7.6% of the traffic.

The considerable economic contribution of cruise activities to port cities, or nearby touristic destinations, gives ports a strong incentive to vie for more port calls and passenger excursions. Noteworthy that the prevailing conditions in the economies of European countries and the adjacent countries included in the itineraries of cruise vessels deployed in Europe (i.e., North Africa) might

diverge and sometimes result in uncertainty and lower the willingness of cruise lines to offer cruises in the region.

Figure 42. Cruise traffic in Med and adjoining seas per region.




*Source: MedCruise, (2019).*

***Take-aways for port of Taranto***

- Europe is a major source of cruise passengers, yet with low penetration in all European countries. This creates opportunities for the port of Taranto to benefit by attracting cruise passengers from source countries which are in close proximity.
- The port of Taranto is part of the second major cruising area in the world. The region has demonstrated continuous growth in cruise calls and passengers and has the potential to maintain this trend. Yet there are many destinations to be selected by cruise lines and competition is intense.
- The geographical location of the port of Taranto allows to take advantage of linking different regional cruising areas in the Mediterranean, i.e., it can serve as among the ports/destinations included in itineraries that include Adriatic as well as East Med and/ow West Med destinations.
- There are almost a million Italians that cruise every year. The port of Taranto could attract part of this market, exploiting the potential of hosting more cruise calls, and considering the potential of hosting cruise homeporting activities. In this regard, in summer 2023 Taranto will become a new port of embarkation and disembarkation for Costa Crociere: an opportunity to develop the hospitality industry and facilitate the launch of a new economy in the area.

### 2.3.3. Offshoring, nearshoring and onshoring

Nearshoring is the concept of sourcing work to a foreign, lower-wage country that is relatively close in distance and/or time zone. Elements such as quality, market or risk related drivers often lie at the foundation of a nearshore decision. Robotization and automation in production and the rise of additive manufacturing techniques (such as 3D printing) can help nearshoring as these technologies provide higher level of flexibility in terms of the locations, the manufacturing processes, the scale and scope of the output, and the customization of the products (see also further in the part on 'technology' in PESTEL). Also, these technologies to some extent rebalance the importance of input costs, particularly labour. Economic policy can also support nearshoring decisions by firms (see earlier in part on 'political' dimension of PESTEL). However, nearshoring also has its limitations:

- ✓ A complete nearshoring of an entire supply chain often is not feasible due to the complexity of global supply chains.
- ✓ Disconnecting a supply chain from China is not always possible given the country's dominance as a manufacturing site in many industries. Evolutions in Asia, with concepts such as "local for local" or "China plus one" (China offshoring within the Far East and Pacific region) will further

develop and impact global supply chains. For example, countries such as Vietnam and Bangladesh have shifted from basic commodities trading to become a refiner or producer of branded goods.

- ✓ Successful nearshoring partly depends on the availability of advanced infrastructure, cluster effects and local available expertise and skilled human resources. Some nearshoring projects might look good on paper but fail due to critical shortages in one or more of these areas.
- ✓ While nearshoring in most cases should lead to lower transport and distribution costs between the production facility and regional markets, the relationships between transport distance and cost and between transport distance and transit time are not always linear. An overseas offshore production site near a major seaport could therefore be more favourable from a transport and distribution standpoint than a nearshore location in a landlocked country.
- ✓ Certain industries are more suited to nearshoring than others, and the cost/benefit balance of nearshoring evolves over time depending on comparative costs and imperatives brought by production and distribution.

The changing international trade climate and the global supply chain crisis that occurred in the wake of the COVID-19 pandemic (including major supply chain disruptions and high freight rates) have made managers more susceptible to considering nearshoring in Europe to de-risk supply chains. Moving from international supply chains to regional or local ones is a way to avoid supply issues, to guarantee efficient and timely deliveries to market and to achieve more resilient supply chains. Not only supply and cost issues would matter but also a stronger focus on the environmental impact of transport. Thus, some nearshoring will be driven by sustainability. However, the above has not resulted yet in a production "renaissance" in Europe. For now, existing evidence points much more to a regional offshoring from west to east Europe than a nearshoring trend from Asia to Europe. The CEE zone (Central and Eastern European countries) has quickly become a privileged destination for foreign investors. In 2019, Poland reached an FDI inflow of 15.97 billion USD, Hungary 32 billion USD, the Czech Republic 9.3 USD, Romania 6.9 billion USD, Estonia 2.96 billion USD and Slovakia 2.31 billion USD (De la Bassetière, 2021).

The above observation does not imply there is no nearshoring taking place from Asia. Although we still cannot speak of a major nearshoring pivot, there are plenty of proponents of moving supply chains closer to home. This is evidenced by IKEA, who recently announced its plan to nearshore production of some of its product lines to Turkey to streamline the supply chain of its European stores. Central Europe appears primed to take advantage of any nearshoring to Europe, partly because of rising costs in Asia (e.g. wages are increasing at a faster rate than in Europe).

The aforementioned considerations on-shoring, offshoring and near-shoring activities highlight opportunities for the Italian port system and the Port of Taranto. The international trade of the port of Puglia could benefit both from the development of the activities of the container terminal "San Cataldo Container Terminal" (Yilport group) due to the commercial agreement stipulated with Kalipso which will allow, in addition to a decisive increase in traffic via sea, also the development of rail traffic, and the development of Ro-Ro traffic.

***Take-aways for port of Taranto***

- The changing balance between onshoring, nearshoring, and offshoring will affect maritime trade flows, both for containerized cargo and raw materials. Any large-scale nearshoring trend in the medium to longer term is expected to have various ramifications for the port of Taranto:
- The most likely nearshoring locations from a European perspective include North Africa (Morocco, Tunesia), Turkey and East and Central Europe. The cargo flows linked to the sourcing of raw materials and components are most likely going to transit seaports that are in close proximity to these locations, i.e. Tanger Med and smaller local ports for North Africa; Turkish ports (Ambarli, Mersin, etc..) for the Turkish locations; and North Adriatic ports (Trieste, Koper, etc.), Greek ports (Piraeus and Thessaloniki), Polish ports and also Hamburg for Central and Eastern Europe. However,

for Central and East Europe it is unclear what share of such import flows would be shipped directly to the mentioned ports of entry, and what share will be transshiped in other locations (such as at Med hubs) before being feedered to the ports of entry.
- European distribution patterns of products fabricated in nearshoring locations will not necessarily rely on distribution centers located in close proximity of these nearshore locations.
- The presence of the operator Yilport Holding and the agreement stipulated with the company Kalipso could provide significant development opportunities in an intermodal perspective with a progressive increase also in rail traffic.
- From April 2023, a new intra-Mediterranean operator will call at Taranto. This is Medkon Lines, which will include Taranto in its connections between Italy, Turkey and North Africa and vice versa.

### 2.3.4. The growing importance of strong economic ecosystems

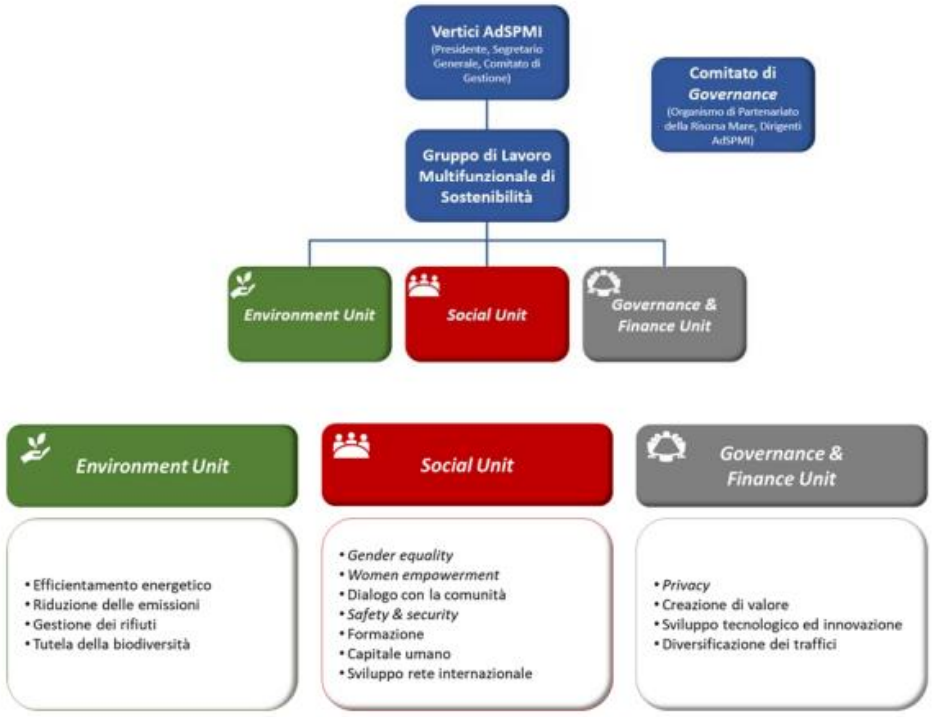
Multinational enterprises (MNEs), as key drivers of globalisation, have adopted flexible multi-firm organisation structures on a wide variety of markets. Many of the world's largest MNEs manage extensive networks of globally dispersed inputs through supply chain management practices. Moreover, export-oriented enterprises are encouraged by the designation of a growing number of special economic zones (SEZs), coastal open cities, and economic and technological development zones (EDTZs), all designed to encourage manufacturing activities, re-export and distribution.

Companies are typically seeking location advantages when deciding on where to set up a production unit, a logistics facility or service centre. Over the last few decades, we see an increasing tendency for companies to regroup and relocate forming ecosystems or clusters in the process. Clusters appear in all forms and sizes, from the basic manufacturing industry to high tech productions as regions covering hundreds of hectares to a simple street.

The initial reason for companies to group together in a certain location is linked to a certain advantage presented by the area in question. This could have been a particular resource, tax advantage presented to a specific type of company or any competitive advantage presented by the area. Resources, technology, capital and other inputs can be efficiently sourced in global markets. Most companies in such an ecosystem are not direct competitors but instead differentiate in order to attract a particular market segment or are on a different vertical level (supplier, producer, warehousing, etc..). They are thus often linked by input/output relationships. Yet, they share many common needs, opportunities, and constraints. The ecosystem provides the companies with a larger entity when contacting outside investors, be it public or private. The clustering of activities facilitates knowledge transfers and spill-over, creates a local labour market of skilled workers and enhances the possibilities for innovation. Many seaports can be regarded as ecosystems since ports typically consist of geographically concentrated and mutually related business units centred around transport, trade, and industrial production. Next to the advantages discussed above, port ecosystems can exhibit strong scale and scope advantages linked to physical cargo flows. The concentration of activities opens more opportunities to the bundling of cargo flows via intermodal transport (feeder vessel or rail) and to achieve a higher connectivity to the rest of the world via frequent transport services.

In this regard, the PNA of the Ionian Sea has initiated already in the 2020-2022 planning, functional actions to strengthen the Taranto port ecosystem, including through the promotion of a value system shared with the main categories of stakeholders functional, social, and economic well-being within the Ionian port ecosystem. In this regard, Figure 43 shows the hierarchical functional structure developed by the PNA in order to activate internal and external resources for the creation of value to be disseminated to the port and territorial community.

Figure 43. ESG hierarchical functional structure PNA of the Ionian Sea.




*Source: 2020-2022 Three-Year Operational Plan - Revision 2022, PNA of the Ionian Sea - Port of Taranto.*

In addition to this project defined in the 2020-2022 Three-Year Operational Plan of particular relevance is the agreement of the PNA of the Ionian Sea with the "ESG Laboratory - Environmental Social Governance", the Intesa Sanpaolo initiative planned for the entire national territory and dedicated to SMEs that aspire to improve their sustainability profile by initiating the transition towards ESG objectives and investments in sustainable and circular economy projects.

In this way, the PNA of the Ionian Sea increases its action aimed at spreading the culture of sustainability by supporting the enterprises of the port ecosystem in this sense. The establishment of an ESG Laboratory in Taranto, in collaboration with Intesa Sanpaolo and other institutional partners (Srm - Centro Studi e Ricerche per il Mezzogiorno, PNA of the Southern Adriatic Sea, Confindustria) aims to accompany companies towards targets of social inclusion and sustainable, blue, digital, and circular economy. The initiative, which integrates perfectly with the other innovative development and acceleration projects already underway in the port of Taranto, will contribute to generating new competitive advantages with an innovative impact on the port, economic, social, and environmental context derived directly from the sustainable growth of the enterprises in our ecosystem.

Considering the strategic objective of Institutional Accountability, the PNA of the Ionian Sea in the three-year period 2020-2022 has launched a path to increase the international visibility of the Port of Taranto, with the aim of strengthening the positioning of the Ionian port of call in the Mediterranean and in international markets, to generate new opportunities for contamination of the port ecosystem and more business opportunities for the local port maritime cluster.

The importance attached by the PNA of the Ionian Sea to issues related to the development of a port ecosystem also lies in its understanding of both the monetary and social value that the Blue Economy/Sea Economy holds at the national to regional level. In this respect, Figure 44 highlights the incidence of Blue economy/Sea economy on value added and employment (%) of each Italian Region.

The PNA of the Ionian Sea is an institutional and territorial partner - as part of the Ionian port's global promotion activities - of FAROS Blue Economy Accelerator, the first Italian accelerator in the CDP

network of startups and scale-ups specialising in the blue economy, port innovation, and sustainable marine resources and energy.

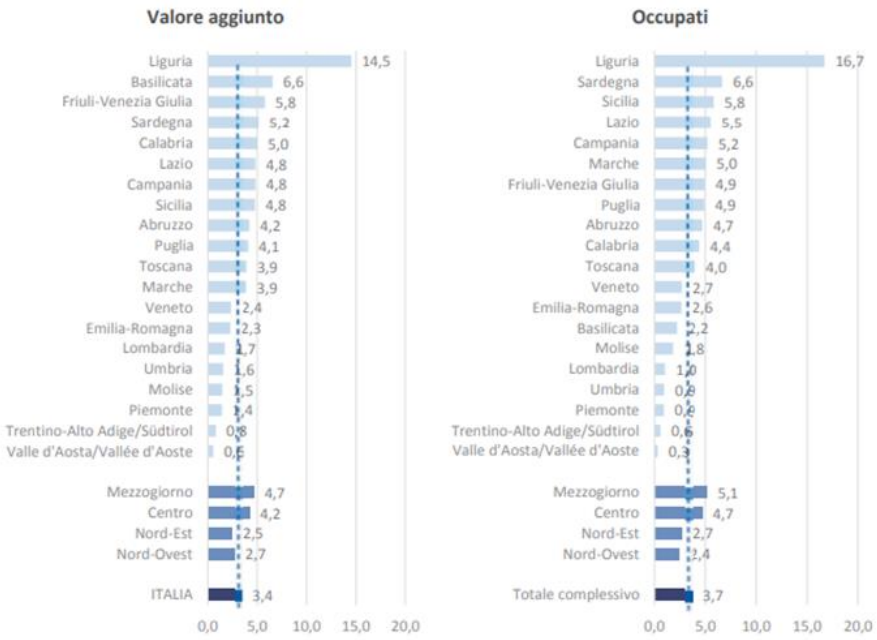
Faros is the result of an initiative by CDP Venture Capital Sgr through its Fondo Acceleratori, and is managed by a|cube, an accelerator and incubator focused on high social and environmental impact realities, with the involvement of the international accelerator PortXL, the world's first maritime accelerator dedicated to the acceleration of start-ups in the port and maritime sector.

The Faros accelerator aims to boost the growth of start-ups that develop innovative products or solutions in trends related to shipbuilding, smart ports & green shipping, ocean energy systems, ocean data, sea health & restoration, disruptive use of blue resources, sustainable aquaculture, coastal tourism.

From 2022 until 2024, 6-8 start-ups will be selected each year at the seed and pre-seed stage. They will have access to structured support from the accelerator's partners, who will guide them towards the validation of their business model and specific use cases. The best teams will also have access to further follow-on investments already allocated by CDP, the programme's anchor investor.

In fact, the sea economy's own activities account for 4.1% of the total value added generated by productive activities in Puglia and ensure an employment impact of nearly 5% of the regional total, significantly higher than the national average (3.4% and 3.7%, respectively).

Figure 44. Blue economy/Sea Economy in Italian Regions: impacts on value added and employment (%).




*Source: X Rapporto sull'Economia del Mare, Unioncamere 2022.*

***Take-aways for port of Taranto***

- Success in the globalized economy increasingly relies on the development and strong governance of diversified and sustainable ecosystems. The Port of Taranto should therefore continue to shape a strong local port ecosystem, characterised by the interaction between a range of mutually enforcing activities.
- The impact of the Blue Economy/Economy of the Sea on regional added value and employment should continue to be part of port and Marine Spatial Planning (MSP): a fuller range of potential stakeholders related to the Blue Economy could be included in the local port ecosystem; in this sense, the Faros Accelerator is an effective tool to involve ecosystem actors through the organisation of dedicated events, development and testing of pilot projects with selected start-ups, so that they can

develop new paradigms of sustainable resource management and new systemic solutions. This will also facilitate the matching of the partners' innovative needs with the proposals of the start-ups.

- There are interesting opportunities for the Port of Taranto related to the development of new strategic actions in line with the ESG paradigm. In particular, the ESG Lab becomes a meeting point, both physical and virtual, to accompany the ecosystem's companies in the sustainable transition, a development path aimed at generating new competitive advantages and sustaining long-term growth with positive impacts on the environment and people. The workshop becomes the tool to promote discussion and stimulate awareness on ESG issues among operators and related supply chains. Through the sharing of experiences, the objective is to support all companies and relative supply chains - interested in ESG issues - to take the first steps towards initiatives that improve the sustainability profile with positive impacts on company development.

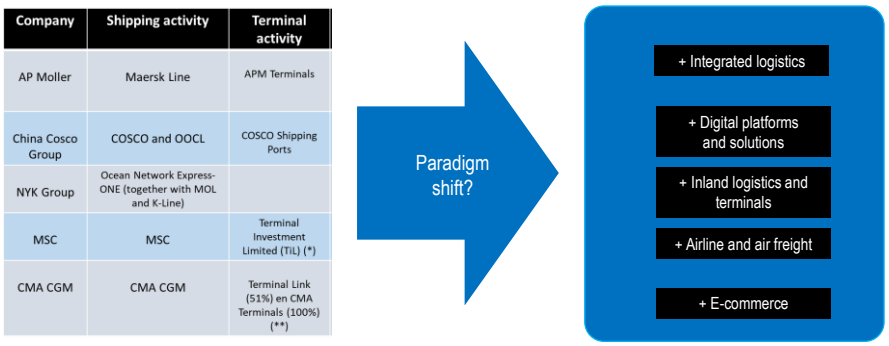
### 2.3.5. Changing market structure in shipping and logistics: vertical integration

The logistics industry is subject to integration forms, aiming to improve its scale, scope, and market reach. Functional integration involves horizontal consolidation and vertical integration strategies. Vertical integration is commonly understood as a single organization who owns and controls one or more links in their supply chain. Vertical integration creates a logistics market consisting of a wide variety of service providers ranging from megacarriers to local niche operators.

Competition between logistics service providers is no longer focused only on services to the cargo flows: advanced services are offering total pipeline/supply chain visibility to customers in terms of reliability performance through advanced tracking and tracing, environmental impact measurement (e.g., carbon footprint calculator), security risks and related event management. Many market players have also come to understand that landside operations are key to a successful integration along the supply chain. As a result, competition between ports and across the logistics sector looks set to intensify. As ports and logistics firms battle to protect and gain market share, the race to find cost savings and efficiency gains will become even more pronounced. For example, COVID-19 has accelerated the logistics integration strategies of some major container carriers. Helped by historically high operating margins, a number of carriers, such as Maersk Line, CMA CGM or MSC, have embarked on a take-over spree in the air freight business, e-commerce and last-mile logistics, digital platforms and forwarding activities (Figure 45). However, not all carriers are walking the path of logistics integration. For example, there is currently no indication from ONE, Evergreen or Hapag-Lloyd of a large investment ramp-up in logistics companies.

Regarding the Port of Taranto, the recent entry of a global operator (Yilport of Yildirim Group) into the management of the container terminal is an element for potential logistics hub development in Puglia compared to wider international logistics chains. In addition, the Yilport company intends to develop maritime traffic through the attraction of a deep-sea container service.

Figure 45. Logistics integration by container shipping lines

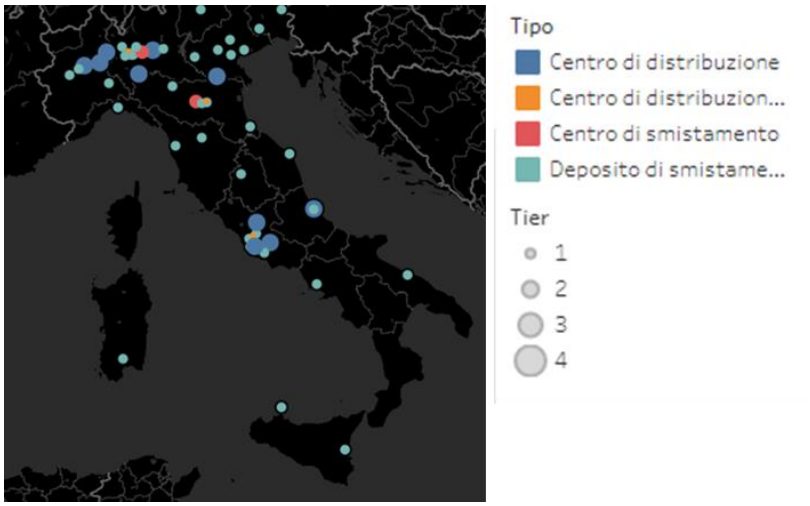



(*) Fully owned by MSC till 2013, stake brought to 60% in May 2019. Other shareholders are Global Infrastructure Partners (GIP) and GIC Private Limited, a Singaporean Sovereign Wealth Fund; (**) Terminals controlled by CMA Terminals were transferred to Terminal Link in late 2019.

*Source: Authors' elaboration based on Notteboom et al. (2022)*

While some carriers are vertically integrating in view of offering global logistics solutions, other market players (might) enter the container shipping business although on a small and rather fragmented scale for now. For example, faced with the challenge of keeping stores stocked amid a global supply chain crisis, e-commerce giants such as Amazon as well as large retailers like Walmart and Costco went so far as to charter their own container ships, typically calling at smaller container ports. In this vein, Amazon has progressively initiated a ship-to-door distribution strategy: the multinational has decided to focus on more widespread distribution (through the use of fulfillment centers). Amazon has also progressively increased the in-house management of transportation processes: since 2019 there has been a significant increase in the volumes moved with its own fleet, moreover, leaving the most complicated routes to the 3PLs. Despite the improved performance of competitors, Amazon has maintained a large margin in terms of ship-to-door time (1.7 days versus 3), and it has increased the level of control over a Supply Chain process. In Italy, Amazon has opened a total of 54 warehouses, including distribution centers, urban centers, and sorting centers and depots (Figure 46).

Figure 46. Amazon distribution centers in Italy.




*Fonte: www.wired.it*

In summary, the level of functional integration is increasing rapidly although not all companies are adopting such a strategy. Many distribution functions which used to be separated are now controlled by a single entity or are coordinated between parties. Mergers and acquisitions have permitted the emergence of large logistics operators that control many segments of the supply chain and meet the requirements of many shippers to have a single contact point on a regional or even global level (the 'one-stop shop'). Technology is playing a particular role in this process namely in terms of IT (control of the process) and intermodal integration (control of the flows). As a result, competition between ports and across the logistics sector looks set to intensify.

Vertical integration is also shaping the cruise industry. In the Caribbean market, for example, cruise lines seek vertical integration by investing in destinations. They develop their very own port and shopping facilities in destinations either by leasing a whole island or by leasing part of it, creating private destinations only for their 'guests.' Norwegian Cruise Line established the very first private resort developed by a cruise line, the Great Stirrup Cay in South Bahamas, to be followed by several cruise lines, including Costa Cruises (Dominican Republic); Disney Cruise Line (Castaway Cay Island); Holland America Line (Bahamas); MSC (at the Dominican Republic), Carnival (Bahamas), Royal Caribbean International & Celebrity Cruises (Haiti). The ultimate goal is to minimize spending leakages outside the company's assets, i.e., the cruise ship and the facilities ashore.

On the contrary, cruise lines' strategies in Europe focus on investing in ports and assuming responsibilities for operating cruise terminals. The target is to safeguard a minimum level of port

services quality for their cruise ships and cruise passengers. Avoiding congestions problems and securing optimal berthing process during the peak cruise season are also important. This strategy is applied through the concession of port facilities, either through greenfield projects or, more frequently, through the concession of existing port infrastructure. Specialised cruise terminals replace multi-purpose or temporary docking facilities. New cruise terminals are built, and existing ones are upsized and upgraded, imposing additional investments on the hosting ports. Aiming to effectively respond to calls for upgrading cruise terminals while safeguarding public spending, port network authorities started to seek the active involvement of third parties to finance, construct, operate, and/or commercially develop cruise facilities. The concessioning of cruise terminals to third parties and developing new terminals have become common. In some ports, cruise lines are directly involved in the financing, building and operations of terminals. In other ports, local cruise terminal operators (these frequently being port agents) are progressively joined by other companies that have developed interests in taking control over cruise ports and/or specialised purpose vehicles (SPVs) built by terminal operating companies. In addition, as cruise activities in ports gain more operational autonomy, public authorities are pursuing some form of partnership with third parties, aiming to finance and develop growth strategies.

Irrespective of ownership structure, the emergence of transnational cruise terminal operators (currently observed at a limited scale) might further transform the industry in the coming years. The case of Global Port Holding, operating 24 cruise ports/cruise terminals, including some in Italy, is indicative. While a further fragmentation of itineraries is likely to occur, closer integration between the cruise port and the cruise shipping industry is expected.

***Take-aways for port of Taranto***

As regards freight markets:

- The vertical integration trend leads to larger port users with strong bargaining power throughout the supply chains. Different forms of co-makerships and partnerships with these market players are needed to address issues affecting the performance of the port-related chains in terms of efficiency, sustainability and resilience.
- Ports have to think along with the port users and have more than ever to go for a less port-centric supply chain focus while doing so. The Port of Taranto's attractiveness is therefore not only determined by the port characteristics, but also on how the port is able to insert itself in the supply chains of the customers in an efficient and sustainable way.
- Logistics integration also comes with higher demands for digital transformation solutions that go beyond individual ports. Digital transformation within the Port of Taranto thus has to be complemented with digital network formation with other nodes in the wider logistics network.
- The Port of Taranto can benefit from the decisions performed by e-commerce giants (e.g., Amazon) and large retailers (e.g., Walmart, Costco, etc.) with regards to the localisation of their urban centers, sorting centers and depots in the Regions for developing also distribution activities, value added services and last mile logistics.
- Relatedly, in the future, increased traffic flows are expected from large-scale distribution (GDO) which increasing will ground on the intermodal integration of maritime and rail transport.

As regards the cruise market:

- There is an opportunity to attract private investments through the concession of a cruise terminal to third party/ies.
- The engagement of the private sector in cruise terminal management might lead to increased quality in service provisions to cruise vessels and passengers.
- As of April 2021, Taranto Cruise Port (TCP) is part of the large family of Global Ports Holding (GPH), the world's largest independent cruise terminal operator. TCP will have the concession, for the next twenty years, of a portion of maritime state-owned areas and assets insisting on the San Cataldo pier of the Ionian port of call, for the operation of cruise passenger support services in the port of Taranto as well as any other activity governed by the concession deed. The collaboration with the GPH operator has opened a new season of development and renewed expansion of the Taranto port of call in the cruise tourism sector, encouraging the dynamic and sustainable development of the local economy as well as the port's proactive function towards the territory.

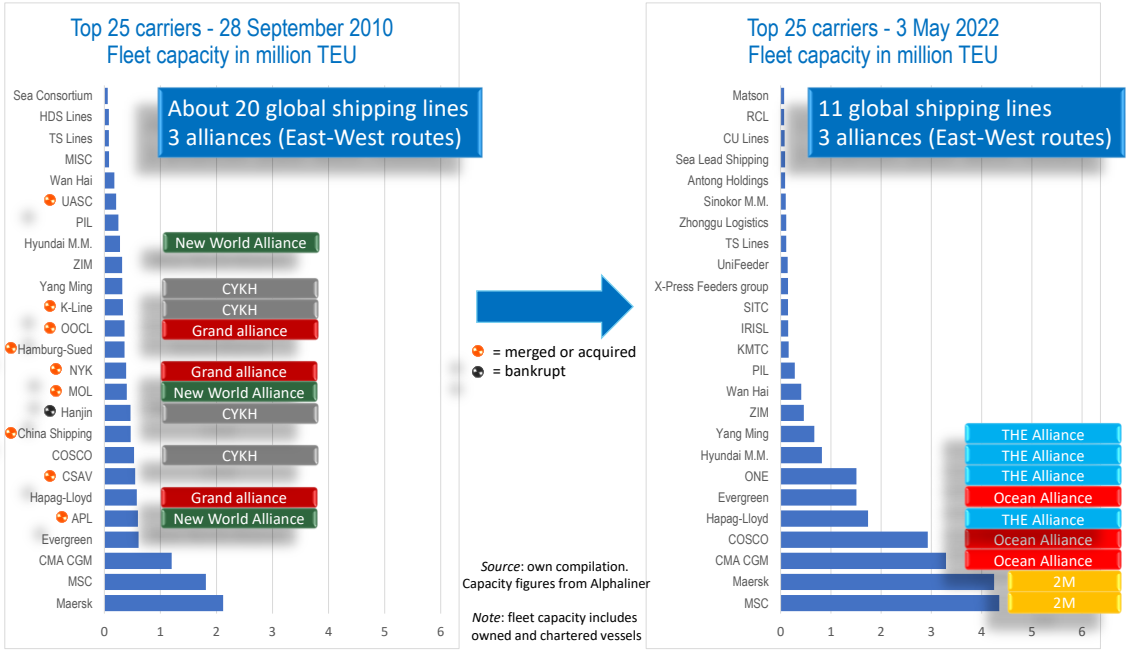
### 2.3.6. Changing market structure in shipping and logistics: horizontal integration and the emergence of global terminal operators

Mergers and acquisitions (M&A) shape the contemporary business environment, not only between different types of corporations (vertical integration) but also between corporations involved in the same type of activity or core business (horizontal integration).

Several waves of horizontal integration activity have resulted in a high market consolidation level in the logistics industry. For example, many of the top 3PL companies were involved in large-scale M&A activities while several M&A waves have created a container shipping market dominated by about ten global carriers which co-operate within alliances (Figure 47).

The top terminal operators have invested in container operations in European ports often in partnership with shipping lines and other companies. This has resulted in very complex ownership structures with many operators present in more than one port. The same applies to bulk trades and cruise terminals where terminal groups are expanding the scope over more than one port. Partly as a reaction to consolidation and alliance formation in container shipping, the terminal operating industry has witnessed an internationalisation process during the last decades, leading to the emergence of terminal operators offering globe-spanning services. The top global container terminal operators control an increasing share of the world's total container handlings (Table 27). Global port operators have created worldwide terminal networks that can offer consistent levels of services and modes of operation. Carrier-linked terminal operators, such as Cosco Shipping Ports, APM Terminals or TIL, continue to invest in vast global terminal networks, while independent global terminal operators (PSA, DP World or Hutchison Ports to name but a few) are increasingly hedging the risks by setting up dedicated terminal partnerships with shipping lines.

Figure 47. The impact of the 2014-2017 M&A wave in container shipping on the top 25 carriers and the associated strategic alliances – a comparison between September 2010 and May 2022.




Note: In January 2023, MSC and Maersk announced that the 2M will be discontinued in January 2025

*Source: Authors' elaboration based on carrier fleet data of Alphaliner*

Table 27. Global/international terminal operators' throughput league table, 2018-2019 (million TEU).

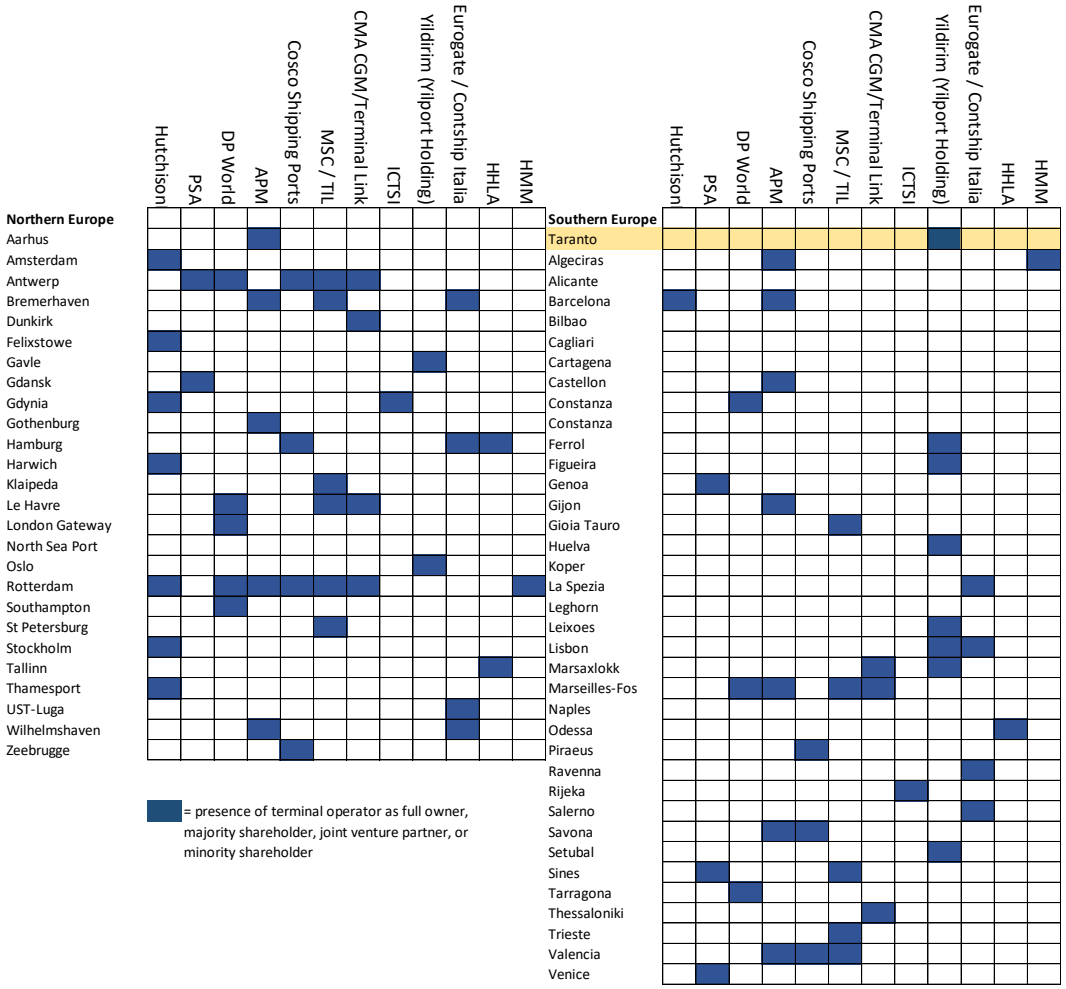
| | Throughput in million TEU |
|---|---|
| **China Cosco Shipping** | 109.8 |
| PSA International | 84.8 |
| **APM Terminals** | 84.2 |
| Hutchison Ports | 82.6 |
| DP World | 69.4 |
| **Terminal Investment Limited (TIL)** | 50.8 |
| China Merchants Ports | 35.6 |
| **CMA CGM** | 26.1 |
| SSA Marine | 13 |
| ICTSI | 11.8 |
| Eurogate | 11.7 |
| **Evergreen** | 10.1 |
| **Hyundai Merchant Marine (HMM)** | 9.5 |
| **NYK** | 8.2 |
| **MOL** | 7.8 |
| HHLA | 7.7 |
| Yildirim/Yilport | 6.1 |
| Bolloré | 6 |
| **Yang Ming** | 4.3 |
| SAAM Puertos | 3.1 |
| **K Line** | 3.1 |
| **Total** | **645.7** |

Notes:
Carrier-linked terminal operators are marked in **bold.**
Figures include total annual throughput for all terminals in which more than 10% shareholding held as of 31st Dec 2019. Figures do not include stevedoring operations at common user terminals and also exclude barge/river terminals

*Source: Authors' elaboration based on data of Drewry (2022)*

When it comes to the Port of Taranto case, in 2001, it entered the global container terminal operator era with TCT - Taranto Container Terminal (Evergreen 40%, Hutchison 50% and Maneschi 10%). However, the operator left the port some 15 years later. In 2018, after the redevelopment of the multi-purpose pier and the modernization of the mooring quay with the deepening of the seabed, YILPORT Holding expanded its portfolio in the Mediterranean Region by signing a 49 years concession in the San Cataldo Container Terminal (SCCT) located in the Port of Taranto. In 2020, YILPORT Holding started operations at SCCT (Figure 48).

Figure 48. Presence of global terminal operators in European ports (ports in alphabetical order per region).




*Source: own compilation based on terminal operator websites.*

The process of horizontal integration and waves of M&As have also shaped the cruise industry since the 1980s. Dominated by four major conglomerations, the global cruise industry is nowadays characterised by an oligopolistic market structure. These are three cruise groups, namely Carnival Corporation, Royal Caribbean International and Norwegian Cruise Line, and the independent MSC. The contemporary structure of cruise shipping has been shaped by several mergers and acquisitions dating back to the 1980s and the 1990s. Such mergers and acquisitions occur also today but at a considerably lower scale. The market share of the Big-4 stands at 83.2% of the total deployed capacity. The remaining independent cruise companies control 13.1% of the total deployed capacity. Table 28 shows the market shares in cruise industry in 2019, unveiling the industry's oligopolistic nature.

Following the conditions imposed by the COVID-19 outbreak, major losses confronted cruise lines. As a result, many cruise companies went bankrupt, including the Hong-Kong owned Genting Cruises and several independent operators, like Jalesh Cruises, Cruise and Maritime Voyages, FTI Cruises, all of them being regional cruise companies with small fleets. COVID-19 affected the entire industry. All cruise lines proceeded with a reassessment of their fleet, with several deciding to sell cruise vessels for scrap (mostly the older ones) or in the second-hand market. In contrast, other cruise companies decided to postpone or even cancel newbuilding orders.

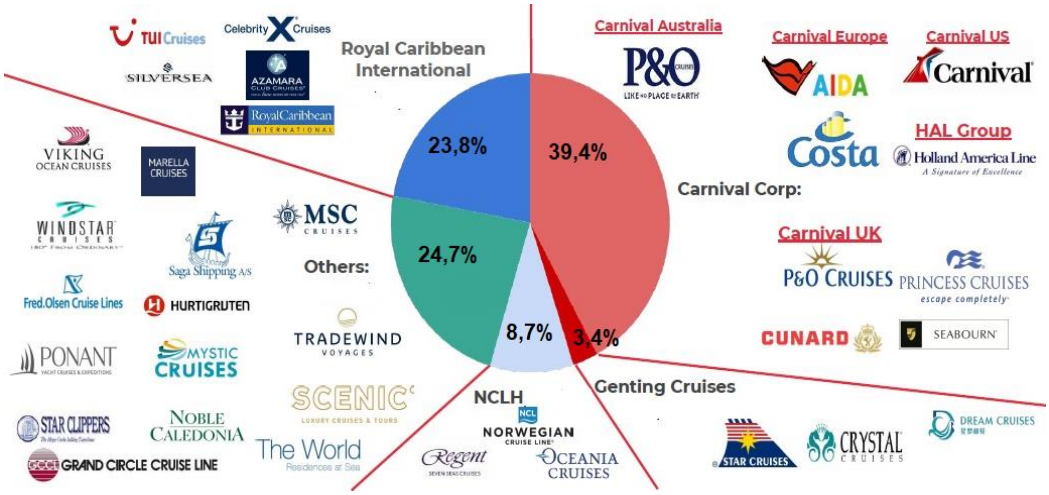
Table 28. Market Shares in Cruise Industry in 2019.

| Cruise Group | Number of Berths | Market Share |
|---|---|---|
| Carnival Corp. | 252.490 | 41,8% |
| Royal Caribbean International | 140.416 | 23,8% |
| Norwegian Cruise Lines | 59.046 | 9,0% |
| MSC | 54.028 | 8,6% |
| Genting Cruises | 13.693 | 3,7% |
| Other independent Companies | 82.104 | 13.1% |
| TOTAL | 601.777 | 100% |

*Source: Cruise Industry News (2019).*

Figure 49 presents the structure of the cruise market as of January 2022 before the bankruptcy of Genting, including the major cruise groups and their market share in terms of berth capacity.

Figure 49. Cruise Market Structure.




*Source: Authors based on data from Cruise Industry News (2022)*

The founders of the modern market, Carnival Corporation, Royal Caribbean Cruise Ltd (RCCL) and Norwegian Cruise Lines are the three largest modern conglomerates. Carnival is the largest group, with 9 different brands, operating 91 cruise vessels. The development model of the two market leaders involves extensive integration of various corporate forms, intending to cover various market segments. Such strategic choices allow the provision of differentiated services while promoting each corporate format as unique.

A variety of corporate strategies exists to achieve an increased market share. Carnival is opting for route restructuring strategies, while RCCL focuses on revenue through investments in large ships. A common practice to achieve the endorsed targets is to transfer ships between cruise brands. Mergers and acquisitions are a common way for cruise groups to increase market share, contributing to an increasing market concentration. Norwegian Cruise Lines acquired two companies from Prestige Cruise Holdings in 2014: Oceania Cruises and Regent Seven Seas. In the same year, Carnival Corporation merged Iberocruceros with Costa Brand. The most significant merger took place in 2003, with the acquisition of one of the most important players in the market (P&O Princess Cruises) by Carnival Corporation.

***Take-aways for port of Taranto***

As regards the freight markets:

- The horizontal integration trend leads to larger port users with strong bargaining power.
- Virtually all container ports in Europe have welcomed one or more international terminal operators (either independent terminal operators or carrier-linked operators).

- The presence of an independent and international terminal operators managing the SCCT in the Taranto Port is expected to produce positive effects on the container throughput of the port in the next few years.

As regards the cruise market:

- Increased market concentration provides cruise lines increased bargaining power over ports and destinations. Cruise companies might push for even greater incentives from the port network authorities, the local authorities at the destination or even the central government.
- A cooperation scheme with a major cruise group can safeguard significant cruise vessel calls and passenger traffic at a port.
- On the other hand, a strong engagement with a major player in the cruise industry might jeopardize the business growth of cruise port in case a cruise company seek for an alternative destination or port of call.

### 2.3.7. Changing network structure in shipping and logistics: maritime networks

Corridors have become the main arteries of world trade. Strategic points along maritime corridors such as the Panama Canal, Suez Canal, the Straits of Malacca, and the Straits of Gibraltar function as important turntables in extensive hub-and-spoke and relay/interlining activities. Many of the world's larger ports can be found near these key locations. Shipping lines have designed liner services with slow steaming large vessels connecting a limited number of global ports on each side of the trade routes. The networks are based on traffic circulation through a network of specific transhipment hubs. However, shipping lines do not necessarily opt for the same hubs.

The changes that have affected the organizational patterns underlying the liner services referred to in the main international traffic routes, over the last 30 years have led to the establishment in the Mediterranean of an increasing number of transhipment port hubs, functional to optimize the container shipping services of the main carriers engaged in international trade along the above-mentioned routes (East West and North South). To the traditional first-generation transhipment ports (such as Malta, Algeciras, Port Said and Piraeus), second-generation transhipment ports have been gradually added. In this regard, during the 1990s, also in order to support the growth of Italian ports, we saw the development of the transhipment ports of Gioia Tauro, Cagliari and Taranto. These are ports that in the early 2000s experienced rapid growth in the volumes of containers handled and that come to be progressively located at a greater distance from the main traffic route, turning out to be located at greater latitudes than the first-generation transhipment hubs. This process of gradual "moving away" from the coasts of North Africa continued rather sharply in the early part of the 20th century with the third generation of transhipment ports, consisting of the Spanish ports of Valencia and Barcelona (operating as load centers) and ports located near the Black Sea (Ambarli and Constanza). Beginning in the latter part of the first decade of the 21st century, partly as a result of the post-2008 international crisis, there is a significant change in the overall design of the transhipment hub network within the Mediterranean. The need to contain the operating costs of shipping carriers engaged in the provision of sea-borne container transport services and, in particular, bunkering costs, has led to the emergence of a fourth generation of transhipment terminals in the Mediterranean. These are terminals located along the north coast of Africa near the main East-West route, namely Tanger Med, Algiers, Bejaia, Djen Djen, El Sokhna and El Dekheila (Alessandria).

Figure 50. The main routing alternatives between East Asia and Europe.


*Source: Notteboom and Rodrigue (2011).*

As a result of this path of innovation and changing competitive dynamics, the supply system of transhipment services within the Mediterranean Sea now appears to be expanding but also undergoing profound changes. The analysis of the main transhipment ports operating in the Mediterranean shows a specialized supply system since, contrary to Northern Europe, there is a certain presence of pure transhipment hubs in the Mediterranean (considering as such ports with a transhipment share in total container throughput of above 80%) and mixed ports with high transhipment incidence (between 40% and 80%).

***Take-aways for port of Taranto***

- In a supply chain context of increased risks and disruptions, carriers and shippers seek cargo routing flexibility, also for Asia-Europe trade links. This implies that Mediterrennean gateway and transhipment ports will potentially face some competition from alternative route options by rail (Eurasian landbridges) or sea (Cape route and NSR). However, the overall volumes on these alternative routes are expected to remain rather modest compared to the dominant Suez Canal route.
- The port of Taranto can develop new links to the array of routing options (for example by connecting to Black sea ports in Georgia in view of establishing a link with the middle rail corridor to China).

### 2.3.8. Changing network structure in shipping and logistics: hinterland connectivity

With a total maritime container throughput of an estimated 108 million TEU in 2021 (Notteboom, 2022), the European container port system ranks among the busiest container port systems in the world. Europe counts about 130 seaports handling containers of which around 60 accommodate intercontinental container services. Table 29 provides an overview of the fifteen largest container ports in the European Union. A number of these ports act as almost pure sea-sea transhipment hubs with a high transhipment volume (i.e., Gioia Tauro, Marsaxlokk, Algeciras) while other ports can be considered as almost pure gateways (e.g., Genoa, La Spezia, Marseille) or a combination of a dominant gateway function with sea-sea transhipment activities (e.g., Hamburg, Rotterdam, Le Havre, Valencia, Barcelona, Gdansk, and Antwerp-Bruges). In 2021, about 74% of the total container throughput in the European

port system passed through the top-15 EU ports. Still, the European port scene is becoming more diverse in terms of number of ports involved and the scope of port functions and services, leading to more routing options available to shippers.

Table 29. The top-15 container ports in the European Union in 2021 (in 1000 TEU) and growth Q3 2022.

| Rank 2021 | Rank 2020 | Rank 2007 | Port | Container traffic 2021 in 1000 TEU | Y-o-y growth Q3 2022 | Remark | Growth 2020-2021 |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | Rotterdam (NL) | 15,300 | -4.4% | | 7.8% |
| 2 | 2 | 3 | Antwerp-Bruges (BE) | 14,225 | -5.0% | | 2.8% |
| 3 | 3 | 2 | Hamburg (DE) | 8,715 | -2.3% | | 2.2% |
| 4 | 5 | 8 | Valencia (ES) | 5,614 | -6.2% | | 3.4% |
| 5 | 4 | 17 | Piraeus (EL) (*) | 5,317 | -10.5% | | -2.2% |
| 6 | 7 | 4 | Bremerhaven (DE) | 5,019 | -9.5% | | 5.2% |
| 7 | 6 | 6 | Algeciras (ES) | 4,797 | -0.6% | | -6.1% |
| 8 | 9 | 10 | Barcelona (ES) | 3,531 | 1.1% | | 19.4% |
| 9 | 8 | 5 | Gioia Tauro (IT) | 3,147 | 10.2% | 10M | -1.5% |
| 10 | 10 | 9 | Le Havre & Rouen (FR) | 3,070 | 0.1% | 6M | 25.6% |
| 11 | 11 | 12 | Marsaxlokk (MT) | 2,970 | N/A | | 21.7% |
| 12 | 12 | 14 | Genoa (IT) | 2,558 | -2.0% | | 8.7% |
| 13 | 13 | 64 | Gdansk (PL) | 2,118 | 15.5% | | 10.1% |
| 14 | 15 | 62 | Sines (PT) | 1,824 | -5.3% | 8M | 13.2% |
| 15 | 17 | 19 | Marseille (FR) | 1,480 | 5.0% | 6M | 12.3% |
| | | | TOP 15 | 79,685 | | | 7.1% |
| | | | TOP 3 | 38,240 | | | 9.5% |

*Source: Notteboom (2022) based on traffic data respective port network authorities.*

In the past decade a number of Mediterranean and Baltic ports have joined the top league in Europe. Many Ligurian and North-Adriatic ports were typically challenged by the physical limitations to terminal capacity extensions (i.e., the locked-in geographical situation of the respective coastal port cities) and by the limited success so far in attracting a lot of business from the Alpine region and Southern Germany. In more recent years, new terminals have been opened (such as in Vado Ligure) and a more aggressive rail strategy is helping these ports to gain markets share in the Alpine region and Central and Eastern Europe. Transhipment hubs in the Mediterranean have substantially increased their role in the container market. After a steep increase of the market share from 4.5% in 1989 to 14% ten years later, their market position further evolved to reach 14.8% in 2019. Piraeus, Algeciras, Gioia Tauro, and Marsaxlokk (Malta) remain the most important pure transhipment hubs on the European shores of the Med. Still, they are facing increased competition from hubs in Africa (Tanger Med in particular, but also to a lesser extent the Egyptian hubs of Port Said, Alexandria and Damietta) and Turkish ports.

Competition exists between a number of Mediterranean ports and those of the Northern Range, in that they constitute two different systems through which ocean-going traffic can reach the economic and industrial heartland of Europe. The cargo routing choices of shippers and shipping lines depend on several factors such as costs (port, inland transport, sea voyage, feeder/shortsea), time (at sea, in port and to the hinterland), efficiency, inland connectivity of ports, frequency, reliability, infrastructure and equipment availability, cargo balance (import/export) and ease of business. Quite a few port choice models have been developed and tested in the past (see for example: Biermann and Wedemeier, 2016; Tavasszy et al., 2011; Veldman and Buckmann, 2003; Veldman et al., 2005; Zondag et al., 2010; Mueller et al., 2020). All these models show that the outcomes are very sensitive to changes in input variables, such as transport costs, time variables or frequency/reliability.

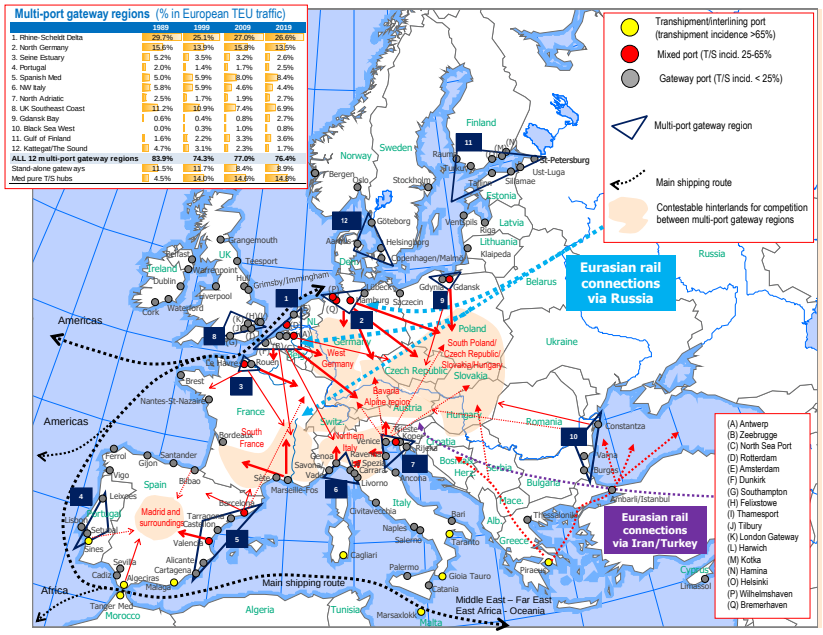
A number of key factors and developments are expected to influence the competitiveness of routing options into the European hinterland, and thus in the North-South cargo balance, with an impact on costs, transit times and inland connectivity:

- ✓ The timely supply of sufficient container terminal capacity and human resources will have a major impact on the market position of individual container ports, certainly when faced with a market environment characterized by port congestion and tight labour supply.

- ✓ The need for skilled and cost-efficient dock workers and a flexible workforce that can cope with the volatility in terminal activity caused by the variability in ship arrival patterns, seasonality in the container market and operational challenges caused by human, economic and natural disruptions.
- ✓ Sustainability considerations will increasingly have an impact on inter-port competition and the hinterland reach of European ports. $CO_2$ taxes and high bunkering costs can favour shorter routes and affect modal choice in hinterland transport. The energy transition will also affect the cost base of the different transport modes.
- ✓ Corridor formation (particularly by rail) will have a major influence on future cargo routing decisions and competition between north and south European ports. For seaports, the connection of TEN-T ports to the TEN-T rail network is mandated by Regulation (EU) 1315/2013, Article 41(2), which sets out that seaports shall be connected with the railway, road and, where possible, inland waterway transport infrastructure of the trans-European transport network by 31 December 2030. While the Commission identified that all seaports of the Core and Comprehensive TEN-T Network are already connected to the TEN-T rail network, major improvements remain necessary to ensure efficient and sustainable rail transport into the hinterland. In principle, a number of mainland Mediterranean ports offer transit time advantages over the north European ports for accommodating cargo flows between Asia/Middle East and large parts of Southern and Central Europe. Gateway ports in the Med have gained a much better connectivity in the global shipping networks than before, which gives these ports the opportunity to benefit from a higher critical mass and the economies linked to larger vessels.

On the latter point, several joint initiatives are underway with the objective of improving the position of the Med ports. West Med ports' strategies include a range of logistics platforms both in seaports and in strategic inland locations (e.g., the tm-concept of the Barcelona port authority). To attract Asian trade distribution to the region, some ports have joined their marketing efforts under the umbrella of Medports. Infrastructural efforts are combined with marketing initiatives for Med ports to become gateway to Europe for specific good flows. For example, Marseille, Venice and Koper are among the Med ports trying to develop logistics chains for perishable goods from the regions around the Mediterranean Sea to Northern and Central Europe, thereby leveraging on short inland transit times by rail.

Figure 51. The European container port system and main contestable hinterlands.




*Source: Authors' elaboration.*

Italian ports are slowly gaining ground to serve the Alpine region and central and eastern Europe, partly by relying on rail investments. At national and regional level, the focus is also on the implementation of a new rail service concept involving longer trains (750m instead of 440-500m), a larger hinterland service range (up to 400km instead of 180km), a stronger focus on cross-border rail connections instead of only domestic services, higher service frequencies and commercial speed, and lower costs per TEU-km. Ongoing rail infrastructure investments are aimed at improving the rail connectivity of Italian ports.

One of the main obstacles to Med ports is that the hinterland volumes are still much smaller than in some north European ports (i.e., Rotterdam, Antwerp or Hamburg), which implies that a vast network of frequent intermodal services out of these ports typically is harder to develop and maintain.

At the national level, the connections of Italian ports with their respective hinterlands are supported by a dense network of "*interporti*" and other logistics centers located throughout the peninsula. The 24 Italian interports officially surveyed by the Ministry of Infrastructure are mainly located in the North of the country (14) while Southern Italy still appears to be struggling under this profile. In this regard, it is sufficient to consider that 3 of the 14 interports in Northern Italy, namely Quadrante Europa in Verona, CIM in Novara and Interporto Padua, handle more than 70% of the total TEUs operated by the national interport system.

The geographic distribution of the Italian intermodal traffics in 2021 unveils the importance of logistics centers (*interporti*) for the development of the national logistics and the overall port system (Figure 52). In fact, in 2021, 2,487,114 TEU (+36.2% compared to 2020) equivalent to about 1,376,209 UTI (+33.4% compared to 2020) were handled.

Figure 52. Intermodal traffics in the Italian logistic centers (interporti): 2021.

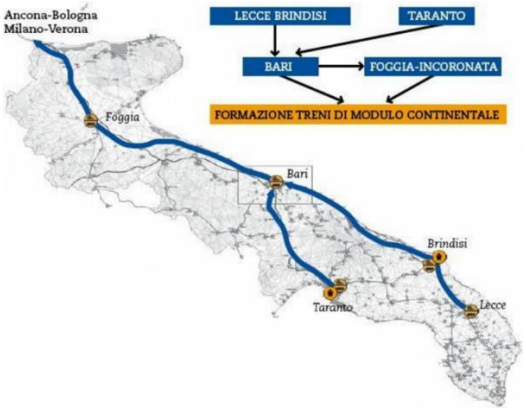

*Source: Almanacco della Logistica 2022, Confetra.*

Of the above traffic, only 8% was handled by the Interporto Regionale della Puglia, a logistics hub of extreme importance to the Port of Taranto. This position ensures the perfect integration between the traffic traveling along the Scandinavian-Mediterranean Corridor (in which the Port of Taranto is located) and the other corridors of the TEN-T network (Figure 53). At present, the area involved is about 50 hectares including 90 thousand m$^2$ of covered area for logistics warehouses and office buildings and is functionally divided into three areas dedicated to as many types of traffic:

- ✓ rubber-rubber warehouses: mainly intended for logistics/corporate use;

- ✓ rubber-rubber warehouses for cold logistics, equipped with temperature-controlled cold rooms in the -25°C / +4°C range;
- ✓ iron-rubber warehouses: connected to the main railways by a platform protected by a canopy for loading and unloading of goods on the wagons moved on the rail link serving the Freight Village.

Figure 53. Location of the Interporto Regionale della Puglia.




*Source: Puglia Regione Website.*

***Take-aways for port of Taranto***

- Container port competition in Europe is very dynamic with more and more ports vying for contestable hinterland regions in the core of the European Union. Still, local hinterlands continue to form the backbone of ports' cargo bases. This also applies to the port of Taranto.
- The position of the port of Taranto on some key long-distance rail and maritime TEN-T corridors combined with the vast network of logistics centers (*interporti*) and other logistics nodes in Italy opens up opportunities for developing a stronger transit function for transhipment and gateway traffic.
- The connection of the Port of Taranto with the Interporto Regionale della Puglia could constitutes in the next future an unprecedented opportunity for developing intermodal traffics and port throughput.
- Valuable business opportunities are also expected from the enhancement of connections with other logistics centers and far dry ports as well as the development of the Ionic Special Economic Zone (SEZ).

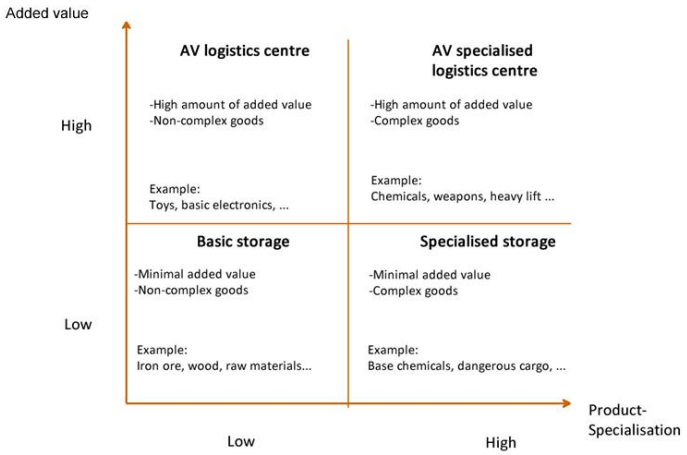
### 2.3.9. Changing network structure in shipping and logistics: distribution networks

It is possible to distinguish certain types of warehousing depending on their distance to the customer and the degree of specialization required by the product (Figure 54). Depending on the specialization degree and customer distance four types of warehousing can be identified, ranging from the basic storage facilities like grain silos and simple sheds for storing wood to specialized logistics/distribution centers with a high amount of added value activities.

Before 1993, most companies in Europe set up a distribution structure based on a network of distribution centers in major countries in which they were present. Since cross-border transactions have increased drastically after the creation of the European Internal Market in 1993 and the fall of the Iron Curtain, most companies consolidated their national distribution centers to European Distribution Centers (EDC) covering all of Europe. Some locations are more EDC preferable than others. At present, the center of gravity for EDCs is located in a region comprising Belgium, the south and eastern parts of the Netherlands, northern France (Lille/Valenciennes) and parts of western Germany (mainly the Ruhr area). According to the statistics of the Holland International Distribution Council (HIDC), 57% of all EDCs serving American companies and 56% of those serving Asian companies are located in the

Netherlands, concentration levels far higher than in the other EU countries in the ranking, namely Belgium and Germany.

Figure 54. Warehousing typology diagram.




*Note: AV = added value.*

*Source: Authors' elaboration.*

The rise of EDCs is particularly visible in the hinterland with vast developments that have taken place along waterway/rail/road corridors connecting ports and the markets as well as in inland ports and inland logistics platforms. However, not all EDC activities are drawn inland. Major seaports, such as Antwerp-Bruges, remain the prime location for large-scale distribution facilities for commodities such as oil products, cacao, coffee, and tobacco (cf. impact of traders), for forest products and steel, for new and second-hand cars and for bulky goods linked to the local (chemical) industry. The decision to locate a distribution center inside the port implies advantages and disadvantages. According to Ferrari et al. (2006) and Monios et al. (2016), the most cited advantages can be summarized as follows:

- ✓ Good integration and cooperation between terminal operations and distribution center activities;
- ✓ Possibility to re-export from the port to other markets;
- ✓ Reduce traffic congestion and pollution for local inhabitants when operating distribution activities inside the port area.

The report of Cushman & Wakefield (2019) identifies the important new transportation corridors which will emerge between now and 2030 to support the evolution of the European logistics industry. The logistics 'Blue Banana', which is Europe's primary distribution corridor from the Benelux countries to northern Italy, has transformed into multiple corridors in response to EU expansion and new motorway and rail additions. These logistics corridors are set to evolve further due to factors including increasing freight volumes, transport costs, labor shortages, road congestion, e-commerce, multimodal connectivity, and transport networks. In addition, political issues including the UK's departure from the European Union also have an impact. Cushman & Wakefield identifies eight primary logistics corridors likely to define European logistics in 2025 or 2030 (Figure 55):

- ✓ The original blue banana which implies the channelling of international trade into Europe primarily via the Benelux ports, through the German Rhineland to northern Italy. The growing importance of Mediterranean ports is likely to extend the blue banana to include north Italian ports;
- ✓ UK corridor (post-Brexit) as a result of UK supply chains increasingly being domestically focused;
- ✓ Irish corridor heavily relying on the short-sea shipping route between the ports of Cork and Dublin in Ireland and the port of Antwerp-Bruges with some spillovers to North Sea Port and Rotterdam;
- ✓ Iberian corridor in Spain and Portugal fed by manufacturing activities (such as in the automotive industry) and growing import flows from Asia, and supported by rail developments;

- ✓ Central Europe corridor supported by TEN-T motorway and rail developments This corridor could eventually extend to northern Italy and thus connect to the original blue banana via Bologna and Milan. In this regard, the Port of Taranto presents significant opportunities related to its membership in the Scandinavian-Mediterranean corridor as well as its potential inclusion in the Baltic-Adriatic corridor following its extension. In fact, considering the evolving scenario of maritime and intermodal transport in the Mediterranean area and the new global challenges that require a high capacity of the national transport system, from an intermodal point of view, the Port of Taranto could act as an economic driver able to increase the competitiveness of the Southern regions as well;
- ✓ North Sea corridor connecting the port of Hamburg with Copenhagen and Malmo through completion of Rodby-Puttgarden tunnel;
- ✓ Black Sea corridor – A future distribution corridor that will be connected to the Central Europe 'banana' once TEN-T Rhine-Danube rail and motorway network's branch connecting Budapest with the Black Sea is completed. As a result, Romanian markets such as Bucharest are expected to play a crucial role;
- ✓ Baltic corridor – The Baltic's growing importance as a manufacturing location will partly depend on the construction of TEN-T motorway road and rail networks that will connect this region with Finland, Poland, the Czech Republic, and Germany.

The future distribution system configuration obviously has an impact on the cargo routing patterns in Europe. EU enlargement up to now has not had a huge impact on the location of EDCs in the blue banana as this zone still offers the best access to the EU's core markets and infrastructure. The emergence of new logistics corridors implies that the center of gravity in European distribution is expected to slowly shift east to southeast due to the rise of Central and Eastern Europe, implying Belgium and the Netherlands will face increasing competition in attracting EDCs. Land and maritime corridors might prove to be crucial to support the further development of efficient European distribution network configurations. However, efficient long-distance corridors can also have a downside to well established EDC regions such as Belgium and the Netherlands: they make it easier for logistics service providers to move distribution facilities inland closer to the customer base without having to sacrifice a good accessibility to the maritime gateways. A range of factors is driving the remodelling of logistics networks, such as a growth in the number of product lines and order complexity, customer demand for quicker delivery times, and the need for flexibility to cope with demand volatility. Under the influence of e-commerce and online retail, XXL warehouses are increasingly being built. These are warehouses with a floor area of at least 40,000 $m^2$. The number of XXL warehouses in Belgium and the Netherlands is growing explosively. In addition to logistics service providers or Third-Party Logistics operators (3PLs), many shippers also choose for XXL warehouses. The growth in demand for XXL warehouses thus arises from supply chain reconfiguration and the consolidation of operations into fewer, larger centralized hubs. These hubs supply a large hinterland area more cost-effectively than might be possible from traditional networks. Despite the growth of XXL warehouses, the market has not moved towards omnichannel warehouses in which all activities take place under one roof. Instead, the market has evolved towards different types of warehouses. For example, E-commerce leads to the development of more cross docking sites close to large population groups in order to act quickly. The XXL warehouses have been developed where a lot of (cheap and flexible) workers and space are available.

Figure 55. Future logistics corridors in Europe.


*Source: Cushman & Wakefield (2019).*

***Take-aways for port of Taranto***

- While the port of Taranto is somewhat remote the dense cargo hinterlands in the 'blue banana', new logistics corridors are emerging across Europe and the Med. These corridors are expected to affect the current distribution systems leading to a more diverse spatial landscape with less concentration of European distribution centres in Belgium, the Netherlands, northern France, and western Germany.
- The Port of Taranto is located at the periphery of the eight primary logistics corridors which are expected to define European logistics in 2025 or 2030 and therefore a clear strategy for bridging this gap is needed.
- The distribution market is characterised by the growth of XXL warehouses, e-commerce hubs as well as an increasing specialisation of distribution centers in niche markets (both productwise and spatially). In this vein, the port of Taranto is challenged to follow a targeted commercial strategy concerning distribution and warehousing activities, thereby benefiting the most from the current and future structure and cargo base of the port ecosystem, the SEZ development and its location at the crossroads of major maritime trade lanes.

### 2.3.10. Other relevant economic trends in the cruise industry

The growth of the cruise is determined by a combination of increased demand and the quest of cruise lines to create new markets. The scope is to develop attractive itineraries rather than visit specific destinations. Cruise ships serve different types of itineraries aiming to benefit from the maximum utilisation of the existing fleet, combined with maximising profits per passenger. Issues related to reducing costs (mainly through lower fuel consumption) are also at play when planning these itineraries.

Factors that influence the development of itineraries include the origins of perspective passengers, the need to match the demand as implied by the demographics of the market, seasonality, the connections with aviation, land transport, the possibility of combining popular ("marquee") with less popular destinations or developing new destinations and itineraries, the potential revenue from shore activities compared to onboard costs, supply, availability and fuel costs. In short, cruise lines plan their itineraries, based on a series of factors that in many cases are not destination related from a touristic attractiveness point of view.

Cruise lines follow three types of fleet deployment, aiming to develop the optimum cruise itinerary planning:

- ✓ Year-round deployment, responding to an area served all year round due to resilient demand (with high / low seasons). These services are offered in markets such as the Caribbean and the Mediterranean.
- ✓ Seasonal services, where vessels serve periodic market opportunities during periods of good weather, with the Baltic, Norwegian, Alaskan, and New England regions being typical examples,
- ✓ "Repositioning" between all-year or seasonal markets, which is a prominent practice between the Caribbean and the Mediterranean, Alaska and Hawaii. Given the globalisation of the market in recent times this practice has extended to one applied in further markets (i.e., between the Mediterranean and the Indian Ocean).

Competition in modern cruising is not limited to competition between different geographical areas. Changes within a particular geographical area are regular and frequently significant. For example, in the Mediterranean Sea market, cruise ships are deployed one year in the Western Mediterranean and the following year deployed in another area, i.e., the Adriatic, and vice versa. As a result, there are cruising areas continuously experiencing growth in cruise traffic while others are more exposed to cruise traffic volatility. Cruise lines are affected by the prevailing conditions in each geographic region, country, or even specific destination, and change cruise itineraries or even the scheduling of offered cruises regularly. Such changes are not only the outcome of the demand for cruises in a particular geographical area but might also be the outcome of changes in the conditions prevailing in a specific country separately. As a result, market shares are gained and lost annually.

Cruise itineraries are commonly characterised by seasonality (Notteboom et al., 2022). It implies that an array of cruise ports is used during a peak season but may receive limited, if any, cruise ship calls during the rest of the year.

The average number of passengers per cruise call is increasing, and ports and destinations need to adjust to host bigger vessels and more passenger movements per call. This growth is primarily the result of cruise vessel size increase and can only partially be attributed to the increasing occupancy rate. In 2020 and 2021, health protocols led to an increase in the number of passengers per call – as these protocols included among others, a maximum occupancy rate of 50% per cruise vessel – but this lowering was only temporal.

A significant percentage of cruise passengers belong to those who choose to cruise more than once. In Italy, the "repeaters" amount to 32.4%, while the average age has fallen from 56 years in 2002 to 49 within just over a decade as younger passengers choose to cruise. According to data produced by the port of Tenerife, 70% of passengers repeat the cruise in the exact same area because of their high degree of satisfaction from previous experience. The experiences and the level of satisfaction of the visitors are important when they decide to make a return cruise in that area or advertise the destination, i.e., solicit other passengers (relatives, acquaintances, friends, associates, etc.) to carry out a cruise to a specific area. Recent empirical research highlighted that greater satisfaction is associated with more significant expenditure at the particular destination, greater chances of returning, and a greater likelihood of prompting others to cruise to a destination (Satta et al. 2016).

There is a lot of diversification at the level of the cruise product as the product offered is not homogeneous. Innovation in cruise ship design allows for differentiation in amenities and services provided onboard, while new itineraries, themed cruises and multiple options for the duration of the voyage expand the activities in the destinations visited. As such, cruise companies are responding to the changing holiday patterns of cruise passengers and demographically broaden the cruise industry's target population. The result of the specialization of services is the differentiation of the product offered, and the consequent segmentation of the relevant market. Cruises can be grouped according to a set of different characteristics, amenities and services offered by ships with differentiated technical characteristics. Table 30 presents the various cruise segments and their characteristics.

Table 30. Cruise products.

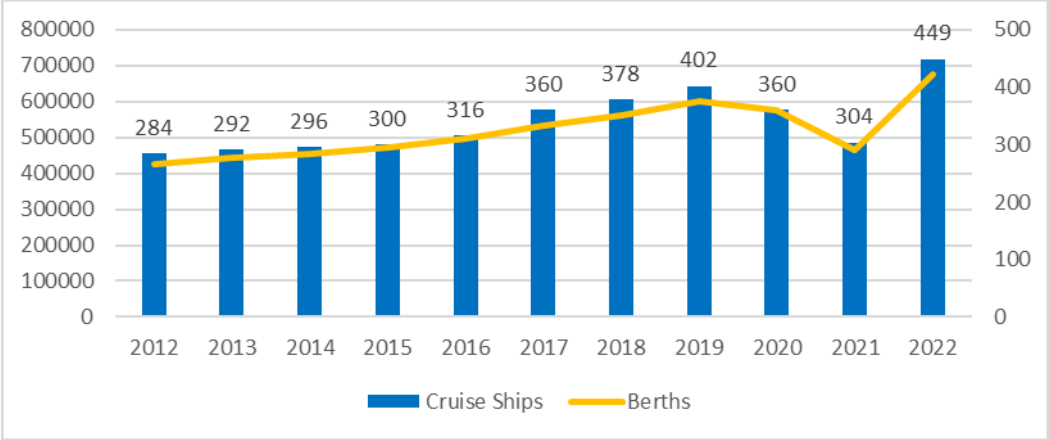
| Type of product | Contemporary | Premium | Luxury | Specialty |
|---|---|---|---|---|
| Key Word | Quantity | Quality | Exclusiveness | Adventure |
| Cruise ships | Big | Medium sized | Small | Very small |
| Maximum Capacity | 2.000 –6.000 | 1.500 – 2.500 | 100-800 | 100-300 |
| Cabins | Small | Big | Very big of suites | Mixed choices |
| Onboard meals-food | Good | Fine dining | Gourmet | Mixed choices |
| Orientation | Family friendly | Family friendly but focus is on the adults | Not family friendly | Not family friendly in most cases |
| Amenities | Fitness/Sports | Spa | Spa | Few /spa |
| Cruise duration | 3-7+ nights | 7-14 nights | 10+ nights | 3-20 nights |
| Quality of services | 3-4 **** | 4-5 ***** | 5-6 ****** | 3-5 ***** |
| Cost | $-$$$ | $$-$$$ | $$$$$ | $$$$-$$$$$ |
| Cruise companies | Carnival Cruise Line, Costa Cruise Line, Disney Cruise Line, MSC, Norwegian Cruise Line, Royal Caribbean International | Azamara Cruise Line, Celebrity Cruises, Holland America, Oceania Cruises, Princess Cruises | Cunard Line, Regent Seven Seas Cruises, Seabourn, Sea Dream, Silversea Cruises | Cruise West, Discovery World Cruises, Hurtigruten, Peter Deilmann, Star Clippers, Viking River Cruises, Windstar Cruises |

*Source: Authors' elaboration.*

As a result, there are multiple cruise products offered by cruise lines, aiming at increasing market penetration and targeting multiple social groups of perspective cruise passengers.

When considering the cruise fleet development, the pandemic contributed to the exclusion of the older cruise vessels from the global cruise fleet as the majority of them went for scrapping in an effort of the cruise companies to reduce operational expenses and gain some liquidity during the pandemic aiming at surviving in the market. In 2022, the global cruise fleet consisted of 449 cruise ships with a total capacity of 674,421 low berths. Figure 56 shows the cruise fleet development between 2010 -2022.

Figure 56. Cruise fleet evolution.



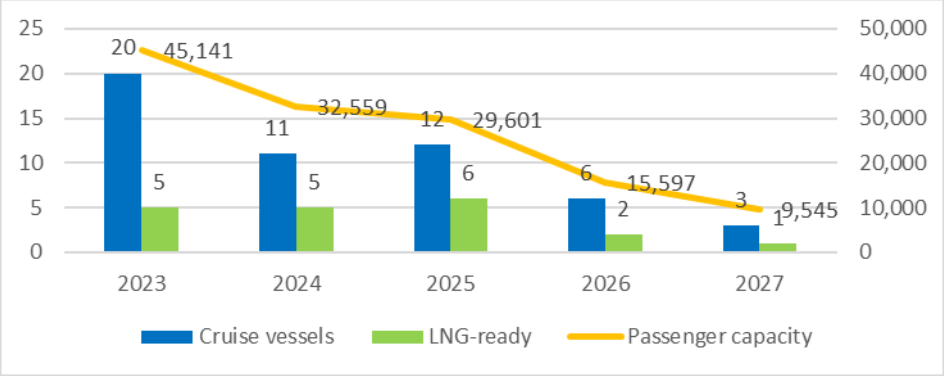

*Source: Authors based on data from Cruise Industry News (2022).*

In 2022, 252 cruise vessels with a combined capacity of 17.1 million passengers facilitated numerous destinations around the globe. Of them, 156 cruise vessels, with a total capacity of 9.154.788 passengers, were deployed in Europe, most offering cruises in the Mediterranean.

As regards the order book, while the pandemic postponed some of the deliveries and cancelled a few orders, in the short term, around 15% of the existing fleet (in terms of the number of vessels) will be added soon. Given the sustainability challenges, there is a trend towards constructing cruise vessels that use LNG as fuel. The challenge for cruise ports is to develop the appropriate LNG bunkering facilities. Figure 57 shows the number of cruise vessels on order, their passenger capacity, and the number of LNG-ready vessels. It is expected that by 2027 the existing fleet's passenger capacity will be increased by 19.6%. It is also important to highlight that 36.5% of the newbuilding vessels will use LNG as fuel.

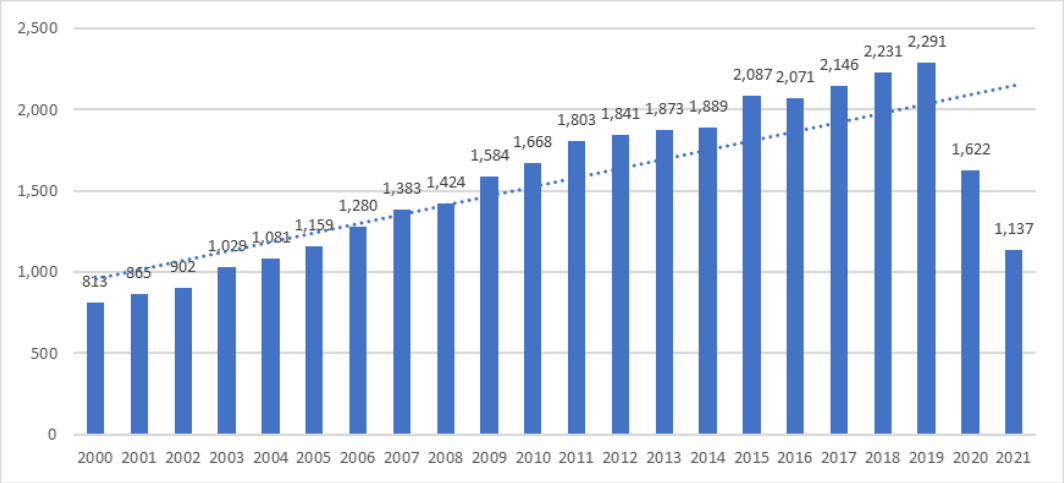
Another important characteristic of the Mediterranean as a cruise destination is that the cruise vessels calling at Med ports are increasing in capacity. Figure 58 shows the average cruise passengers per call at MedCruise ports in the 2000-2021 period.

Figure 57. Cruise vessels on order.




*Source: Cruise International News (2022).*

Figure 58. Number of cruise passengers per cruise call in MedCruise ports.




*Source: MedCruise, (2022).*

***Take-aways for port of Taranto***

- Seasonality affects the use of a cruise terminal. A cruise terminal might remain unused for a lengthy period with such an underutilization prone to risk the related port infrastructures. Alternative uses of space and facilities are worth to be considered, or a port might use its cruise terminal as a multipurpose facility or develop non-permanent infrastructures (i.e., floating docks). This insight appears relevant to the Port of Taranto case.
- Societal pressures for year-round utilization, so that the port-city and the related destinations enjoy cruise tourism benefits, put pressure on ports to develop conditions for expanding the cruise season.
- The port of Taranto can emerge as a destination for a specific cruise segment by aligning the offered services to the needs of the particular segment.
- The destination profile can provide significant input to the managing entity of the ports to prioritize the hosting of specific cruise lines.
- The port needs to be ready to facilitate cruise companies offering different cruise products, thus providing differentiated services to cruise companies and cruise passengers.
- Development of marketing campaigns targeting "repeaters".
- The PNA might focus on increasing cruise passengers' satisfaction. The port and the destination could work to provide a comprehensive and memorable experience to cruise passengers

## 2.4. SOCIAL CONTEXT ANALYSIS (S)

### 2.4.1. Population/workforce

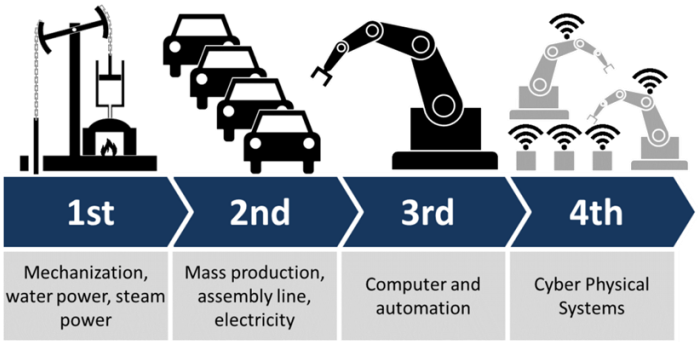
The future development potential and competitiveness of ports will be strongly influenced by the availability of a highly talented, skilled, and motivated workforce. First, ports need skilled and cost-efficient dock workers and a flexible workforce that can cope with the volatility in terminal activity caused by the variability in ship arrival patterns, seasonality in the cargo markets and operational challenges caused by human, economic and natural disruptions.

Second, the level of disruptive innovations is such that a new set of skills is required to operate within the port sector. Some traditional skill sets will become obsolete whereas others will thrive. Creatives and problem solvers will find their way into this new reality, but definite hard skills such as applied mathematics, statistics, data analytics, software engineering, and cybersecurity will be required. Considering these fields are already being drained at the source, the port and logistics sector will have to engage with universities, government, and knowledge institutions in order to reshape the available university and other educational program to ensure high quality influx into the sector.

Finding and training suitable workers has become a challenge in many ports around Europe due to current labour shortages and the associated “war for talent”. Still, each port or port region comes with its own challenges with respect to the workforce at the terminals, in the logistics centers in the port area, in industrial premises located at the port and in the field of hinterland transportation (truckers, train drivers, etc.). It is clear that two worlds collide; the fast, creative and disruptive environment of (digital) innovations start-ups on the one hand and the operationally standardized, process driven and risk averting environment of port and maritime operators on the other. One of the true challenges will be to reconcile disruptive technology with the real-world environment of day-to-day port operations.

The national port system is also impacted by the effects of the fourth industrial revolution (Figure 59), and in particular new digital technologies for improving productivity, general working conditions, the quality of strategic plans, and communication with partners and customers. In this respect, Industry 4.0 is based on the connection of physical resources and partners in the entire supply chain through digital networking and connections via the Internet.

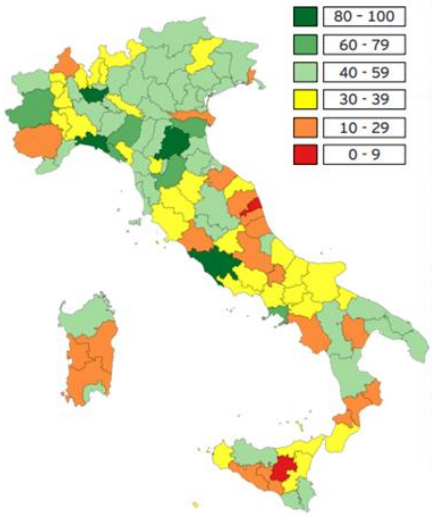
Figure 59. Industrial revolutions.




*Source: Authors’ elaboration.*

In the next years, national maritime port logistics will have to face substantial changes due to the introduction and large-scale diffusion of digital technologies and innovative standards also related to the "big data" paradigm and the activities of collection, storage and use for the effective operation of ports and their competitiveness. In this regard, the current situation regarding the level of digital infrastructure in the Italian regions shows a strong inhomogeneity between territories even very close to each other (Figure 60).

Figure 60. Levels of digital infrastructure in the various Italian regions.




| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GE | 100,0 | TR | 50,5 | TV | 40,5 | FR | 32,2 |
| MI | 92,2 | TS | 50,4 | BAT | 39,6 | AL | 32,0 |
| RM | 82,1 | NO | 49,9 | CB | 39,2 | GR | 31,4 |
| BO | 80,8 | PI | 49,2 | BI | 38,3 | RI | 31,2 |
| TO | 73,7 | PZ | 49,0 | AN | 38,1 | TE | 29,0 |
| FI | 73,2 | AO | 48,6 | CO | 37,7 | MT | 28,8 |
| NA | 67,1 | SR | 48,5 | MS | 37,5 | CZ | 28,4 |
| SP | 65,3 | FC | 47,6 | FG | 37,5 | AP | 28,2 |
| FE | 64,1 | PV | 47,6 | SI | 37,2 | AG | 28,0 |
| PR | 60,5 | LO | 47,3 | ME | 37,0 | SA | 27,9 |
| PO | 59,7 | VI | 46,4 | AR | 36,6 | VB | 27,3 |
| CA | 58,9 | MN | 46,3 | LC | 36,2 | CL | 26,3 |
| RE | 58,4 | UD | 46,0 | CR | 35,5 | GO | 26,2 |
| MO | 57,7 | IM | 46,0 | VC | 35,2 | AQ | 25,5 |
| MB | 56,2 | BR | 45,3 | AT | 35,2 | VT | 24,8 |
| TN | 55,1 | LU | 43,9 | VA | 34,5 | OR | 24,2 |
| BS | 55,1 | VR | 43,4 | SO | 34,5 | CN | 23,2 |
| VE | 54,8 | RN | 43,2 | CT | 34,3 | NU | 23,0 |
| BA | 54,5 | RG | 42,7 | RC | 34,0 | IS | 22,7 |
| PE | 54,2 | PG | 42,6 | LT | 33,3 | MC | 21,6 |
| LE | 52,8 | CS | 42,4 | TP | 33,3 | PU | 21,2 |
| PA | 51,7 | SV | 41,9 | BN | 32,9 | CI | 15,2 |
| RA | 51,6 | TA | 41,6 | BL | 32,7 | KR | 12,9 |
| PD | 51,4 | SS | 41,4 | CH | 32,6 | RO | 12,1 |
| PC | 51,1 | PN | 41,1 | CS | 32,6 | VV | 11,8 |
| BG | 50,8 | LI | 40,9 | PT | 32,5 | EN | 8,4 |
| | | BZ | 40,7 | AV | 32,3 | FM | 0,0 |

*Source: EY, 2020.*

The digital transition that is affecting the national port maritime sector will also have significant implications for the employment pipeline. In this regard, it is necessary to provide in advance for an adequate process of technical-functional specialization of the workforce engaged in the port maritime sphere and a progressive shift toward agile and digital forms of work. As far as the Port of Taranto is concerned, from the recent surveys conducted by the PNA of the Ionian Sea when developing the current Port Master Plan (PRP), it emerges that there are 1,622 workers directly and indirectly connected to port operations. If the expanded related industries are considered, the employment impact of the Port of Taranto ranges between 10,000 and 12,000 workers overall. With this in mind, the PNA of the Ionian Sea has already initiated and intends to further implement two activities to support the digital transition and training of its staff:

1) Supporting the introduction of digital innovations with a focus on maritime-port entrepreneurship through the implementation of the "Faros" accelerator program that aims to create a value network consisting of (i) start-ups working in the field of port innovation, blue economy, blue growth and ocean industry, (ii) business stakeholders and (iii) public administration;
2) Organization of training courses for agile work and establishment of standard operating protocols for the facilitation of this practice.

***Take-aways for port of Taranto***

- The major social changes in port shipping in the coming years will concern the availability of a highly talented and motivated workforce needed to introduce major digital innovations in the industry.
- To keep the pace with new social trends, PNA will be urged to invest in innovative educational programs for boosting internal human resources. The same apply to the Port of Taranto in the next future.
- The Port of Taranto should cooperate with regional and national Universities and research centres specialized in port shipping for developing ad hoc learning & training programs in line with emerging trends which are shaping the industry.

The PNA has started a digital transition process through three priority project actions in the TOP 2020-2022 that are part of the broader 'Taranto Digital Port' ecosystem, fulfilling the requirements of the

Legislator according to which Public Administrations must implement primarily digital services (digital & mobile first), the Law 84/94 and the indications on the digitalisation of Ports:

1. Establishment of the Single Administrative Counter (in accordance with art. 15 bis of Law 84/94), as a single online front office service with respect to the subjects delegated to operate in the port, for all administrative and authorisation procedures concerning economic activities, with the exception of those concerning the Single Customs Counter and controls and security. The same has been implemented and activated at the web address: https://sua.port.taranto.it.
2. Establishment of the Port Community System - PCS integrated with the security systems as a collector platform of all port stakeholders in order to reduce the port's management time and make the logistics chain more efficient, at the same time promoting telematic dialogue between the various port community stakeholders. It was implemented in its first release and, after an experimental phase, was activated at the web address: https://pcs.port.taranto.it and features not only an advanced version for access management but also integration with the IO APP.
3. Digitisation of the Authority, as a set of services and activities aimed at the digital transition of PNA in order to make the use of human and instrumental resources more efficient and consequently improve the public service and offer a better organisation of internal activities through the development of an information system to support all administrative procedures and internal processes. This action is leading to the implementation of several modules, including the Operational Cartography integrated with the organisation's assets, the Performance Management System, and the digitisation of the SUA's back office.

In the implementation of these services, adhering to privacy and cybersecurity requirements, several protocols have been signed, also with a view to interoperability, including with the Customs Agency to interoperate with the AIDA platform and with the General Command of the PNAs to receive AIS and PMIS data. All the services are integrated with the PagoPA enabling platform and the flows are integrated with digital signature, the Entity's protocol system and automated PEC sending.

The PNA of the Ionian Sea has also set up a single authentication system, as a single point of access for all online services to which users can authenticate themselves in accordance with the AgID principle of digital identity only by adopting digital identity systems defined by the regulations, and realised through a single sign-on mechanism that provides, in accordance with the requirements of Legislative Decree no. 82 of 7 March 2005. - Digital Administration Code on the methods of access to Public Administration services, 3 modes:

- ✓ use of SPID (Sistema Pubblico di Identità Digitale)
- ✓ use of CIE (Electronic Identity Card)
- ✓ use of eIDAS (electronic IDentification Authentication and Signature) for non-Italian eIDAS users

The same, for non-European users or institutional users (e.g., PNA), provides access with a user/password based on institutional email.

To complete the services outlined above for the digitisation of the Authority, an intelligent business module has been prepared and dynamic datasets have been identified to be made available in Open Data.

In addition, according to AgID indications, all services are natively implemented on cloud PNA according to the principle of cloud first, for which high levels of efficiency and regulatory consistency can be defined, realising the objectives of the Italian Digital Agenda on Data Centre rationalisation and infrastructure optimisation, with two environments of Testing and Exercise.

Lastly, PNA of the Ionian Sea has, in addition to a video surveillance system at the public areas, a transit control system based on the reading of number plates, Kemler codes (dangerous goods) and container codes at the access gates to the port areas, which is integrated with the PCS in order to have an overall

control of transits and to be able to also implement the Port Tracking system in agreement with the Customs Agency for the fully computerised control of goods.

Finally, it should be noted that almost all of these actions were candidates and approved for the PAC Call for Proposals promoted by the Ministry of Infrastructure and Transport and for which project reporting has also been initiated.

The PNA of the Ionian Sea therefore represents one of the main points of the supply chain and the optimisation, digitalisation and dematerialisation of the procedural chain, together with the interoperability and integration with different systems and platforms through a modular and sharable development of services, are the current and pressing objectives in order to improve and make traffic more efficient, increase the competitiveness of the port and interport system and consequently facilitate the economic growth of the Port, the Territory and the Country system. At the same time, the information systems that have been implemented over the past two years, and which are constantly evolving, exploit the most innovative technologies, making the Authority's online services among the most modern in the scenario of the PNAs, which will also allow the migration to the National Strategic Pole to be achieved in the shortest possible time.

### 2.4.2. UN SDGs and ESG as frameworks for port development

The United Nations presented the agenda for Sustainable development in 2015: the Sustainable Development Goals (SDGs). This agenda presents the goals that are crucial for reaching a sustainable development of our planet from an environmental perspective. In total, 17 main goals are set which should all be reached in 2030 (Figure 61). The United Nations defines sustainable development as: "*the needs of the present without compromising the ability of future generations to meet their own needs*".

Figure 61. UN Sustainable Development Goals.


*Source: United Nations.*

In the 2030 Agenda for Sustainable Development, sustainable transport is mainstreamed across several SDGs and targets, especially those related to food security, health, energy, economic growth, infrastructure, and cities and human settlements. The transport and logistics sector will be playing a particularly important role in the achievement of the Paris Agreement, given the fact close to a quarter of energy-related global greenhouse gas emissions come from transport and that these emissions are projected to grow substantially in the years to come.

The UN SDGs are part of a wider stream of sustainability criteria and targets also port-related companies increasingly will have to adhere to. The notion of Environmental Social and Governance (ESG) has become a critical aspect in this regard as it refers to the three key factors when measuring the sustainability and ethical impact of an investment in a business or company. Most socially responsible investors check companies out using ESG criteria to screen investments. At the same time, ESG ratings

are more and more fully integrated in more traditional project and company ratings. ESG ratings have been developed by a wide range of rating companies such as MSCI, ISS ESG (Institutional Shareholder Services), S&P Global Ratings, CDP (Carbon Disclosure Program) and Sustainalytics.

In March 2018, the European Commission announced measures to enhance the ESG transparency of benchmark methodologies and an initiative to put forward standards for the methodology of low-carbon benchmarks in the Union. This marked the start of a vast set of regulations and directives on EU climate transition, EU Paris-aligned benchmarks and the content and form of the ESG disclosure requirements. Companies increasingly are required to gather and disclose ESG-related information (e.g., via the Corporate Sustainability Reporting Directive or CSRD). Under the Sustainable Finance Disclosures Regulation (SFDR), EU financial institutions will need to report on ESG performance of financial products. At the same time, the International Sustainability Standards Board (ISSB) is set to develop global baseline for climate disclosures with initial standard published in 2023.

When it comes to Italy, much of the applicable ESG legislation is derived from EU law. Although there is no separate ESG related legislations, the Italian regulatory framework includes several significant legislative acts concerning ESG, sustainability and related issues. In 2016, the Italian National Action Plan on Business and Human Rights for the period 2016-2021 was adopted. The country committed to implement the 17 Sustainable Development Goals ("SDGs") and encourage companies to realise the goal of decent work for all, as set out in SDG 8 (Decent Work and Economic Growth), and to adopt indicators of quality, sustainable development, equality, and gender. In addition, in 2022, the Italian Government approved:

i) a National Transition Plan (Piano per la Transizione Ecologica) that includes a series of policy actions aimed at promoting the transition of the industrial sector to net zero emissions, consistent with the objectives and actions of the European Green Deal,
ii) a National Strategy for Circular Economy (Strategia per l'Economia Circolare) which sets out key policy actions and strategy related to a circular economy.

The National Recovery and Resilience Plan (Piano Nazionale di Resilienza e Ripresa, "PNRR") and its complementary plan contain investments and reforms which concern, health, environment, biodiversity, and climate (e.g., concerning the fostering of a circular economy and renewable energy sources). In addition, a national biodiversity strategy for 2030 is under review.

Financial institutions have developed sustainable financial products which are often linked to the ESG rating of their customers. Sustainable finance is part of the spectrum of instruments to reach a more sustainable future as it provides financial incentives (or penalties) for investment or divestment decisions. Sustainable finance has seen a massive growth in the past decade with the introduction of a wide range products and instruments (green bonds, green loans, sustainability-linked loans, etc.). From a financial perspective, green/sustainable is becoming the norm, while opting for a non-sustainable or less sustainable path comes at a cost premium for the client. In this perspective, in March 2018, the European Commission published a "Sustainable Finance Action Plan", which lays out the strategy and measures needed to establish a financial system that can promote a sustainable development from an economic, social, and environmental point of view, in order to participate to the implementation of the Paris Agreement on climate change and the United Nations 2030 Agenda for Sustainable Development. The action plan recommends ten actions to be taken at European level to: (i) facilitate the channelling of financial investment towards a more sustainable economy; (ii) consider sustainability in risk management procedures and (iii) enhance transparency and long-term investment.

Emerging practices show that five common themes characterized Sustainable finance. These are the so-called 5Rs of Sustainable Financial Systems which are:

- ✓ Reallocation: The efficient reallocation of capital to keys priorities is fundamental for financing a sustainable economy. This includes access to green finance, mobilising capital for sustainable infrastructure, financing critical areas of green innovation.
- ✓ Risk: There is a growing interest of the overall financial system to sustainability factors for risk management. This results in the fact that, ceteris paribus, projects that include sustainable factors have a high probability of being financed and are considered as low-risk projects.
- ✓ Responsibility: Financial institutions are adopting shared principles that guide the integration of ESG factors. Policymakers support this process by clarifying how core responsibilities link to sustainability factors (notably fiduciary duty for investors, corporate governance for enterprises).
- ✓ Reporting: To enable the efficient allocation of capital and ensure accountability, the financial system needs a reliable information flow. Market approaches to disclosure are increasingly supported by policy frameworks (e.g., EU non-financial reporting; FSB Task Force) and extend from corporate reporting to disclosure by financial institutions at the product, portfolio, and institutional levels.
- ✓ Roadmaps**:** to achieve a reliable sustainable finance strategy, countries need process to join the dots between sectors and key issues. This is translated by the definition of a clear plan with specific objectives, control points and corrective actions.

In this vein, on 8 November 2021, the draft Sustainable Finance Action Plan for Italy was presented to stakeholders. It contains initiatives that aim to boost Energy Efficiency Mortgage Loans, develop social housing, and allow for considerable investment in research and development for circular economy activities ect.

UN SDGs and ESG requirements will also be crucial in shaping relations with port stakeholders. Over the years, ports have gained a lot of experience in dealing with stakeholders through advances in stakeholder relations management programs and principles (Dooms et al. 2013; Notteboom et al., 2015; Felício et al., 2022). Ports which successfully reach out to civil society and industry stakeholders, towards creating public acceptance of port projects have a competitive edge in port competition. Reaching out to stakeholders on the port development theme concerns not only the provision of information on strategic plans and projects. It also requires efforts to educate the wider population on the sense of urgency in sustainable port development, port competitiveness, energy transition and the wider ramifications of digitalisation.

Next to information provision, PNAs are also challenged to consider an active participation of certain stakeholder groups in project planning stages, where deemed valuable, or when existing regulations and ESG frameworks and practices require such an involvement.

***Take-aways for port of Taranto***

- The future of the port of Taranto will increasingly have to be guided by UN SDGs and ESG requirements and disclosure about these. UN SDGs and ESG requirements are crucial in shaping relations with port stakeholders.
- In terms of institutional accountability, the PNA of the Ionian Sea has also focused its mission by introducing a new concept of institutional ethics through the principle of 'accountability': 'accountability' understood, therefore, as a synonym for transparency, openness or good governance and, in a broader sense, implies having to 'account' for one's conduct towards one's ecosystem;
- While there are already quite a few examples of sustainable finance in the port industry, there is still room for ports to embrace sustainable finance in partnership with their financial service providers. The sustainable finance market will need a further upscaling to deal with the specific challenges linked to the implementation and financing of large energy transition projects such as green hydrogen infrastructure, with impressive business opportunities also for Italian ports such as the Port of Taranto.
- The rise of sustainable finance implies green/sustainable investment, projects and overall company strategies are becoming the norm. From a finance perspective, opting for a non-sustainable or less sustainable port development path will more and more come at a cost premium.

- UN SDGs and ESG requirements bring a stronger focus on stakeholder relations management in ports and creates new opportunities for fostering port clusters and innovative port ecosystems.

### 2.4.3. Cruise focus on CSR and enhancement of license to operate

When it comes to the cruise industry, the need for a social license to operate is today a major challenge and a goal for all the major cruise lines. Irrespective of whether the justification of these concerns is solid or not, it is today more important than ever for a port, a destination, and the cruise line that it visits them to secure a positive societal perception of cruise activities (Pallis and Vaggelas, 2020). Cruise trips of today are both popular and controversial with the relationship between tourism and local development remaining critical, given the impact of the cruise business on local culture and the local economy (Hesse, 2017). The image of the contemporary cruise is also linked with environmental problems and the periodic overflow of cultural sites and historic cities by groups of cruise passengers at the nearby ports of call.

At the same time, an emphasis on initiatives that limit environmental impacts or any other external economies that cruise growth produces is becoming an integral part of cruise shipping strategies (i.e., green strategies). Cruise companies focus increasingly on corporate social responsibility (CSR) actions, with reference to:

- ✓ Environmental issues – e.g., water consumption, waste management and emissions, etc.
- ✓ Issues with socio-economic implication – e.g., labor relations. human rights, health and safety protocols, products consumption onboard, and the avoidance of any negative effects from the excessive cruise passenger traffic on specific destinations and ports (indicative is the case of Venice in Italy).
- ✓ The enhancement of the positive economic impact of cruise business development via sustainability – e.g. creating a sustainable supply chain, win-win agreements with ports, tour operators and with all the stakeholders engaged in cruise ship and cruise passenger facilitation.

***Take-aways for port of Taranto***

- As cruise companies develop a Corporate Social Responsibility strategy, the cruise port might opt to follow the same path, in order to maintain its attractiveness and competitiveness.
- Sustainability must be at the core of port strategy and operations.
- A closer cooperation between cruise lines, the cruise port and the destination are worthy
- Social support for the expansion of growth activities should not be taken for granted, but needs to be enhanced via an appropriate port strategy.
- There are Codes of Good Practices for Cruise Ports as regards the port-city relations (for example the ESPO Code of Practice) that provide guidance for ways to enhance the cruise port's licence to operate.

## 2.5. TECHNOLOGICAL DEVELOPMENT AND INNOVATION (T)

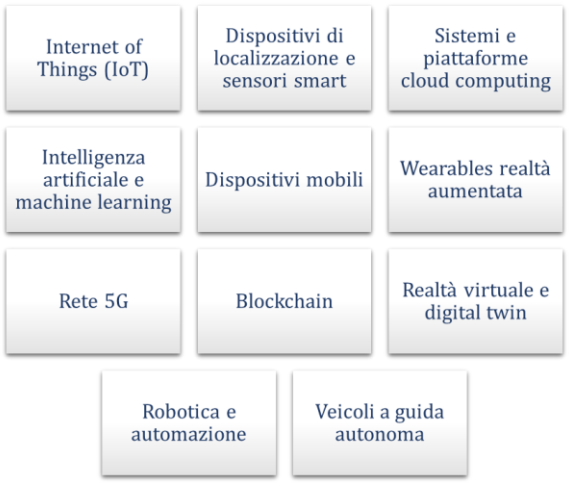
### 2.5.1. Industry 4.0, digital technologies, and automation

The fourth industrial revolution (i.e., Industry 4.0) is unfolding and is mostly based on robotization and automation (with supporting IT structures forming cyber-physical systems), methods of additive manufacturing (such as 3D printing) and emerging digital technologies. These technological developments confer a higher level of flexibility in terms of the locations, the manufacturing processes, the scale and scope of the output, and the customization of the products. In such of context, the importance of input costs, particularly labor, are rebalanced.

Technology advances such as robotization implies that the flexibility of manufacturing becomes more reliant on easy access to suppliers and customers. Under such circumstances, areas with access to global and regional distribution systems have an important advantage in the fourth industrial revolution. Logistics zones near large terminal facilities such as ports, airports, and intermodal terminals in the hinterland offer an attractive proposition for the emerging manufacturing landscape of the fourth industrial revolution and therefore have the potential to assume a growing share of manufacturing. Industry 4.0 affects transport and logistics demands as more manufacturing will be regional, be it in local factories, independent manufacturing farms or even a new role for logistics service providers that will offer production services and integrate them with their transport, storage, and distribution services. All the above developments will affect global trade patterns.

At the national level, the digitization process will enable a drastic reduction in the time taken to complete logistics operations, with a twofold positive effect in terms of lower management and operational costs, and reduced emissions and related negative externalities. The improvement of logistics performance will thus result in reduced impacts on the environment and local communities. The digitalization process, instead, will be led by further emerging digital technologies that, according to international experts in the field, are likely to have disruptive effects in the maritime-port environment as reported in Figure 62.

Figure 62. Disruptive technologies in the maritime-port industry.




*Source: Authors' elaboration.*

The need to invest substantial resources in the digitization and digitalization of key port processes is well understood, supported in part by the opportunities offered in this regard by the National Recovery and Resilience Plan (NRP). In particular, within Mission 3 "Sustainable Infrastructure", investments planned to develop and implement a homogeneous digitization/digitalization system for the entire national port system that can cover both the "ship cycle" and the "land cycle." The investment "2.1 Digitization of the logistics chain," funded for € 250 million, aims to implement this type of integrated

infrastructure and thus strengthen national logistics competitiveness through the creation of an interoperable digital system between public and private actors for freight and logistics, capable of simplifying procedures, processes, and controls by focusing on the dematerialization of documents and the exchange of data and information.

Major international and domestic ports are preparing for the change by undertaking projects involving both PNAs and major logistics operators in order to take advantage of the opportunities related to the adoption of the above technologies in the port environment. At the national level, the ports of Trieste, Venice and Livorno offer some best practices in this regard. In the Port of Trieste, for example, the "Smart Road" project, aimed at ensuring computerized control of the transit of heavy vehicles between the logistics center (*interporto*) and the port of Trieste, has made it possible to speed up boarding times, reduce the level of congestion, and increase the level of security in the port areas.

As part of the Port of Venice, the "Sea Traffic Management" (STM) system has been developed, which enables data exchange between selected parties, ships, nautical service providers and shipping companies, integrating them with a network of weather sensors in order to provide real-time information to ships and the entire port community through the Port Community System (PCS).

As for the Port of Livorno, the implementation of the "Corealis: The Port of the Future" project has enabled the management and optimization of in-port activities, thanks to technologies and data analysis models employed in the optimization of cargo flows and yard operations, such as Artificial Intelligence, automated sensors, and traffic management systems.

In this respect, PNA of the Ionian Sea has signed important memoranda of understanding, which are described and explored below.

**Memorandum of Understanding with ESA (European Space Agency)**

Space resources can represent a unique opportunity for the development and support of maritime systems and services, while enabling long-term sustainable socio-economic development. A key function in Europe is played by the European Space Agency (ESA), whose purpose is to provide for and promote cooperation between European states in space research and technology and their space applications, with a view to their use for scientific purposes and for operational systems for space applications; ESA has technical expertise in space applications and downstream services, in particular within the framework of the ARTES 4.0 programme, Generic Programme Line "Business and Applications - Space Solutions".

The PNA has signed a memorandum of understanding with ESA aimed at enhancing common areas of research, innovation and technology in maritime ecosystems and services. Specifically, the protocol envisages the parties' joint commitment to experimental initiatives aimed at testing the use of space applications/technologies in maritime transport, with the aim of supporting the growth of maritime ecosystems and a green economy. With this tool, the PNA is experimenting a new project path aimed at fostering the productivity and efficiency of the port, which, thanks to more innovation, can aspire to play a leading role in the national and international maritime market and support its own growth path towards a smart and green model. The operational objectives common to both organisations can be summarised as follows:

- ✓ joint participation in innovation/acceleration programmes and/or training activities providing the necessary skills in the field of space and maritime innovation
- ✓ promote innovation in specific research areas where space and maritime solutions can represent common and interchangeable growth factors for the local space and maritime economy
- ✓ contribute to the European strategy set out in space and maritime policies whose principles can represent and ensure proper coordination and complementarity with the activities pursued by

Member States while continuing to pursue leading themes of space contributions to the understanding of our planet's climate.

**Memorandum of Understanding with the DTA (Aerospace Technology District)**

As part of the broader collaboration with ESA, the PNA has also approached the field of aeronautical technologies, whose important role in the coming years could be linked to the development and implementation of UAM/UAS (Urban AirMobility/Unmanned Aerial Systems) applications through which the application of air mobility systems to maritime transport could be experimented, enabling long-term socio-economic development based on the inclusive protection of natural assets.

In this area, the PNA has signed a Memorandum of Understanding with the DTA (Aerospace Technology District) to use experimental technologies capable of monitoring activities in the port area and to integrate intermodality and the provision of services between land and sea in a sustainable manner.

The collaboration between the parties is focused on the following objectives:

- ✓ contribute to the European strategy defined in aerospace and maritime policies whose principles can represent and ensure proper coordination and complementarity with the activities of the Member States while continuing to pursue cutting-edge topics;
- ✓ enhance the integration of mutual scientific knowledge in the fields concerned;
- ✓ create public value for the benefit of the socio-economic system (territorial and port);
- ✓ participate in innovation/acceleration programmes and/or training activities that provide the necessary skills in the field of space and maritime innovation;
- ✓ participate in initiatives to support the innovative ecosystem of the territory and the port of Taranto;
- ✓ promote innovation in specific research areas in which aerospace and maritime solutions can represent common growth factors for the local aerospace and maritime economy;
- ✓ support the design and testing of UAM applications, and of U-Space enabling services, and of innovative services based on space technologies (SATEO, SATNAV, SATCOM).

**Memorandum of Understanding with the MIT (Ministry of Infrastructure and Transport), Puglia Region, RFI - Rete Ferroviaria Italiana S.P.A., Ferrovie dello Stato Italiane, which aims to identify a magnetic levitation transport system**

The decarbonisation and sustainability of transport and mobility systems is a pressing challenge to mitigate climate change on a global, European and national level. This has led in the last decade to the development of a range of available transport technology solutions geared to meet the new demand requirements of an increasingly urbanised, globalised and economically, environmentally and socially sustainable world.

The strategic plan for Italy aims to reform the country and its infrastructure system by safeguarding objectives, common with those of the European Union, such as sustainability, innovation, social cohesion and digitalisation; Mission 3 envisaged by the NRRP aims to design interventions targeted at the transport sector that will make it possible to meet the environmental and logistical challenges in the mobility sector, representing an important change for Italy because it supports interesting economic actions for the sustainable enhancement of goods transport services, facilitating imports and exports.

The PNA has signed a memorandum of understanding with the MIT (Ministry of Infrastructure and Transport), the Apulia Region, RFI - Rete Ferroviaria Italiana S.P.A., and Ferrovie dello Stato Italiane, which aims to identify an alternative, sustainable and ultra-fast (maximum speed at least higher than that of the land transport systems currently in use), captive-guided and low energy consumption freight and passenger transport system, suitable to guarantee:

- ✓ a considerable modal shift in favour of collective transport with the consequent reduction in heavy vehicle traffic density;
- ✓ a significant decrease in traditional transport times and related energy consumption;
- ✓ greater environmental protection and sustainability;
- ✓ a better connection and interconnection between transport systems and smart cities.

In particular, RFI has initiated study, research and technological development activities on advanced transport technologies, including:

- ✓ *MagRail*: technology derived from passive magnetic levitation systems, designed to operate on top of existing railway tracks, increasing performance and travel speed on the same track;
- ✓ *Hyperloop*: high-speed magnetic levitation transport of goods and passengers inside low-pressure tubes in which capsules are propelled by linear induction motors and, in some configurations, air compressors.

The protocol aims to carry out, a feasibility study, a first-stage technical-economic feasibility project and a comparative analysis of the two technologies, and a possible subsequent prototyping and field-testing of the demonstrators with subsequent testing and certification aimed at the development of the new transport systems, identifying evaluation metrics during the testing phase.

**PON Legality 'Improvement of smart and integrated security standards in the Taranto port and production development area'**

The PNA entrusts new-generation technologies with the implementation of the project 'Improvement of intelligent and integrated security standards in the Taranto production and port development area' financed by the National Operational Programme (NOP) Legality 2014-2020 - the seven-year investment plan managed by the Ministry of the Interior, within the framework of cohesion policies.

The project aims to raise the levels of security and legality in which the economic and industrial system of the areas involved operates (the port-logistics area and the areas of the municipalities of Taranto, Massafra and Statte belonging to the ASI Consortium), through the integration of current techniques of territorial control with more advanced technologies, to be implemented with integrative and innovative methods in order to strengthen the security of the areas and increase their attractiveness, also in view of the establishment of the Special Economic Zone. The project envisages the creation of garrisons with the aid of video-analysis equipment, sensors, thermal cameras, and number plate readers that will supply data to a PSIM (Phisical Security Information Management) platform capable of collecting and correlating data that will be used by the Taranto Police Headquarters for predictive and crime analysis.

The project aims to monitor the main industrial agglomerations through the installation of environment filming equipment, cameras, and context filming equipment, in order to be able to intervene promptly in the event of criminal acts or reported car traffic. The video surveillance system will be implemented for urban security purposes and for the protection of public order and safety in line with the latest technology.

Specifically, the implementation and management of the video surveillance system is aimed at:

- ✓ prevent criminal acts through the deterrent action that the presence of cameras can exert;
- ✓ live surveillance of areas that from time-to-time present particular critical elements or in connection with events relevant to public order and safety;
- ✓ facilitate the suppression of the same criminal acts should they occur in the areas controlled by the cameras, using the information that the system will be able to provide.

***Take-aways for port of Taranto***

- Technology advances such as robotization implies that the flexibility of manufacturing becomes more reliant on easy access to suppliers and customers. Logistics zones near large terminal facilities

such as ports, airports, and intermodal terminals in the hinterland offer an attractive proposition for the emerging manufacturing landscape of the fourth industrial revolution.

- Industry 4.0 affects transport and logistics demands as more manufacturing will be regional, leading to a more diverse economic geography landscape in Europe also giving more chances to peripheral regions in the EU to attract production activitities.
- A number of emerging digital technologies are expected to shape the maritime-port industry with disruptive effects on national and global supply chains in terms of both coordination among partners, operational and financial performances as well as resilience. PNAs are expected to keep the pace with these unprecedented challenges participating in cutting edge port projects and innovative action jointly with both private and public parties and experts.
- The PNA will continue to develop collaboration with the European Space Agency (ESA) in order to strengthen the use of space applications to promote sustainable innovation aimed at maritime ecosystems and support the growth of a sustainable green economy.
- The collaboration with the Aerospace Technological District will make it possible to monitor changes in the various pollution matrices of the port area and to experiment with loading and unloading of goods in the port in smart mode, through the use of drones that will be able to guarantee the transport of small packages (up to 100kg) between the docks and ships waiting to dock in the port. The collaboration, which will also involve the companies that currently manage the connection services between the ships and the docks as well as other companies operating within the port of Taranto, will allow the use of satellite technologies and drones to monitor the area to ensure greater efficiency and safety in all operations.
- The PON Legality project 'Improvement of the intelligent and integrated security standards of the Taranto port and production development area' allows for its implementation through a scaled development based on the needs that will emerge over time and contributes to improving the security levels of the agglomerations in between. The archive of recorded data also constitutes, for the retention period subsequently established, an information asset for the purposes of the judicial police with possible reporting to the competent judicial authority to prosecute in the event of crimes being detected.
- The PNA will continue to be part of projects that envisage field experimentation of new technologies (magnetic levitation transport) at the service of land mobility in a logic of complementarity and/or interoperability on different traffic segments and/or different scales, evaluating the possibilities of development on the regional and national railway network.

### 2.5.2. Supply chain coordination and digitalization

Global supply chains are undergoing major changes as a consequence of efficiency, sustainability, and resilience targets. Digitalization will play an ever more important role in these transitions. The main trends for the medium term can be summarized as follows:

- ✓ A massive re-engineering of supply chains in favour of co-modality and synchromodality because the political and legislative context, and the pressure from customers and society at large. Co-modality is a notion introduced by European Commission (2006) and refers to the use of different modes on their own and in combination in view of obtaining an optimal and sustainable transport chain. Haller et al. (2015) defines synchromodality as an "*evolution of inter- and co-modal transport concepts, where stakeholders of the transport chain use data to actively interact within a cooperative network to flexibly plan transport processes and to be able to switch in real-time between transport modes tailored to available resources*". A key characteristic of the concept is that not one single kind of party is leading in finding and implementing a synchromodal solution. A synchromodal approach assumes that the shipper books a-modally thereby leaving the decision on the mode(s) of transport to be used to logistics service providers. This renders the whole transport system more flexible in terms of mode choice.
- ✓ More horizontal collaboration between transport companies and logistics service providers will be needed to deal with the need for shorter, more sustainable and cost-efficient supply chains. This will entail its own complexities, mainly where it concerns mutual trust concerning data-sharing protocols and protection of one's competitiveness. To this extent, shippers will expect an

orchestration function from service providers in which operational excellence is supported by the ability to obtain a greater convergence between physical and data processes.

- ✓ Competition between logistics service providers is no longer focused only on services to the cargo flows: advanced services in the management of information flows are increasingly key to gaining a competitive advantage in the market. These advanced services are more and more aimed at offering total pipeline/supply chain visibility to customers in terms of reliability performance through advanced tracking and tracing, environmental impact measurement (e.g., carbon footprint calculator), security risks and related event management.
- ✓ The streamlining of supply chains through segmentation and standardization using advances in data analytics and visibility. This will lead to a 'plug-and-play supply chain' (DHL, 2016) which can be described as finely-tuned, agile supply chains consisting of core standardized, easily replicable solutions, augmented by standardized, process-proven bolt-ons that are tailored to unique segment or market needs. These supply chains need to be supported by intelligent, data-driven decisions around customers, markets and profitability.
- ✓ Supply chains will have to be supported by ever more performant ICT systems. The data component will leverage performant and pro-active service providers to transform into companies that have a new outlook on the term of logistics services. The presence of collaboration platforms will capacitate certain service providers to develop new types of logistics services.
- ✓ Resilience of the supply chain is becoming a crucial element in dealing with ever more present supply chain disruptions as a result from local political instability, natural disasters, acts of terrorism and cyberattacks, pandemics, etc. Supply chains will need to have redundancy built in. Again, the development of data-driven models will enable such re-engineered supply chains. Supply chains will be designed for resilience. This will result in increased supply chain visibility and data sharing between supply chain stakeholders.

According to the European Technology Platform ALICE (Alliance for Logistics Innovation through Collaboration in Europe), global supply chains will evolve towards an open global logistic system founded on physical, digital and operational interconnectivity, through encapsulation, interfaces and protocol design, aiming to move, store, realize, supply and use physical objects throughout the world in a manner that is economically, environmentally and socially efficient and sustainable. It will require full standardisation of internationally recognised consignment codes in order to communicate throughout the physical reality of the chain.

The various transport systems and ICT platforms will have to integrate horizontally and vertically to become an open ICT infrastructure for the total logistics sector. In other words, the globally independently developed logistics networks will have to be connected enabling shippers an overall view. Maximal standardization will be the open infrastructure's lubricant.

***Take-aways for port of Taranto***

- Ports will have to make the most of the available space, time, and resources available whilst creating the lowest conceivable pressure on the environment. To this extent the disruptive ICT innovations such as robotics and automation, autonomous vehicles for port operations, big data analytics and the Internet of Things and simulation and virtual reality possibilities, are all important enablers.
- Ports should play an active role in supporting the accomplishment of a physical, digital, and operational interconnectivity. PNAs and governments are challenged to invest in smart infrastructure to support business and turn ports and infrastructure in general into "smart" infrastructure that is able to "sense" whatever is required from it by the supply chain processes.
- Cybersecurity within a port or logistics environment has long been an underestimated problem. Ports are likely to become increasingly possible targets for attacks. More coordinated efforts with both governmental as private organisations to address cyberthreats are critical.
- Taking into consideration the many platforms being developed ranging from port networks to booking platforms or various forms of horizontal collaboration, a clear need emerges for

implementable network solutions that transcend the individual platforms. Ports can play a role to connect the various networks of connected networks.

- The Port of Taranto should also evaluate development opportunities which can originate for the entire local community and port cluster from the adoption of digital solutions for enhancing innovative touristic services nested in the cruise and ferry domain.
- The PNA will evaluate the definition of further protocols with private entities and operators in order to expand interoperability and improve controls to speed up the logistics chain, as well as fibre or 5G connectivity (an action that the Authority is already pursuing);
- The PNA must continue the action carried out over the last 2 years for the digital transition of the Authority and the port logistics chain in accordance with DL 7 March 2005 no. 82 and Law no. 84/94, as well as the Three-Year Plan for Information Technology in Public Administration, through the establishment of the Single Administrative Counter, the implementation of the Port Community System and the start-up of internal digitalisation, consisting in the implementation of the digitalisation process of the Ionian port of call both externally with all the actors involved, to enable improvements connected to the PNA/user interface, and internally aimed at improving the efficiency of the processes that characterise the functioning of the Authority

### 2.5.3. The gigantism of vessels

The search for economies of scale and the focus on cost control has pushed the container shipping industry towards the deployment of ever-larger containerships. The introduction of container vessels of up to 24,000 TEU has resulted in an overall upscaling across the main east-west trade routes, with slightly smaller vessels cascading to north-south routes. In recent years, the 24,000 TEU vessel (400m long and 23 rows wide) seems to remain the upper limit, as more and more shipping lines are ordering ships in the 12,000 to 17,000 TEU range which offer more flexibility and versatility in terms of route deployment also considering the maximum dimensions of the new Panama Canal locks which opened in 2016. In May 2022 a total of 221 vessels in the 12,000-17,000 TEU segment were on order, which would represent an increase of 72% of the current existing fleet (figures Clarkson). Moreover, vessels between 4,000 and 8,000 TEU, which had virtually ceased to be built since 2014, are making a strong comeback on the market.

Increasing attention is paid to emission reductions and energy savings associated with ship size. Scale increases in vessel size combined with advances in ship technology and slow steaming can decrease annual $CO_2$ emissions of the world containership fleet. However, for mega-ships of 24,000 TEU, $CO_2$ emissions per unit of cargo transported are very similar to those of 14,000-16,000 TEU (data of MRV Thetis and Lloyd's) which might partly explain the growing interest in the latter ship size class. Emission control and energy efficiency have become the main concerns in newbuilding decision-making. Container carrier CMA CGM was the first to order ULCSs with engines using LNG, which began operations in 2020. In 2022, several operators have placed big orders for large container vessels to be powered by methanol. For example, COSCO ordered 12 ships of 24,000 TEU in November 2022. The market is currently characterized by an order wave which grows concerns about future overcapacity: as many as 561 containerships were ordered in 2021 compared to 114 in 2020 or 107 in 2019 (figures disclosed by Alphaliner).

Scale increases in vessel size are also found in the cruise business. The early goal of the cruise industry to develop a mass market has been achieved via economies of scale as larger ships can accommodate more customers as well as creating additional opportunities for onboard sources of revenue. In the post-pandemic era, all cruise lines seek to expand their market share by linking to new cruise ship orders. The current large cruise ships have a capacity of about 6,000 passengers. The average capacity of a cruise ship on order to be delivered in 2023 is 2,257 cruise passengers. The average vessel capacity on the current orderbook with delivery in 2026 is 2,467 passengers, while for 2027 the respective average capacity is 3.182 passengers. These passenger capacity specifications are beyond the size of vessels in the previous decade. The orderbook shows that the tendency towards larger vessels will continue.

Among the core issues to be addressed by ports are the availability of adequate infrastructure and the organisation of the cruise terminal operations in an efficient way. Cruise lines need deeper and lengthier docks to facilitate the new generation of cruise ships efficiently. The necessity of new infrastructures poses significant challenges when a port is facing land scarcity or the need for regular dredging of its basin. Beyond matters worth consideration in all ports, such as the number of berths, water and sewage facilities, customs, agents, pilots, security and immigration processes, gangways usage etc., the development of transport and tourism capacities is also critical. These concerns need to be addressed following a better understanding of the exact implications that the enduring increase in the size and capacity of cruise vessels and the resulting scale of operations produce. Such discussion would help the understanding of operational, social and environmental limitations and any potential differentiation depending on specific variables. Inevitably this has brought into the agenda of cruise lines and port managers the issue of long-term arrangements. The parameters that would enable a location, or a port, to secure a long-term commitment of cruise lines that would provide the motive to proceed to product and process adjustments need to be defined. Destinations and ports seek ways to reach ways of collaboration with cruise lines towards this end and broader expertise on what needs to be done towards this direction is essential.

***Take-aways for port of Taranto***

- The 24,000 TEU vessel (400m long and 23 rows wide) seems to have become the commercial and environmental upper limit in ship size, as more and more shipping lines are ordering ships in the 12,000 to 17,000 TEU range.
- Emission and energy reduction concerns have accelerated the ordering and deployment of LNG and methanol-powered vessels which require adequate bunkering facilities.
- The market is characterized by a massive vessel order wave which is expected to lead to overcapacity. Next to idling vessels, carriers are using super slow steaming to absorb some capacity as well as to meet the stricter IMO emission standards since January 2023.
- Cruise ports need to continuously adapt their infrastructures and superstructures to the size of the new cruise vessels, especially those ports facilitating major cruise destinations.
- The increase in passenger capacity of cruise vessels requires cruise ports to be able to handle a significant number of passengers simultaneously.
- The mega cruise ships and the number of passengers they carry are posing a threat to the sustainability of cruise destinations, challenging social support for cruising.
- Cruise development needs to take into account the cruise carrying capacity of a destination.
- Contemporary cruise vessels provide a wide range of services, pushing cruise passengers in less spending at the destination.
- Ports need to explore the development of long-term relationships with cruise lines, in order to be able to better plan its infrastructure development and operations efficiency.

## 2.6. ENVIRONMENTAL SUSTAINABILITY AND GREEN TRANSITION (E)

### 2.6.1. The energy transition

The energy transition from fossil fuels to renewables is widely considered as a key action field in decarbonizing the global economy. Yet, the greatest part of the required energy in the coming decade will still come from fossil sources. However, the highest growth rate will be seen in renewable energy sources. The World Energy Outlook 2022 report of the International Energy Agency (IEA) summarizes the longer-term global energy mix. In the 'Stated Policies Scenario' (STEPS), coal demand will reach a peak within the next few years, natural gas reaches a plateau by the end of the 2020s, and oil demand reaches a peak by mid-2030s before it starts to decline. In relative terms, the share of fossil fuels (coal, oil, and natural gas) in total energy supply is expected to decrease from just under 80% in 2020 to slightly above 60% in 2040. The main scenario also shows that about 60% of all new power generation capacity to 2040 shall regard renewables (IEA, 2022). Under the more ambitious 'Announced Pledges Scenario' (APS), global energy demand is expected to increase by only 0.2% per annum to 2030 (0.8% p.a. in the STEPS) combined with a much stronger shift to low emission energy sources. The speed of transformation in the 'Net Zero Emissions by 2050' scenario (NZE) is even more dramatic.

The EU is a frontrunner in the decarbonization of the economy, supported by the Green Deal and Fit for 55 programs. The Green Deal is a new growth strategy that aims at transforming the EU into a fair and prosperous society, with a modern, resource-efficient, and competitive economy to achieve net zero emissions of greenhouse gases in 2050. It provides a roadmap with actions to boost the efficient use of resources by moving to a clean, circular economy and stop climate change, revert biodiversity loss and cut pollution. It outlines investments needed and financing tools available and explains how to ensure a just and inclusive transition. It covers all sectors of the economy, including transport, energy, agriculture, buildings, and industries such as steel, ICT, textiles and chemicals. Meeting the objectives of the European Green Deal will require significant investment. The Fit for 55 programs represents a set of proposals to revise and update EU legislation and to put in place new initiatives with the aim of ensuring that EU policies are in line with the climate goals agreed by the Council and the European Parliament. The package of proposals aims at providing a coherent and balanced framework for reaching the EU's climate objectives, which:

- ✓ ensures a just and socially fair transition;
- ✓ maintains and strengthens innovation and competitiveness of EU industry while ensuring a level playing field vis-à-vis third country economic operators;
- ✓ underpins the EU's position as leading the way in the global fight against climate change.

As a result, EU trade policy is expected to somewhat disconnect from countries or regions where sustainability is not high on the agenda and is expected to seek tools such as carbon pricing or other forms of trade barriers to find a level playing field in fair trade relations with such countries. The push for a greener mobility is pushing the search for minerals and raw materials for the production of batteries and other technological components. Quite a few of these mining products can also be found in parts of the world which were less at the forefront of international trade (such as South American countries like Chile and Bolivia). A systematic use of greener alternatives for logistics will need to be developed as environmental pressure from society and regulators will increase. This will result in the development of sustainable hubs and corridors along which new renewable energy networks will need to be developed. This will impact the way ports operate and will be able to link into this grid.

Given the current importance of coal, gas, and tanker trade for the many ports including the Port of Taranto, the unfolding energy transition will have a deep structural impact on the long-term development of maritime traffic in these ports. These impacts are multiple.

The demand for coal currently is spiking in some European countries due to looming energy shortages and the goal of becoming energy-independent from Russia. Still, in the medium to long-term, coal-

powered plants will gradually be phased out, thereby evaporating a large part of the coal imports via European ports. Reducing the dependency on crude oil as energy source and as source for distillates and feedstock is expected to take more time.

Natural gas represents the second-most important source of energy in Europe following crude oil. However, the continent's resources are limited, and demand was predominantly met through pipeline trading with neighboring countries such as Russia and Algeria until the Ukraine crisis. In 2021, inland demand of natural gas in the EU increased by 4.3% compared with 2020, to reach 15,834,900 terajoules. The highest inland demand was registered in Germany, Italy, and France with 3.633.109 terajoules, 2.899.704 terajoules and 1,718,451 terajoules, respectively. Compared with 2020, the EU natural gas production fell by 7.6% in 2021 to 1,755,874 terajoules. The main EU natural gas producer, the Netherlands, registered a drop in production of 9.4%. With a natural gas production of 724,748 terajoules in 2021, the Netherlands remained the first producer of natural gas in the EU, followed by Romania, whose primary production equaled to 343,927 terajoules, and Germany, whose primary production was of 169,004 terajoules. The Ukraine crisis has triggered a search for additional non-Russian gas volumes from existing gas suppliers such as Qatar and new suppliers (piped or shipped). In the medium-term gas imports via maritime LNG terminals (Figure 63) and via non-Russian pipelines are expected to increase, thereby also fundamentally altering the geographical distribution of gas trading partners away from Russia.

Figure 63. The Gas Infrastructure Europe (GIE) LNG Map for the Mediterranean area (April 2022).


Note: Blue, red, and yellow dots present LNG import terminals with (dot with white center) or without (full color) additional small-scale or large-scale services. Green dots represent LNG export terminals.

*Source: Excerpt of map Gas Infrastructure Europe*

Renewable wind and solar energy, and biofuels have seen growth in the overall energy supply in Europe as a whole, but they still have a very long way to go in order to reach the supply levels of oil and gas. Still, the installation of wind and solar parks has grown into a major industry with some ports playing a key role as logistics hubs for the installation of (offshore) wind parks. In this perspective, the Port of Taranto has taken a leading role in the gradual shift towards renewable energy sources and initiatives to prevent the rising tide of plastic and other waste ending up in the seas by supporting the development of long-term, sustainable, and well-coordinated basic waste management systems.

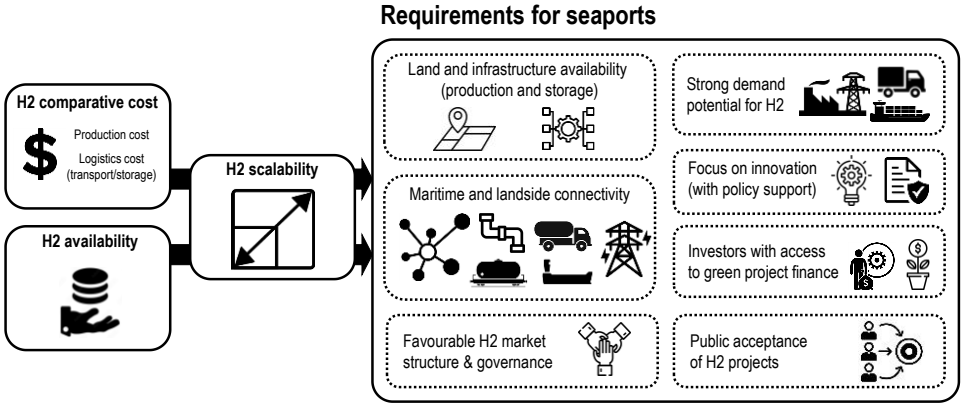
The Beleolico wind farm, for example, is the first one built in the Mediterranean Sea - and operated by Renexia - and consists of 10 turbines with a total capacity of about 30 MW and a consequent estimated production of more than 58,000 MWh/year, equal to the energy needs of 60,000 people.

According to the International Renewable Energy Agency (IRENA), hydrogen is likely to influence the geography of energy trade, further regionalizing energy relations, with the emergence of new centers of

geopolitical influence built on the production and use of hydrogen (IRENA, 2022). At present, over 30 countries and regions are planning for active growth in cross-border hydrogen trade. IRENA estimates that over 30% of hydrogen could be traded across borders by 2050, a higher share than natural gas today. Green hydrogen refers to hydrogen that is produced with renewable electricity such as solar and wind power. Hydrogen is considered as a perfectly clean fuel, since the only waste it produces is water vapour. Green hydrogen is an important piece of the energy transition, but it is not the next immediate step, as we first need to further accelerate the deployment of renewable electricity to decarbonize existing power systems, accelerate electrification of the energy sector to leverage low-cost renewable electricity, before finally decarbonize sectors that are difficult to electrify like heavy industry, shipping, and aviation through green hydrogen. The development of green hydrogen will be positively influenced by strong cooperation between different actors including energy and molecular operators, support for investment, operational and maintenance costs (e.g., European Funds) to launch the market, development of adequate infrastructure, and construction of electrolysers close to places of consumption. However, the widespread adoption of hydrogen fuel will require massive infrastructure investments in addition to new industrial regulations.

A number of seaports in Europe are stepping up their efforts to become energy and feedstock hubs and growing producers of green hydrogen. Ports are aware it is essential to offer affordable green energy to all players in port areas, at all times, in order to keep the industry in the region. Both local production and import play a crucial role in this. The first projects related to imports of renewable energy are expected to take shape between 2025 and the end of this decade. Extensive feasibility studies are conducted to analyze ideal sourcing regions, to prepare seaports for receiving the hydrogen carriers of the future, and to set up specific pilot projects in the context of a sustainable economy. Figure 64 summarizes the key requirements for ports to support the cost competitiveness and scalability of the green hydrogen option and to become green hydrogen hubs.

Figure 64. Key requirements for ports to serve as green hydrogen hubs.




*Source: Notteboom and Haralambides (2023)*

In this context, the PNA has joined as a strategic partner of the project of Energie Salentine characterized by the IT 02 of the IPCEI Hydrogen - wave RHATL. The project in the final presentation aims to install an electrolysis plant of 400 MW dedicated to the production of green hydrogen. The electrolysis plants will also use "purified" waste water avoiding the depletion of natural resources. The supply of electricity from renewable sources for the production of green hydrogen will be guaranteed, among other things, by Enel Green Power - partner of the Project - . the produced green hydrogen will be used which gas fuel to support of the industrial and harbour processes in the industrial area tarantina, will be transported (and stored) through an infrastructure realized directly also in collaboration with the SNAM - direct partner of the Project.

The focus of port ecosystems as regards hydrogen should not only be on green hydrogen, but also on the decarbonization of grey hydrogen. Grey hydrogen can be turned to blue hydrogen when relying on CCUS (Carbon Capture, Utilization and Storage). Although today blue and green hydrogen account for less than 1% of hydrogen demand and biomethane for just 1% of global gas production, interest in these solutions is growing, with more and more countries committing to targets and funding. The European RePowerEU programme forecasts a demand for 35 billion cubic metres of biomethane and 20 million tonnes (about 70 billion cubic metres equivalent) of clean hydrogen in Europe by 2030; these two solutions, combined, account for about 25% of the current EU natural gas market.

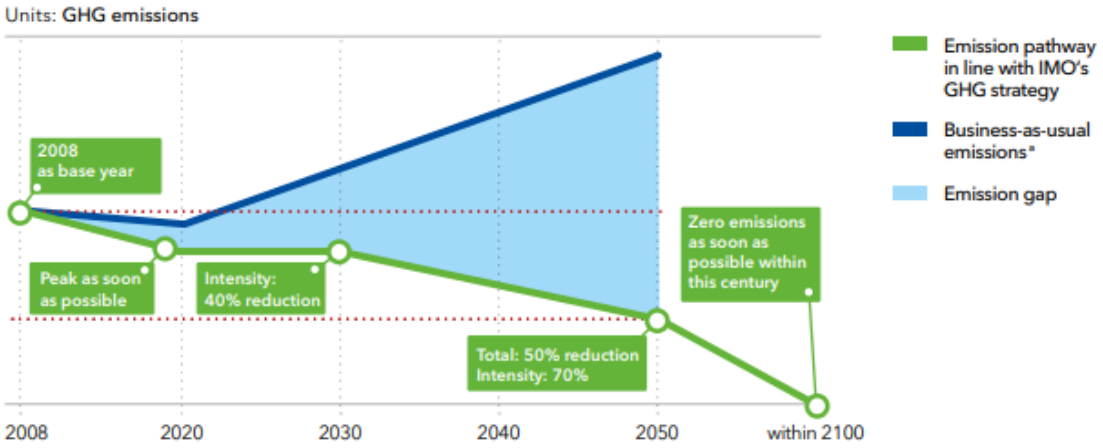
**Take-aways for the port of Taranto**

- In the next 5 to 10 years a number of valuable business and funding opportunities related to the implementation of interventions for switching to renewable energy sources will emerge in the port context: PNA are urged to prepare forthcoming challenges and exploit related opportunities for shaping new business models in energy consumption and production systems.
- The implementation of projects dedicated to the circular economy and the reduction of waste related to port activities will become a key issues for all ports worldwide, especially in the EU area.
- The strong interest in green hydrogen and the emergence of hydrogen valleys provide opportunities to port of Taranto to tap into this emerging market. Early movers are expected to excel as green hydrogen hubs.

### 2.6.2. Green shipping

In response to the objectives set out in the Paris Agreement, such as keeping the average increase in global temperatures below 2 degrees Celsius above pre-industrial levels and to fall below 1.5 degrees Celsius, the IMO defined specific objectives for the shipping industry on proposal of the Marine Environment Protection Committee (MEPC). The answer is in the Initial IMO GHG Strategy adopted in April 2018: with 2008 as a baseline year, this strategy aims to at least halve total GHG emissions from shipping by 2050, and to reduce the average carbon intensity ($CO_2$ per tonne-mile) by a minimum 40% by 2030, and 70% before mid-century (Figure 65). The IMO's ultimate vision is to phase out GHG emissions as soon as possible within this century.

Figure 65. IMO strategy for major reductions in GHG emissions from shipping.




*Source: DNV-GL, 2019.*

In order to comply with IMO regulations in terms of energy efficiency, naval units must meet increasingly ambitious technological standards. More in detail, the main energy efficiency requirements can be summarized as follows:

1. Energy Efficiency Design Index (EEDI)[16];
2. Energy Efficiency Operational Indicator (EEOI)[17];
3. Energy Efficiency eXisting ship Index (EEXI)[18].

It is essential to highlight that there is a close relationship between the three indicators, which are fundamental for the definition of appropriate procedures for improving the conditions of environmental impact for the different ships.

In June 2021 (MEPC 76), the IMO adopted amendments to its MARPOL Annex VI regulations, to introduce two new instruments which came into force in January 2023: the Energy Efficiency Design Index for existing ships (EEXI) and the Carbon Intensity Indicator (CII). The latter effectively measures the energy efficiency of ships in relation to the transport work they undertake in moving freight and/or passengers, which is used to operationalize the EEXI, a technical instrument that is directly comparable to the widely understood workings of the EEDI, but which is more generally applicable to existing ships, rather than just new ships.

A large-scale use of carbon-neutral fuels and/or exhaust gas abatement equipment will be required to meet the new IMO decarbonization targets. Potential alternatives to conventional marine fuels are diverse and it is not easy to identify the preferred one. The current technological level provides the following alternative fuels for ships in order to comply with the regulations and their strategy towards greener operation:

- ✓ Liquefied Natural Gas (LNG).
- ✓ Biofuels (biodiesel, liquefied biogas, etc.).
- ✓ Methanol.
- ✓ Ammonia (NH3).
- ✓ Renewable energy.
- ✓ Electrification.

Since the second half of 2022, there is a noticeable increase in container vessel orders involving methanol-powered large containerships (placed by Maersk, COSCO and CMA CGM or associated vessel

[16] The Energy Efficiency Design Index (EEDI) is an energy efficiency indicator that promotes the use of energy efficient propulsion systems, with the consequent emission reduction. In 2011, in which the EEDI was first introduced, the index was referred to the CO2 emissions of tankers, bulk carriers, gas carriers, general cargo, containerships and reefer; but with an amendment of 2014 introduced by the Marine Environment Protection Committee (MEPC), the application of the EEDI has been extended also to Ro-Ro ships, Ro-Pax ships and LNG carriers. The maximum value limits of the EEDI are revised and made more stringent every 5 years, until reaching in 2025 a reduction of 30% of the value of the index compared to the value of phase 0 (IMO, 2014). EEDI is proportional to the fuel consumption of the vessel divided by its carrying capacity and speed (IMO, 2014); it is expressed as grams of CO2 per tons-mile (gCO2/ton-mile), therefore the higher the energy efficiency of the ship the lower the EEDI.

[17] The Energy Efficiency Operational Indicator (EEOI) is an indicator of the average annual carbon intensity of a ship in its actual operating conditions, taking into account the cruising speed, draught, capacity actually used, distance travelled, hull and engine deterioration and weather. Although EEOI is referred to as an energy efficiency indicator, it is technically more accurate to refer to it as a carbon intensity measure, being calculated as gCO2/ton-mile (UCL Energy Institute, 2015). The major difference between EEOI and EEDI is that while EEDI is a technical indicator for the propulsion systems of ships under construction, the EEOI consists of an indicator referring to the operational factors of the ships under navigation and is therefore applied not only to new ships but also to ships already operating before the introduction of the index. Therefore, an optimization of ship's operations, like an improvement in the energy management or the trip optimization, will have a positive impact on the EEOI while it will not be visible in the EEDI.

[18] The Energy Efficiency eXisting ship Index (EEXI) is a measure introduced by the IMO to reduce the greenhouse gas emissions of ships. The EEXI is a measure related to the technical design of a ship. Ships have to attain EEXI approval by participating in the periodical survey that will be launched in 2023 at the latest. The required EEXI value is determined by the ship type, the ship's capacity and principle of propulsion and is the maximum acceptable attained EEXI value. The attained EEXI must be calculated for the individual ship, which falls under the regulation.

charterers), while also ammonia and some other low carbon fuels are being considered as ship fuels of the future.

Ports are challenged to make sure they provide bunkering facilities for the maritime fuels of the future, and develop and implement voluntary programs to support the greening of the shipping fleet. An example is the Environmental Ship Index (ESI). Under the auspices of the IAPH's World Ports Sustainability Program, the Environmental Ship Index Portal enables ports and other interested parties to incentivize ships to use cleaner engines and fuels with preferential treatment offered either through discounts on port dues, bonuses, or other benefits commensurate with a specified level of cleanliness. ESI is a voluntary tool that includes a formula-based evaluation of vessels' nitrogen oxide (NOx) and sulfur oxide (SOx) emissions.

From 1 January 2018, large ships loading or unloading cargo or passengers in European Economic Area (EEA) ports must monitor and report their $CO_2$ emissions and other relevant information. Moreover, the new IMO regulations that came into force on 1 January 2020 are pushing European ports towards the adoption of new technologies and fuels with less environmental impact. Therefore, the use of LNG is an integral part of a broader energy-environmental EU policy that aims at the gradual transition to a low-carbon economy through the substantial reduction of polluting emissions, the use of clean fuels and the use of renewable sources.

When berthed, ships require electricity to support activities like loading, unloading, heating and lighting and other onboard activities. Today, this power is generally provided by auxiliary engines that emit carbon dioxide ($CO_2$) and air pollutants, affecting local air quality and ultimately the health of both port workers and nearby residents. The same holds for noise nuisance. As an alternative to onboard power generation, vessels can be hooked up to an onshore power supply (OPS), i.e., connected to the local electricity grid. In this way, ships' operations can proceed uninterrupted, while eliminating negative side effects. Ports nowadays are not normally equipped to supply vessels with electricity from the dockside, nor are vessels usually equipped to receive power in this way. Around the world, though, many activities in this direction are now underway and interest in the technology is rapidly growing, spurred on by tougher environmental legislation, greater focus on emissions in ports, and, more recently, rising fuel prices.

One of the consequences of the coming into force in January 2023 of the new IMO regulations aiming to reduce maritime carbon emissions and the environmental impact of shipping, is that many container shipping lines have opted for super slow steaming. While this prolongs the transit time on shipping routes, super slow steaming helps to meet carbon emissions targets as well as absorb some of the emerging vessel overcapacity on some of the main trade routes.

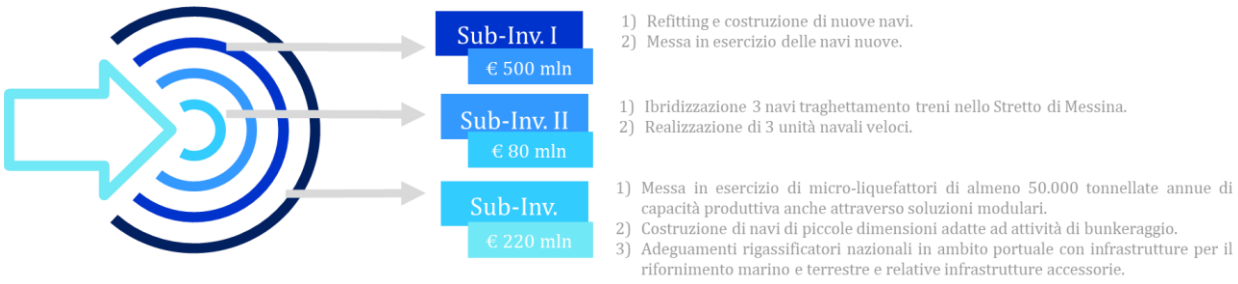
The maritime decarbonization targets of IMO and the EU will affect the transition to other ship fuels (hydrogen, ammonia, methanol, batteries, etc.). Implementing projects like green corridor pilots to attract investment and create entry points for first movers presents further opportunities. It is expected that there will not be one single ship fuel solution for the long-term future, but a range of possible green fuels adapted to the routes and ship types (for example, a battery-operated ferry on a shorter route vs. a methanol or ammonia powered ultra-large container vessel on the Asia-Europe trade). Another factor that it expected to support the decarbonization in shipping relates to the inclusion of shipping in the Emission Trading Scheme (ETS) and/or the emergence of a $CO_2$ tax.

With the aim of supporting the green transition in shipping and port industry, the Italian NRRP paid great attention to investments and initiatives aimed at decarbonizing the transport and mobility sectors, which are considered a key factor for the country's sustainable recovery. Therefore, two of the six missions defined in the plan concern both the energy and infrastructure profiles of green transport, in particular Mission 2 "Green revolution and ecological transition" and Mission 3 "Infrastructure for sustainable mobility". The NRRP defined, within Mission 2, an investment plan aimed at renewing the Italian fleet, mainly referring to passenger ships. The main objective of the investment is to contribute

to the reduction of the environmental impact of maritime transport, improve social cohesion by ensuring territorial continuity through sustainable maritime services of which attractiveness and comfort for passengers will be enhanced. The program provides for the allocation of a total of 800 million euros as a contribution to shipowners for the purchase of new ships or the modernization of existing or under construction ships, and improve the availability of alternative marine fuels, with the aim of promoting the ecological transition of the fleet. In particular, the resources provided by the Complementary Plan to the National Recovery and Resilience Plan (NRRP) will be allocated to projects presented by shipping companies that are able to ensure better environmental performance and a significant reduction in polluting emissions from ships, including while berthing in ports, thanks to the use of latest generation propulsion systems, electric batteries, hybrid or innovative solutions from a hydrodynamic point of view, digital control systems or material sustainability.

The substantial investment complements the interventions already underway for the transformation of Italian ports areas and for the electrification of the docks, so that moored ships can turn off polluting engines and use electricity taken from the ground. These various interventions are aimed at promoting the ecological transition of maritime transport, a fundamental component of the Italian economic system. The considerable resources made available will make it possible to encourage the renewal of fleets by encouraging shipowners to purchase new ships equipped with the latest generation technologies, with engines capable of using fuels with low environmental impact (LNG, bioLNG, methanol, hydrogen, ammonia), or to transform ships already in operation to allow them to use fuel systems with a lower environmental impact, also through the use of biofuels. More in detail, the program is composed by three sub-sections showed in Figure 66.

Figure 66. National Recovery and Resilience Plan in Italy: funds for ferry vessel refitting and newbuildings.




*Source: Authors' elaboration.*

To incentivize the use of LNG (Liquefied Natural Gas), Art.6, of Legislative Decree 16.12.2016, no. 257, provides that "By 31 December 2025, an adequate number of refueling points for LNG, also combined with CNG refueling points, accessible to the public at least along the Italian sections of the core TEN-T network to ensure the circulation in connection with the European Union network of LNG-fueled heavy vehicles, with gradual development having regard to the current demand and its development in the short term, unless the costs are disproportionate to the benefits, including the benefits for the environment". Moreover, Article 11 of the aforementioned D. Lgs. 257/2016, sets out the bureaucratic process relating to small-scale (less than 50 tons) LNG storage and transportation infrastructures, placing the competence to simplify the administrative procedure, in compliance with current environmental, health, fiscal and safety regulations, in the hands of the Taranto Municipality, for the port of Taranto.

Finally, the Ministerial Guidelines stipulate that the DEASP shall identify interventions and measures to be implemented in pursuit of the objectives of reducing $CO_2$ emissions by improving energy efficiency and promoting the use of renewable energies. These interventions must be analysed through the CBA (Cost-Benefits Analysis) tool. The Port of Taranto has perfectly aligned itself with these Guidelines, as its medium-term vision includes the development of feasibility studies and related infrastructures to deal with the most promising alternative energy vectors (LNG and hydrogen).

Next to emissions, ports also have to comply with numerous international, EU and regional measures on the treatment of liquid discharge and garbage from vessels. Most of these measures are in place to ensure healthy marine environments, thus addressing organic compounds or toxins present in sewage discharges or bilge water from cruise vessels or the possibility of storing invasive species in ballast water.

***Take-aways for port of Taranto***

- Infrastructure and superstructure provision for the use of alternative fuels/fuels.
- Need for additional investments in alternative fuels bunkering facilities, otherwise the port might lose competitiveness and attractiveness.
- Decarbonization and reduction need to be at the core of ports' strategy.
- New processes are needed for handling different fuels.
- With the percentage of ships using alternative fuels still being relatively low, there is the danger of not recovering the investment cost at least in an acceptable period of time.
- Onshore power supply (OPS) is one of the strategies for reducing the environmental impact of seagoing vessels in ports, but its implementation needs a coordinated approach with the shipping lines and other (European) ports.
- Cost-effective implementation of the technology requires collaboration among a wide range of stakeholders at an early stage, when planning new quays and ordering new vessels, for example.
- Ports need to develop the necessary infrastructures and processes for accepting vessels' liquid and solid waste and segregating recycling materials.
- EU regulations concerning the reduction of harmful emissions produced by the maritime-port sector require a careful analysis of issues related to the sustainability of port activities.
- The development of green strategies in ports cannot disregard the analysis of best practices applied in the maritime transport sector. In this thein, The National Recovery and Resilience Plan (NRRP) provide PNAs and port operators with valuable incentives for implementing green investments (see for example the "Green Ports" funding scheme).

### 2.6.3. Green ports and hinterland connectivity

The focus on green port and terminal activities has given rise to a wide range of projects and initiatives, such as in the field of:

- ✓ The applications of Carbon Capture Utilization and Storage (CCUS) to capture and store $CO_2$ (for example in depleted offshore gas fields) or to reuse $CO_2$ as feedstock in production processes;
- ✓ The achievement of "ecologies of scale" through environmental zoning and co-siting/co-location;
- ✓ The development of windmills and solar parks/roofs in ports;
- ✓ Contributions to the development of supply chains of renewables such as bio-fuels, bio-based chemicals, blue and green hydrogen, etc.;
- ✓ The use of low-emission or zero-emission quay and yard equipment and green warehousing and distribution activities (e.g., energy efficient warehouses, solar panels or warehouse roofs. Many market players in the port industry are operating assets such as equipment and real estate which can be made more sustainable (electrification, improve energy-efficiency, shift to renewables, water treatment, etc.) while also being part of supply chains that need to become greener. In the future, every new investment or finance file is going to be assessed in depth from a sustainability angle;
- ✓ The use of fume-return systems in industrial clusters;
- ✓ Measures to include green aspects in concession policy, at the level of the general concession procedures, the bidding phase, the selection phase and the drafting of the concession agreement (see: Notteboom and Lam, 2018; for a detailed discussion). Green aspects can also be included in the permitting practices of higher authorities;
- ✓ The inclusion and development of green zones and buffers in port areas;
- ✓ Measures to reduce the idling of ships and inland transport modes in port areas.

When it comes to the greening of hinterland transport, ports across Europe typically develop initiatives or participate in the following areas:

- ✓ Development of data-driven synchromodality solutions such as data platforms that allow real-time hinterland transport choices;
- ✓ Initiatives to support the energy transition in hinterland transport, such as hydrogen or battery-operated trucks, vans and inland barges;
- ✓ Initiatives to develop inland terminals and port-hinterland concepts that support a shift of cargo to rail and inland barges through a network of bimodal and trimodal inland terminals;
- ✓ Supporting research into new or renewed transport modes such as unit transport per (vacuum) tube such as hyperloop concepts and alike, or drones and other autonomous vehicles for zero emission transport;
- ✓ Designing and implementing green inland-focused port dues whereby the port dues for seagoing vessels could be linked to the onward modal split in hinterland transport;
- ✓ Advances in traffic management system (rail, inland barge, road) to increase efficiency and reduce energy consumption and emissions;
- ✓ The implementation of pricing mechanisms and other instruments to spread traffic in time and space to reduce congestion and optimize vehicle flows;
- ✓ Initiatives to further develop pipeline networks within the port area and in connection to industrial zones and customers in the hinterland. Next to traditional chemical base products such propylene, ethylene and grey hydrogen, the pipeline networks of the future will mainly focus on rest heat, waste water and renewable energy sources such as green hydrogen. Such newer uses of pipelines demand reconversion of existing pipelines (for example gas pipelines made ready for hydrogen transport) and investments in new infrastructures.

***Take-aways for port of Taranto***

- The greening of port operations through a series of measures as listed earlier is crucial for sustainable port development.
- There is a growing focus on green and sustainable hinterland transport. Ports have to green their inland transport activities in order to keep their community 'license to operate';
- Effective data management and digital platforms are key in reducing inefficiency, emissions and energy consumption in hinterland transport, and in promoting a modal shift to rail.
- A number of suitable initiatives and investment options for increasing the sustainability of port development are available for the Port of Taranto both in the field of greening port and terminal operations (e.g., applications of CCUS, the achievement of "ecologies of scale", the development of windmills and solar parks/roofs, contributions to the development of supply chains of renewables, the use of low-emission or zero-emission quay or yard equipment, green clauses in concessions, etc.) as well as hinterland transportation (e.g., development of data-driven synchromodality solutions, initiatives to support the energy transition, initiatives for supporting modal shift, advances in traffic management system, solutions for reducing congestion and optimizing vehicle flows, etc.).

### 2.6.4. Towards a circular economy

Green supply chain management (GSCM) strives for a reduction in environmental impacts by focusing on a series of strategies throughout the supply chain. They include Reduce, Re-use, Recycle, Remanufacture, also known as the four "Rs" that comprise reverse logistics. The fields of action in GSCM include product design, process design and engineering, procurement and purchasing, production, energy use and mix, and logistics (including distribution and transportation).

The transition to a circular economy, in which the value of products is maintained within the economy for the longest possible time whilst minimizing the generation of waste and using them as possible alternative raw materials as input for new production (feedstock concept), is gaining ground, both in production processes, thus impacting consumption behavior and patterns, and supply chains. A main driver for this shift consists of the short supply of raw materials and the subsequent soaring commodity

prices. Transitioning towards a circular economy also protects companies from major and unexpected market fluctuations and geopolitical risks. Consumer preferences are also shifting away from the ownership concept towards models where they are willing to share or use products instead of owning them outright. Therefore, this shift from a linear economy towards a circular economy should lead to the recuperation of used materials and resources at the end of the lifecycle of products, and this with a minimum of loss of quality. It requires the reverse supply chain to be completely closed. The European Commission has adopted a "Circular Economy Package" laid down in an action plan "Closing the loop – An EU action plan for the Circular Economy", that next to a set of legislative proposals on waste to stimulate Europe's transition towards a circular economy. As long as the logistic chain cannot be closed in an efficient way, the circular economy model will not be "sustainable". In other words, the transition to a circular economy comprises both production and logistic processes.

In reality, however, logistics often struggles with the collection of materials because of volume and cost constraints, as well as regulatory complexities. Seaports can be considered to be clusters of transport, trade and industrial activities. Therefore, it is only logical that they present a unique platform to attract material flows and develop a portfolio of recycling activities, for example in the case of the (petro)chemical cluster. An important part of the success of the circular economy will hinge on the way smart logistics will enable the transparency needed to set up efficient and integrated fully circular supply chain networks. Next to the physical aspect of integrating supply chain flows to maximize circular economy opportunities, end-to-end integration of supply chain processes will be crucial. Thus, the circular economy will certainly offer new opportunities for shipping and logistics service providers but will also challenge them to enter into close collaboration with the industry stakeholders.

The circular economy paradigm is finding increasing application within the Italian maritime-port industry also thanks to the spread of some best practices especially managing waste generated by port activities as well as the implementation of recycling and reuse mechanisms to reduce the environmental impact of the sector. In 2019, for example, the Liguria Region approved the new "Management Plan for Ship-generated Waste and Cargo Residues," developed by the Western Ligurian Sea Port Network Authority in compliance with Legislative Decree 182/03 and Directive 2000/59/EC. The plan defines good practice guidelines in the introduction of services dedicated to the disposal of waste generated by ships calling at the ports of Genoa, Prà, Savona and Vado Ligure, in compliance with strict safety and security standards, also based on the identification of approved expert and professional suppliers.

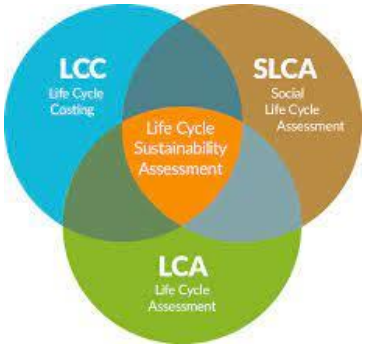
The PNA of the Ionian Sea has also been active in the development of waste treatment & waste management systems aimed at improving the capacity to transnationally address environmental vulnerability, fragmentation and safeguarding ecosystem services in the Adriatic-Ionian Sea area. The PNA is participating in the ECOWAVES project focused on reducing waste generated in port areas, with a focus on plastic materials. The project led to the establishment of a transnational strategy focused on waste management for the protection of the port environment and the creation of a transnational network for the environmental protection of the port area. The circular economy theme also finds space within the DEASP (2022 version): it supports the establishment and development of innovative models for sustainable growth, capable to reinforce city-port relationships and to favour a process of urban, environmental and sociocultural regeneration.

In this direction, the Eco Industrial Park is also involved in the construction of an infrastructure aimed at attracting a plurality of transport companies, processing services and assembly of industrial components, in strong connection to the traffic flows in the port of Taranto. The project is part of a context characterized by a strong green connotation based on five pillars of development: renewable energy communities, the sustainable industrial park, the logistics park, green mobility and connectivity.

The circular economy paradigm also rests on the application of managerial techniques aimed at ensuring the sustainability of activities, technologies and investments along with their entire life cycle, such as Life Cycle Assessment (LCA), Life Cycle Costing (LCC), Social Life Cycle Assessment and

Environmental Life Cycle Costing (ELCC) (Figure 67). In this perspective, LCA focuses on the life cycle of a product/technology/investment ("from cradle to grave"), addressing the various environmental impacts along all stages of its useful life. According to ISO 14040 Standards, LCA can been as the "*compilation and evaluation through the entire life cycle of the input and output streams, as well as the potential environmental impacts, of a product system*". It is particularly important for analyzing the sustainability of processes and products offered by measuring the environmental impact and identifying the most critical steps when it comes to environmental impacts, to design and manage technologies/product/process along with a sustainable perspective. LCC, instead, focuses on the economic and financial perspective when assessing a product/technology/investment, in its entire life cycle. For this aim both tangible and monetized costs and intangible costs whose monetary quantification can be challenging, are taken into account. This methodology guarantees the assessment of the economic sustainability of products/technologies/investments in the long term. More recently also Social Life Cycle Assessment and Environmental Life Cycle Costing have been developed within both academia and the industry providing the backbone for the development of soundly Life Cycle Sustainability Assessment (LCSA) solutions. They will be progressively integrated in the decision-making process of public and private entities operating in the port domain.

Figure 67. LCA, LCC and SLCA for Life Cycle Sustainability Assessment.




*Source: Abo Akademy University, 2021.*

***Take-aways for port of Taranto***

- Circular economy paradigm is starting to increasingly inspiring both strategies, investments and actions within the maritime port industry.
- The Ionian Sea Porth Authority consider circular economy paradigm a key issue for fostering sustainable port development and setting environmental-related goals for the next future.
- The application of the concepts of LCA, LCC, ELCC and SLCA could bring significant benefits in terms of reducing the impact of port activities from both environmental and social perspectives.

## 2.7. REFERENCE REGULATIONS (L)

### 2.7.1. Port Governance & Port Competition: EU and national regulatory framework

The PNA, already Port Authority, is not economic public agency of national importance to special ordering and is endowed of administrative, organizational, normative autonomy, of budget and financial; it is instituted with Law 28.01.1994, n. 28, then amended and supplemented by Legislative Decrees 04.08.2016 and n. 169; 13 December 2017, n.232 and, among other things, by Laws 17 July 2020, n. 77; 11 September 2020, n. 120 and 05.08.2022, n. 108. It is subject to the powers of guidance and supervision of the Minister of Infrastructure and Transport and this together with the Minister of Economy and Finance for the deliberations of approval of the budget, any notes of variation and the final account; the financial management statement of the Port Network Authority is subject to the control of the Court of Auditors.

The mission of the Authority is traced to art. 6, codicil 4 of the institutive Law according to which the PNA carries out tasks of (i) address, programming, coordination, regulation, promotion and control, also through the harbour territorial offices second previewed how much to article 6-bis, codicil 1, letter c), port operations and services, authorising and granting activities referred to in Articles 16, 17 and 18 and other commercial and industrial activities carried out in ports and territorial districts. To the PNA they are, moreover, conferred powers of order, also in reference to safety regarding risks of incidents connected to the activities and the conditions of hygiene on the job according to article 24; (ii) ordinary and extraordinary maintenance of the common parts in the harbour within, comprised that for the maintenance of the backdrops; (iii) entrustment and control of the activities directed to the supply for a fee to the harbour users of services of general interest, not coincide or closely related to the port operations referred to in Article 16, paragraph 1; (iv) coordination of administrative activities carried out by public entities and bodies within ports and in maritime state areas included in the territorial division; (v) exclusive administration of the areas and the assets of the maritime State property included in its district, in accordance with the provisions of this law and the navigation code, subject to the eventual regional competences and the special legislation for the safeguard of Venice and its lagoon; (vi) promotion and coordination of forms of connection with the logistic systems “retroportuali” and “interportuali”.

On the point there is to say that pursuant to art. 6 co. 11 of L. 84/94, the PNA cannot carry out, neither directly neither through participated societies, harbour operations and activities closely connected to them.

With the procedures and procedures referred to in article 15 of Law 7 August 1990, n. 241 can always regulate the performance of activities and services of common interest and useful for the most effective performance of the functions assigned, in collaboration with Regions, local authorities and public administrations. It can, moreover, assume participations, to social character of minority, in initiatives finalized to the promotion of logistic and intermodal connections, functional to the development of the harbour system, according to article 46 of decree-law 6 December 2011, n. 201, converted, with amendments, from law 22 December 2011, n. 214.

To the extent of interest here, the legislation of the sector set out above, provides art. 7 which are organs of the PNA the President (appointed by the Minister of Infrastructure and Transport, in agreement with the President or the Presidents of the region concerned and chosen among citizens of the Member States of the European Union having proven experience and professional qualification in the fields of the economy of transport and port), the Management Committee (consisting of the President of the Port Network Authority, a component designated by the region or each region whose territory is included, even partially, in the port system, by a component designated by the mayor of each of the municipalities former headquarters of in the Port Network Authority included in the Port Network Authority and by the maritime director in whose jurisdiction falls the port of the Port Network Authority) and the Board

of Auditors, while Art. They shall govern their functions and tasks. In particular, the Chairman shall appoint and chair the Management Committee, which shall be responsible, inter alia, for approving the three-year operational plan, the estimated budget, the variation notes and the balance sheet; to adopt the town development plan of harbour system and the document of strategic planning of system; to deliberate, on proposal of the President, in order to the authorizations and the concessions of advanced duration to four years, to decide the Plan of the organic one of the port of the workers of the enterprises of which to articles 16, 17 and 18 of the same norm.

The Chairman, who together with the Management Committee constitutes the Political Governing Body of the Administration, in addition to submitting the TOP and the DPSS to the Management Committee, has the task, among other things, of deciding, after consulting the Management Committee, with regard to the concessions referred to in Article 6, paragraph 10, to provide for the coordination of the activities carried out in the port by public administrations, without prejudice to the provisions on single door customs and controls, as well as to provide coordination and control of activities subject to authorisation and concession, and port services; administer the areas and goods of the maritime state property, falling within the territorial division of competence, on the basis of the relevant legal provisions, exercising, after consulting the Management Committee, the powers laid down in Articles 36 to 55 and 68 of the Navigation Code; exercising, after consulting the Management Committee, the competences attributed to the PNA from articles 16, 17 and 18 in the respect of the dispositions contained in the decrees of the Minister of infrastructures and the transports of which, respective, to article 16, codicil 4, and article 18, paragraphs 1 and 3, and in compliance with the resolutions of the Transport Regulatory Authority on matters of competence; exercise the tasks of proposal on the delimitation of free zones, after consulting the maritime authority and local administrations concerned; to exercise every other competence that is not attributed by the present law to the other organs of the PNA. The Board of Auditors shall carry out all the tasks provided for by current legislation in relation to the function of auditor.

In the above-mentioned normative panorama and socio - economic reference assumes particular importance the task of the PNA to administer the areas and goods of the maritime state property falling within the territorial area of reference identified, for the Authority, by decree of the Ministry of Transport and Navigation of 06.04.1994 and extended with subsequent decree of the same Dicastery of 23.06.2004 and, currently, awaiting further expansion.

In relation to the foregoing it is evidenced as the Law instituting the PNA expressly recalls, for the purposes of the management of the maritime state property areas, art. 36 to 55 and 68 of the Navigation Code (R.D. 30 March 1942, n. 327) and detailed regulations, art. 18, the concession of areas and docks to entrust to the authorized operator ex art. 16 to the accomplishment of the operations and harbour services.

The concession in use of docks and marine state property areas is therefore released, according to art. 18 of law n. 84 of 1994, to the harbour enterprises (previously authorized from the PNA, according to art. 16, on the base of an operating program from they proposed) for the development of the harbour operations of cargo, unloading, transhipment, storage and any other handling of goods or other materials as well as for port services which are complementary or ancillary to cargo handling. For all other uses, the temporary occupation of areas and maritime state property is granted pursuant to art. 36 of the Navigation Code subject to advance payment of a fee commensurate with the type and duration of the concession.

Concessions can be issued with a state license, when they are not longer than four years and do not import plants difficult to remove, or with formal act, if, on the contrary, they provide for a duration of more than four years or import plants that are difficult to remove.

Al aim to discipline the tasks and the finalities of administration of the areas and the assets of the marine State property, the PNA of the Ionian Sea has been equipped, to make date from 2015 of appropriate

Regulations "Administrative procedures in matter of marine State property"adopted by Order of the President no. 12/15 of 22.09.2015.

This Regulation has been amended over the years.

In particular, the following Ordinances are noteworthy:

- ✓ the n. 18/18 of 21.12.2018 with which amendments of the Regulations to the aim to recepire are approved, for how much it concerns to the marine state property concessions ex art. 18 l. 84/94, the indications of the Ministry of Infrastructures and the Transports contained in the Circular n. 3087 of 05.02.2018 in order to the criteria to use in the procedure of comparison of the applications of release or renewal of the marine state property concessions and those of the Authority of Regulation of the Transports established with deliberation n. 57 in date 30 May 2018 in order to guarantee the equal and not discriminatory access to harbour infrastructures.
- ✓ the n. 6/21 of 22.03.2021 with which amendments of the Regulations have been approved in order to regulate the procedures of presentation of the applications according to the modalities provided by the "Sportello Unico Amministrativo" (SUA) established in compliance with art. 15-bis of L. 84/94 and better to define some aspects of equal procedural afferent to the administration of the areas and the goods re-entering in the marine State property.

It should be noted that art. 18 L. 84/94 has been the subject of a recent and substantial revision by art. 5 of Law No. 118 of 05.08.2022 "Annual Law for the market and competition 2021". This should be done in order to promote the development of competition, inter alia, in order to ensure access to markets for smaller companies, taking due account of the social policy objectives related to the protection of employment, within the framework of the principles of the European Union and to contribute to the strengthening of social justice, to improve the quality and efficiency of public services and to enhance the development of investment and innovation in order to protect the environment, the safety and health rights of citizens; to remove regulatory obstacles; the opening-up of markets.

In fact, with the allocation of areas that took place on the basis of an assessment of the request from the applicant, it was established that the areas and docks are entrusted through public evidence procedures, also initiated at the request of the party, by publishing a notice, in compliance with the principles of transparency, impartiality and proportionality, ensuring conditions of effective competition; this reserving functional operating spaces to the development of the harbour operations from other enterprises not holders of the concession in the respect of the principles of transparency, equity and equal treatment.

In order to standardize this discipline has been issued, as required by art. 18 cit. a specific Regulation laying down rules for the granting of concessions of areas and docks (Interministerial Decree MIT and MEF 28.12.2022, n. 202) that contains precise indications on: content of the notice; subjects allowed to submit applications for the purposes of granting the state concession; criteria for determining the fee; management of the concession (Modification of the content of the state property concession; Subjective events subsequent to the release of the concession; Turnover of state property concessionaires; Verification activities of the granting authority).

The ritual investigation procedure provides, pursuant to art. 2, paragraphs 8, 9 and 10 of the aforementioned Regulation approved by decree n. 202/2022, with reference to applications that provide for a duration of the concession longer than forty years, the preliminary acquisition of the opinion of the Ministry of infrastructures and the transports about the coherence of the same with the instruments of national strategic planning of the field. Moreover, the PNA will have to estimate the coherence of the received requests and the relative programs of activity with the harbour Town development plan and with the instruments of strategic planning of the field, under penalty the inadmissibility of the same ones.

It is clear that the institution in question is extremely important in view of the fact that the granting of the concession confers on a private individual a legal advantage in that he is granted a special right of use which not only could not exercise, but would even constitute a crime, in the absence of a suitable title. This is essentially the case in two different directions: on the one hand, it is directed at the granting authority, not only in the sense that it must not obstruct the actual exercise of the right of use by the concessionaire (negative obligation) but also in the sense that it bears the obligation to put the concessionaire in the objective possibility of using the good (positive obligation). In this perspective the "obligation of delivery" from the granting authority towards the concessionaire must be framed. The concession is, therefore, the kind of institution of the administrative concession and has been, since its origin, a fundamental instrument of the administration's action. The growing development of industries and commerce over the years has extended the scope of use of maritime property to include uses related to the emerging interests of tourism and bathing, industry and commerce. The problem of the internal Legislator, then, was precisely to find a point of synthesis between the protection of the interests of the dealers so to speak "historians" and the need to comply with the scope of European rules which are particularly attentive to compliance with principles such as the protection of competition, the prohibition of discrimination and freedom of establishment.

This is not an easy solution, as demonstrated by the turbulence that has occurred since 1993, the year of the first legislative intervention (Law No. 494/93), until the extension to 31.12.2033 of the effects of the state-owned recreational tourist concessions in place at 01.01.2019 introduced by Law No. 145/2018.

Precisely this last legislative option has prompted the European Commission to send Italy on 3 December 2020 a letter of formal notice to be understood as the first official act of a new infringement procedure by asking our country to "ensure transparency and equal treatment" in the allocation of tourist-recreational concessions. To such regard the Assembly Plenary of the Council of State has been pronounced with decision n. 18 of the 9 November 2021 ruling that the national legislative norms that disposing the automatic delay of the marine state property concessions for tourist-purposes. The Court of First Instance held that the Court of First Instance was not entitled to rely on Community law. 49 TFEU and Art. 12 of Directive 2006/123/EC.

The Plenary Assembly, moreover, has established that also where acts of extension of the concessions released from the P.A. have intervened the subsistence of a right to the continuation of the relationship in head to the concessionaires must be excluded. It follows from the disregard of the measure law that the effects it produces on the concessions already granted must also be considered not to be without the presence or not of a declaration of the legal effect of extension adopted by the P.A. or the existence of a judge. the Plenary Assembly has ordered that in order to avoid the significant socio-economic impact that would result from an immediate and generalized forfeiture of all existing concessions, and to allow the Administrations to continue with the tender procedures, the state property concessions for tourist-recreational purposes already in place continue to be effective until 31 December 2023.

In general, art. 36 Nav. Cod. ("Concession of state property") attributes to the Administration, compatibly with the requirements of public use, the power to grant the occupation and the use, also exclusive, of the marine state property for a determined period of time. The granting procedure is initiated on the initiative of the private subject, as provided by art. 5, co. 1, of Executive Regulation of the Navigation Code; the application must specify, pursuant to art. 6 of the aforementioned Regulation both the use that the applicant intends to make of the state property and the duration of the concession requested. The necessary indication of the first element (the use) responds to a precise requirement: to allow the Administration to verify that the use of the good is profitable and, at the same time, that the concession is functional to the satisfaction of the public interest, The successful implementation of which constitutes the principal directive rule which must be constantly standardized in the work of the public administration on concessions in general.

It is possible that several applications for concession from different parties may be received by the administration. This case is governed by art. 37 Nav. Cod. which provides that: "*In the case of more than one application for a concession, the applicant shall be preferred if he offers more guarantees of the beneficial use of the concession and proposes to use it for a use which, in the view of the administration, is in the greater public interest*". As a result of the infringement procedure n. 2008/4908, opened against the Italian State, on the Community incompatibility of the automatic renewal of the concession on expiry has been repealed (from art. 1, comma 18, del d.l. 30 December 2009, n. 194 converted with l. 26 February 2010, n. 25) the c.d. "right of insistence" of art. 37, co 2 Cod. Nav., which ordered that, during the renewal, preference should be given to the previous concessionaire over the new instances, effectively limiting competition.

The Regulations of execution of the navigation code preview that, in the case in which the concession is "of detail importance for the entity or the purpose", the Administration orders the publication of the application by posting in the register of the municipality where the property is located and the insertion of the application by extract in the Sheet of legal notices. Case-law has on several occasions ruled on the power of the administration to decide on the publication of the application, ruling that its exercise must follow objective criteria, since it cannot be left to the discretion of the administration. The rationale of the provision of the aforementioned "obligation to publish" is therefore to be found in the dual purpose of involving any counter-parties through the submission of observations, objections and complaints and, at the same time, to allow other potentially interested parties to be granted the right to submit competitive applications. The submission of the application initiates the investigation phase of the grant procedure and provides for the acquisition of the opinions of the various administrations concerned in order to assess all the public interests involved in the procedure and to verify the existence of conditions necessary for the issue of a valid concession measure.

Once the investigation phase has been successfully completed, as any vetoes of the administrations consulted have been overcome and any disputes on the conditions established have been resolved, the Administration will issue the decision to issue the concession. The granting of the concession creates a legal relationship between the administration and the concessionaire, from which a series of rights and obligations derive: the concessionaire is granted a right of use and occupation of the area and the obligation to use it within the limits and the modalities established by the act of concession; must provide suitable guarantee of performance by means of security (art. 17 Reg. Nav. Cod.) and pay the fee (art. 16 Reg. Nav. Cod.). It is recognized in head to the administration the faculty to make to unilaterally terminate the concessorio relationship following a discretionary appraisal through the revocation (art. 42 Nav. Cod.). The configurability of this power that does not find correspondence in private law, is justified by the need to constantly adapt the activity of the administration to the realization of the prevailing public interests; the Administration also retains a general power of supervision and control over the exact fulfillment of the concessionaire which is exercised in the power to order the revocation of the concessionaire (art. 47 Nav. Cod.) if he does not fulfil the obligations assumed by signing the concession deed. Moreover, the Administration orders the claim of the indemnities due for the uses without title of the marine state property, of zones of the territorial sea and the pertinences of the marine State property, that is for uses various from the concessorio title, are determined to the extent that would have resulted from the application of this decree, increased by two hundred percent and one hundred percent respectively.

### 2.7.2. Accountability & Transparency

Administrative transparency does not have an explicit and direct provision in our Constitution: in fact, in none of the 139 articles of our Fundamental Charter appears the word transparency, let alone the concept of transparency related to the activity of the PNA. When it came to defining the general form and content of administrative activity, the founding fathers referred to other principles: "*The public offices are organized according to legal provisions, so that the good performance and impartiality of the*

*administration are ensured*" (art. 97, co.2 Cost.). Subsequently, despite the explicit reference in the heading to the institution of access to administrative documents, transparency was not initially included by the national legislator of 1990, in the list of general principles of administrative activity contained in Article 1 of Law 8 aosto 1990, n. 241 (New rules on administrative procedure and right of access to administrative documents).

The institution of documentary access introduced by the aforementioned legislation has, at the same time, been a point of arrival and a point of departure. Of arrival because, before that, lacked a general discipline on the access to the administrative documents. Starting point, because, with it, the foundations have been laid for the construction of a real culture of transparency fed by the awareness - matured gradually over time - of the importance of having tools to know the activity of the PNA, not only, for the defense of individual subjective legal positions, but also and, in some respects, above all, to verify abuses and distortions in the exercise of public power. Over the years, this first general regulation on transparency/ accessibility has been affected by several regulatory measures, first of all the one operated by Law n. 15/2005. As part of a major reform of L. 241/1990, the legislator has made some significant changes in the field of transparency. First, it amended Article 1 by stating that: "Administrative activity shall pursue the purposes determined by law and shall be governed by criteria of economy, efficiency, publicity and transparency, in accordance with the procedures laid down by law and the principles of Community law'. In this way it has been institutionalized the obligation for all public administrations to make their work visible and controllable contributing to make the administrative action known by ensuring the maximum possible circulation of information both within of the administrative system, be between the latter and the outside world.

He then intervened massively on Article 22 of L. 241/1990 rewriting it completely; of this rewriting two aspects deserve attention here: the desire to reaffirm the value of transparency as a general principle of administrative action and the emergence of a further specification, always referring to transparency, according to which it "*relates to the essential levels of benefits concerning civil and social rights that must be guaranteed throughout the national territory pursuant to Article 117, second paragraph, letter m), of the Constitution*".

During 2009, Legislative Decree no. 150 of 27 October 2009 introduced further substantial changes in the field of transparency: the first paragraph of Article 11 states that "*Transparency is understood as total accessibility.... information on all aspects of the organisation, indicators of management trends and use of resources for the pursuit of institutional functions, and the results of the measurement and evaluation carried out by the competent bodies, in order to promote widespread forms of monitoring compliance with the principles of good conduct and impartiality. ....*" On closer examination, in addition to providing an initial definition of administrative transparency, the rule in question must also be appreciated for the fact that it clearly testifies to the existence of a metamorphosis: the eligibility of a form of access teleologically new than in the past.

The reference is to the possibility that transparency can be aimed at the implementation of widespread forms of control over the activity of the PNA. This is not a trivial novelty, since precisely this purpose was (and still is) an insurmountable limit on access to documents. The Legislative Decree. 150/2009, therefore, has actively contributed to the construction of that process of differentiation of accessibility in the forms that we know today: that of document access, incardinated in L. 241/1990, and that of simple and generalized civic access governed by Legislative Decree 14 March 2013, n. 33 following the delegation given to the Government by 6 November 2012, n. 190 "*Provisions for the prevention and repression of corruption and illegality in public administration*".

In this regard, it should be noted that the phenomenon of corruption and, in general, illegality is, in our country, a problem of considerable importance, especially because it constitutes a concrete obstacle to an orderly development of the economy, society and the market. Numerous studies place Italy, with reference to the issue of corruption, in positions not entirely flattering compared to the majority of

advanced countries, resulting in an ethical "gap" that seems to characterize our country with particularly negative connotations: In any case, according to Transparency International, the data on the corruption perception index (as of 2022) place Italy at 41 in the world out of 180 countries analyzed, with a marked improvement compared to previous years.

The national legal system, moving in a prevailing way from the cases of crime that have existed for some time in our penal code in terms of corruptive behavior, particular attention has been paid in recent years to the problem of preventing corruption in the public administration in relation to its activities, in order to achieve a discipline suitable not only to repress illegal conduct of this type, but also to impose the adoption of appropriate measures to combat corruption in the broad sense or maladministration (understood as the taking of decisions or behaviour of a civil servant that presents aspects deviating from the care of the general interest due to the improper conditioning of nature by particular interests), also in implementation of the constitutional principles of legality, impartiality and good administration.

The L. n. 190/2012 cit. , is the first organic legislation adopted in Italy to adequately address the issue and respond to the constant monitoring and continuous recommendations of international verification bodies (such as, for example the Working Group within the OECD) also implementing commitments entered into at international level and, mainly, under Article 6 of the UN Convention (Merida Convention) against corruption of 31 October 2003, ratified and enforced in Italy by Law 3 August 2009, n. 116 and Articles 20 and 21 of the Criminal Convention on corruption of Strasbourg of 27 January 1999, ratified by Italy by Law 28 June 2012, n. 110. This law is part of the framework of international legislation on the fight against corruption that has seen the progressive imposition of the choice of the tool of preventing corruption alongside that of repression of the same. In the face of the pervasiveness of the phenomenon, in fact, considered to encourage law enforcement strategies that limit the commission of corruptive conduct through the creation of a system of prevention of corruption or with the adoption of general and specific measures to prevent possible phenomena and promoting integrity as a necessary complement to the sanctions regime established by the Criminal Code for corruption offences, with a view to ensuring the proper use of public resources and making the procedures transparent and the decisions of the administrations impartial.

The law has established the obligation for the Government to adopt a decree within six months of its issuance for the reorganization of the discipline concerning advertising obligations, transparency and dissemination of information by public administrations and in order to comply with the provisions of Decree no. 33 of 14 March 2013 (Reorganization of the regulation concerning the right of civic access and the obligations of publicity, transparency and dissemination of information by public administrations - Transparency Decree, subsequently amended by Legislative Decree. 25 May 2016, n. 97 the legislator has imposed a series of obligations on public administrations to publish information, data, and documents on their institutional sites. This is because transparency, or greater public awareness of the organisation and activities of public administrations, is seen as a means of combating corruption in public administration. The principle is crystallized in art. 1 of the same decree pursuant to which "Transparency is understood as total accessibility of data and documents held by public administrations, in order to protect citizens' rights, to promote the participation of those concerned in administrative activities and to promote widespread forms of control over the pursuit of institutional functions and the use of public resources. It contributes to the implementation of the democratic principle and the constitutional principles of equality, impartiality, good performance, responsibility, effectiveness, and efficiency in the use of public resources, integrity and loyalty in the service to the nation.

It is a condition of guaranteeing individual and collective freedoms, as well as civil, political, and social rights, it integrates the right to good administration and contributes to the creation of an open administration, at the service of the citizen". The Constitutional Court affirmed that with Law 190/2012 «administrative transparency is also elevated to the rank of principle-barrier to the spread of corruption» and that the amendments to D.lgs. 33/2013 have further extended the objectives pursued

through the principle of transparency, adding the purpose of «protecting citizens' rights» and «promoting the participation of interested parties in administrative activity». The Court has also recognized that the principles of openness and transparency are referred to in the Italian Constitution as a corollary of the democratic principle (art. 1 Cost.) and the proper functioning of the administration (art. 97 Cost.). In short, with the Anti-Corruption Law, transparency has become "a real legal asset" that concerns not a part of the administration of the public sector, but all administrative procedures. In particular, the introduction in Italy, by D. Lgs 97/2013, of a real "Freedom of Information Act' in analogy to what happened in Northern Europe and Anglo-Saxon countries.

The Decree has greatly expanded the institution of civic access that, in homage to the international principles of transparency, becomes a right of every citizen not only to demand the effective publication in institutional sites of documents, information and data to be made compulsory public (simple civic access), but also to obtain, free of charge, data and documents other than those, without there being a specific interest in access to be demonstrated, but in any case within the limits laid down by the legislation itself (citizen access). The ANAC (National Anti-Corruption Authority) in the face of these changes has adopted, with Determina n. 1310/2016, the "First guidelines on the implementation of the obligations of publicity, transparency and dissemination of information contained in D.lgs. 33/2013 as amended by D.lgs. 97/2016" together with the Annex relating to the "List of publication obligations" with which to make a general survey of the subjective and objective scope of the transparency obligations of public administrations. The PNA has adopted since the three-year period 2014 - 2016 the Three-year Plan for the prevention of corruption and transparency with which it has defined its strategy for the prevention of corruption and illegality in the implementation of specific legislation and authoritative indications of ANAC improving every year the level of analysis and deepening of legislation, by adopting organizational measures that have been found, at present, to be perfectly suitable to counter the corruptive phenomenon.

### 2.7.3. Marine Spatial Planning

The analysis of the legal and institutional framework related to the PNA domain should include also the current state of the art concerning marine spatial planning (MSP), especially when the port/ports the PNA is responsible for is characterized by a certain degree of port activities heterogeneity. In this perspective, on July 23, 2014, the European Parliament, and the European Council, through the Directive 2014/89/EU, established a framework for Maritime Spatial Planning (MSP). This represents a tool for managing the use of the seas and oceans in a coherent manner and to ensure that human activities take place efficiently, safely, and sustainably. The main objectives of the MSP EU framework are:

- ✓ supporting the sustainable development and growth in maritime sector by considering economic, social, and environmental aspects, through the application of an ecosystem- based approach, and to foster a synergy between different activities and uses;
- ✓ contributing to the sustainable development of energy sectors at sea, of maritime transport, and of the fisheries and aquaculture sectors, as well as to the preservation, protection, and enhancement of the environment, including resilience to climate change impacts. In addition, MSP also contributes to the promotion of sustainable tourism and the sustainable extraction of raw materials.

To implement the MSP, each Member state should establish procedural step that take into account relevant activities and uses in marine waters. In this vein, they should:

- ✓ take into account land-sea interactions;
- ✓ take into account environmental, economic and social aspects, as well as safety aspects;
- ✓ aim to promote coherence between maritime spatial planning and the resulting plan or plans and other processes, such as integrated coastal management or equivalent formal or informal practices;
- ✓ ensure the involvement of stakeholders;
- ✓ organise the use of the best available data;

- ✓ ensure trans-boundary cooperation between Member States;
- ✓ promote cooperation with third countries.

The EU MSP Directive was transposed into Italian legislation with the Legislative Decree 17 October 2016, n. 201. On 1 December 2017, through the Decree of the Presidency of Council of Ministries, the final version of guidelines containing criteria for preparing maritime spatial plans were published (Gazzetta Ufficiale, January 24th, 2018, n. 19). However, to date, there is no legally binding MSP plan for Italy. Also at the Regional level, MSP plans are currently not available. However, Italian Adriatic and Ionian regions have been involved in MSP exercises developed within the ADRIPLAN project, funded by EC DG MARE. The analysis and proposals were developed for the Emilia-Romagna region in the framework of the Italian national project RITMARE. The guidelines comprise the identification of the marine areas to be considered during the preparation of maritime plans and the definition of the relevant areas in terms of land-sea interactions. The three marine areas identified, coherently with the definition of marine sub-regions under the Marine Strategy Framework Directive (2008/56/EU) were: 1) Maritime Area "Adriatic"; 2) Maritime Area "Ionian and Central Mediterranean"; 3) Maritime Area "Tyrrhenian and Western Mediterranean".

When it comes to the national MSP authority, according to article 8, functions of MSP Competent Authority are the responsibility of the Ministry of Sustainable Infrastructures and Mobility. MSP competences are shared among different institutions which are the Inter-ministerial Coordination and the Technical Committee. Regional authorities are also involved in MSP specifically in the Technical Committee, by their representatives, according to the marine sub-region of interest.

In addition, in June 2021, the Italian Government submitted its proposal for future MSP plans for the three aforementioned Italian maritime regions to the European Commission. These plans were submitted to the Regional Councils for approval and will then be open for a public debate in each of the Regions.

On the 1st of February 2022, the documentation on MSP related to the activation of the Strategic Environmental Assessment (SEA)[19] procedure has been sent by the Ministry for Sustainable Infrastructures and Mobility, as proposing authority, to the competent authority on SEA, the Ministry of Ecological Transition; As a result, on the 7th of February 2022 three environmental preliminary reports, one for each of the three aforementioned maritime areas were sent to the national authorities with environmental competences that now have 30 days to reply with their eventual comments.

Turns out opportune to evidence as, San Cataldo Container Terminal (Yilport) has started an operation with one of the main operators of the field Renantis - Falck Renewables, which develops, plans, builds and operates renewable energy production plants in many countries and is an international player in technical consulting for renewable energy. In this context, the SCCT has signed a *Memorandum of Understanding* with the Falck Group Companies on support for the creation of a logistics hub for the construction and operation of floating marine wind projects. Object of the MOU is the potential use, in compliance with current legislation, of an area of the Terminal Containers for landing, storage and assembly of floating platforms and wind turbines in the dock. The project also aims to create significant synergies in the supply chain with other economic operators of public interest, such as Acciaierie d'Italia, for the purchase of steel (by Falck itself) and other related activities and services.

[19] "Strategic environmental assessment consists of a range of analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programmes and evaluate the inter-linkages with economic and social considerations" (OECD Corporate WebSite: https://www.oecd.org/dac/environment-development/strategicenvironmentalassessment.htm#:~:text=Strategic%20environmental%20assessment%20consists%20of,with%20economic%20and%20social%20considerations )

### 2.7.4. SEZ & FTZ: the national legal and institutional framework

The Decree Law No. 91 of 20 June 2017, amended by Law No. 123 of 3 August 2017 (GURI General Series No. 188 of 12 August 2017) and subsequent amendments, as part of the urgent measures for economic growth in Southern Italy, has foreseen and regulated the possibility of the establishment of the Special Economic Zones (SEZ) within which the already operating enterprises or of new installation can benefit of fiscal facilitations and administrative simplifications. With the DPCM 25 January 2018 was adopted the Regulation establishing Special Economic Zones (SEZ) (GURI General Series n. 47 of 26 February 2018), which defines (art. 2): a) the modalities for the institution of the SEZ, included the interregional SEZ; b) their duration; c) the criteria for the identification and the delimitation of the area of the SEZ; d) the criteria that regulate the access of the companies; e) the overall coordination of development objectives.

In June 2019, with Decree of the President of the Council of Ministers, seen the Resolution of the Regional Council of Puglia n. 612 of 29 March 2019 and the Resolution of the Regional Council of Basilicata n. 198 of 15 March 2019, the Ionic SEZ was established, Interregional Special Economic Zone comprised between the Puglia and the Basilicata, that it has in the port of Taranto the harbour district of reference. With Decree of the President of the Council of Ministersof 21 February 2022, the Extraordinary Commissioner of the Government of the Ionic Interregional SEZ Puglia - Basilicata was appointed, in the person of Dr. Floriana Gallucci.

As known, the main incentives offered by the Italian SEZ consist in tax benefits and administrative simplifications (including the possibility of establishing an enclosed free trade zone). In addition, the Italian SEZ offer the established companies easier and better access to credit and infrastructure of the territory.

The Free Trade Zone landlocked is a customs procedure provided for by Reg. EU nr. 952/2013 of the European Parliament and of the Council of 09 October 2013, whose institution in the Port of Taranto is demanded and strongly desired by the PNA of the Ionian Sea. Inside the harbour area 11 areas are characterized whose perimeter is approved of by the Direction of the Agency of Customs and Monopolies. To regulate the regime was issued by the Territorial Directorate of Puglia, Molise, and Basilicata Framework Regulations prot. N. 16590 RU of 03.09.2020 that traced the first operating guidelines. The role of operator and holder of the FTZ scheme is entrusted to PNA and is provided that, the structural and technological works required by current Community regulations are carried out after the allocation of areas and once the activities that will be established there. In addition, all the innovative tools provided by the procedures of digitization and interoperability with administrations will be provided at full capacity.

Al Disciplinary Picture has made continuation in date 16 February 2021, the publication on the site of the PNA of the "Regulations of Operation of the Bonded Custom Zone of the Port of Taranto" in which the main requirements for initiating the procedures for expressions of interest and the main facilitative customs instruments provided for by current Community legislation have been indicated, which allow the productive activities that intend to establish themselves, to hold, store and handle, in the most favourable condition, the goods in foreign state in suspension of customs duties (duty, VAT , excise duties and border surcharges) without time limits .

The PNA of the Ionian Sea for the important role that it plays in the within of the regime of FTZ and that of "governor" of the Port is proceeding, with the aim to attract and to render attractive to the economic operators the installation in the cited areas, to create the conditions more favorable, pushing strongly on the technological innovations required today for commercial, customs and logistic transactions.

It is working in order to supply to the enterprises that, multiple, are being started to demand the entrustment of the areas FTZ and SEZ, the access to the facilitations customs, fiscal and administrative, as well as all the computerized and more advanced tools of interoperability between the Administrations, fast procedures of control for the movimentazioni of the goods and people through the systems of the PCS (Port Community System) and dedicated software able to dematerialize documents, fences and barriers.

### 2.7.5. Environmental regulatory framework

By virtue of the growing global attention to environmental sustainability issues and the increased awareness of institutions regarding the harmful effects that environmental impacts can cause, numerous regulations have been introduced and others are now being defined, both at the international/EU and national levels. In this perspective, appear to be particularly relevant to the port maritime sector the regulations produced by the IMO and EU legislation, including Directives and Regulations currently in force, but also with reference to the proposals contained within the "Fit for 55" package.

Figure 68 shows the overview of environmental legislation at the international and EU level, summarizing for each level of regulatory source the main regulations and/or conventions in force to date and those in the process of being approved.

Figure 68. Environmental regulatory framework.


*Source: Authors' elaboration.*

With specific reference to regulations at the international level, we highlight:

1. United Nations Framework Convention on Climate Change (UNFCCC): an international environmental agreement produced by the United Nations Conference on Environment and Development (UNCED) with the goal of stabilizing atmospheric concentrations of greenhouse gases at a level that prevents dangerous anthropogenic interference with the Earth's climate system. No mandatory limits on greenhouse gas emissions are placed on nations, but periodic updates, called Protocols, are planned in order to achieve emission reduction targets.
2. Kyoto Protocol: an international agreement that establishes precise targets for cuts in emissions of gases responsible for the greenhouse effect and global warming, achievable through the use

of market-based mechanisms such as the Emission Trading System (ETS), Clean Development Mechanism (CDM) and Joint Implementation (JI). Initially, the Protocol included an average emissions reduction target of at least 5 percent below 1990 levels over the five-year period 2008-2012; with the Doha agreement, the Protocol's extension was protracted from 2012 to 2020, with additional greenhouse emission cut targets.

3. Paris Agreement: international agreement adopted in 2015 aimed at limiting the average global temperature increase to below 2° Celsius compared to pre-industrial levels as well as achieving rapid solutions to reach net zero emissions in the second half of the century.

Within the scope of marine environmental protection issues, a key role is played by the IMO regulations mentioned above and in particular by:

1. International Convention for the Prevention of Pollution from Ships (Convenzione MARPOL): the most important international convention concerning the prevention from pollution of the marine environment caused by ships, adopted in 1973 and subsequently supplemented by numerous amendments collected in 6 technical annexes that represent the core of the measures provided by the Convention. Annex VI, in particular, introduces, as of 2015, Sulphur Emission Control Areas (SECAs), areas within which the maximum sulphur content of ship fuels must be less than 0.1 percent, as well as regulations regarding the use of two performance indicators designed to regulate the energy efficiency of ships and their operations, such as the Energy Efficiency Design Index (EEDI) and the Energy Efficiency Operational Indicator (EEOI).
2. Initial IMO GHG Strategy: adopted in April 2018, aims to reduce annual GHG emissions released by the shipping sector by 50 percent by 2050 from 2008 levels and contain carbon intensity by 40 percent by 2030 and 70 percent by 2050. Within the Initial IMO GHG Strategy, the following possible measures for achieving these goals are identified:

- - short-term measures (2018-2022): increasing energy efficiency by tightening energy efficiency requirements (EEDI);
- - medium-term measures (2023-2030): introduction of low-carbon alternative fuels and/or economic incentives for reducing emissions, through Market-Based Measures;
- - long-term measures (after 2030): introduction of carbon-free alternative fuels.

With regard to EU regulations dedicated to environmental protection issues, the following regulations appear to be of particular relevance:

1. European Green Deal: introduced in December 2019 by the European Commission, is a very ambitious strategic plan that aims to make the European Union climate neutral by 2050. In order to achieve this goal, the European Commission has set interim targets to be reached by 2030, including a reduction of at least 55 percent in GHG emissions from 1990 levels, an annual share of at least 32 percent of energy generated from renewable sources, and an increase in energy efficiency of at least 32.5 percent;
2. Maritime Strategy Framework Directive: Directive requiring EU member states to take the necessary measures to achieve a good status of the Union's marine environment by 2020. It entered into force in June 2008, and was transposed into each member state's national legislation by mid-2010. It is the first EU legislative instrument related to the protection of marine biodiversity and aims to protect the resource on which marine-related economic and social activities depend;
3. EU MRV Regulation**:** Regulation that require ships to monitor and report CO2 emissions, fuel consumption, and average energy efficiency. Entered into force in 2015, it applies only to commercial voyages calling at any EU port to load or unload cargo and/or passengers.

In July 2021, the European Commission proposed the "Fit for 55" package, which revises and implements European sustainability legislation to achieve the goals set by the European Climate Law.

Among the 13 proposals contained within the regulatory package, the following are of particular relevance to the port maritime sector:

1. EU Emission Trading System (EU-ETS): the European Emission Trading System is based on a cap-and-trade type mechanism, which provides for the establishment of an overall cap on emissions allowed on European territory in the sectors concerned (cap) to which corresponds an equivalent number of allowances (where each allowance corresponds to 1 ton of CO2eq) that can be bought or sold on a special market (trade). One of the main innovations contained within the proposed EU ETS revision included within the "Fit for 55" package concerns the inclusion of the shipping sector within the emissions trading system. Specifically, ships over 5,000 GT will be included from 2023 and 100 percent of emissions generated in intra-EEA voyages, and 50 percent of emissions generated in voyages to/from non-EEA ports will be covered by the measure.
2. Energy Taxation Directive (ETD): the European Commission with the ETD revision desires to align the energy tax system with EU sustainability policies by promoting the use of green technologies and removing anachronistic tax exemptions and reductions that encourage the use of fossil fuels. Specifically, it is proposed to remove tax exemptions for the purchase or use of marine fuels in the EEA beginning in 2023. Fuels will be taxed according to their energy content and environmental performance.
3. Fuel EU Maritime Initiative: introduces stricter limits on the carbon intensity of energy used by ships starting in 2025. The legislation would apply to ships exceeding 5,000 GT and would cover energy used on board while docked in an EU port, all energy used on board when the ship operates routes between EU ports, and 50 percent of energy used on board when the ship operates routes between an EU port and a non-EU port. In addition, starting in 2030, container ships and passenger ships that dock in a European port will necessarily have to connect to onshore energy sources to cover the energy needs of the ship at berth.
4. Alternative Fuels Infrastructure Directive (AFID): is a scheme designed to increase the availability of alternative fuels and more climate-friendly electricity supplies in EU ports. AFID, which has been in effect since 2014, is designed to promote a sufficient infrastructure network for recharging and refueling ships berthed with alternative fuels, providing alternatives to engines currently powered by fossil fuels. The proposal included within the Fit For 55 package aims to transform the Directive into a Regulation making it binding.

In addition to the above-mentioned regulations, which are of a more general nature, particular relevance in the area of protection and preservation of the marine environment is assumed by the following regulations:

1. Biodiversity Strategy: it aims to halt the loss of biodiversity and ecosystem services in the EU and help stop global biodiversity loss by 2020. A new post 2020 strategy is currently being developed with targets to be met by 2030, including several goals to revert marine biodiversity loss.
2. 7th Environmental Action Programme (7th EAP): it steps up EU efforts to protect the natural capital, by stimulating resource-efficient, low-carbon growth and innovation, and safeguard people's health and wellbeing, respecting the Earth's natural limits.
3. Habitat and Bird Directives (HBD): mainly focus on different marine habitats and species in order to implement protection measures that ensure their conservation status.
4. Water Framework Directive (WFD): it establishes a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater, with the objective to achieve/maintain Good Ecological Status & Good Chemical Status for the coastal and transitional waters.

5. Bathing Water Directive (BWD): it aims to preserve, protect and improve the quality of the environment and to protect human health by adopting adequate containment measures in the release of microorganisms in marine-coastal waters.

# CHAPTER III. SWOT ANALYSIS OF THE PORT OF TARANTO

## 3.1. INTRODUCTION

This section presents a SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis related to the Port of Taranto, which provides a summary of the Strengths and Weaknesses of the port based on an analysis of its resources and capabilities, and the Opportunities and Threats that emerge in the current macro-environment context. According to the managerial methodology applied, the terms Strength, Weakness, Opportunity, and Threat are defined as follows:

- ✓ **Strengths**: the best resources and capabilities that make the port successful (typically internal competences, resources, skills, etc.);
- ✓ **Weaknesses**: areas in which the port needs to improve;
- ✓ **Opportunities**: probable circumstances for which the port is well suited to explore;
- ✓ **Threats**: external factors or trends the port has limited, if any, control over and could negatively affect its future.

The SWOT serves as a basis for generating strategic options and assessing future courses of action for the port of Taranto, which will be presented in the following sections.

The detailed information included in this section is based on desk research and proper assessments made by the project team, on inputs and feedback received from the port authority, and on the findings from a survey conducted among both the internal and external stakeholders of the port during March 2023, as reported and described in Section IV. The PESTEL analysis (see Section II) provided an overview of the main trends and developments in the macro-environment that potentially affect the current and future competitive position of the port of Taranto. Its findings provide direct input for identifying relevant **opportunities** and **threats** for the port of Taranto.

The **strengths** and **weaknesses** of the port of Taranto can relate to **resources** (assets that the port has or can call upon) and **capabilities/competencies** (the ways those assets are used). These elements have been identified also paving on data and information reported in Section I. The aforementioned resources and capabilities can relate to the following three dimensions:

- ✓ **Hardware:** the port's location, the available port land, the infrastructure and superstructure in the port and the access to the hinterland, communication hardware, people, and capital;
- ✓ **Software:** automation, data available, financial flows, etc.
- ✓ **Orgware:** organization skills, know how, processes, cooperation with stakeholders, organizational aspects related to ESG, laws and regulations, land management and concession policy, etc.

The current and to-be-developed strengths of the port of Taranto should not only form the basis for the **competitive advantage** of the port in the port-related markets (cargo, cruise, logistics, industry, etc.) but also guarantee the **port's license to operate** from a broader societal perspective. Therefore, the SWOT analysis has been executed for the different market segments in the port, as well as for the port's societal license to operate. In this vein, for the aims of the analysis, the following market segments and areas of interest are distinguished:

- ✓ SWOT analysis for the overall trade flows and supply chains;
- ✓ SWOT analysis for the containerized cargo market;
- ✓ SWOT analysis for the cruise/ferry/ro-ro markets;
- ✓ SWOT analysis for industrial bulk and breakbulk cargo flows/activities;
- ✓ SWOT analysis for the energy market and energy transition;
- ✓ SWOT analysis regarding the societal license to operate.

The SWOT analysis results are detailed in connection to a TOWS matrix (Table 31). Each box of the TOWS matrix can be used to identify options that address a different combination of the internal factors (strengths and weaknesses) and the external factors (opportunities and threats).

Table 31. General presentation of the TOWS matrix.

| | **Strengths** | **Weaknesses** |
|---|---|---|
| **Opportunities** | **S-O:** Strengths the port of Taranto can use to take advantage of opportunities. | **W-O**: Overcoming weaknesses of the port of Taranto by taking advantage of opportunities. |
| **Threats** | **S-T:** Strengths the port of Taranto can use to avoid/mitigate threats. | **W-T:** Options of the port of Taranto to minimize weaknesses and avoid threats. |

*Source: Authors' elaboration.*

The following sub-sections report the synthesis of the main research outcomes from the series of SWOT analyses in a tabular format. Next to identifying the opportunities and threats for the port of Taranto, the tables also define specific TOWS-matrix combinations in the third column of each table. These are coded with one of the following indications:

- ✓ **S-O** = Strengths the port of Taranto (hardware, software and/or orgware) can be used to take advantage of the opportunity that has been identified;
- ✓ **W-O** = the port of Taranto might be able to overcome weaknesses (hardware, software and/or orgware) by taking advantage of the considered opportunity;
- ✓ **S-T** = Strengths of the port of Taranto (hardware, software and/or orgware) can be used to avoid/mitigate the considered threat;
- ✓ **W-T**: Options for the port of Taranto to minimize weaknesses (hardware, software and/or orgware) and avoid considered threats.

## 3.2. SWOT ANALYSIS AT THE LEVEL OF OVERALL TRADE FLOWS AND SUPPLY CHAINS

Table 32. SWOT analysis at the level of overall trade flows and supply chains.

| | Short description | Comment & positioning in TOWS-matrix |
|---|---|---|
| **Opportunities** | The political adoption of concepts such as 'trading with friends' and 'friendshoring'. | **S-O**: This can, in the medium term, generate shifts in origin-destination flows using the port of Taranto, with a growing dependence on traffic relations within the EU, the US/Canada, other western oriented nations, and upcoming nations in the renewable energy landscape. This is particularly relevant to high-tech products, key mining products and renewable energy flows. |
| | An increasing level of integration among existing EU member states and potential accession of new EU member states in the Balkan region or wider Med region. | **S-O**: As a port located in the periphery of the EU, the port of Taranto is likely to be affected more than centrally located ports. |
| | Success in the globalized economy increasingly relies on the development and strong governance of diversified and sustainable ecosystems. | **W-O**: The Port of Taranto should therefore continue to shape a strong local port ecosystem, characterized by the interaction between a range of mutually enforcing activities. |
| | Increasing attention to the Blue economy/Ocean economy | **W-O**: The impact of the Blue Economy/Sea Economy on regional value added and employment should be considered in port planning and marine spatial planning: a more comprehensive range of potential stakeholders related to Blue Economy could be included in the local port ecosystem. |
| | Logistics integration comes with higher demands for digital transformation solutions that go beyond individual ports. | **W-O**: Digital transformation within the Port of Taranto thus has to be complemented by digital network formation with other nodes in the wider logistics network. |
| | Industry 4.0 affects the demand for transport and logistics services as more manufacturing will be regional, leading to a diverse landscape for economic geography in Europe. | **S-O**: More chances for peripheral regions in the EU (such as south Italy) to attract production and manufacturing activities emerge in the mid- and long-term. |
| | A number of emerging digital technologies are expected to shape the maritime-port industry with disruptive effects on national and global supply chains in terms of coordination/integration among partners, operational and financial performances as well as resilience. | **S-O**: Port of Taranto is expected to keep the pace with these unprecedented challenges by participating in cutting edge port projects and innovative action jointly with private and public parties and experts. |
| | Taking into consideration the many platforms being developed ranging from port networks to booking platforms or various forms of horizontal collaboration, a clear need emerges for implementable network solutions that transcend the individual platforms. | **S-O**: Port of Taranto should play an active role in supporting the accomplishment of physical, digital, and operational interconnectivity through investments in smart infrastructure to support business and turn ports and infrastructure in general into "smart" infrastructure. |
| | The revised TEN-T Regulation emphasizes the maritime pillar while fostering | **S-O**: The Port of Taranto is at the periphery of the EU port system, proximate to EU |

| | | |
|---|---|---|
| | cooperation with third countries, including neighboring countries. | Mediterranean neighboring countries. The port should attract additional cargo flows from these countries, playing a role in fostering EU trade relations with these countries. |
| **Threats** | Seaports are increasingly perceived to be of national strategic interest in energy provision and transition, geopolitical relations, public health, etc. | **W-T**: This brings higher risks of political interference at the supranational and national levels in choosing appropriate business development options for ports, potentially also in the case of Taranto. |
| | The war in Ukraine and the growing tensions between China's command economy/socialist market economy and the free market economic system create an uncertain geo-economic context for world and regional trade. | **W-T**: This can potentially lead to higher traffic volatility in the Port of Taranto as well as in other national ports. |
| | The risks for economic shocks make long-term growth projections becoming more unstable. Risk assessment and mitigation are vital for port activities. | **S-T**: Unpredictable trade-related conditions demand a resilient, flexible and adaptive port strategy in Taranto that can adjust to uncertainty and unexpected changes in the port competition context. |
| | The establishment of free trade zones in Southern countries. | **S-T**: This can undermine the ambitions of the ZES within the port of Taranto. |
| | The vertical integration trend leads to larger port users with strong bargaining power throughout the supply chains. Also, the horizontal integration trend leads to larger port users with strong bargaining power. | **S-T**: Different forms of co-makerships and partnerships with key port users are needed to address issues affecting the performance of the port-related chains in terms of efficiency, sustainability and resilience. The Port of Taranto's attractiveness is therefore not only determined by the port characteristics but also by how the port is able to insert itself in the supply chains of the customers in an efficient and sustainable way. Cooperating closely with the International Terminal Operators (ITOs) involved in port operations is urged aiming at being further integrated into the new emerging global supply chains. |
| | Carriers and shippers seek cargo routing flexibility, also for Asia-Europe trade links. This implies that Mediterranean gateway and transhipment ports will potentially face some competition from alternative route options by rail (Eurasian landbridges) or sea (Cape route). | **W-T**: The port of Taranto can develop new links to the array of routing options (for example by connecting to Black Sea ports in Georgia in view of establishing a link with the middle rail corridor to China). |
| | The EU proposals on including emissions from maritime transport in the ETS system increases the importance of non-EU ports at the periphery of the Union as an intermediate call, in long-distance voyages. | **W-T**: This might increase feeder services in the Mediterranean Sea and the Port of Taranto could benefit from this trend by playing a role as a new pole for feeder calls and cargoes in the geographic area. |

*Source: Authors' elaboration.*

Note:
S-O = Strengths the Port of Taranto can use to take advantage of opportunities.
W-O: Overcoming weaknesses of port of Taranto by taking advantage of opportunities.
S-T = Strengths the Port of Taranto can use to avoid/mitigate threats.
W-T: Options of the port of Taranto to minimize weaknesses and avoid threats.

## 3.3. SWOT ANALYSIS FOR THE CONTAINERIZED CARGO MARKET

Table 33. SWOT analysis for the containerized cargo market.

| | Short description | Comment & positioning in TOWS-matrix |
|---|---|---|
| **Opportunities** | China's BRI has already had ramifications on Chinese container port investments in Europe, the Med and Italy, next to newly established long-distance rail connections between China and Europe. | **W-O**: While the Port of Taranto currently does not appear as a key node in the growing BRI-related infrastructure network, its central position in the Med makes the port part of a larger area that could continue attracting interest from a Chinese geo-economic perspective. |
| | For Central and East Europe ports, it is unclear what share of 'nearshoring'-related import flows would be shipped directly to the mentioned ports of entry, and what share will be transshipped in other locations (such as at Med hubs) before being feedered to the ports of entry. European distribution patterns of products fabricated in nearshoring locations will not necessarily rely on distribution centers located in close proximity to these nearshore locations. | **W-O**: There are significant opportunities for the Port of Taranto to insert itself as an intermediate hub for such traffic flows. |
| | The growth of the e-commerce is affecting container flows and distribution patterns. Increased traffic flows are expected from large-scale distribution (GDO), which increasing will trigger the intermodal integration of maritime and rail transport. | **W-O**: The Port of Taranto can benefit from the decisions performed by e-commerce giants (e.g., Amazon) and large retailers (e.g., Walmart, Costco, etc.) with regards to the 147ocalization of their urban centers, sorting centers and depots in the regions for also developing distribution activities, value added services and last mile logistics. |
| | The distribution market is characterised by the growth of XXL warehouses, e-commerce hubs as well as an increasing specialisation of distribution centers in niche markets (both product-wise and spatially). | **W-O**: The port of Taranto is challenged to follow a targeted commercial strategy concerning distribution and warehousing activities, thereby benefiting the most from the current/future industrial structure and cargo base of the port ecosystem, the ZES development and its location at the crossroads of major maritime trade lanes. |
| | New logistics corridors are emerging across Europe and the Med. These corridors are expected to affect the current distribution systems leading to a more diverse spatial landscape with less concentration of European distribution centres in Belgium, the Netherlands, northern France, and western Germany. | **W-O**: While the Port of Taranto is somewhat remote to the dense cargo hinterlands in the 'blue banana', the new emerging logistics corridors can provide opportunities to attract European distribution activities. The Port of Taranto is located at the periphery of the eight primary logistics corridors expected to define European logistics in the 2025-2030 timeframe; therefore, a clear port strategy for bridging this gap is needed. |
| | Virtually, all container ports in Europe have welcomed one or more international terminal operators (ITOs), including both independent terminal operators or carrier-linked operators. | **S-O**: The presence of an independent and international terminal operator managing the SCCT in the Port of Taranto is expected to produce positive effects on the container throughput of the port in the next few years. |

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| | The South-Italian container market offers possibilities for developing gateway traffic of the ports located in this region. | **S-O**: The Port of Taranto can consider developing a commercial strategy to expand its local gateway hinterland, thereby competing with other Italian ports. The presence of the operator Yilport Holding and the agreement stipulated with the company Kalipso provides significant development opportunities from an intermodal perspective with a progressive increase also in rail traffic. The ZES development could also help attract container traffic, but also provide opportunities for offering value-added services. |
| | The 24,000 TEU vessel (400m long and 23 rows wide) seems to have become the commercial and environmental upper limit in ship size, although more and more shipping lines are ordering ships in the 12,000 to 17,000 TEU range. | **S-O**: Having a terminal accessible to the largest container vessels is a key basic condition to compete in the deepsea container market. |
| | The break of the 2M alliance in 2025 will result in the reorganization of the shipping networks of Maersk and MSC, while the potential of other alliances reforming their terms of cooperation is on the table | **S-O**: Being able to serve deepsea services, the pPrt of Taranto, could gain a role in serving those alliance members, which will seek to restructure their shipping networks and establish new hub and feeder ports. |
| **Threats** | The most likely nearshoring locations from a European perspective include North Africa (Morocco, Tunisia), Turkey and East and Central Europe. The cargo flows linked to the sourcing of raw materials and components are most likely going to transit seaports that are in close proximity to these locations, i.e., Tanger Med and smaller local ports for North Africa; Turkish ports (Ambarli, Mersin, etc..) for the Turkish locations; and North Adriatic ports (Trieste, Koper, etc.), Greek ports (Piraeus and Thessaloniki), Polish ports and also Hamburg for Central and Eastern Europe. | **W-T**: Port of Taranto will only marginally be able to attract additional gateway container traffic in case of large-scale nearshoring to Europe. |
| | Container port competition in Europe is very dynamic with more and more ports vying for contestable hinterland regions in the core of the European Union. | **S-T**: The port of Taranto has been included in TEN-T Scandinavian Mediterranean Corridor (Malta) and the extension of the Baltic Adriatic corridor. The position of the port of Taranto on some key long-distance rail and maritime TEN-T corridors combined with the vast network of logistics centers (interporti) and other logistics nodes in Italy opens up opportunities for developing a stronger transit function for transhipment and gateway traffic.<br><br>**S-T**: Local hinterlands continue to form the backbone of ports' cargo bases. This also applies to the Port of Taranto (for now).<br><br>**S-T:** The connection of the Port of Taranto with the Interporto Regionale della Puglia could constitute an unprecedented opportunity for developing intermodal traffics and port throughput in the future. Valuable business opportunities are also expected from the enhancement of connections with other logistics centers and |

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| | | far dry ports, as well as the development of the Ionic Special Economic Zone (SEZ). |
| | In the last decade there has been a strong increase in the competitiveness of North African ports operating in the container business, especially in relation to transshipment activities. | **S-T:** Effective data management and digital platforms are key in reducing inefficiency, emissions and energy consumption in hinterland transport and promoting a modal shift to rail. |
| | Successful transhipment ports often rely on carrier-linked terminal investments and a high liner shipping connectivity. | **W-T**: This could damage the development of the related port traffic by the Port of Taranto |
| | | **W-T:** Port of Taranto has to rebuild its transhipment position from zero, building relations with carriers and gradually developing a good maritime connectivity. |
| | The container market is characterized by a massive vessel order wave which is expected to lead to overcapacity. Under such circumstances carriers tend to concentrate flows in large hubs. | **S-T**: The port of Taranto has a favourable location and infrastructure for regaining a position in the Med transhipment business. |
| | | **W-T**: Under the current weaker market circumstances, it is more difficult to relaunch the port as a major container gateway and transhipment center. |

*Source: Authors' elaboration.*

Note:
S-O = Strengths the port of Taranto can use to take advantage of opportunities.
W-O: Overcoming weaknesses of port of Taranto by taking advantage of opportunities.
S-T = Strengths the port of Taranto can use to avoid/mitigate threats.
W-T: Options of the port of Taranto to minimize weaknesses and avoid threats.

## 3.4. SWOT ANALYSIS FOR CRUISE/FERRY/RORO

Table 34.SWOT analysis for the cruise/ferry/roro market.

| | Short description | Comment & positioning in TOWS-matrix |
|---|---|---|
| **Opportunities** | Europe is a major source of cruise passengers, yet with low penetration in all European countries. The Port of Taranto is part of the second major cruising area in the world. The region has demonstrated continuous growth in cruise calls and passengers and has the potential to maintain this trend. | **S-O**: This creates opportunities for the Port of Taranto to benefit by attracting cruise passengers from source countries which are in close proximity.<br><br>**W-O**: There are important business opportunities originating from the development of marketing campaigns targeting "repeaters". The Port Authority might focus also on increasing cruise passengers' satisfaction when disembarking at the port of call. The port and the destination could work to provide a comprehensive and memorable experience to cruise passengers<br><br>**W-O**: The Port of Taranto should also evaluate development opportunities that can originate for the entire local community and port cluster from adopting digital solutions for enhancing innovative touristic services nested in the cruise and ferry domain. |
| | There are almost a million Italians that cruise every year. | **S-O**: The port of Taranto could attract part of this market, exploiting the potential of hosting more cruise calls, and considering the potential of hosting cruise homeporting activities. |
| | There is a consolidation of Italy's trade relations with North African countries | **W-O**: This could favor the development of Ro-Ro traffics for the benefit of the Port of Taranto, along these routes. |
| | The (almost) uninterrupted cruise market increase. | **W-O**: This is an opportunity for the port of Taranto to develop those strategies that will enable it to attract more cruise passengers.<br><br>**S-O**: The geographical location of the port of Taranto allows to take advantage of linking different regional cruising areas in the Mediterranean: it can serve as among the ports/destinations included in itineraries that include Adriatic as well as East Med and/or West Med destinations |
| | Corporate Social Responsibility and sustainability are at the core of cruise lines' strategies | **W-O:** The port of Taranto should focus on corporate social responsibility as part of its social license to operate, following the same path as cruise lines. Collaboration with the cruise terminal operator and further cooperation with destination institutions on the sustainability of cruise services would help develop a competitive advantage over competing cruise ports and destinations. |
| | Cruise activities growth is taking place through specialization. As a result, | **S-O**: Further development of the port terminal dedicated to cruise activities, |

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|---|---|---|
| | increasing cruise traffic will require additional capacity in cruise ports and thus capital investments. | operated by an independent and skilled private operator rather than the Port Authority, should be accompanied by structured cooperation with stakeholders along the cruise supply chain to upgrade the services offered to cruisers and cruise vessels |
| | The engagement of the private sector in cruise terminal management might lead to increased quality in service provisions to cruise vessels and passengers. | **W-T:** The port of Taranto can emerge as a destination for a specific cruise segment by aligning the offered services to the needs of the particular segment. At the same time, it needs to avoid a single-dimension approach. The port needs to act as a facilitator of stakeholders' interactions in order to secure the offering of differentiated services to the various cruise lines that might consider visiting the region and their passengers.<br><br>**S-O**: There is an opportunity to increase private investments through the participation of a global cruise terminal operator in the port of Taranto. |
| | The Mediterranean Sea is the second biggest cruising market and following the resumption of cruise activities after the pandemic, there are strong indications that cruise lines are restructuring their itineraries, seeking niche markets, new destinations, and homeports | **S-O:** The port's geographical location, the existence of an organised cruise terminal, and the presence of a global cruise terminal operator, are crucial parameters for a cruise line seeking new destinations.<br><br>**S-O**: The port of Taranto can pursue a cooperation scheme with a cruise company, in order to safeguard a minimum number of cruise calls. |
| | Short Sea Shipping will continue to be at the forefront of EU maritime initiatives toward a more environmentally friendly transportation system | **W-O**: The port could exploit new short-sea shipping Ro-Ro services linking Italy with nearby EU member states (i.e., Greece) and neighbouring countries (such as Turkey and North African countries). |
| | The ongoing cargo unitization increases Ro-Ro cargoes | **W-O**: The port of Taranto should take actions to attract Ro-Ro services. |
| **Threats** | There is a threat that cruise passengers will remain onboard during their visits to a specific destination.<br><br>In cruise shipping, there are many destinations to be selected by cruise lines, and competition is intense. A cooperation scheme with a major cruise group can safeguard significant cruise vessel calls and passenger traffic at a port. | **W-T**: The port and the destination must provide incentives to make disembarkation attractive.<br><br>**S-T**: The 20-year concession agreement awarded to Global Port Holding for managing the cruise passenger terminal of the Port of Taranto signed on April 2022, embeds the Port of Taranto in a global network of cruise terminal facilities managed by an independent international operator; this is expected to make Taranto a privileged destination to be included in cruise lines itineraries with a positive effect on the cruise traffics for the Port.<br><br>**W-T**: A strong engagement with a major player in the cruise industry might jeopardize the business growth of a cruise port in case a cruise line seeks an alternative destination or port of call. |

| | | |
|---|---|---|
| | In the case of single cruise terminals, the concession to a private company might result in a private monopoly in cruise port services provision. The increased market concentration provides cruise lines additional bargaining power over ports and destinations. Cruise companies might push for even greater incentives from the port authorities, the local authorities at the destination or even the central government. | **W-T**: The concession of a cruise terminal combined with the development of recreational activities by the terminal operator would jeopardize the benefits that the destination enjoyed due to the growth of cruise activities, as the terminal operator will seek to be the one benefiting by cruise passengers' spending.<br><br>**S-T**: The presence of a Global Cruise Terminal Operator at the port of Taranto, balances the bargaining power of cruise companies. |
| | Seasonality affects the use of a cruise terminal. A cruise terminal might remain unused for a lengthy period with such an underutilization prone to risk the related port infrastructures. | **S-T**: Alternative uses of space and facilities are worth to be considered, or a port might use its cruise terminal as a multipurpose facility or develop non-permanent infrastructures (i.e., floating docks). This insight appears relevant to the Port of Taranto case.<br><br>**S-T**: Building on an existing port-city relation and strong stakeholder relations, the port could work with the destination to expand the cruise season. Towards this, the port should work on increasing the positive experiences of cruise passengers in order to foster cruisers' intentions to revisit the destination and to perform positive WoM (Word of Mouth) to relatives and friends. |
| | Cruise ships are getting bigger. The increase in passenger capacity of cruise vessels requires cruise ports to be able to handle a significant number of passengers simultaneously. | **W-T**: Cruise ports need to continuously adapt their infrastructures and superstructures to the size of the new cruise vessels, especially those ports facilitating major cruise destinations. |
| | There are several competitors regarding the facilitation of ferry vessels in the area of Southern Italy | **W-T**: Ferry business will remain an unexplored market for the port of Taranto, and the port should focus on the development of the port markets which has competitive advantages. |

*Source: Authors' elaboration.*

Note:
S-O = Strengths the Port of Taranto can use to take advantage of opportunities.
W-O: Overcoming weaknesses of port of Taranto by taking advantage of opportunities.
S-T = Strengths the Port of Taranto can use to avoid/mitigate threats.
W-T: Options of the port of Taranto to minimize weaknesses and avoid threats.

## 3.5. SWOT ANALYSIS FOR INDUSTRIAL BULK AND BREAKBULK CARGO FLOWS AND ACTIVITIES

Table 35. SWOT analysis for industrial bulk and breakbulk cargo flows and activities.

| | Short description | Comment & positioning in TOWS-matrix |
|---|---|---|
| **Opportunities** | Technology advances such as robotization imply that the flexibility of manufacturing becomes more reliant on easy access to suppliers and customers. | **S-O**: Logistics zones near large terminal facilities such as ports, airports, and intermodal terminals in the hinterland offer an attractive proposition for the emerging manufacturing landscape of the fourth industrial revolution. |
| **Threats** | The EU is likely to push through with imposing sustainability criteria on import flows of certain ETS related products. | **S-T**: This can have a dual effect on the steel and petrochemical industries in the port of Taranto: (1) Moderate price increases for imports of raw materials (such as iron ore or oil); (2) Moderate price increases for imports of finished steel and chemical products, giving a small support to local production. As it stands at present, the latter price factor is however expected to be quite negligible. |
| | The increase in the cost of energy and raw materials will generate a progressive increase in the incidence of energy costs on total production costs, potentially negatively impacting the competitiveness of Europe's industrial activities. | **W-T**: For the Port of Taranto there are major risks associated with the crisis in the iron and steel sector and the dependence of port traffic on the production activity of the "Acciaierie d'Italia" company. |
| | The gradual transition to a decarbonised EU economy will significantly reduce oil shipments to the EU. | **W-O**: Being a port that facilitates significant oil shipments, the port of Taranto should take initiatives towards the disengagement from this market, focusing on cargoes that are serving the green transition. |

*Source: Authors' elaboration.*

Note:
S-O = Strengths the Port of Taranto can use to take advantage of opportunities.
W-O: Overcoming weaknesses of the port of Taranto by taking advantage of opportunities.
S-T = Strengths the Port of Taranto can use to avoid/mitigate threats.
W-T: Options of the port of Taranto to minimize weaknesses and avoid threats.

## 3.6. SWOT ANALYSIS FOR THE ENERGY MARKET AND ENERGY TRANSITION

Table 36. SWOT analysis for the energy market and energy transition.

| | Short description | Comment & positioning in TOWS-matrix |
|---|---|---|
| **Opportunities** | While there are already quite a few examples of sustainable finance in the port industry, there is still room for ports to embrace sustainable finance in partnership with their financial service providers. The sustainable finance market will need further upscaling to deal with the specific challenges linked to the implementation and financing of large energy transition projects such as green hydrogen infrastructure | **S-O**: Impressive business opportunities emerge in the field of green finance when funding port projects and investments aimed at increasing port sustainable growth and green strategies, especially in the case of the Port of Taranto given the well-known historical criticalities and weaknesses originating from heavy polluting industries located in both the port and the city areas.<br><br>**S-O**: The National Recovery and Resilience Plan (NRRP) provides Port Authorities and port operators with valuable incentives for implementing green investments (see, for example, the "Green Ports" funding scheme). |
| | Ports are increasingly urged to develop both green strategies and CSR (Corporate Social Responsibility) initiatives for complying with updates in the EU environmental-related legal framework and keeping the pace with the increasing pressure and claims from public opinion and societal groups of interest. | **W-O**: The Port of Taranto might opt to anticipating this emerging trend when pursuing its portfolio diversification strategy by prioritizing green and sustainable port investments and projects. This strategic approach could support and enhance the new positioning of the Port of Taranto at both national and international level, fostering its attractiveness and competitiveness. Sustainability must be at the core of port strategy and operations. |
| | Emission and energy reduction concerns have accelerated the ordering and deployment of LNG and methanol-powered vessels which require adequate bunkering facilities. | **S-O**: Given its strategic location close to the main shipping route in the Med, the Port of Taranto is invited to concretely evaluate investments and initiatives for bunkering and storage facilities dedicated to alternative marine fuels. |
| | In the next 5 to 10 years, several valuable business and funding opportunities related to implementing interventions for switching to renewable energy sources will emerge in the port context. The implementation of projects dedicated to the circular economy and the reduction of waste from port activities will become key issues for all ports worldwide, especially in the EU area. | **S-O**: Port of Taranto is urged to prepare for forthcoming challenges and exploit related opportunities for shaping new business models in energy consumption and production systems (e.g., energy production from renewable sources, implementation of innovative managerial tool in the energy management systems field, diffusion of best practices for targeting reductions in energy consumption from private operators located in port areas, etc.).<br><br>**S-O**: The strong interest in green hydrogen and the emergence of hydrogen valleys provide opportunities for the Port of Taranto to tap into this emerging market. Early movers are expected to excel as green hydrogen hubs.<br><br>**S-O**: The Ionian Sea Porth Authority considers circular economy paradigm a key issue for fostering sustainable port development and setting environmental- |

| | | |
|---|---|---|
| | Onshore power supply (OPS) is one of the strategies for reducing the environmental impact of seagoing vessels in ports. Still, its implementation needs a coordinated approach with the shipping lines and other (European) ports.<br><br>Developing green strategies in ports cannot disregard the analysis of best practices applied in the maritime transport sector. | related goals for the next future. LCA, LCC, ELCC and SLCA managerial practices are expected to bring significant benefits in reducing the impact of port activities from both environmental and social perspectives.<br><br>**S-O**: Being part of the core TEN-T network, the Port of Taranto could exploit several EU funding schemes for financing energy transition projects and the development of alternative fuel bunkering facilities.<br><br>**W-O**: The Port of Taranto should consider to accelerated OPS-related port projects and form alliances with other ports and shipping actors for sharply realizing these infrastructures and facilities in the port areas.<br><br>**S-O:** Several suitable initiatives and investment options for increasing the sustainability of port development are available for the Port of Taranto both in the field of greening port and terminal operations (e.g., applications of CCUS, the achievement of "ecologies of scale", the development of windmills and solar parks/roofs, contributions to the development of supply chains of renewables, the use of low-emission or zero-emission quay or yard equipment, green clauses in concessions, etc.) as well as hinterland transportation (e.g., development of data-driven synchromodality solutions, initiatives to support the energy transition, initiatives for supporting modal shift, advances in the traffic management system, solutions for reducing congestion and optimizing vehicle flows, etc.). Relatedly a number of feasible best practices already tested in major European ports exists and could envisage the next steps towards energy transition within the sustainable and green strategy pursued by the Port of Taranto. |
| **Threats** | The rise of sustainable finance implies green/sustainable investment, projects and overall company strategies are becoming the norm. From a financial perspective, opting for a non-sustainable or less sustainable port development path will more and more come at a cost premium.<br><br>Social support for expanding growth activities should not be taken for granted, given the heavy industrial heritage from polluting industries historically located in the Port of Taranto. | **W-T**: The industrial cargo base of the port of Taranto strongly relies on some hard-to-abate industries (steel production, chemical industry). This could lead to low interest from national and international financers and investors towards green projects located in the Port of Taranto.<br><br>**S-T**: Concrete commitment of the Port of Taranto as regards energy transition and decarbonization has to be clearly communicated to both relevant public authorities, societal groups of interest and the whole local community, grounding on both innovative communication strategies, the adoption of CSR reporting grounded on material topics and quantitative empirical analyses as well as dialoguing with involved stakeholders though bi-directional communication channels. |

| | | |
|---|---|---|
| | The percentage of ships using alternative fuels is relatively low. | **S-T**: Social support needs to be enhanced via an appropriate port strategy.<br><br>**W-T**: There is the danger of not recovering the initial CAPEX in bunkering facilities for alternative fuels, jointly considering the long financial payback period which characterized this type of investment and the potential technological uptakes in the forthcoming years. |

*Source: Authors' elaboration.*

Note:

S-O = Strengths the Port of Taranto can use to take advantage of opportunities.
W-O: Overcoming weaknesses of the Port of Taranto by taking advantage of opportunities.
S-T = Strengths the Port of Taranto can use to avoid/mitigate threats.
W-T: Options of the Port of Taranto to minimize weaknesses and avoid threats.

## 3.7. SWOT ANALYSIS REGARDING THE SOCIETAL LICENSE TO OPERATE

Table 37. SWOT analysis regarding the societal license to operate.

| | Short description | Comment & positioning in TOWS-matrix |
|---|---|---|
| **Opportunities** | The future of ports will increasingly have to be guided by UN SDGs and ESG requirements and increase voluntary disclosure provided to port stakeholders regarding the aforementioned topics and issues. UN SDGs and ESG requirements will become increasingly crucial in shaping relations with port stakeholders. | **S-O**: In the current port context, unprecedented opportunities emerge for the Port of Taranto linked with the development of innovative port-related strategic actions aligned with the ESG paradigm. Decarbonization and emission reduction are expected to be at the core of the port's strategy and shape the port development agenda. |
| | UN SDGs and ESG requirements bring a stronger focus on stakeholder relations management in ports and creates new opportunities for fostering port clusters and innovative port ecosystems. | **S-O**: This trend triggers new opportunities for the Port of Taranto to further upgrade stakeholder relations management (SRM) practices from a port ecosystem perspective. Relatedly, the mapping and prioritization of port stakeholders is expected to become an interactive and continuous activity, leading to a process-based approach toward SRM practices. |
| | There is a growing focus on green and sustainable hinterland transport. Ports have to green their inland transport activities to keep their community 'license to operate'. | **S-O**: The position of the Port of Taranto on some key long-distance rail and maritime TEN-T corridors combined with the vast network of logistics centers (interporti) and other logistics nodes in Italy opens up opportunities for developing a stronger transit function using environmentally friendly transport rail and shortsea/coastal shipping. |
| **Threats** | The major social changes in port shipping in the coming years will concern the availability of a highly talented and motivated workforce in order to guarantee the introduction of major emerging digital innovations in the port domain. | **S-T**: To keep pace with new social trends, the port authority should invest in innovative educational programs to boost internal human resources.<br><br>**S-T**: The Port of Taranto should intensify its cooperation with regional and national Universities and research centres specialized in shipping for developing ad hoc learning & training programs in line with emerging trends which are shaping the industry. |
| | The mega cruise ships and the number of passengers they carry threaten the sustainability of cruise destinations, challenging social support for cruising. The cruise vessels visiting the port are not the biggest ones that receive negative headlines | **W-T:** Port of Taranto will need to explore the development of long-term relationships with cruise lines to be able to better plan its infrastructure development and operations efficiency and to guarantee the balance between positive and negative externalities from cruise operations affecting the port ecosystem and the local community as well as a fair distribution of benefits and costs among the diverse stakeholders locally involved in the whole value chain.<br><br>**W-T:** The port of Taranto should seek to increase societal interaction and awareness as regards the benefits and sustainability of cruise activities served by the port, aiming at |

| | | |
|---|---|---|
| | | eliminating possible social reactions dealing with the destination's cruise carrying capacity. |

*Source: Authors' elaboration.*

Note:
S-O = Strengths the Port of Taranto can use to take advantage of opportunities.
W-O: Overcoming weaknesses of the Port of Taranto by taking advantage of opportunities.
S-T = Strengths the Port of Taranto can use to avoid/mitigate threats.
W-T: Options of the Port of Taranto to minimize weaknesses and avoid threats.

# CHAPTER IV. THE STAKEHOLDERS' PERSPECTIVES

## 4.1. METHODOLOGICAL PROFILES & RESEARCH OBJECTIVES.

Within the *overall* decision-making process leading to designing and setting the structure of the Three-Year Operational Plan (TOP) 2023 - 2025, the PNA of the Ionian Sea engaged not only the external informed sectorial experts and practitioners but also directly involved the maritime port cluster of Taranto as well as all the other relevant port stakeholders. This strategic approach in formulating the overall mission, strategic goals and priority actions included in the TOP 2023 – 2025 has been considered a key methodological step in order to conclude on a final document capable to fully incorporate the perspectives of the different stakeholders. Due to their hybrid nature, Port Network Authorities are compelled to interact with an increasing number of key stakeholder groups in the attempt to balance multiple and potentially conflicting public/private interests and claims (Notteboom et al., 2015). As discussed in Chapter 2 (PESTEL), stakeholder relations management programs in ports have made strong advances in the past decades. Ports which successfully reach out to civil society and industry stakeholders have a competitive edge in port competition and, in doing so, strengthen their societal licence to operate.

By assuming an overarching and inclusive perspective, stakeholders can be defined as "*all actors that can affect or are affected by the achievement of the firm's objectives*" (Freeman, 1984). In the case of a Port Network Authority this definition leads into an extensive and heterogeneous variety of groups of interests (Figure 69), among others due to the fact that ports are embedded in supply chains (Robinson, 2022) and typically exert strong port-city interactions.

Figure 69. PNA's internal and external stakeholder categories.

| Code | Stakeholder category | Description |
|---|---|---|
| SHAR | Shareholders | Public entities or private organisations/firms holding an equity share in the PA, or entitled to appoint PA board of directors or executive directors |
| FINC | Financial community | Financial and credit institutions providing financial resources to support PA investment decisions and port development (equipment, infrastructures, dredging, etc.) |
| EMPL | Employees and labour unions | Labour unions and people working at executive (white and blue collars, etc.) and operational levels in the PA, public institutions (customs, coast guard, etc.) concessioning firms, labour pools and port-related firms (forwarders, ship agents, etc.) |
| CONC | Concessionaries | Terminal operators helding at least a concession in the port area, or other concessionaries related to warehouses, industrial areas, logistics platforms, malls or commercial areas |
| USER | Port users | Freight forwarders, ship agents, brokers, road hauliers, railway companies, logistics providers, etc. |
| CARR | Carriers | Shipping lines (container, ro-ro, cruise companies, etc.) and tramp operators (liquid bulk, dry bulk, etc.) |
| PASS | Passengers | People using port facilities for tourism (cruise and yachting) and travel (ferry) |
| PSPR | Port services providers | Pilots, mooring and towage operators, customs, coast guard, etc |
| LOCO | Local community and societal groups of interest | People and organisations located in the proximity of the port areas and directly or indirectly affected by port operation and business. This category also includes those people or groups of individuals who are interested in environmental and societal critical issues |
| REGU | Regulators | Policy makers and public institutions setting the institutional framework and governance mechanisms |

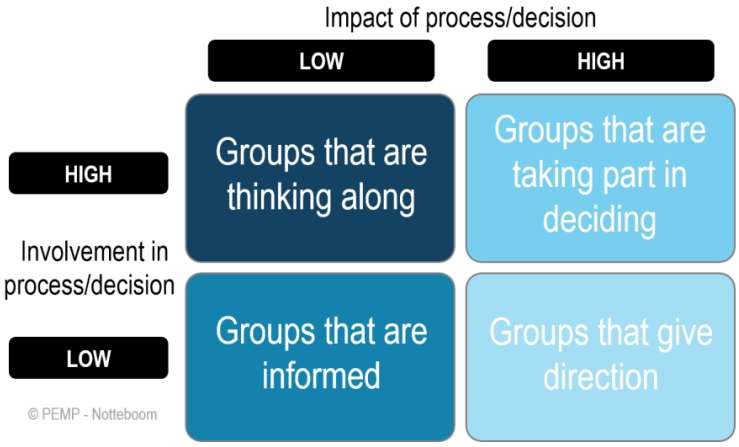
*Source: Notteboom et al. (2015).*

As a result, port managers increasingly ground on Stakeholder Relationship Management (SRM) practices to secure long term relations with critical stakeholders. In this perspective, the adoption of

new forms of communication, in terms of both media and contents disclosed, and interaction with stakeholders becomes an important tool for managing salient groups of interests in the port domain (Pando, Araujo, and Maqueda 2005; Cahoon 2007; Parola et al. 2013).

In view of grouping and prioritizing the numerous port stakeholders, a port network authority shall apply a two-stage approach. The first step is defining the involvement of port stakeholders in the decision-making process, which might be “High” or “Low”. The second step consists of estimating the impact that the decision will have on the port stakeholders which might again be “High” or “Low” (Notteboom et al. 2022). The process concludes on the formation of four groups of port stakeholders

Figure 70. Classification of stakeholders based on their involvement in and impact on a process/decision.

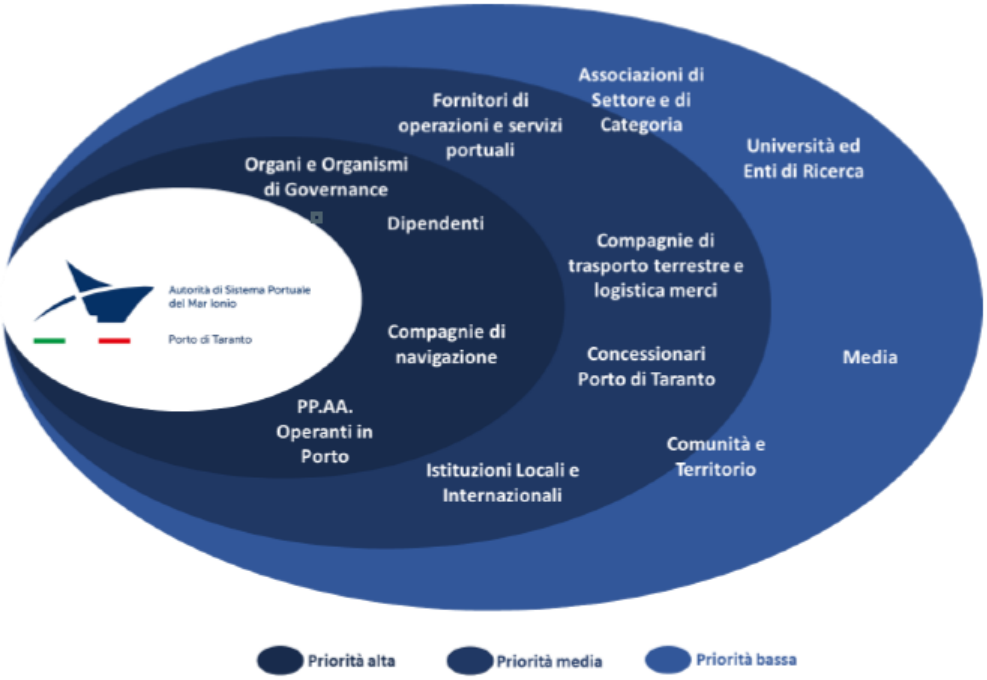



*Source: Notteboom et al. (2022).*

Each PNA indeed is expected to map its own stakeholders and evaluate the potential influence of each stakeholders group on port operations as well as development and planning in the long term. Then with regards to the specific issue or project or decision to be taken, each PNA prioritises critical stakeholders to be involved within the decision-making process in line with their legitimate claims and interests, as well as their role and competences with respect to the decision/initiative.

In this perspective the Port Network Authority of the Ionian Sea has already identified the general categories of relevant stakeholders with respect to the overall port operations, as reported in the Sustainability Report 2021 (Figure 71), in compliance with the "AA1000 Stakeholder Engagement Standard". Table 38 details the most prominent type of stakeholders included in each group.

Figure 71. The PNA of the Ionian Sea' stakeholders.




*Source: Sustainability Report 2021.*

Table 38. The PNA of the Ionian Sea' stakeholders: detailed description.

| Categoria di *stakeholder* | Sotto-categoria di *stakeholder* |
|---|---|
| **Dipendenti** | Dirigenti |
| | Personale |
| **Organi e Organismi di *Governance*** | Comitato di Gestione |
| | Organismo di Partenariato della Risorsa Mare |
| | Organismo Indipendente di Valutazione (OiV) |
| | Commissione Consultiva |
| **Fornitori di operazioni e servizi portuali** | Imprese esercenti operazioni e servizi portuali |
| **Compagnie di navigazione** | Compagnie croceristiche |
| | Compagnie trasporto merci |
| **Compagnie di trasporto terrestre e logistica merci** | Compagnie di trasporto stradale, ferroviario e logistica merci |
| **Concessionari Porto di Taranto** | Imprese concessionarie |
| **Istituzioni Locali e Internazionali** | Regione Puglia |
| | Comune di Taranto |

| Categoria di *stakeholder* | Sotto-categoria di *stakeholder* |
|---|---|
| | Istituzioni Pubbliche e Private Nazionali, Europee ed Internazionali |
| | Ministeri |
| | Marina Militare |
| Pubbliche Amministrazioni Operanti in Porto | Agenzia della Dogane |
| | Capitaneria di Porto |
| | Ufficio di sanità marittima, aerea e di frontiera |
| | Corpo Nazionale dei Vigili del Fuoco |
| | Posto di Ispezione Frontaliero |
| | Polizia di Frontiera |
| | Guardia di Finanza |
| Università ed Enti di Ricerca | Istituti scolastici |
| | Università ed Enti di Ricerca |
| | ITS e Fondazioni analoghe - Enti di Formazione |
| | Centri Studi |
| Comunità e Territorio | Associazioni Territoriali |
| | Comunità Locale |
| Associazioni di Settore e di Categoria | Assoporti |
| | Altre Associazioni del Settore Marittimo Portuale Nazionali ed Internazionali |
| | Associazioni Sindacali |
| Media | Testate giornalistiche |
| | Giornalisti e blogger/influencer |

*Source: PNA of the Ionian Sea, Sustainability Report 2021.*

Within the stakeholder engagement activities performed for the development of the TOP 2023-2025, all the aforementioned groups of stakeholders have been involved by the PNA of the Ionian Sea, jointly with the group of experts responsible for supporting the PNA in developing the final document. These activities, indeed, were aimed at concretely securing the participation of internal and external stakeholders to the overall decision-making process.

In this vein, the inclusion of all the relevant stakeholder groups' perspectives, expectations & insights on the Port of Taranto for the next three years were guaranteed by the adoption of diverse stakeholder engagement methods in line with the characteristics of each group. The selected methods included the following:

- One-to-one interviews & administering of a semi-structured questionnaire: this approach was adopted for engaging top-managers and middle-managers from the PNA of the Ionian Sea, and other employees of the organization holding specific tasks related to the development of the TOP 2023-2025.
- Physical focus group with key informed experts: this approach was selected with regards to concessionaires (especially terminal operators), transport companies, port-related manufacturing industries, the port's industry base, representatives from public organizations operating in the Port of Taranto and representatives from local institutions and the University of Bari.
- Open public stakeholder event: On 22 March 2023, the PNA of the Ionian Sea organized an open event in collaboration with the research team, for presenting the initial results of the TOP 2023-2025 to the local community and stakeholders. The event was attended by representatives of local authorities, port related state authorities, port stakeholders, research institutes/university and citizens. During the event, the attendees were informed about the TOP and were invited to

put forward questions and remarks, which enriched the development of the TOP 2023-2025 report.

- Launching a field research with the use of an online semi-structured questionnaire through the monkey survey platform. The survey included questions on the strengths, weaknesses, opportunities and threats for the port of Taranto in view of complementing the SWOT analysis performed by the research team, as well as questions on the strategic objectives of the port network authority. This methodology was adopted for guaranteeing the broader participation of all stakeholders categories, as well as to reach as many stakeholders as possible.

The one-to-one interviews have been conducted by the team of experts from the PNA' advisor, TIM10 Srl, along with the schedule shown in Table 39. This approach allowed for a strong participation from both the management and the personnel of the PNA in the design and development of the TOP 2023-2025. The one-to-one meetings took place between 14th of February and 16th of February grounding on the Microsoft TEAMS digital platform.

Table 39. One-to-one in-depth interviews with top -management and personnel from the PNA of the Ionian Sea: scheduling of the meetings.

| | *Slot* | *Director* | *Direction* |
|---|---|---|---|
| Thursday 16.02.2023 | 15:30-16:30 | **Roberto Settembrini**<br>*General Secretary PA of Taranto*<br>segretario.generale@port.taranto.it | **General and International Affairs Directorate;**<br>**Staff Secretary General:**<br>- ICT - DIGITAL TRANSITION AND INFORMATION SYSTEMS<br>- EUROPEAN PROGRAMS AND INNOVATION<br>- MANAGEMENT CONTROL<br>- ZFD - SEZ |
| Wednesday 15.02.2023 | 15:00-15:30 | **Raffaella Ladiana**<br>raffaella.ladiana@port.taranto.it | **Administrative Management** |
| Tuesday 14.02.2023 | 15:30-16:00 | **Marina Altamura**<br>marina.altamura@port.taranto.it | **Legal Department - Tenders and Contracts** |
| | 16:00-16:30 | **Giuseppe Lecce**<br>giuseppe.lecce@port.taranto.it | **Operations Directorate - Security, State Property** |
| | 16:30-17:00 | **Domenico Daraio**<br>domenico.daraio@port.taranto.it | **Technical Direction** |

*Source: Authors' elaboration.*

Each interview lasted on average 45 minutes, involving overall 6 interviewers (3-4 per each interview) and 5 interviewees belonging to the following PNA' Direction:

- General and International Affairs Directorate;
- Staff of the Secretary General;
- Administrative Management Department;
- Legal Department – Tenders & Contracts;
- Operations Directorate – Security, State, Property;
- Technical Direction.

The interviews were conducted starting from a list of semi-structured questions. The two physical focus groups planned within the project activities took place in Taranto on 22 March 2023 and allowed to receive the prominent points of view of key business actors operating in the port of Taranto with regards to the above reported fundamental and critical issues and topics:

- Strengthen of the Port of Taranto;
- Weaknesses of the Port of Taranto;
- Treats & Opportunities originating from both international as well as national and local context;

- Relevant actions/interventions requested/needed for taking the pace with new challenges and trends that are shaping the industry, the Port of Taranto as well as local economy.

The involved parties included:

- ✓ ENI S.p.A.;
- ✓ San Cataldo Container Terminal (SCCT) / Yilport;
- ✓ Taranto Cruise Port;
- ✓ Vestas;
- ✓ Representatives of the Ionian Interregional SEZ.

The online survey has been sent to stakeholders belonging in one of the 16 categories shown below (in addition there has been included also a residual category "Others"):

- ✓ Cargo owner / Cargo Agent;
- ✓ Shipping company;
- ✓ Operators referred to articles 16, 17, 18 and 19 L. 84/94;
- ✓ Freight forwarders;
- ✓ Hauliers;
- ✓ Railway operators;
- ✓ Intermodal logistics operators;
- ✓ Tourism and trade operators;
- ✓ Maritime and shipping agents;
- ✓ Workers of companies operating in port;
- ✓ Member Body/Body of the PNA;
- ✓ Public Administration operating in port (Harbour Master's Office, Customs, etc.);
- ✓ Local institutions (Municipality, Chamber of Commerce, University, etc.);
- ✓ Port service provider;
- ✓ PNA employee:
- ✓ Local community and interest groups (students, teachers, associations, etc.);
- ✓ Other (please specify).

The online survey monkey questionnaire covered three (3) sections, including 17 questions in total aimed at acquiring the feedback and the main insights/expectations from all the relevant stakeholders of the Port of Taranto. Before sending out the survey, the content and structure of the online questionnaire have been subjected to several exchanges between the PNA and the advisory team with weekly alignment meetings between February and March 2023.

The online questionnaire was launched on March 5, 2023 and remained open until March 27 and was organized in three sections as follow:

1) General information;
2) Assessment of the current state of the Port of Taranto;
3) Mission and strategic objectives of the PNA.

The survey monkey link was sent to 151 representatives of the aforementioned stakeholder groups on March 6, and two reminders were delivered respectively on March 13 and March 17. Finally, a total of 111 valid and usable questionnaire responses were received.

### 4.2. ONLINE SURVEY: DESCRIPTIVE STATISTICS.

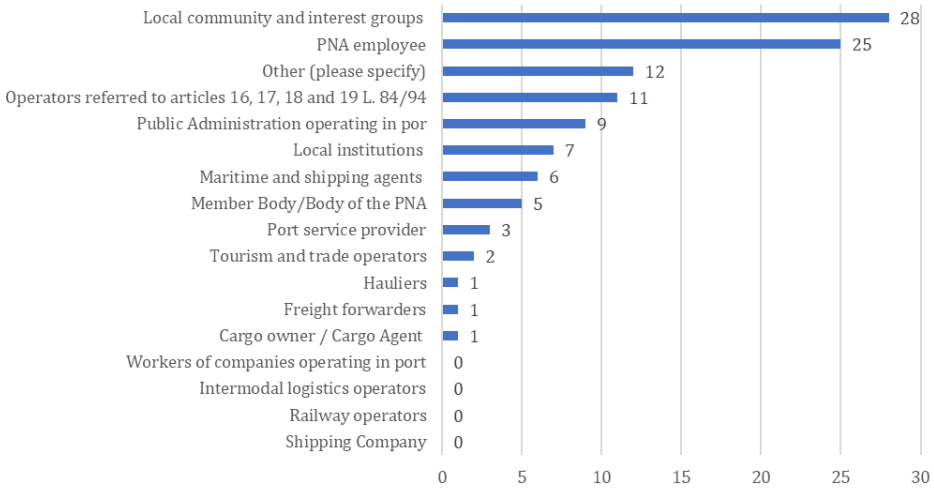
This section presents the main descriptive statistics related to the respondents.

Two peaks in the filling out of the questionnaire occurred respectively on March 7 (after the launch of the survey) and March 15 (following the first formal reminder from the PNA of the Ionian Sea).

The stakeholders who have shown the greatest willingness to actively participate in the online research for supporting the drafting process of the 2023-2025 Three-Year Operational Plan belong to the categories i) "Local community and interest groups," which includes students, teachers, and community organizations (28 responses – 25,23%), and ii) "PNA employees" directly involved in the planning of the next three years (25 responses – 22,52%) (Figure 72). Within the port context, even concessionaires and authorized companies operating in the port (category "Operators referred to in Articles 16, 17, 18, and 19") have shown strong involvement, as well as public administrations operating in the port (such as the Harbour Master's Office, Customs, etc.).

The questionnaire results also highlighted the strong connection between the PNA of the Ionian Sea and local institutions, demonstrating the networking and clustering activities carried out by the organization during the previous programming period. The participation of this category of stakeholders also points to the willingness to take a leading role not only in analysing the state of the art of the port but also in defining the strategic objectives of the next three years by subjects indirectly impacted by port activities.

Figure 72. Categories of stakeholders.




*Source: Authors' elaboration.*

When it comes to the background and the main businesses/sectors of interest of the respondents, a clear prevalence of stakeholders involved or interested in "port governance", "container terminal", and "general cargo terminal" emerged, proving the enormous potential linked to the diversification of skills and know-how of port ecosystem members (Table 40).

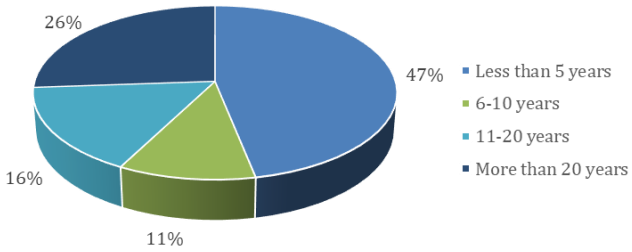
Table 40. Area of interest in the Port of Taranto.

| Business of interest | Responses |
|---|---|
| Port Governance | 27 |
| Container terminal | 24 |
| General Cargo terminal | 17 |
| Other (please specify) | 17 |
| Cruise Terminal | 16 |
| Inland transport, road and railways | 15 |
| Liquid Bulk terminal | 14 |
| Industrial activities in port | 14 |
| Dry Bulk terminal | 13 |
| Port ancillary services related to ship and cargo | 13 |
| Ro-Ro terminal | 10 |
| Technical-nautical services | 8 |
| Offshore activities | 7 |
| Distribution, warehousing and other services related to cargo | 6 |

*Source: Authors' elaboration.*

The respondents were also classified based on their experience in the maritime-port industry[20] as well as along with their organizational position and professional profile. Almost half of the respondents have been working in this field for less than 5 years, demonstrating the widespread presence of a port culture and the importance of this context in the territory of Taranto and, more generally, in the Ionian Sea area (Figure 73).

Figure 73. Personal experience in the maritime-port industry.




*Source: Authors' elaboration.*

Even though the majority of respondents hold operational or middle management positions, 33% of them hold top management positions (CFO/CCO/Director/Secretary General and CEO/President).

[20] A drop-down list was included in the questionnaire where it was possible to select the number of years of experience in the maritime-port sector, which was then reclassified into the following ranges: 1) < 5 years, 2) between 6 and 10 years, 3) between 11 and 20 years, and 4) > 20 years.

Table 41. Current position in the organization.

| Current position in the organization | Responses |
|---|---|
| Operational position/Middle manager | 65 |
| Senior Manager | 9 |
| CFO/CCO/Director/General Secretary | 20 |
| CEO/President | 17 |
| **Total** | **111** |

*Source: Authors' elaboration.*

Following the initial section on socio-demographic characteristics of the respondents (corresponding to the "General Information" section of the questionnaire), a filtering system based on the direct involvement of the organization in terminal, logistics, or industrial activities of the Port of Taranto was implemented. This filtering was integrated in the online survey in view of presenting a customized survey to each respondent in line with his/her/their expertise and stakeholder group affiliation. In case a respondent has a direct involvement in terminal, logistics, or industrial activities of the Port of Taranto, he/she/they would gain access to the second section of the survey dedicated to the evaluation of the current state of the Port of Taranto (regarding strengths, weaknesses, opportunities, and threats as part of the SWOT analysis – see Section 4.3). In case the respondent has no direct involvement, he/she/they would only be asked to provide feedback on the mission and the strategic objectives of the PNA of the Ionia Sea (see Section 4.4). In particular, 62,16% of respondents proceeded with the evaluation of the specific dimensions of the SWOT analysis, while 37,84% were directed towards the final section of the questionnaire.

## 4.3. SWOT ANALYSIS: THE VIEWS AND PERCEPTIONS OF INTERNAL AND EXTERNAL STAKEHOLDERS.

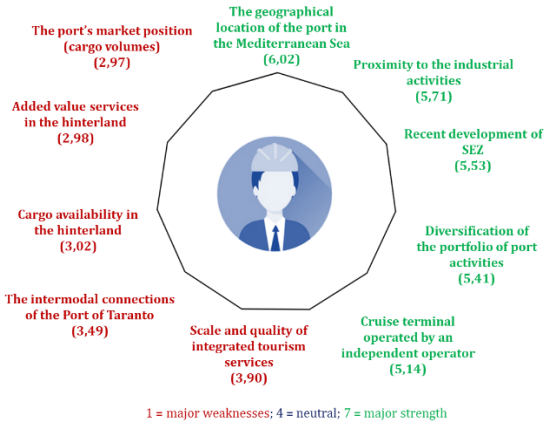
The SWOT analysis conducted in Chapter III is based on the "as is" context of the port of Taranto and the results of the PESTEL analysis conducted in Chapter II of the document. To give more prominence to the analysis, the engagement of the port stakeholders allowed to acquire relevant data and information from heterogenous typologies of groups of interests directly involved in port activities and port operations. The goals were twofold: a) testing the results of the desk research analysis performed in Chapter II (PESTEL performed by port experts) and Chapter III (SWOT by port experts) and b) scrutinizing further strengths, weaknesses, opportunities, and threats characterizing the Port of Taranto and its operational environment.

### 4.3.1. Strengths and weaknesses

From a comprehensive list of potential strengths and weaknesses, the respondents were asked to assign a score ranging from 1 (weakness) to 7 (strength). According to the respondents (Figure 74 and Figure 75), the most prominent strengths (i.e. internal resources and capabilities or specific features of the Port of Taranto) include the port's geographic location in the Mediterranean (score: 6,02), the proximity of industrial activities, the recent development of the Special Economic Zones (SEZ), the diversification of the portfolio of activities, and the presence of a cruise terminal managed by an independent operator. In this vein, the perceptions of the sample stakeholders are perfectly in line with the research outcomes form the PESTEL and the SWOT analyses.

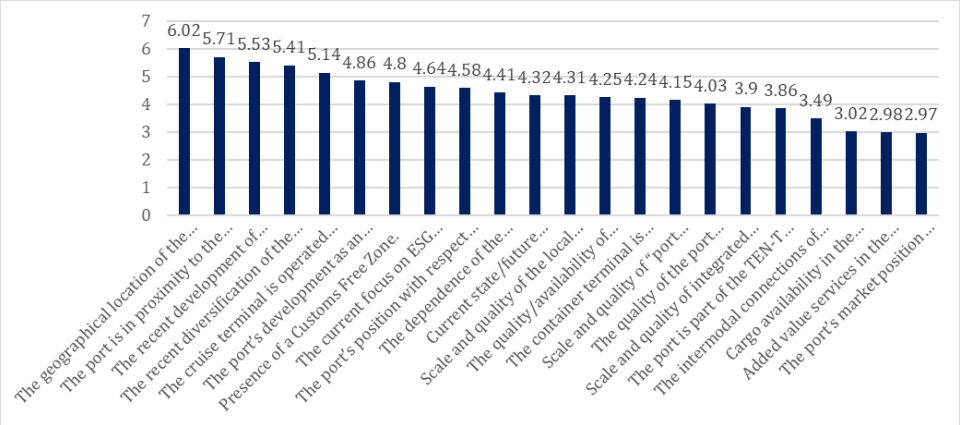
As for the weaknesses - or the areas where the port needs to intervene more - it emerged that the most critical aspects relate to the port's market position in terms of volumes of goods (with a score of 2.97), followed by added value services in the hinterland, the cargo availability in the hinterland, the intermodal connections of the Port of Taranto and the scale and quality of integrated tourism services.

Figure 74. Major strengths & weaknesses of the Port of Taranto.




*Source: Authors' elaboration.*

Figure 75. Weighted average score of strengths & weaknesses of the Port of Taranto.




*Source: Authors' elaboration.*

The online survey structure also included the possibility for the respondents to text additional/alternative strengths or weaknesses not included in the preselected list of items.

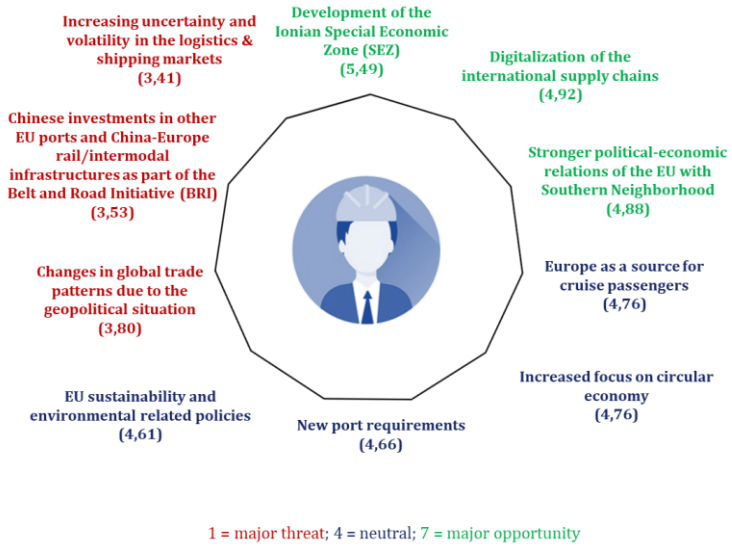
When it comes to the strengths, some of the respondents named the improvement in the exploitation of the port areas, together with the recent implementation of physical infrastructures. Additionally, another element of interest was found to be related to the development of intermodal transport and interconnectivity with other transport modes through the exploitation of opportunities connected to the proximity of the Grottaglie airport and its connection to the main transport routes. Finally, it is important to develop cross-cutting skills and know-how, increasing the points of contact already present with local institutions and continuing to consolidate synergetic relationships with the entities of the area.

Regarding the weaknesses, some issues emerged as critical aspects to be considered in the TOP 2023-2025: the need to cope with the increasing competition from the ports of Bari and Brindisi, also through territorial marketing activities that can guarantee adequate promotion of the "Taranto brand" and the peculiarities of the territory. Stakeholders also showed particular attention to economic and financial issues, identifying additional weaknesses in the management costs for individual operators and in the high vessel-related port costs.

### 4.3.2. Opportunities and threats

The questionnaire also included questions dedicated to the opportunities and threats for the Port of Taranto in order to investigate the perspectives of different stakeholder groups on the exogenous variables assessed by the SWOT analysis. Also in this case, the respondents were asked to assign a score ranging from 1 (threats) to 7 (opportunities). The main results are reported in Figure 76 and Figure 77. According to port stakeholders, the three points where the port of Taranto can exploit the greatest opportunities are the following: i) the development of the SEZ, ii) the digitalization of international supply chains, and iii) the stronger political-economic relations of the EU with the Southern neighbourhood; while the major threats to the port of Taranto are i) the increasing uncertainty and volatility in logistics and shipping markets, ii) Chinese investments in other EU ports and railway/intermodal infrastructure along the China-Europe axis under the Belt & Road Initiative (BRI), and iii) changes in global trade patterns due to the geopolitical situation.

Figure 76. Major opportunities & threats for the Port of Taranto.

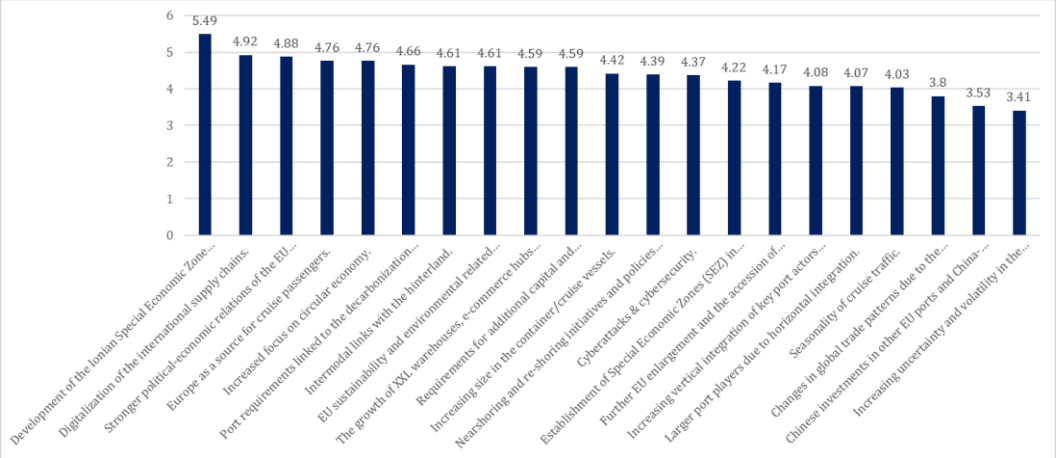



*Source: Authors' elaboration.*

Furthermore, the stakeholders have identified additional opportunities within the context of the Port of Taranto, mainly related to the strengths previously identified, including i) the development of value-added logistics services, ii) diversification of the port portfolio in particular looking at the increase in cruise traffic, and iii) the conquest of new "contestable" market segments. The analysis also revealed new points of interest that the PNA will necessarily have to take into account in defining new programming activities, such as the opportunities offered by cold ironing (already included in the Authority's development plans) and the development of railway connections.

Regarding the threats, two key additional variables have been mapped, mainly related to fears of changes in the national regulatory framework and possible unbalanced regional governance in favour of the Adriatic ports.

Figure 77.Weighted average score of opportunity & threats of the Port of Taranto.




*Source: Authors' elaboration.*

## 4.4. PRIORITIZING THE STRATEGIC GOALS OF THE PNA OF THE IONIAN SEA: THE STAKEHOLDERS' PERSPECTIVES.

The definition of the strategic objectives of the PNA of the Ionian Sea has to integrate the results of the analysis of the opinions expressed by internal stakeholders during one-to-one meetings and by external stakeholders through their responses to questions 12 to 17 in the online questionnaire.

With reference to the strategic objectives, external stakeholders were asked to classify the most important elements for the development strategy of the port of Taranto that should be prioritized in the next three years, assigning a score from 1 to 5 points, where 1 indicates a low priority and 5 a high priority. The following key elements have been included within the development strategy:

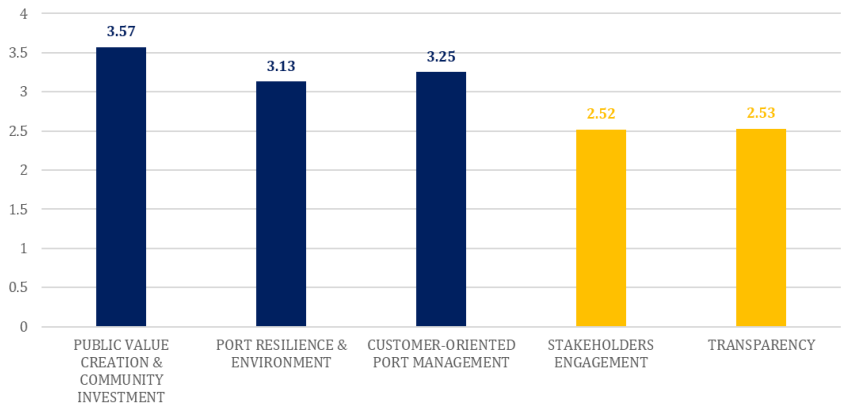
- ✓ Public value creation & community investment, including activities related to the creation of job opportunities, the increase of social welfare, the active participation of the Port of Taranto in economic development, and the implementation of initiatives for the benefit of the community;
- ✓ Port resilience and environment, manifested through the exploitation of opportunities related to the sustainability of port activities and eco-friendly development;
- ✓ Customer-oriented port management, dedicated to increasing traffic, improving performance in terms of return on investments, and launching port marketing initiatives, also at an international level.
- ✓ Stakeholders' engagement, through initiatives aimed at establishing and maintaining collaborative relationships with all stakeholders, promoting consensus.
- ✓ Transparency, a principle that is substantiated in ethical and transparent management according to the principles of ethics, transparency, integrity, anti-corruption, and compliance with current regulations.

From the analysis of the questionnaire results, it emerged that the attention of the stakeholders of the Taranto port cluster is mainly focused on the creation of public value and investments for the community (average score: 3,57), which might be partly due to the predominance of respondents belonging to the category of "local community and interest groups" and also due to the actual understanding of the importance of the societal license to operate and the protection of the internal port ecosystem, even outside the port areas. The Port of Taranto must thus be understood as a driving force for the development of the territory. Therefore, opportunities offered by the increase in port attractiveness and the development of the Ionian port will have to be taken into account, even in the next three-year programming period. This statement is also confirmed by the second objective in order of priority represented by "customer-oriented port management", which provides for the inclusion of activities aimed at developing port throughput and expanding the user base of the port, also at an

international level, within the PNA's mission, through specific promotion activities already initiated during the previous programming period (Figure 78).

It is interesting to note how the objectives of "stakeholder engagement" and "transparency" are presented with a relatively low score. This result suggests that the attention paid by the PNA in previous periods has led to full awareness among all stakeholders that these principles are now inherent in the mission and guiding principles of the Authority, thus demonstrating the need to focus the interventions of the next three-year period on issues that are not adequately supervised by the Authority.

Figure 78. Elements of the Port of Taranto' development strategy that should be prioritized.




*Source: Authors' elaboration.*

Furthermore, respondents were invited to put forward additional strategic considerations through the category 'other'. This exercise resulted in the following relevant points of interest:

- ✓ Organizational well-being of personnel;
- ✓ Information and communication activities;
- ✓ Internationalization of the airport;
- ✓ Continuous monitoring of the profitability of concessions;
- ✓ Development of cargo services.

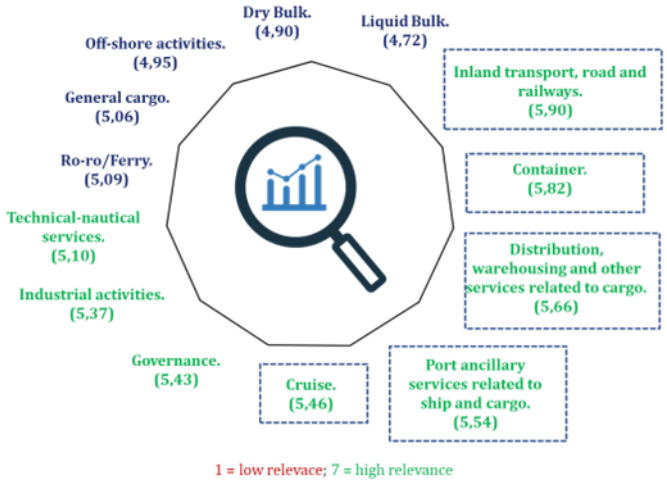
In order to identify the elements that the PNA will have to take into account within the development strategy defined in the next three-year programming period, stakeholders were asked to evaluate the business areas considered strategic for increasing the level of attractiveness and growth of the port. Respondents were asked to use a scale of scores from 1 to 7, where a score of 1 identifies a business area considered less relevant and 7, on the contrary, a business area considered most important. As shown in Figure 79 and Figure 80, the area of highest importance is related to land transport, both road and rail (with an average score of 5,90). This result certainly derives from the importance of intermodality and hinterland connectivity issues for the development of the port and is also the result of the attention paid by the PNA in the previous programming period to the integration between different modes of transport, through projects and initiatives - some of which are still ongoing - that promote modal shift towards more sustainable forms of transport such as rail and shortsea/coastal shipping.

The port cluster has also understood the importance of relaunching the container terminal, historically dedicated to transhipment activities and which, in the future, could be reconfigured in order to exploit the opportunities connected to the development of logistics in the port's hinterland. In this sense, the interest in distribution, warehousing, and other cargo services is also consistent, as they would allow

the Port of Taranto to offer higher value-added services, effectively increasing the attractiveness of the port, together with the development, on the port side, of auxiliary port services for the ship and cargo.

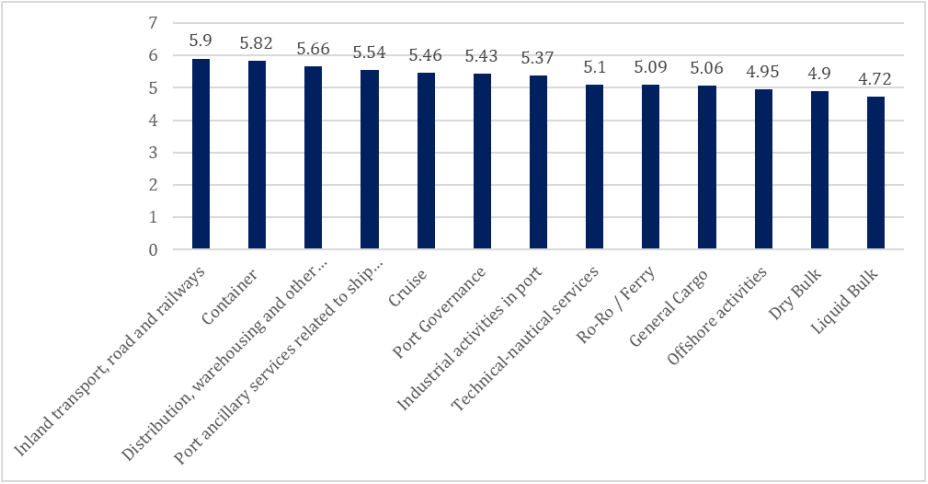
Finally, the importance attributed to the cruise terminal only confirms the need to lead the Ionian port towards the increase of passenger traffic, which maintains a high priority for both the port cluster stakeholders and the PNA. The latter has, in recent years, developed specific efforts on promoting the "Taranto brand" and developing port areas dedicated to passenger services. These efforts have indeed materialized in the arrival of an important international operator, Global Ports Holding, and in receiving an important recognition in the cruise sector as the "*Destination of the Year*" at the Seatrade Cruise Awards.

Figure 79. Strategic business areas.




*Source: Authors' elaboration.*

Figure 80. Weighted average score of strategic business areas.




*Source: Authors' elaboration.*

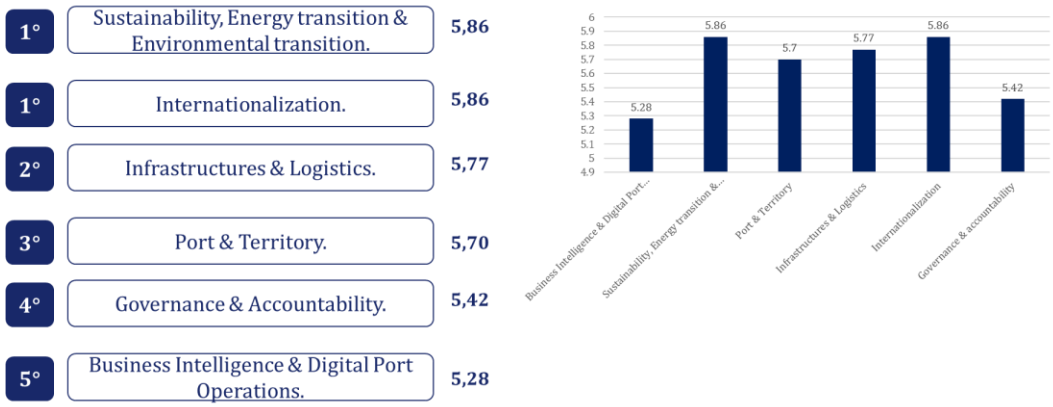
Together with the analysis of the elements considered priorities in the development strategy of the PNA of the Ionian Sea and the sectors deemed most strategic by the stakeholders of the port cluster, a subsequent analysis was carried out with reference to the strategic objectives to be included in the Port Agenda for the 2023-2025 period. In this regard, respondents were asked to rate the level of importance (on a scale from 1 to 7) of some objectives identified jointly by the PNA and the group of external advisors and experts, including:

- ✓ Business Intelligence & Digital Port Operations;
- ✓ Sustainability, Energy transition & Environmental transition;
- ✓ Port & Territory;
- ✓ Infrastructures & Logistics;
- ✓ Internationalization;
- ✓ Governance & accountability.

The results of the analysis of the questionnaire responses (highlighted in Figure 81) led to the creation of a ranking of strategic objectives, among which significant importance was attributed to the objectives of "Sustainability, Energy transition & Environmental transition" and "Internationalization," considered fundamental by stakeholders for the development of the Port of Taranto (both with an average score of 5,86).

These results are perfectly in line with what was emerged regarding the key elements to be included in the mission of the entity. Consequently, it was possible to observe a high level of attention towards issues related to the "green ports" paradigm and the reduction of the environmental impact of port activities, as well as to the adoption of internationalization strategies that would allow the exploitation of opportunities connected to the context in which the Port of Taranto operates (see the results of the SWOT analysis conducted in Chapter III in this regard).

Figure 81. Ranking of strategic objectives.




*Source: Authors' elaboration.*

The final part of the questionnaire was dedicated to investigating areas that could generate detailed actions to be included in the TOP 2023-2025, through the definition of a set of options evaluated by all respondents using a scoring scale from 1 to 7. The hypotheses formulated by the working group were classified into the following areas, to which a residual category "Other" was also added for inclusion of additional insights:

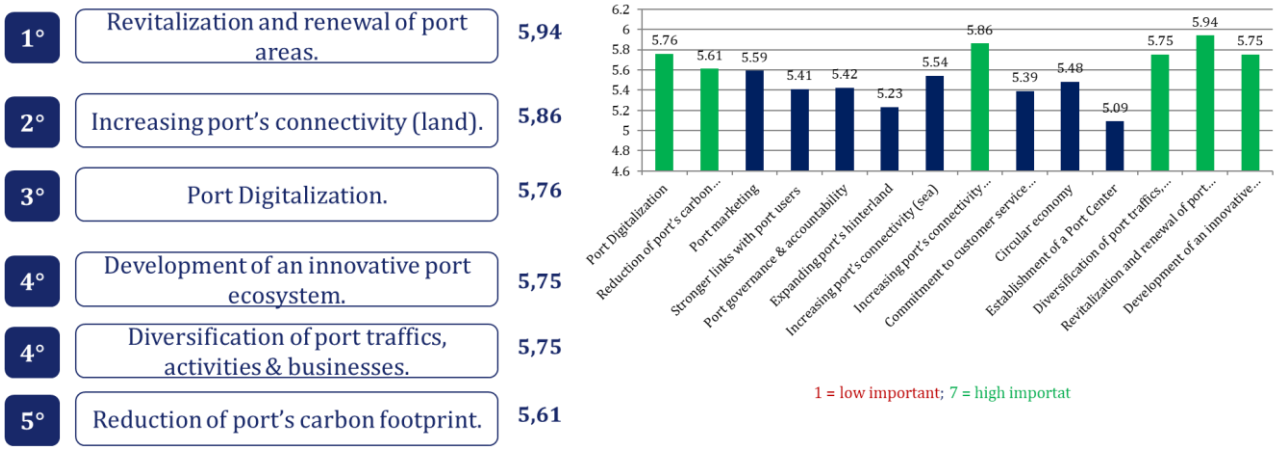
- ✓ Port Digitalization;
- ✓ Reduction of port's carbon footprint;
- ✓ Port marketing;
- ✓ Stronger links with port users;
- ✓ Port governance & accountability;
- ✓ Expanding port's hinterland;
- ✓ Increasing port's connectivity (sea);
- ✓ Increasing port's connectivity (land);
- ✓ Commitment to customer service delivery;
- ✓ Circular economy;
- ✓ Establishment of a Port Center;

- ✓ Diversification of port traffics, activities & businesses;
- ✓ Revitalization and renewal of port areas;
- ✓ Development of an innovative port ecosystem.

In relation to this analysis, the stakeholders of the port ecosystem of Taranto have shown particular interest mainly in areas related to port infrastructure and intermodality, specifically referring to the redevelopment of obsolete port areas and increasing the port's hinterland connectivity.

In this regard, issues related to diversifying traffic (in order to reduce the port's dependence on historical captive businesses, such as dry bulk flows in relation to Acciaierie d'Italia) and the development of an innovative port ecosystem have also become particularly important, including through the application of Industry 4.0 paradigms for the digitalization of the port.

Figure 82. Actions/interventions to be included in the 2023-2025 TOP.




*Source: Authors' elaboration.*

# CHAPTER V. PORT MANIFESTO: MISSION, STRATEGIC GOALS & KEY POTENTIAL ACTIONS BY THE PORT NETWORK AUTHORITY (PNA) OF THE IONIAN SEA

## 5.1. MISSION & STRATEGIC OBJECTIVES OF THE PNA OF THE IONIAN SEA: INTRODUCTION

The previous chapters contained a detailed analysis of strengths, weaknesses, opportunities, and threats with respect to the Port of Taranto (SWOT/TOWS Analysis - Chapter III), complemented in Chapter IV by a stakeholder approach grounding on a focus group with key informed practitioners operating in the Taranto maritime logistics and the outcomes of the questionnaires administered to stakeholders from Taranto port community. Chapter V aims to examine the mission and strategic objectives defined within the PIAO 2023-2025, which have emerged as interesting development and implementation opportunities in line with the results of the SWOT/TOWS analysis.

The TOWS matrix was introduced in chapter 3 on the SWOT analysis. Each box of the TOWS matrix can be used to identify options that address a different combination of the internal factors (strengths and weaknesses) and the external factors (opportunities and threats). Table 42 provides an overview of the positioning of the actions.

Table 42. Positioning of the 23 identified actions of the 3-year operational plan in the TOWS matrix.

| | **Strengths** | **Weaknesses** |
|---|---|---|
| **Opportunities** | **S-O: Strengths port of Taranto can use to take advantage of opportunities.**<br>ENVIRONMENTAL MONITORING (4)<br>THE ENERGY TRANSITION OF THE PORT OF TARANTO (5)<br>PORT-CITY RELATIONS: INTE(G)RATION BETWEEN PHYSICAL INFRASTRUCTURE, SOCIAL COMMUNITY AND URBAN FABRIC (6)<br>MANAGEMENT OF STATE PROPERTY (10)<br>THE NRRP AS A TOOL FOR FURTHER PORT INFRASTRUCTURE (11)<br>EFFICIENCY ENHANCEMENT, OPTIMISATION AND MAINTENANCE OF EXISTING INFRASTRUCTURE AND VALORISATION OF GREENFIELD AND UNDERUSED AREAS OF THE PORT (12)<br>PROMOTION, MARKETING AND INTERNATIONAL RELATIONS: ACTIONS TO SUPPORT THE POSITIONING OF THE PORT OF TARANTO IN GLOBAL MARKETS (14)<br>ANALYSIS AND OPTIMISATION OF PROCESSES RELATED TO THE GOVERNANCE BODIES OF THE ADSP (20)<br>RESOURCE DEVELOPMENT AND MANAGEMENT (HUMAN, TECHNOLOGICAL AND FINANCIAL) (22) | **W-O: Overcoming weaknesses of the port of Taranto by taking advantage of opportunities.**<br>INTEROPERABILITY OF PORT COMMUNITY SYSTEM AND 5G INFRASTRUCTURE (2)<br>CIRCULAR ECONOMY (3)<br>STRATEGIC SYSTEM PLANNING FOR THE PORT OF TARANTO (13)<br>INNOVATIVE ECOSYSTEM OF THE PORT OF TARANTO: ACCOMPANIMENT FROM AS IS TO TO BE (16)<br>DEVELOPMENT OF THE RESULTS (PERFORMANCE) CULTURE (19)<br>START-UP AND FULL OPERATION OF THE AGENCY PURSUANT TO ART. 17, CO. 5, L. 84/94 (23) |

| Threats | S-T: Strengths port of Taranto can use to avoid/mitigate threats. | W-T: Options of the port of Taranto to minimize weaknesses and avoid threats. |
|---|---|---|
| | OPEN PORT - EXHIBITION CENTER OF THE PORT OF TARANTO: FROM VIRTUAL TO REALITY (7)<br>WATERFRONT DEVELOPMENT (8)<br>SECURITY AWARENESS (9)<br>INSTITUTIONAL COMMUNICATION: FROM CONSOLIDATING BRAND IDENTITY TO ORGANISING EVENTS. (15)<br>ENVIRONMENTAL, SOCIAL, GOVERNANCE: TARANTO SUSTAINABLE PORT CITY (17)<br>MONITORING AND REPORTING ON ONGOING ZONING PROCEDURES (21) | CREATION AND IMPLEMENTATION OF A DATABASE OF LEGAL OPINIONS (1)<br>CREATION AND COMPILATION OF SELF-MONITORING CHECKLISTS AND MONITORING OF PROCUREMENT PROCEDURES ABOVE AND BELOW THE EU THRESHOLDS (18) |

*Source: Authors' elaboration.*

Note: The colors relate to the six main objectives:
1. BUSINESS INTELLIGENCE & DIGITAL OPERATIONS
2. SUSTAINABILITY, ENERGY TRANSITION & DIGITAL PORT OPERATIONS
3. PORT & TERRITORY
4. INFRASTRUCTURES & LOGISTICS
5. INTERNATIONALIZATION
6. GOVERNANCE & ACCOUNTABILITY

Specifically, the outcome of this analysis is set out in Annex no. 1 "*Port Manifesto*", what can be defined as a declaration of intent with which the Authority presents, in a concise way, the main projects, activities and interventions (strategic pillars) in relation to what will be the main SWOT/TOWS elements to be taken into account for the implementation of the sustainable development policy to be implemented over the three-year period 2023-2025.

The mission of each organization is a formal written statement that communicates the purpose and "reason for being" of the organization (Campbell and Yeung 1991). It is important to formulate and communicate a clear and inclusive mission statement. Three perspectives need to be considered when developing a good or effective mission statement: (i) the content and (semantic) structure of the mission statement; (ii) the key elements included in the statement, and (iii) the purpose or objectives of a mission statement. Combined these three perspectives would enable to measure the quality of a mission statement. More specifically, the mission should be the most visible and public part of a strategic plan and could focus on the following eight key elements (Pearce and David 1987):

- ✓ Customers and/or markets (port users in our case)
- ✓ Products and/or services
- ✓ Core technologies
- ✓ Geographic domain
- ✓ Expression of commitment to survival, growth, and profitability
- ✓ Key elements in the entity philosophy
- ✓ Organization self-concept (distinctive competence)
- ✓ Public image desired by the organization

PNAs are typically hybrid organizations (source) dealing with a multitude of private and public stakeholders and combining/balancing various objectives. This broad scope in terms of stakeholders and objectives complicates the formulation of clear and coherent mission statements and strategic objectives by PNAs. Furthermore, as PNAs typically are responsible for the development and management of the entire port area, mission statements of PNAs need to be formulated for the entire port ecosystem and not only for the own PNA organisation.

The Port Network Authority (PNA) of the Ionian Sea is subject to the institutional mission defined by the Port Reform Law No. 84 of 1994[21], which provides strategic guidelines made concrete by the PNA within the previous Three-Year Operational Plan 2020-2022, in which the programmatic basis was defined in order to set specific areas and strategic goals to generate Public Value.

In this context, the updates to the programmatic and performance basis established by the PNA in the PIAO 2023-2025 are set. These include a series of more detailed strategic goals examined in this Chapter and which constitute the starting point of the actions included in the Three-Year Operational Plan 2023-2025 (Figure 83).

Figure 83. Strategic objectives from PIAO 2023-2025.


*Source: Authors' elaboration.*

The SWOT/TOWS analysis performed by the Working Group includes an in-depth examination of the main strengths, weaknesses, opportunities, and threats of all major market segments. This analysis supports the current programmatic hypotheses set by the Port Network Authority (PNA) of the Ionian Sea, which are currently under review in the process of drafting the Port System Strategic Planning Document (DPSS). Consequently, taking into account the strengths and weaknesses (endogenous) of the Port of Taranto, actions and activities have been defined for each of the strategic objectives to ensure

[21] The institutional tasks (institutional missions) assigned to the Port Network Authorities (PNA) by Law No. 84/1994, and subsequent amendments, are as follows:
a) direction, programming, coordination, regulation, promotion, and control, also through the territorial port offices, as provided for in Article 6-bis, paragraph 1, letter c), of port operations and services, authorizations and concessions pursuant to Articles 16, 17, and 18, and other commercial and industrial activities carried out in ports and territorial districts. The Port Network Authority is also conferred with ordinance powers, also with regard to safety concerning risks of incidents related to work activities and conditions of hygiene under Article 24;
b) ordinary and extraordinary maintenance of the common areas within the port, including those for maintaining the seabed;
c) assignment and control of activities aimed at providing general interest services to port users for a fee, not coinciding or closely related to port operations under Article 16, paragraph 1;
d) coordination of administrative activities carried out by public entities and bodies within the ports and in the maritime demesne areas included in the territorial district;
e) exclusive administration of the maritime demesne areas and assets included in its territorial district, in accordance with the provisions of this law and the navigation code, without prejudice to any regional competences and special legislation for the safeguarding of Venice and its lagoon. For the management of activities related to functions on the maritime demesne, the PNAs make use of the Maritime Demesne Information System (S.I.D.);
f) promotion and coordination of forms of connection with the retro-port and inter-port logistics systems.

that the port can reap benefits from the opportunities offered and mitigate any potential threats (exogenous).

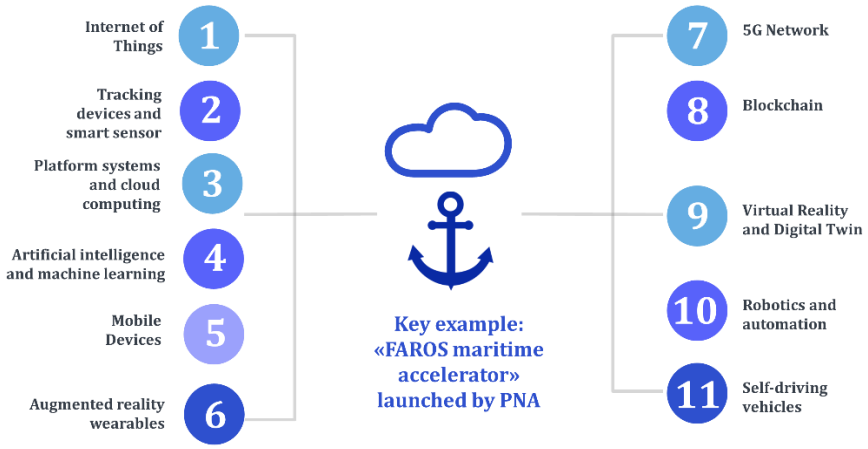
## 5.2. BUSINESS INTELLIGENCE & DIGITAL PORT OPERATIONS

The first strategic goal of the Integrated Activity and Organization Plan (PIAO) 2023-2025 identifies the implementation of business intelligence activities and digitalization of port processes as one of the main strategies to pursue in the next three years. Specifically, the implementation of business intelligence systems (BI) could support the Port Network Authority (PNA) in: i) monitoring port operations in real-time, ii) identifying problems and inefficiencies, and iii) developing a decision-making process focused on improving tasks related to traffic and cargo management, as well as underlying profiles for implementing innovative safety & security protocols. Furthermore, the implementation of business intelligence and digitalization systems could lead the port community to greater collaboration and information sharing among the different stakeholders involved in the port sector, such as shipping companies, terminal operators, public administrations, and public entities operating in the port context. Consequently, there could be a drastic reduction in waiting times and costs, a better asset utilization and an improvement in the transparency of operations.

In this vein, already in the previous triennium (2020-2022), the PNA was particularly proactive in introducing new managerial tools and concrete technology solutions for innovation, recognized as the preeminent driver for a synergetic development of port activities. The PNA has configured itself as a promoter - as well as the main *host* - of a new way of interpreting the different port and logistics vocations of the Ionian cluster that can now operate in a business environment with a strong international profile.

In this context, it is possible to place the potential linked to the introduction of new technologies and innovations of the Industry 4.0 paradigm (Figure 84) as also identified as a key development in the SWOT analysis, which offer opportunities for growth of the logistics, industrial and commercial ecosystem of the port, making it a protagonist of a sustainable and inclusive growth.

Figure 84. Industry 4.0 technologies for the development of innovation in ports.




*Source: Authors' elaboration.*

In this perspective, the examination of the aforementioned technologies allows identifying the actions and activities to be included within the mission of the PNA that will facilitate in the sustainable growth of the Ionian port in the next three years.

In particular, the Internet of Things (IoT) is configured as an immaterial infrastructure that allows the provision of advanced services through the constant interconnection of "physical" and "virtual" things,

enabling the development of innovative business models, thanks to the use of "smart" devices capable of acquiring, classifying, processing, and transmitting data and information relevant to the production process. Within the port and logistics supply chain, the introduction of such technologies would allow obtaining relevant positive impacts related to the issues connected with the efficiency of processes and the safety of activities, which can be listed as follows:

- ✓ Optimization of physical and informational flows related to the "core" activities of the sector (such as handling of goods/passengers, value-added services, intermodality);
- ✓ Real-time updating of data available to users and operators (shipping companies, carriers, ship managers, yard managers, etc.);
- ✓ Implementation of cybersecurity protocols and tracking of production processes.

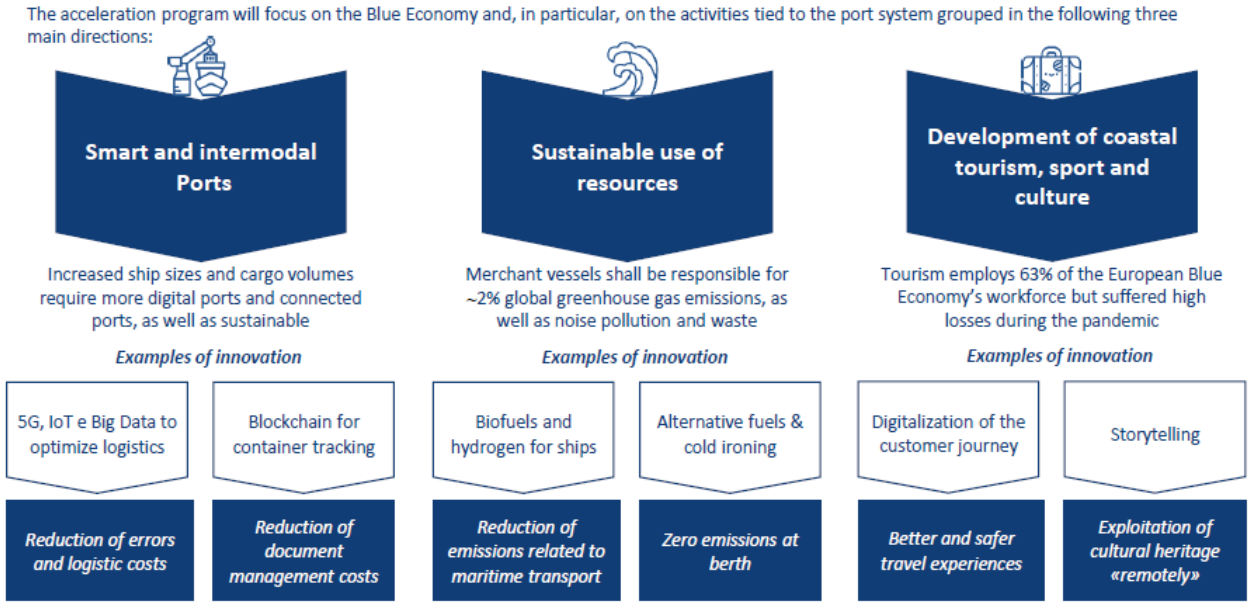
However, the use of IoT technologies cannot be separated from the implementation of careful integration and synergic activities with tracking and tracing devices and "smart sensors" that provide data and information used in efficiency and optimizing processes. Smart sensors can be placed both along the transport routes and within logistics nodes, providing valuable support to port operators and the PNA in all import / export logistics activities, thereby helping to identify and address bottlenecks along the logistics chain (e.g., gate congestion, waiting times, etc.). They also allow the development of new services for port users (e.g., related to navigation), guaranteeing opportunities to offer higher added value services. Several impressive business opportunities exist also in the cruise and tourism domain for the Port of Taranto due to the recent investments in physical infrastructures for the cruise terminal and the new waterfront.

The data gathering activities carried out through the use of these technologies also constitute the starting point for the development of online platforms for port users, such as cloud computing platforms that would allow authorized users to enjoy various types of real-time services, such as networks, servers, storage, applications, and others, with minimal management and interaction effort with the service provider. Consequently, the inclusion of investment projects based on the aforementioned technologies within the mission and the key strategic goals of the PNA would allow the provision of highly innovative tools and services, promoting synergetic and highly organized cooperation within and between companies, by lowering average hardware costs and by sharing key information among partners operating in the same value chain.

Within the process of digitization of the PNA and the implementation of BI technologies, it is also necessary to embrace the principles of the AI paradigm - Artificial Intelligence, as it would offer opportunities related to the automated data analysis activities and dialogue among the various port operation management software.

The effective realization of the path towards digitization, which already started in the previous three years period (2020-2022), requires the gradual transition to the use of technological and digital devices to support stakeholders and port operators. Mobile devices, including smartphones, and the development of dedicated applications are a key factor in the digitization of the maritime-port logistics sector: companies have the possibility to facilitate and personalize the experience of users, both in the freight transport sector and in the passenger one. Furthermore, wearable devices, that come in the form of everyday objects equipped with sensors and displays that allow monitoring of various variables and facilitate the execution of operational activities (e.g., cargo screening), are expected to impact port operations in the next future providing data on workers' performance and their stress levels but also supporting port users both in cargo and passenger operations. These technologies are extremely important in pursuing objectives related to the social sustainability of activities and the protection of port workers but also for improving the quality of tourism services provided to cruises visiting the Port of Taranto. In this vein, the FAROS maritime accelerator, i.e., a unique maritime accelerator specialized in Blue Economy, launched in 2021 by the Ionian Port Network Authority, is expected to favour also the star-up of new ventures in this domain (Figure 85).

Figure 85. FAROS maritime accelerator: A unique maritime accelerator specialized in Blue Economy.




*Source: Taranto Port Profile, 2022.*

However, such devices require an internet connection that guarantees the possibility of taking advantage of the digital network described above, which is why it is impossible to disregard the implementation of a 5G network that, in the maritime-port logistics, is a key factor for the development of innovative and digital processes as well as for favouring the adoption of new technological solutions.

Continuing the examination of technologies whose introduction in the port domain the PNA is expected to support in the next three-year period (2023-2025), it is essential to evaluate also applications linked with blockchain, a complex and structured database organized according to the rules and principles of peer-to-peer technology that stores and tracks all operations performed. The new features specific to the blockchain can provide added value to maritime-port logistics and port digitalization in terms of data reliability, traceability, and security, thus improving interoperability and integration of the elements and actors of the logistics chain.

The digitalization of port processes would also find its peak in the use of virtual reality and digital twin technologies, which combine the functionalities of hardware and software devices to create a three-dimensional virtual space within which the user can move freely through headsets, wearables, and screens. In particular, this type of technology is characterized by a very high level of reliability thanks to the quality of the measurements and the particularly high frequency of data collection from flows. Again, practical port applications are available both in the cargo and passenger field.

The optimization of processes and the streamlining of the various tasks connected to the activities carried out in the Port of Taranto and its hinterland would be further guaranteed by the use of robotics and automation technologies. In fact, the use of "intelligent machines" in the management of the logistics chain would allow routine operations to be performed in a completely automated way, reducing the time it takes to complete the various tasks and ensuring the possibility of increasing the physical and information flows that pass through the port.

The Port Network Authority (PNA) of the Ionian Sea has plans to ground on several innovative technologies for the digitalization of all processes related to the maritime-port sector, attributing to innovation a transversal role of connection between the various operational fields with which the national port system is constantly called to confront. Consequently, already in the previous programming period, the strategic goal related to digitalization and innovation was identified as a driver

for the synergistic development of port activities. In this perspective in the future TOP 2023-2025, the PNA has set a plan of actions aimed at simplifying, digitalizing, and innovating decision making and operational processes and procedures (Business Intelligence & Digital Port Operations) both within and outside its own organizational boundaries. In the prior programming period (2020-2022) 5 key actions related to the strategic goal labelled "Innovation" have been implemented:

- ✓ Creation of the "Future Port Innovation Hub " and promotion of innovation in the port and logistics sector.
- ✓ Digitalization of the institution.
- ✓ Single Administrative Desk (Sportello Unico Amministrativo - SUA).
- ✓ Port Community System (PCS).
- ✓ Increasing the security levels of the port area and the neighbouring industrial areas to possibly extend also within the SEZ (Special Economic Zone).

These actions have led to a radical change in the organizational and governance structure of the PNA, driving to the establishment, in 2022, of an ICT department under the General Secretary's staff. Procedurally, the first draft of the three-year IT Plan for the Authority has also been prepared. The final outcomes of the aforementioned actions will constitute the bases for the implementation of the 2023-2025 action plan, when it comes to the “Business Intelligence & Digital Port Operations” strategic goal.

**Link to the SWOT analysis' results & Future Targets**

The analysis of the current state of the art demonstrates that there are still enormous business development opportunities in the field of BI technologies and port digitalization. In particular, the main research outcomes derived from the SWOT analysis (Chapter 3), suggest to further support the key actions performed in the TOP 2020-2022 capable of enhancing interconnectivity among diverse partners involved both in cargo and passenger overall supply chains, through targeted investments in smart soft and organizational infrastructures. In particular whereas the action no. 3 "Single Administrative Desk (SUA)" has already been completed and is fully operational, new challenging targets related to the following actions could be set for the 2023-2025 period:

- ✓ Creation of the "Future Port Innovation Hub" and promotion of innovation in the port and logistics sector.
- ✓ Digitalization of the institution.
- ✓ Port Community System (PCS).
- ✓ Raising the security levels of the port area and the neighbouring industrial areas to possibly extend also within the SEZ (Special Economic Zone).

Realizing the strategic objective in the field of “business intelligence & digital port operations” thus requires investments in resources and capabilities in the three conceptual layers identified in the SWOT analysis:

- ✓ Hardware: making sure that the necessary infrastructures/assets and people are in place to support the implementation of the above digital initiatives;
- ✓ Software: facilitating the development of digital platform solutions for the exchange of data and optimisation of operations, while at the same time ensuring security and protection against cyber threats.
- ✓ Orgware: enhancing digital collaboration and data sharing between commercial port-related stakeholders; stimulating a sentiment of shared responsibility and commitment in the entire port ecosystem to take on the challenges in the digital field; exploring new governance and business models to increase the effectiveness and attractiveness of digital initiatives.

With regard to the containerized transport segment, the PNA can leverage the technologies of the Industry 4.0 paradigm (e.g. digital platform) to reduce operational inefficiencies related to connections

between the port and the hinterland. Moreover, the application of robotics and automation technologies could expand the benefits connected to one of the main strengths of the port (proximity to logistic nodes and opportunities for intermodality application) to position itself as a business orchestrator in the field of new emerging manufacturing technologies within the port domain through the concession of ad hoc well-endowed port areas (see for example, the Reindustrialization of the Belleli Yard Case).

Figure 86. The Reindustrialization of the Belleli Yard Case.


*Source: Taranto Port Profile, 2022.*

In line with results of the SWOT/TOWS analysis it comes that PNA should also implement some actions related to digital transformation of the Port aimed at guaranteeing logistics integration complying with digital network formation with other nodes in the wider logistics network.

## 5.3. SUSTAINABILITY, ENERGY TRANSITION & ENVIRONMENTAL TRANSITION

Among the strategic development goals identified by the PNA of the Ionian Sea within PIAO 2023 – 2025, the theme of Sustainability, Energy Transition & Environmental Transition has been identified as one of the key targets of the PNA port development strategy. Sustainability asks for the design and implementation of new business models capable of reconciling maritime tradition with innovative business ideas to foster the transition towards the circular economy paradigm, with particular reference to energy management and environmental planning. In this perspective, the PNA aims to make the Port of Taranto a sustainable energy hub, grounding on both green and smart investments. With this in mind, PNA has strengthened its internal competencies by focusing on tangible and intangible investments to support the decarbonization of the port operations. The processes of decarbonization and energy transition, in a context such as Taranto's, appears even more critical given the traditional core activities performed in the port areas (see the AdI large steel plant, whose revamping implies a greater effort in terms of investments and timing). The PNA has always focused on port sustainable development and has already started a process of energy transition that will allow the port to be completely self-sufficient by enhancing the increase of the Public Value generated by the Port in favor of the local community. The introduction of new ESG (Environment, Social, Governance) guidelines is expected to be the most effective driver to inspire the entire entity in pursuing the new evolutionary pattern.

Next, the PNA has also mapped (through its advisors and consultants) relevant benchmarks and best practices available in the fields of Sustainability, Energy Transition & Environmental Transition within the port domain. The identification of a benchmark of port sustainability serves two purposes. First, it is important to identify the sustainability progress of individual ports in order to know the AS-IS situation and to design and plan future interventions. Second, it is fundamental to identify frontrunners and best practices which can foster the sustainable development of seaports in general. In this vein, the ESPO Environmental Report 2022, identifies three key **green services** to be provided by ports to decarbonise port operations:

- ✓ The provision of Onshore Power Supply (OPS) also called Cold Ironing. This service makes it possible for ships to rely less on their auxiliary engines by connecting to the electricity grid when securely moored at berth in the port. Nonetheless, there are many challenges associated with the deployment of OPS in ports, including a lacking business case, low demand from ships, insufficient grid capacity and grid availability, and the need for additional funding. These challenges make it necessary to prioritise OPS deployment where it can maximise emission reductions from ships at berth. The number of European ports that offer OPS has increased from 32 in 2016 to 51 ports in 2022 (the ESPO Environmental Report 2022). In addition, 55% of the surveyed European ports provide OPS at one or more berths in 2022. Regarding the voltage, 86% of surveyed ports are offering low voltage OPS, which mainly serves smaller vessels such as ferries, inland vessels, and auxiliary vessels such as tugs and 49% offer high voltage OPS to serve large seagoing vessels. When it comes to the type of installation, all surveyed ports with OPS installed can provide electricity through fixed installations, while 14% are also capable to provide OPS through mobile installations. This entails that European ports are already flexible in the provision of OPS, taking steps to serve different ship types in different locations in the port to a reasonable extent.
- ✓ The provision of Liquefied Natural Gas (LNG) bunkering facilities. In 2022, 35 of surveyed European ports have bunkering facilities for providing LNG to ships (the ESPO Environmental Report 2022). About 89% of ports provide LNG by truck, 49% provide LNG by barge and 17% of surveyed ports provide LNG by non-mobile installations. In addition, 21% of ports are currently undertaking LNG bunkering infrastructure projects and 24% are planning to install LNG bunkering in the port in the next 2 years. Thus, LNG is still considered as an important alternative fuel for the surveyed European ports.
- ✓ In addition to the aforementioned services, other renewable energy production sources also have great potential for greening European port areas. As wind power densities are higher in coastal areas, most seaports in Europe are suitable location for wind turbines. In addition, the proximity of industries could also lead to projects in port areas that focus on innovative forms of energy production, such as green hydrogen, photovoltaic systems, geothermal heat and certified biomass and biofuels.

In addition to the aforementioned green services, green-oriented differentiation strategies at the level of port dues and port fees can also become a key driver for accelerating both energy transition and environmental transition. This particularly concerns the implementation of voluntary schemes of environmentally differentiated port fees that reward ships that go beyond regulatory green standards. These differentiated dues often consist of different types of discounts or rebates on marine charges or other types of fees. In 2022, 55 European ports offered differentiated dues which account for 60% of surveyed (the ESPO Environmental Report 2022). Quite of these ports implemented the ESI program (Environmental Ship Index) initiated by IAPH. Some 58% of surveyed ports provide differentiated fees for vessels that engage in sustainable waste management and waste segregation, and that reduce their air pollution. This is due to the implementation of the Port Reception Facilities Directive, since it will become mandatory for ports to provide a discount for ships engaging in sustainable waste management. 47% of ports provide differentiated dues reward to vessels that possess an environmental certification. And other sustainable practices by vessels such as reduced GHG emissions and noise reduction are rewarded by 42% and 24% of ports respectively. In the next two years, a third of all surveyed ports are planning to introduce environmentally differentiated port dues.

When it comes to the Italian context, the current state of the art concerning interventions implemented, underway and planned to decarbonise port activities by Italian PNAs have been mapped through the analysis of documents such as the DEASP and the sustainability reports available on their websites (Table 43). The 310 sample actions included in the analysis refer to 8 main typologies including: i) Bunkering and Storage facilities for alternative fuels; ii) Digitisation and ICT platforms; iii) Facilities and

infrastructures for energy supply; iv) Energy efficiency; v) Land use conversion; vi) Policies and measures; vii) Renewable energy production; viii) Research and Development.

Table 43. Green strategies implemented by Italian ports.

| AdSP | Bunkering and storage facilities for alternative fuels | Digitalisation and ICT platforms | Energy efficiency | Facilities and infrastructure for electric energy supply | Land use conversion | Policies and measures | Renewable energy production | Research and Development | Total |
|---|---|---|---|---|---|---|---|---|---|
| Central Adriatic Sea | | | 2 | 6 | | | 1 | | 9 |
| Central Tyrrhenian Sea | 1 | | 6 | 2 | | | | | 9 |
| Eastern Adriatic Sea | 2 | 1 | 8 | 7 | | 1 | 1 | 2 | 22 |
| Eastern Ligurian Sea | 1 | 4 | 4 | 2 | 1 | 10 | 7 | 2 | 31 |
| Eastern Sicily Sea | 1 | | 3 | 2 | | 2 | 4 | | 12 |
| Ionian Sea Port | | | 4 | 4 | | 1 | 5 | | 14 |
| North Tyrrhenian Sea | 1 | 9 | 7 | 5 | | 4 | 5 | 8 | 39 |
| Northen Central Tyrrhenian Sea | 1 | 1 | 10 | 6 | 1 | | 6 | 1 | 26 |
| Northern Adriatic Sea | 2 | 2 | 16 | 4 | | 2 | 4 | 2 | 32 |
| Northern Central Adriatic Sea | | 1 | | 2 | | 1 | 2 | 2 | 8 |
| Sardinian Sea | 1 | 2 | 10 | 6 | | 6 | | 6 | 31 |
| Southern Adriatic Sea | 1 | 2 | 10 | 1 | | | 3 | | 17 |
| Southern Tyrrhenian and Ionian Sea | 1 | | 3 | 2 | 1 | | 1 | | 8 |
| Strait Port System | 1 | | 2 | 2 | | | 2 | | 7 |
| Western Ligurian Sea | 1 | 2 | 7 | 5 | 4 | 6 | 4 | 3 | 32 |
| Western Sicily Sea | | 4 | 2 | 5 | 1 | | 1 | | 13 |
| **Total** | **14** | **28** | **94** | **61** | **8** | **33** | **46** | **26** | **310** |

*Source: Authors' elaboration.*

Energy efficiency interventions are the most carried out by Italian PNAs with a rate of 30% (e.g., the installation of LED lighting). With a share of 19.6% follow the interventions with regard to the construction of infrastructures for the supply of electricity in ports (e.g., cold ironing, electric car charging stations). 14.8% of the interventions are dedicated to the production of renewable energy (e.g., photovoltaic panels, wind power). In addition, 10.64% of the interventions concern policies and measures implemented by the PNAs (e.g., energy efficiency measures, incentives for the use of renewable energy). Digitisation interventions (e.g., development of an intelligent transport system, design of Internet of Things elements and ICT platforms for maritime logistics) and research and development (e.g., development of a circular economy model, joint feasibility studies favouring optimal uses of LNG) represent 9.03% and 8.38% of interventions respectively. 4.52% of interventions are dedicated to the construction of bunkering and storage facilities for alternative fuels (e.g., construction of LNG coastal storage facilities), and 2.8% concern land use conversion (e.g., construction of green buffer areas in or near ports).

The Supplementary Fund to the National Recovery and Resilience Plan (Decree-Law No. 59 of 2021, Article 1, Paragraph 2, Letter c) allocates funds to the Ministry of Infrastructure and Sustainable Mobility (MIMS) for the maritime and port sector. For the measure 'Electrification of quays (cold ironing)', resources totalling EUR 700 million are allocated between 2021 and 2026 to electrify 34 Italian ports. The port of Taranto has been allocated resources amounting to EUR 55 million. In 2022, the Ministry of Infrastructure and Sustainable Mobility has announced a simplification of the bureaucratic procedures for approving quay electrification. To date, Genoa and Savona are the two leading ports in Italy for this technology, with systems already installed at the Riparazioni Navali (ship repairs), the Pra' terminal, and Vado. With regard to interventions for the environmental sustainability of ports, the so-called Green Ports, 270 million euros of investment are planned. The aim of the investment is to make port activities more compatible and harmonious with urban activities and life, thanks to measures to reduce energy consumption and increase environmental sustainability, also using renewable energy. These measures will help reduce greenhouse gas emissions by 55% by 2030. The interventions to be carried out in port areas are numerous. They include:

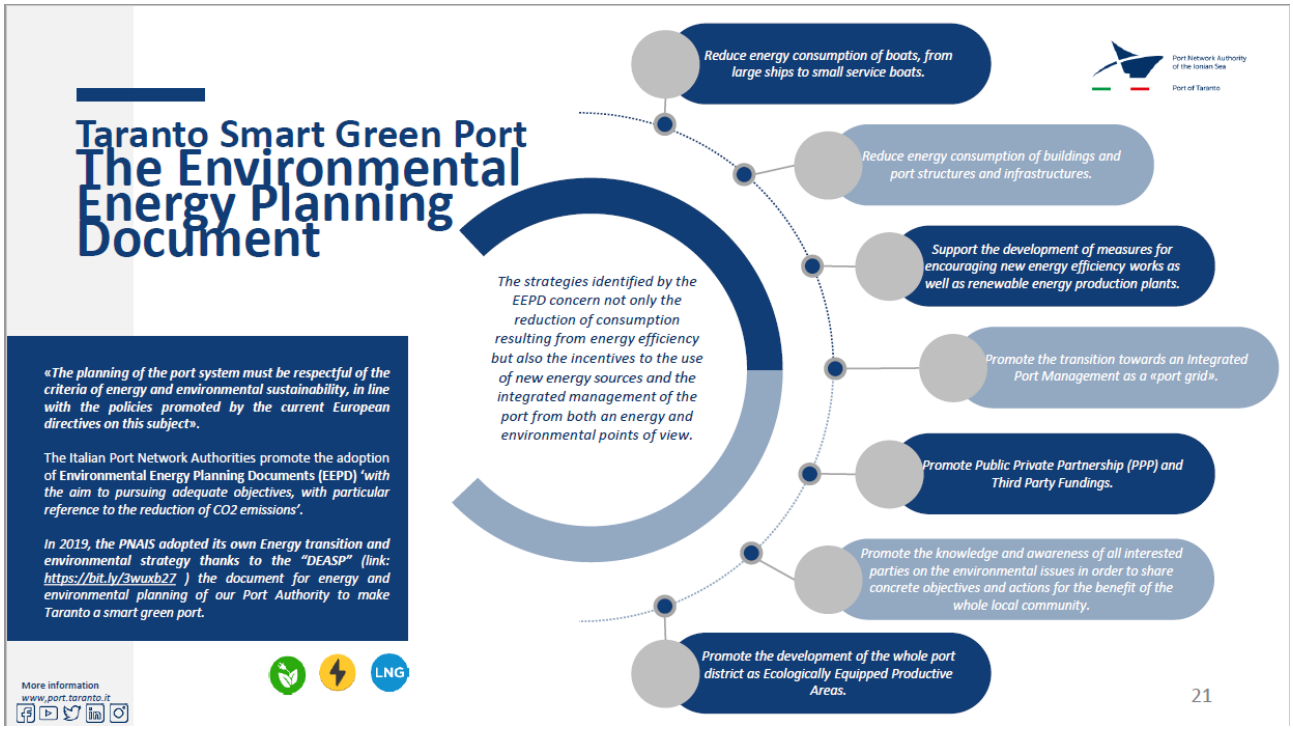
- ✓ the redevelopment of port areas and buildings from a social, economic and environmental point of view;
- ✓ the reduction of greenhouse gas emissions and pollution through increased production of renewable energy;
- ✓ greater attention to the preservation of the natural heritage and biodiversity in the areas surrounding port areas;
- ✓ the realisation and promotion of infrastructure for sustainable mobility;
- ✓ the optimisation of energy transport such as the transfer of electricity from high-voltage lines to port docks and from there to ships.

The PNA of Ionian Sea has started to focus on Sustainability, Energy Transition and Environmental Transition since the development of the TOP 2020 – 2022.

## Link to the SWOT analysis' results & Future Targets

Taking into account the results of the SWOT analysis performed in Chapter III (and particularly the SWOT results at the level of the sub-theme 'energy market and energy transition'), the strategic goal "Sustainability, Energy Transition & Environmental Transition" holds a key role in the programmatic framework of the PNA of Ionian Sea for the 2023-2025 period, especially in the development of new business model based on energy transition towards renewable energy sources. This strategy is perfectly in line with plans and programs already set in the Environmental Energy Planning Document of the PNA of Ionian Sea (Figure 87)

Figure 87. The Environmental Energy Planning Document - Taranto Smart Green Port.




*Source: Taranto Port Profile, 2022.*

The outcomes of the SWOT analysis point to some key measures capable to support the sustainability targets set by the PNAs. The most promising actions include:

- ✓ The implementation of "Baleolico" Project and the installation of photovoltaic plants may ensure the progressive switch to alternative and renewable sources (e.g., wind and solar energy). This action mainly involves 'hardware' development;

- ✓ The development of Onshore Power Supply (OPS) and form of alliances with other ports and shipping actors to assess its feasibility. In addition, the Port of Taranto, given its strategic positioning close to the main shipping routes in the med, should also consider developing bunkering activities for non – fossil ship fuels in order to maintain and improve its competitiveness and attractiveness. The realisation of OPS is not only a question of establishing the necessary 'hardware' (infrastructure in ports and electric grid connections to terminal quays) and 'software' (e.g., data management related to electricity consumption), but also raises some challenges in terms of the 'orgware', particularly at the level of the adopted governance model for making the necessary investments;
- ✓ The development of the Taranto Eco Industrial Park. The project involves the promotion, activation and completion of the technical administrative procedures and the realization of the necessary works for the construction of an Eco Park in the Taranto back port area, including those actions related to the creation of an intermodal transport network capable of facilitating the development of logistics. Also here, its realization requires actions in the field of hardware, software and orgware. The implementation of the real time environmental monitoring system, which primarily concerns software and orgware aspects.
- ✓ The exploitation of sustainable finance tools also involving financial service providers in the transition process. There is room in the port of Taranto to embrace sustainable finance in partnership with their financial service providers.
- ✓ The optimization of integrated solutions for hinterland transportation (e.g., synchromodality solutions). The success of synchromodal solutions is not only dependent on the effective interconnectivity between hinterland transport infrastructures and hinterland transport services (hardware), but also relies strongly on data management and integration (software) and effective forms of collaboration between supply chain actors (orgware).
- ✓ The participation in European Projects, such as ECOWAVES, represents an important demonstration of the higher attention on the application of "circular economy" activities which is one of the most important strengths of the PNA.

Figure 88. The Taranto Eco Industrial Park.


*Source: Taranto Port Profile, 2022.*

## 5.4. PORT & TERRITORY

One of the major strategic goals set by the PNA of the Ionian Sea in the PIAO concerns the relationship between the Port & Territory. In particular, the PNA focuses on promoting initiatives and activities geared toward bringing the Port of Taranto closer to its city and integrating their respective development policies. This integration process was initiated both through the creation of new relationships with the local entrepreneurial cluster and through the development of international partnerships with entities and realities engaged in the context of port city enhancement (both strongly focusing on the 'orgware' dimension).

The industrial tradition of the Port of Taranto, linked to the steel industry, has in the past distanced the port from the territorial community, disfavouring the emergence of a local diffuse culture capable to look at a port as a business generation opportunity and a pivotal orchestrator aimed at creating Public Value and welfare for the local community. In addition, the predominance in the port of industrial and container transhipment traffics, jointly with the scare amount of import-export trades, logistics activities, last mile distribution systems and tourism activities, have negatively affected the development of local enterprises and businesses inside and outside the Port of Taranto. The local lack of a port-related culture, moreover, has led to a knowledge gap among the population about the nature of the port activities in Taranto and the potential societal benefits generated by this type of logistics node.

Spatial planning initiatives from the PNA of the Ionian Sea combined with the key actions programmed for the 2023-2025 period in the field of Port & Territory aim to create areas for supporting the development of the "Port District" in the cargo context as well as tourism-related activities when it comes to the passenger domain, also improving the citizen lifestyle and welfare grounding on such intervention as the new waterfront project. The full integration of port and urban planning makes near-port locations attractive for non-port functions that can benefit from proximity to the port. The total port area can be broader than the total port state-owned areas, as it can also include parts of the external territory functionally related to port activities. At the same time, port state-owned areas may not be devoted exclusively to port activities but interact with urban-type functionalities. In this sense, the planning of port activities makes it possible to define the limits of the operational area, while the delimitation of a sub-area of city-port interaction is more difficult. Similarly, it is rather easy to determine the level of employment directly related to the port, while it is more complex to estimate the indirect employment and indirect value added generated by the port. The concept of expanded port-related industries attempts to capture all these various aspects. Considering the role, the port plays in the territory, planning its development can be a catalyzing factor for the growth of the entire territory, its industries and, in general, its economic activities. In fact, the presence and growth of the supply of port services can be a driver for the overall local economy.

### Link to the SWOT analysis' results & Future Targets

The outcomes from the SWOT analysis (Chapter III) unveils both treats and opportunities for the Port of Taranto with regards to both cargo and cruises traffic flows which are expected to shape the most effective actions to be set for pursuing the PNA of Ionian Sea strategic goal labeled "Port & Territory".

As far as the cargo businesses are concerned, the analysis of treats and opportunities reported in the Chapter III suggests improving actions directed to support the development of more consolidated local entrepreneurial culture, stimulating business networking and the availability of port areas dedicated to support the entire cargo supply chain (agents, shippers, etc.). In this perspective, it is fundamental also linking these actions with those reported in the next Paragraph 5.5 focused on the strategic goal "Infrastructures & Logistics".

Moreover, when it comes to the passenger domain, the recent new strategic positioning of the Port of Taranto in the cruise market opens up windows of opportunity to an increasing range of actions aimed

at improving the relationships between the Port and Territory. In 2023, the Port of Taranto will welcome additional cruise passengers flows, as it will become the home port for the Costa Pacifica cruise ship. The increase in cruise passenger traffic in the port of Taranto is expected to generate several business opportunities for tourism-related activities located in the port areas as well as in neighboring urban areas, with positive impacts for the whole territory. The most prominent action in this field includes the plan of interventions for the regeneration of "Leisure/environmental" areas in the port and urban environment (Waterfront) which not only concretizes the commitment of the PNA of Ionian Sea and the municipal administration in building a redeveloped environment, but above all offers new opportunities for the use of the context of the city-port interface. To create new development opportunities for both the local community and the maritime cluster, the Port of Taranto has also paid special attention to the use of digital solutions. In particular, the realization of the strongly digitally focused "Open Port - Exhibition center of the Port of Taranto" provides a cultural exchange experience to the local community of Taranto, visitors and tourists that can enhance the port but also the territory.

The prospects of growth in cruise passenger traffic volumes in the port of Taranto (especially given the choice by Costa Cruises to have the Costa Pacifica dock in the port of Taranto for the 2023 summer season) could prompt PNA to develop new targeted marketing campaigns. In particular, the development of a campaign targeting "repeaters" and focusing on customer satisfaction could lead cruise passengers to choose (again) Taranto as a tourist destination. Moreover, in the TOP 2023-2025, the Authority could consider providing new and different services to cruise lines and cruise passengers. In addition, the growth in the size of cruise ships urges the port and surrounding city to be ready to handle and welcome a large number of passengers. In addition to the infrastructural limitations that imply renovation works to accommodate large ships, it is appropriate to consider all the induced effects that result from the transit of more passengers both in the port and in the territory.

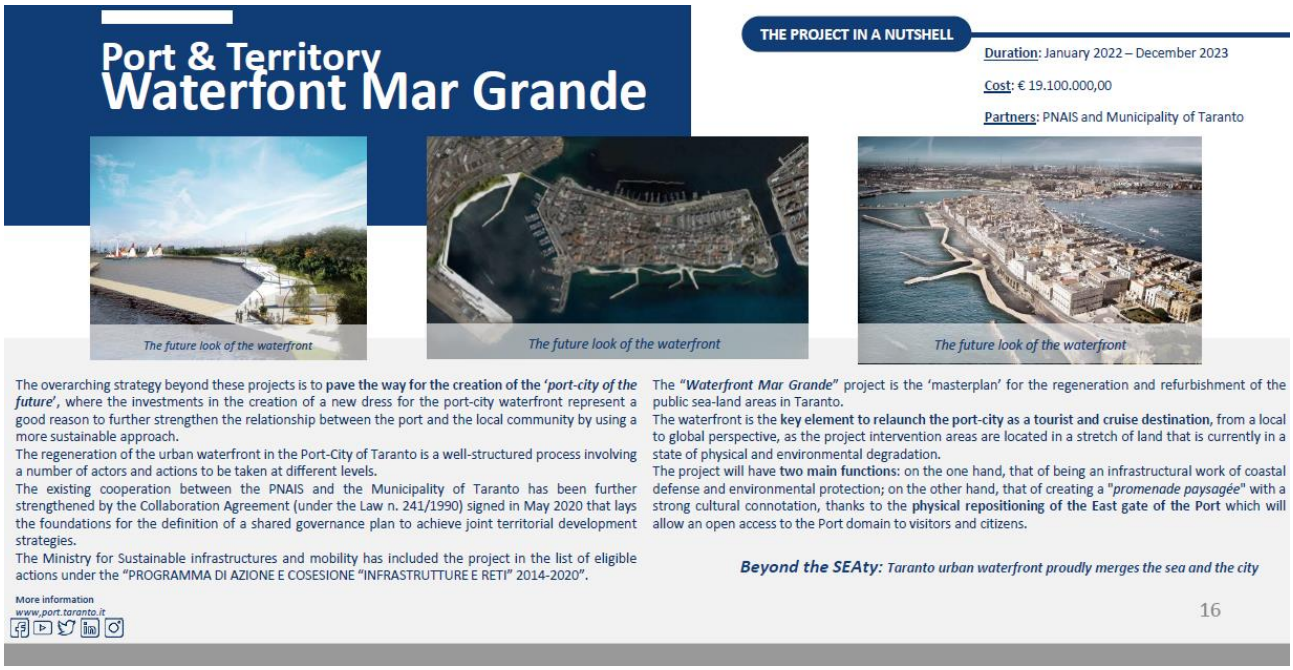
The most promising future actions to be included in the TOP 2023-2025 for pursuing the “Port & Territory strategic goal” include hardware, software and orgware interventions. The most impacting interventions for Taranto should be the following:

- ✓ The Waterfront “Mar Grande” Project (Figure 89), which includes several valuable operational areas capable to improve the relationships existing between the Port of Taranto and the local community, such as: i) physical ‘hardware’ regeneration of the Waterfront (that allows the creation of a new architecture of the land-sea interface); ii) territorial marketing and tourism development (i.e. actions in the field of ‘software’ and ‘orgware’ such as the organization of workshops and thematic meetings, modular system of guided tours to the port of call, networks and cultural connections between port and city, but also actions that combine hardware, software and orgware dimensions such as the further development of the Open Port Exhibition Center of the Port of Taranto).
- ✓ The further development of the Falanto Port Service Center - “Open Port” Project: the project aims at providing Taranto with a new maritime and port related culture, encouraging the fusion of the port, the city, and the environment into a single all-encompassing experience. The PNA has planned the construction of the Falanto Port Service Center, that is a Multipurpose Service Center located on the Molo S. Cataldo as well as the renovation of the pier’s East side berthing quay. The works foresee the realization of a multipurpose building dedicated to the following activities: promotion of maritime culture; multi-purpose auditorium, meeting rooms, areas for exhibitions and educational activities; passenger services; and “meet and greet” services (information point, lounge area, bar, restrooms).
- ✓ The “Ex Torpediniere Taranto” Project: The project involves the realization of ‘hardware’ works for enabling the mooring of ships and maxi yachts as well as the requalification and refurbishment of the existing buildings in the “Ex Torpediniere” area in order to rethink their vocation to improve tourism, cultural and commercial activities. The planned works include the construction of a “nautical center", aimed at implementing activities such as pleasure tourism

nautical services garaging, small shipbuilding, nautical accessories complementary commercial activities. The project also foresees the creation of a digital, immersive center of the Mediterranean Sea, which will host exhibition spaces and immersive multimedia rooms (combination of hardware and software dimensions).

- ✓ The further enhancement and development of business activities related to the Taranto Boating & Marina.
- ✓ Development of specialized training & educational programs partnering with both national and international Universities specialized in the maritime-port domain (combination of software and orgware dimensions)
- ✓ Increasing involvement in National and International (especially EU-funded) projects focused on port culture, territorial marketing, Blue Economy, and tourism activities in the port context (also a combination of software and orgware dimensions).

Figure 89. Waterfront Mar Grande: the project in a nutshell.




*Source: Taranto Port Profile, 2022.*

## 5.5. INFRASTRUCTURES & LOGISTICS

The fourth strategic goal set by del PIAO of the PNA of the Ionian Sea focuses on "Infrastructures & Logistics", unveils legislative and strategic connections with the Regional Plan of Freights and Logistic[22] (RPFL hereinafter). The RPFL, according to Article 2(3) of the Regional Law (RL hereinafter) no. 16/2008, constitutes the "sectorial implementation plan" of the Transport Regional Plan (TRP hereinafter). The RPFL sets and defines, according to an intermodal perspective, the lines of intervention related to the regional freight transport and logistic system, identified by the TRP for each of the four modes of transport, i.e., road, railway, air, and maritime transport.

Since the RPFL is the designed tool to specifically define the regional strategy for the freight transport and logistic system, the strategic goals set by the PNA of the Ionia Sea addressing the development of both port and inland infrastructures as well as of logistic and intermodal services must be coherent and in line with it. In this vein, the Act no. 1611/2017 of the Regional Council has approved seven strategic

[22] The RPFL is foreseen by the Regional Law no. 18/2002 in Article 25(5.a7) and confirmed by Regional Law no. 16/2008 in Article 2(3).

objectives of the RPFL plus one**,** as regards the institution of the Adriatic and Ionian SEZs, which have been specified in further «specific objectives» and «related actions». The Port of Taranto is the "center" of the Ionian SEZ, i.e., the Interregional Special Economic Zone between the Regions of Puglia (1.518,4 ha) and Basilicata (1.061 ha).

When it comes to the current state of the art of the rail and intermodal infrastructures serving the Port of Taranto and the hinterland, it must be noted that the port is the final node of the rail/road part of the "Scandinavian-Mediterranean" Corridor (Helsinki/Malta) and the maritime node connecting the Corridor to the Port of Valletta. The Port is also linked to the Adriatic rail bridge (Bari-Bologna rail line) and to others serving the Potenza-Naples, the Brindisi-Lecce line, and the Reggio Calabria lines.

With regard to the revision (December 2021) of the TEN-T networks, a significant part of the Adriatic rail bridge (i.e., the Ancona-Foggia section) has been included in the "extended Core network[23]" (both rail and road infrastructures). This inclusion makes it possible to extend the route of the "Baltic Sea - Adriatic Sea" Corridor up to Bari, enhancing a strategic connection with the "Scandinavian - Mediterranean" Corridor to the North through the Bologna node and to the South through the Bari node.

Table 44. The Adriatic rail ridge and the revision of TEN-T.

| Section | Comprehensive | Extended Core (Freight) | Extended Core (Pax) | Core (Freight) | Core (Pax) |
|---|---|---|---|---|---|
| Bologna - Ancona | | | | X | X |
| Ancona – Foggia | | X | X | | |
| Foggia - Bari | | | | X | X |
| Bari - Lecce | X | | | | |

*Source: RFI S.p.A. (2022).*

The Port of Taranto is linked to the national rail network through two important nodal infrastructures, i.e., the Taranto Rail Station and the Cagioni Rail Station.

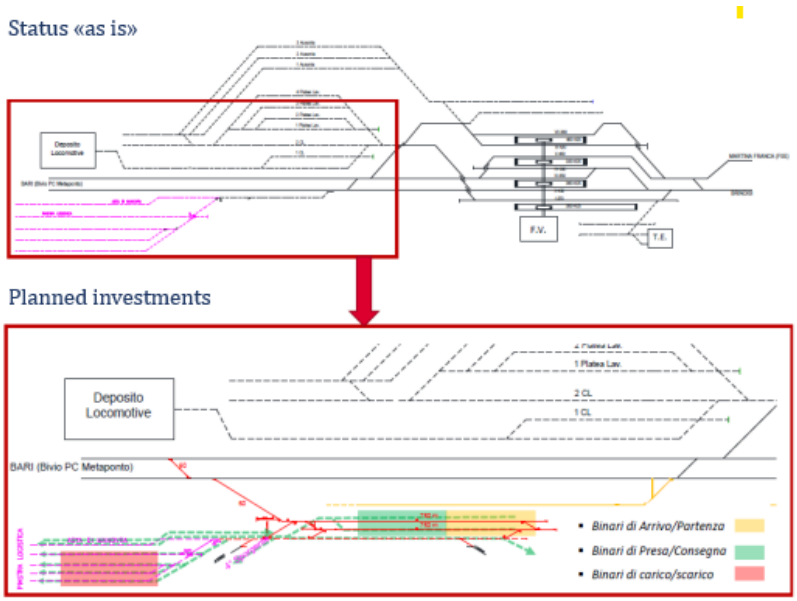
As regards the Taranto Rail Station (Figure 90), three additional (electrified) tracks dedicated to freight traffic are expected to become operational up to 2023, of which two will be centralized with "arrival/departure" and "pick-up/delivery" functions and one with the function of linking with the Logistic Platform (i.e., 5 tracks with a total length of 1 kilometer), located in the Multipurpose Pier[24] of the Port of Taranto (all characterized by a length of 750 meters in comparison to the current length of 450 meters).

A similar project is also under development in the Cagioni Rail Station (Figure 91): up to 2023**,** the project implementation will lead to the construction of 3 centralized and electrified tracks linking the aforementioned Logistic Platform to the national rail network.

In September 2022, the Italian Ministry of Infrastructure and Transport has assigned to RFI S.p.A. the design and implementation of the technological upgrade, the improvement of the rail stations, the adjustment of different sections of track and the reduction of interferences on the Adriatic rail bridge (Lecce-Bologna rail line) for a total amount of 8.5 billion euro.

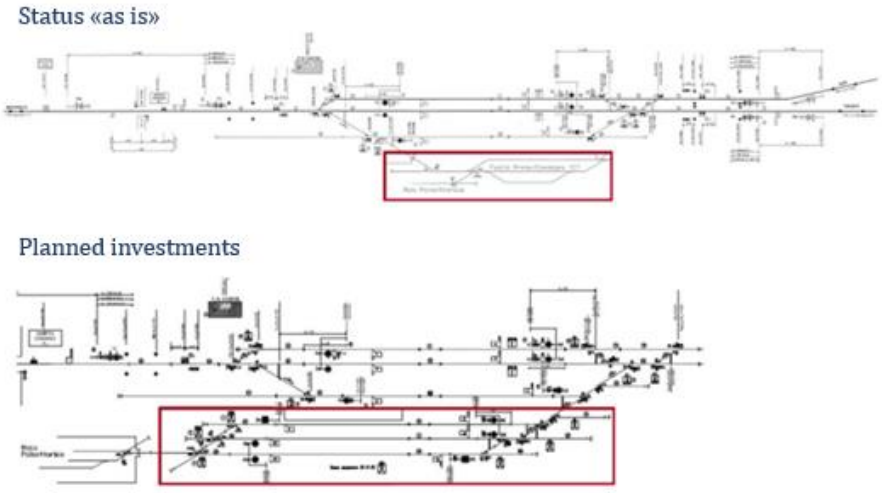
[23] The revision of EU Regulation 1315/2013 on the TEN-T networks adds (art. 6 of EC 2021/812) an "extended central network" which is expected to be completed in year 2040.
[24] The Multipurpose Pier is part of the San Cataldo Container Terminal operated by Yilport.

Figure 90. Taranto rail station.




*Source: RFI S.p.A. (2022).*

Figure 91. Cagioni Rail Station.




*Source: RFI S.p.A. (2022).*

In addition to the allocated funds (2.9 billion euro), it has been agreed to dedicate 5 billion euro through the National Law no. 234/2021 and by the Fund for Development and Cohesion (FSC) for the period 2021-2027 for the construction of bypasses allowing the transit of high-speed passenger and freight trains on new internal rail-routes, preserving the existing coastal rail-line for local public transport services, and for the construction of route variants with the withdrawal of the rail line in order to replace the existing one.

The aim of the aforementioned Investment Plan is to guarantee a capacity consistent with the expected value of rail freight traffic on the Adriatic Rail Bridge (Figure 92) estimated for the 2030 at about 3.5 million TEU per year (RFPL 2022). This estimate translates (out of 300 days/year) into an overall load of 176 trains per day (considering a train length equivalent to 750 meters) along the Adriatic corridor (i.e., an increase of +132 trains/day compared to the current rail freight traffic of an average of 44 trains/day) (RFPL 2022).

Table 45. The Adriatic rail-bridge (Lecce-Bologna): MIT-RFI's Investment Plan.

| Planned Investments (€ million) | Under construction | | |
|---|---|---|---|
| Section | Rail stations | Lines | Total |
| Bologna – Rimini | 43 | 196 | 239 |
| Rimini - Ancona | 23 | 359 | 382 |
| Ancona - Pescara | 22 | - | 22 |
| Pescara - Foggia | 6 | 957 | 963 |
| Foggia - Bari | 24 | 950 | 1.026 |
| Bari - Brindisi | 45 | | |
| Brindisi- Lecce | 35 | 127 | 162 |
| Brindisi- Taranto | 25 | 37 | 62 |
| Upgrading of length and stations | - | 100 | 100 |
| **Total** | **223** | **2.689** | **2.912** |

| First stage | |
|---|---|
| Section | Total |
| Bologna - Imola | 1.400 |
| Pesaro – Fano | 1.850 |
| Alba A. - Roseto | 1.000 |
| Ortona | 750 |
| Bari Nord | 608 |
| - | - |
| - | - |
| Brindisi Taranto | 250 |
| - | 100 |
| **Total** | **5.958** |

| Second stage | |
|---|---|
| Section | Total |
| Imola - Castelbo | 900 |
| Fano - Falconara | 1.900 |
| - | - |
| - | - |
| Bari - Barletta | 2.500 |
| - | - |
| - | - |
| - | - |
| - | - |
| **Total** | **5.300** |

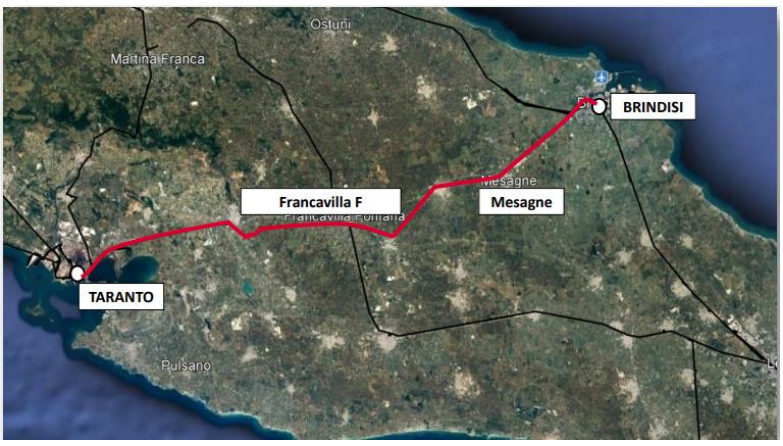
*Source: RFI S.p.A. (2022).*

Figure 92. The Adriatic Rail Bridge.


*Source: RFI S.p.A. (2022).*

Such a commitment undertaken by the Italian Government has convinced the European Commission to include, since December 2021 (EC 2021/812), a significant part of the Adriatic rail bridge (i.e., the Ancona-Foggia section) in the so-called "extended core network" of the TEN-T networks, opening up the possibility of obtaining further European financial resources for the improvement and the enhancement of rail (freight) services on the Lecce-Bologna railway line. Among the main interventions planned are the increase of the commercial speed on the Brindisi-Taranto section (Figure 93) and the quadrupling of the Barletta-Bari section.

Figure 93. Focus on the Taranto-Brindisi rail-route.




*Source: RFI S.p.A. (2022).*

When it comes to the current state of the art for intermodal services for/from the Port of Taranto and its hinterland, it is worthwhile to mention that, in January 2023, terminal operator Yilport handled the first intermodal service at the San Cataldo Container Terminal. This feat has been accomplished partly because of the re-activation of the link to the national rail network in September 2022, operated by the railway operator GTS S.p.A. with the support of the railway company Mercitalia Shunting & Terminal S.p.A., on the Bari – Taranto railway line.

In addition, the so-called "Bari complex node", made up of i) the Bari Lamasinata rail station, the rail yards of ii) Bari Ferruccio and of iii) GTS S.p.A. and iv) the intermodal freight center Interporto Regionale della Puglia S.p.A., plays a pivotal role in the regional freight transport and logistic system and serves a hinterland besides the territory of Puglia Region including the Basilicata, Molise and Calabria hinterlands for a declared rail freight traffic volume of 4,000 trains/year (RPFL 2022). Since October 2022, a rail service between Bari and the Port of Zeebrugge (three round trips per week is operational with a travelled distance of more than 2,000 kilometers in 48 hours, operated in Italy by GTS S.p.A. and out of the national border by the Swiss BLS. It is the intermodal/railway service with the longest distance in Europe which allows savings equivalent to over 5,000,000 truck km/year.

In compliance with the European Union policy, the Puglia Region has set a challenging strategic goal in terms of modal shift in freight transportation services. In particular, a target of 30% of freight traffic to be shifted from road to rail (or ship) has been set, corresponding to about 190 million tons-kilometer of freight by the year 2030 and to about 320 million tons-kilometer of freight by the year 2050 (RPFL 2022).

**Link to the SWOT analysis' results & Future Targets**

The outcomes from the SWOT analysis suggest that a number of opportunities could emerge for the maritime-port cluster of Taranto from the development of actions and interventions related to the "Infrastructures & Logistics" strategic goals. In this vein, although the PNA of the Ionian Sea has already completed a set of actions which could play a key role in implementing intermodal connections and strengthen logistics activities in the port areas, additional interventions are suggested for closing the gap with other port competitors and better positioning the Port of Taranto both at national and international level.

In this perspective, when it comes to intermodal transport related to the container segment, the Port of Taranto benefits from the advantages of the inclusion in the TEN-T Scandinavian-Mediterranean Corridor and in the extension of the Baltic Adriatic corridor. More in detail, the strategic position of the port combined with the network of logistics centers (*interporti*) and other logistics nodes in Italy opens up opportunities for developing a stronger transit function for both gateway and transshipment traffics. Indeed, the connection of the Port of Taranto with the Interporto Regionale della Puglia could constitutes in the near future an unprecedented opportunity for developing intermodal traffic and port throughput.

Additional investments and actions should also be directed towards enhancing passenger-based intermodal transport. Due to the seasonality of the cruise/passenger segment, the presence of a Multipurpose Terminal, could guarantee an optimization of space and facilities and an increase of the opportunities for passengers transiting via the Port of Taranto.

With regard to the insights provided by the SWOT analysis, it emerged that the presence of the Free Trade Zone (FTZ) and Special Economic Zone (SEZ) in the Port of Taranto combined with the establishment of SEZs in the Southern Neighborhood countries can undermine the ambitions of SEZ within the Port. Consequently, the PNA should implement further measures to ensure a decisive competitive advantage over African countries.

Moreover, the transformation of the geo-economic landscape in Europe could provide more chances to peripheral regions in the EU (such as South Italy) to attract production activities and to extend the port

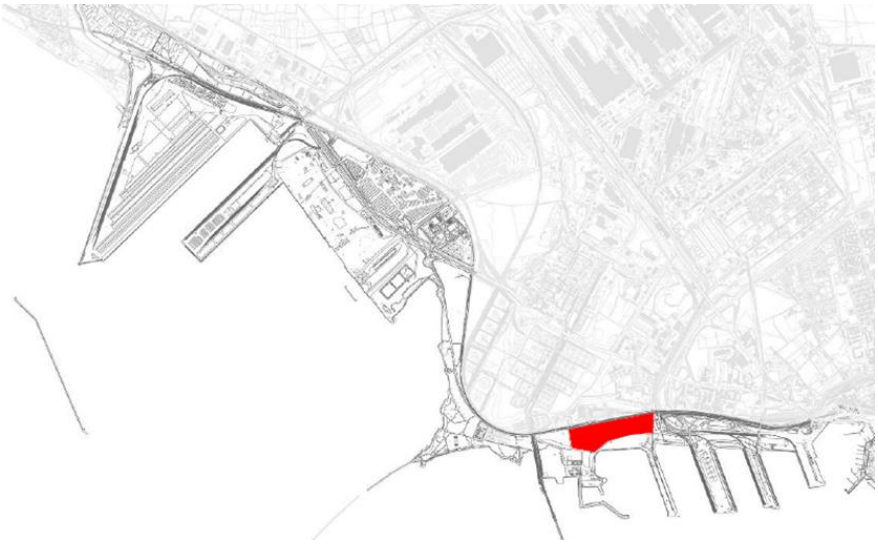
ecosystem perimeter. In this perspective, the PNA can develop new links to benefit from the growth of the BRI-network also implementing the Port's facilities to create an "intermediate hub" toward extra-EU regions. Considering also that carriers and shippers seek for cargo routing flexibility, also on the Asia- Europe trade links, the Mediterranean gateway and transshipment ports will potentially face competition from alternative route options by rail or sea. In this perspective the port of Taranto should take into consideration the development of new links to the array of routing options, for example by connecting to the Black Sea ports in Georgia in view of establishing a link with the middle rail corridor to China.

With particular reference to the containerized cargo market, the Port of Taranto could also implement some actions related to business networking with primary operators from the large-scale distribution sector such as major e-commerce companies such as Amazon or major retailers, also performing commercial strategy to expand local gateway hinterland and intermodal connections.

Possible key actions which could be included in the TOP 2023-2025 for targeting the "Infrastructures & Logistics strategic goal" include:

- ✓ Upgrading both nodal and linear infrastructures, focusing on the development of rail/intermodal connections ('hardware'). In line with strategic objectives no. 1, 2 and 5 of the RPFL (2022), the PNA of the Ionian Sea is expected to promote the development of port and inland infrastructure as well as to favor the integration of intermodal transport services with the regional freights' transport and logistic system also leveraging on the "Bari complex node". The main goal is to define a better positioning for the port of Taranto within the overall Southern Italy freights' transport system.
- ✓ Upscaling of the Taranto Logistics Park with other intermodal connections (Figure 94; mainly an action focusing on the 'hardware' dimension): the logistics park includes a 4,836 sqm of warehouses and yards which extend over an area of 25,700 sqm. After the implementation of the action, the Logistic Park railway tracks no. 4 rail tracks) will be linked to the Taranto railway station and the national railway network

Figure 94. Location of the Taranto Logistics Park.



*Source: Taranto Port Profile, 2022.*

- ✓ Sponsoring new initiative, agreements and projects for facilitating business networking and partnerships among both public and private actors involved in transport, logistics and intermodal infrastructures and services within or nearby the "Bari complex node" (i.e., the PNA of the Southern Adriatic Sea, the Interporto Regionale della Puglia, Mercitalia Shunting and Terminal S.p.A., GTS S.p.A., etc) in order to fuel the further enhancement of both nodal and linear

intermodal infrastructures/terminals. This range of actions mainly focus on the 'orgware' dimension of the competitiveness of the port of Taranto;

- ✓ Enhancing incentives to the railway freight transportation's mode (i.e., a combination of 'software' and 'orgware'): in line with strategic objectives no. 2 of the RPFL (2022), the PNA of the Ionian Sea is expected to co-operate with national, regional and European Institutions (i.e., MIT, RAM S.p.A., Puglia Region and European Commission) in order to design and promote existing and additional incentive schemes to the railway freight transportation's mode (either conventional or intermodal traffic). The PNA of the Ionian Sea has to support Puglia Region in the implementation of the incentive so-called "Regional Ferro-bonus" and in the proposition of additional/alternative incentives by establishing a permanent and institutional dialogue with railway and logistic operators which operate in the hinterland as well as with both national and European institutions;
- ✓ Fostering the effectiveness of the Interregional Ionian SEZ and its integration with the rail freight transport and logistic system: in line with strategic objectives no. 4 and 8 of the RPFL (2022), the PNA of the Ionian Sea has to match the demand arising from industrial and agri-food companies populating the Interregional Ionian SEZ with the offer of logistic and intermodal services by the Regional freights' transport and logistic system. Furthermore, the PNA of the Ionian Sea is expected to play a key role in promoting actively within the maritime logistics cluster both the economic benefits and the simplified administrative procedures available within the SEZ and FTZ areas in order to foster the provision of new "Value Added Services" (VAS) by both local private logistics operators and new entrants. The availability of more sophisticated and well-integrated VAS jointly with the availability of intermodal services within the Port of Taranto are argued to enhance an increase in import/export traffic flows by/from the hinterland of the port. The PNA of the Ionian Sea has to leverage its central role in the governance setting of the Interregional Ionian SEZ and combine it with institutional communication, territorial marketing initiative and destination management and branding activities planned and implemented by both public actors and private agencies at local and regional and national level ('orgware' dimension). In this way, a greater match between the demand and the supply of logistics and intermodal services within the Ionian is expected to be reached, with positive spillovers in terms of VAS-related business opportunities.

## 5.6. INTERNATIONALIZATION

The strategic goals related to the "Internationalization" of the Port of Taranto, defined by the PNA of the Ionian Sea within the PIAO 2023-2025, has been set, in line with 'software' and 'orgware' actions and efforts already developed in the previous three-year timeframe. In this perspective, a number of business networking strategies and promotion activities at international level has been already designed and implemented. Even during the Covid-19 pandemic, with high physical constraints in terms of people moving and meeting the PNA has carried out an intense marketing activity aimed at increasing the levels of internationalization of the organization, participating in numerous digital initiatives, conferences and sectoral event, to open up opportunities for growth in the national, European and Mediterranean context.

In this perspective, at international level, given the profound changes in both port competition and port governance worldwide, the increasing complexity of interactions with all the maritime-port stakeholders has triggered Port Network Authorities (PNAs) to adopt NPM (New Public Management) practices increasingly introducing market-oriented managerial approaches in the management of port activities and in their decision-making process. New Public Management notably imposes greater focus on the monitoring of the performances of the PNAs, leads to goal-oriented approaches and stimulates the diffusion of a managerial culture also within public entities that is less centralised and more oriented towards seeing the citizen as a customer. In recent years there have been also the introduction of the concept of New Public Governance (NPG), as a new paradigm of public service delivery. The notion of

NPG, indeed, embraces "*a multi-actor perspective and suggests the adoption of a variety of vertical and horizontal mechanisms linking various actors, such as politicians, governmental organization committees and representatives, interest groups and citizens*" (Osborne, 2010). The effective implementation of these two innovative concepts in PNAs activities, worldwide, has profoundly transformed organization, mission and strategic objective of the entities, bringing PNAs to growingly act as "facilitator" within the overall port community both at local and international level. Relatedly, also the PNA of the Ionian Sea has started to promote and incentivize successful trust-based relationships among different public/private actors in order to created business networking, market opportunities for the port and synergies and integration among various stakeholder' groups and the key market players.

Within the new port governance and management settings, PNAs are also increasingly encouraged to pursue internationalization strategies for better position the ports themselves within the global market and increase opportunities in terms of both hinterland and foreland connections. Inj this perspective both "inward" and "outward" internationalisation strategies for strengthening port competitiveness and attractiveness in this global market. Notably, "inward internationalization" strategies include a number of viable options such as the attraction of FDI in the port area for strengthening the port competitiveness and increase employment and value added generated in port areas. Outward internationalization strategies can be implemented by setting overseas representative offices, realizing FDIs in other countries and participating in joint projects (Dooms et al. 2019). Also marketing and communication strategies are expected to improve the international standing and reputation of PNAs.

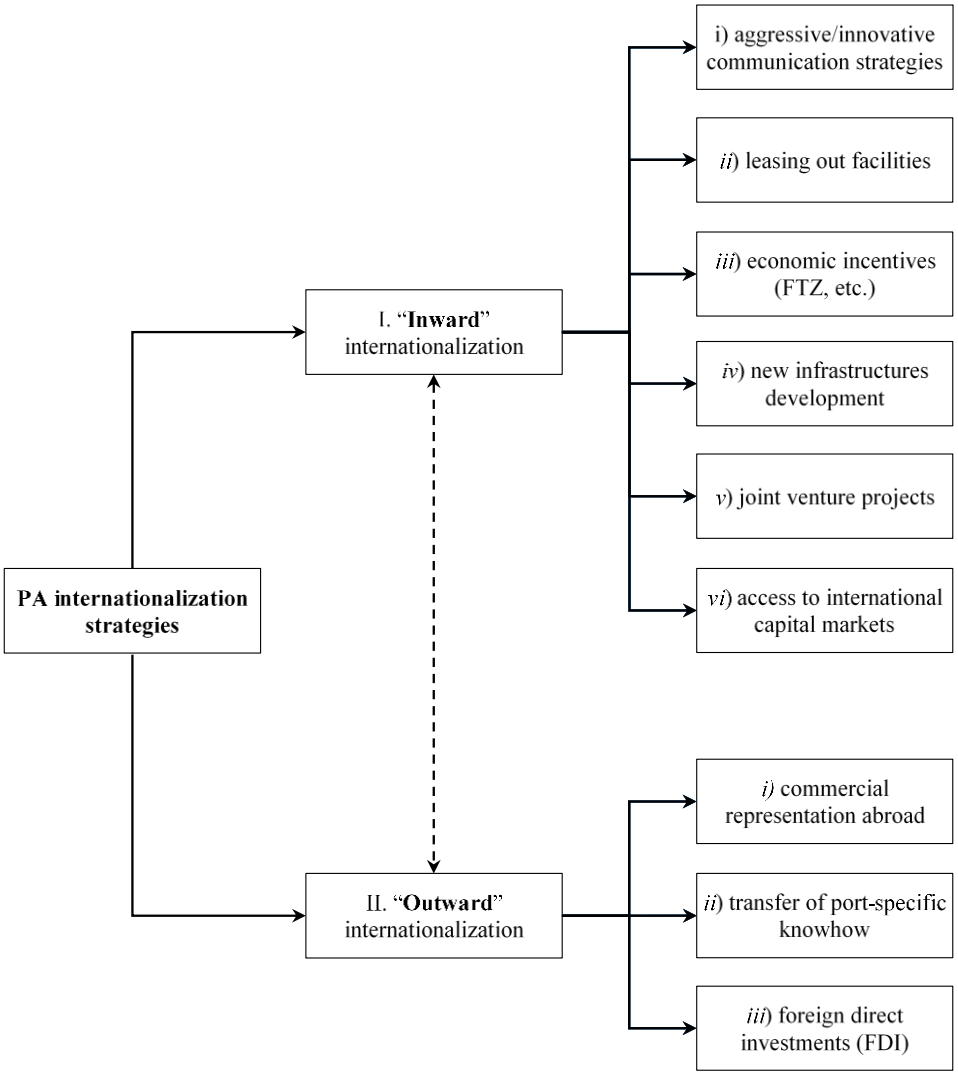
More in details, inward activities include attracting international private players and gathering additional resources to boost investments, traffic volumes, and generate added-value and employment. More concretely, this kind of internationalization strategy include following activities:

- ✓ Aggressive/Innovative communication strategies, which rely on the utilization of new media and the release of innovative contents beyond traditional ones. This type of action is aimed at increasing the PNA capabilities in dealing with the interactions between international stakeholders and combining interests towards converging objectives;
- ✓ Leasing out facilities: this solution can be applied thanks to a wide range of concession options such as management contracts, leases and regular concessions to diverse Build-Operate-Transfer (BOT) arrangements and divestiture and guarantees a certain degree of control in the management and organization of port operations as well as the attraction of highly reputed and skilled foreign operators (see in this sense the entries of Yilport and Global Ports Holding);
- ✓ Economic incentives, such as Free Trade Zone (FTZ) and Special Economic Zone (SEZ) in order to guarantee economic and financial incentives to attract international business investments in the hinterland and to bring economic benefits to the local community. In this perspective, it is essential to develop high-quality infrastructure, favourable regulation, and a strong export focus as well as tax and customs exemptions;
- ✓ New infrastructure development, characterized by a high degree of commitment and risk placed by PNA. This kind of action is required in order to attract international cargo flows and to keep the pace with market demand;
- ✓ Join venture projects, realized by cross-border public-private partnership (PPP) characterized by high commitment and long-term visioning. This solution could help PNA to attract FDIs in terminal superstructures;
- ✓ Access to international capital markets that have been a secondary financial source respect to the traditional one.

To a certain extent, we can argue that home-based internationalization may represent an initial phase setting the ground for future outward expansion and internationalization. Based on practical evidence from PNA actions, three types of outward international options may be identified across a broad spectrum of activities along the foreland-hinterland continuum:

- ✓ Commercial representation abroad, realized by marketing and communication strategies which are necessary to extend benefits and peculiarities of the port to international context in order to convince foreign operators to integrate the port in their supply chain;
- ✓ Transfer of port-specific know-how, from the home country to overseas with the aim of increasing brand awareness in the port community stakeholders and to establish networking activities in future;
- ✓ Foreign direct investments (FDI), that allow PNA to pursue three different objectives: i) to develop its network and to extend it in foreign countries; ii) to gain additional resources and iii) to replicate in other countries its capabilities in managing port infrastructure. It is necessary to specify that this kind of solution has been implemented by a limited number of PNA all over the world.

Figure 95. PNA internationalization strategies: viable options




*Source: Dooms et al. (2019).*

Aligned with the strategic objectives outlined in the 2020-2022 TOP, the activities already carried out by the Port Network Authority were aimed at creating a network around the Port of Taranto that leverages an integrated logistics system based on specialized structures capable of intercepting maritime traffic and connected to a manufacturing industry to promote economic growth in the surrounding area. The PNA played a leading role not only in promoting the "Taranto brand", with particular attention to the promotion of the cruise sector, but also in developing economic and

commercial incentives for operators by activating the Special Economic Zone and the Free Trade Zone within the Port of Taranto. In the case of the FTZ, in February 2021, the PNA approved its operation and initiated its operational activities. Furthermore, the previous TOP included three specific actions related to the internationalization theme:

- ✓ Creation of the "Future Port Innovation Hub " and promotion of innovation in the port and logistics sector;
- ✓ Attraction for investments: Ionian Special Economic Zone (SEZ) and Free Trade Zone (FTZ) of the port of Taranto.
- ✓ International relations and institutional communication also through the web portal and social channels.

**Link to the SWOT analysis' results & Future Targets**

In this perspective, one of the most important strengths of the Port of Taranto regarding the internationalization of the Port, is represented by the capacity of the PNA to insert the node in the supply chains of the customers in an efficient and sustainable way thanks to different form of co-makership and partnership with key players in the maritime and port domain.

Indeed, the consolidation of the relation with SCCT is expected to produce positive effects on the containerized cargo market jointly with some opportunities related to cruise/ferry/ro-ro market provided by the 20-year concession agreement with one of the most important operators worldwide (Global Ports Holding).

With specific regard to the inward internationalization strategy pursued by the PNA during the previous three-year period, it is essential to underline that the PNA has implemented relevant actions related to innovative education programs for boosting internal human resources, in order to face major social changes in port domain. Indeed, it has also upgraded relationship with stakeholders putting in place some social initiatives regarding institutional communication. These actions have been really impacting in the field of the license to operate of the PNA.

From the analysis of the actions already done by del PNA in the previous three-year period, it emerges that the targets and objectives related to all the three actions reported below are still in the process of being achieved.

Regarding the international relationship with operators from the container segment, PNA should rebuild its position from zero, so it has become essential to build solid relations with carriers taking advantage of favourable location and infrastructure of the port.

The attractiveness of the Port of Taranto could also be improved by setting alliances with other national ports when communicating and promoting the respective brands internationally, thus pursuing co-branding strategies.

The concrete commitment of the PNA in this internationalization process requires obviously first the development of solid and trust-based relationship with the overall local port cluster and the entire community. PNA is expected to act for providing concrete and measurables proves of the positive balance between pros and cons which derives from the internationalization of port activities.

This internationalization process would greatly benefit from additional soft intervention from the PNA of the Ionian Sea aimed at intensifying the participation to cross-country R&D project and international cooperation with Universities and Research Centers specialized in transport and logistics.

## 5.7. GOVERNANCE & ACCOUNTABILITY

The PNA of the Ionian Sea has launched an important path towards a sustainable governance approach, in the belief that directing its work on the guidelines of ESG (Environment, Social, Governance) is the most effective strategy to evolve and promote growth and development.

The theme of sustainability embraces - in addition to a series of developments external to the Authority - also internal processes affecting the dynamics of institutional governance. In such optical the PNA of the Ionian Sea intends to realize a real upgrading of the processes of policy making, valuing the concept of "open policy" through the introduction of methodologies based on the principle of participation and inclusion as effective and dynamic tools that need to be standardised and integrated to further increase the values of transparency and the reporting of good government within the PNA of the Ionian Sea.

Figure 96. Accountability & Transparency.


*Source: PNA of the Ionian Sea.*

It is clear the precise goal of the PNA of the Ionian Sea of wanting to coordinate every action combining, in terms of accountability, the ethical and institutional duty to report its work through the use of financial, professional, project and technical-economic resources.

In the three-year period 2023-2025, the Authority will continue along this path, implementing a series of actions and activities aimed at deepening and testing innovative projects and models related to the improvement of environmental and energy performance as well as, more generally, of the entire harbour system also in social optic and of welfare. The PNA of the Ionian Sea is proposed, therefore, as institutional place where to favor the construction of a network, to collaborate and to consolidate, around the jonic port of call, the function of hub of innovation and territorial development.

Therefore, the opportunity to develop in the 2023-2025 programming period actions and projects that can represent flagship initiatives in the field of sustainable governance is noted.

## 5.8. SET OF PLAN ACTIONS

The strategy underlying the construction of the Port of Taranto's development agenda for the three-year period 2023-2025 has led to the creation of a set of **23 actions** connected to the **6 strategic objectives** identified as priority drivers for the new planning cycle that the Port Network Authority will carry out as part of its institutional vision-mission. This in order to promote the broadest sustainability of processes and actions in the medium-long term, also through the promotion of integrated inclusive policies as elements to increase trust and institutional accountability.

The Table 46 illustrates the summary of the objectives and actions included in the 2023-2025 Three-Year Operational Plan. This summary is analysed in detail in the explanatory sheets of each action, as per the document attached to this Plan (see **Annex_2**).

Table 46. Set of plan actions.

| STRATEGIC OBJECTIVE | ACTION |
|---|---|
| *1. BUSINESS INTELLIGENCE E DIGITAL OPERATIONS* | *1.* CREATION AND IMPLEMENTATION OF A DATABASE OF LEGAL OPINIONS |
| | *2.* INTEROPERABILITY OF PORT COMMUNITY SYSTEM AND 5G INFRASTRUCTURE |
| *2. SOSTENIBILITA' E TRANSIZIONE ECOLOGICA ED ENERGETICA* | 3. CIRCULAR ECONOMY |
| | 4. ENVIRONMENTAL MONITORING |
| | 5. THE ENERGY TRANSITION OF THE PORT OF TARANTO |
| *3. PORTO E TERRITORIO* | 6. PORT-CITY RELATIONS: INTE(G)RATION BETWEEN PHYSICAL INFRASTRUCTURE, SOCIAL COMMUNITY AND URBAN FABRIC |
| | 7. OPEN PORT - EXHIBITION CENTER OF THE PORT OF TARANTO: FROM VIRTUAL TO REALITY |
| | 8. WATERFRONT DEVELOPMENT |
| | 9. SECURITY AWARENESS |
| | 10. MANAGEMENT OF STATE PROPERTY |
| *4. INFRASTRUTTURA FISICA E LOGISTICA* | 11. THE NRRP AS A TOOL FOR FURTHER PORT INFRASTRUCTURE |
| | 12. EFFICIENCY ENHANCEMENT, OPTIMISATION AND MAINTENANCE OF EXISTING INFRASTRUCTURE AND VALORISATION OF GREENFIELD AND UNDERUSED AREAS OF THE PORT |
| | 13. STRATEGIC SYSTEM PLANNING FOR THE PORT OF TARANTO |
| *5. INTERNAZIONALIZZAZIONE* | 14. PROMOTION, MARKETING AND INTERNATIONAL RELATIONS: ACTIONS TO SUPPORT THE POSITIONING OF THE PORT OF TARANTO IN GLOBAL MARKETS |
| | 15. INSTITUTIONAL COMMUNICATION: FROM CONSOLIDATING BRAND IDENTITY TO ORGANISING EVENTS. |
| | 16. INNOVATIVE ECOSYSTEM OF THE PORT OF TARANTO: ACCOMPANIMENT FROM AS IS TO BE |

| | |
|---|---|
| ***6. GOVERNANCE E ACCOUNTABILITY*** | **17. ENVIRONMENTAL, SOCIAL, GOVERNANCE: TARANTO SUSTAINABLE PORT CITY** |
| | **18. CREATION AND COMPILATION OF SELF-MONITORING CHECKLISTS AND MONITORING OF PROCUREMENT PROCEDURES ABOVE AND BELOW THE EU THRESHOLDS** |
| | **19. DEVELOPMENT OF THE RESULTS (PERFORMANCE) CULTURE** |
| | **20. ANALYSIS AND OPTIMISATION OF PROCESSES RELATED TO THE GOVERNANCE BODIES OF THE ADSP** |
| | **21. MONITORING AND REPORTING ON ONGOING ZONING PROCEDURES** |
| | **22. RESOURCE DEVELOPMENT AND MANAGEMENT (HUMAN, TECHNOLOGICAL AND FINANCIAL)** |
| | **23. START-UP AND FULL OPERATION OF THE AGENCY PURSUANT TO ART. 17, CO. 5, L. 84/94** |

*Source: PNA of the Ionian Sea.*

## REFERENCES


Cahoon, S. 2007. "Marketing Communications for Seaports: A Matter of Survival and Growth." Maritime Policy & Management 34: 151–168.

Campbell, A., and Yeung, S., 1991. Creating a sense of mission. Long Range Planning, 24(4), pp. 10–20.

de la Peña Zarzuelo, I., Freire-Seoaneb, M. J., & López Bermúdez, B. (2019). Mission Statements in Port Authorities: Empirical Analysis of Content in Spanish Port System. Transactions on Maritime Science, 8(02), 235-245.

Dooms, M., Van Der Lugt, L., Parola, F., Satta, G., & Song, D. W. (2019). The internationalization of port managing bodies in concept and practice. Maritime Policy & Management, 46(5), 585-612.

Fabbrini, F. (2020). Possible Avenues for Further Political Integration in Europe: A Political Compact for a More Democratic and Effective Union?, study commissioned by European Parliament's Committee on Citizens' Rights and Constitutional Affairs, Brussels, May 2020

Freeman, R. E. (1984). Strategic Management: A Stakeholder Approach, Boston, Pitman. Lukas, Janina (2017): Ethik als Standard in der Beschaffung. Werte und Normen als Gestaltungsausgangspunkt von Nicht-Regierungs-Organisationen. Wiesbaden: Springer Gabler.

Notteboom, T., Parola, F., Satta, G. and Penco, L. (2015), "Disclosure as a tool in stakeholder relations management: a longitudinal study on the Port of Rotterdam", International Journal of Logistics Research and Applications, Vol. 18 No. 3, pp. 228-250

Notteboom, T. and Lam, J.S.L. (2018). The greening of terminal concessions in seaports. Sustainability, 10(9), 3318.

Notteboom, T., Pallis, A., Rodrigue, J. P. (2022) Port Economics, Management and Policy, New York: Routledge, 690 pages / 218 illustrations. ISBN 9780367331559.

Nussbaum, B. (2010). Peak Globalization. Harvard Business Review. Retrieved online https://hbr.org/2010/12/peak-globalization

Osborne, S. (2010). The (new) public governance: A suitable case for treatment? In S. Osborne (Ed.), The new public governance? Emerging perspectives on the theory and practice of public governance. New York: NY: Routledge.

Pando, J., A. Araujo, and F. J. Maqueda. 2005. "Marketing Management at the World's Major Ports." Maritime Policy & Management 32: 67–87.

Parola, F., and S. Maugeri. 2013. "Origin and Taxonomy of Conflicts in Seaports: Towards a Research Agenda." Research in Transportation Business & Management, 8: 114–122.

Pearce, J.A., and David, F.R., 1987. Corporate mission statements: the Bottom Line. Academy of Management Executive, 1(2), pp.109-116.

Robinson, R. 2002. Ports as elements in value-driven chain systems: the new paradigm, Maritime Policy & Management 29(3): 241–255.

WTO (2022), Trade growth to slow sharply in 2023 as global economy faces strong headwinds, World Trade Organization, Retrieved online https://www.wto.org/english/news_e/pres22_e/pr909_e.htm