Sustainable Supply Chains in Mediterranean: a concrete roadmap for the Post Covid-19 Era

Introduction

Recent studies on Maritime Space Planning and Blue Economy reveal the importance of shipping to the region's economy, society and environment. These studies, carried out integrating technical, socio-economic and environmental aspects, reveal that maritime transport is the **second most important factor of change** in the Mediterranean, after coastal and maritime tourism.

The Mediterranean is today considered the iconic place of sustainable mobility in the region, where concrete transport and logistics projects are developed with the aim of connecting **Trans-Mediterranean and Trans-European Transport Networks**. The latest trends in this maritime framework show the movement towards a model in which the shipping services in the Mediterranean assume a decisive role in the **Ro-Ro, Ro-Pax services** connecting the Mediterranean maritime terminals, in the service of social and economic structure of the countries.

However, Mediterranean Sea is currently affected by **different pressures**. Due to its geographic position, wedged between the temperate climate of central Europe and the arid climate of northern Africa, the Mediterranean area seems to be one of the most susceptible to global climate change. Moreover, the increased rates of introduction and spread of **marine alien species**, due to the Suez Canal sheer magnitude of shipping traffic, represent a supplementary stress factor to Mediterranean marine native biota already challenged by climatic abnormalities. We also highlight a lack of a joint or regional environmental impact **assessment process** to evaluate the potential effects of ports, port infrastructure and port components on the delicate balances of the marine environment.

So, it is time to implement an **innovative model of sustainable mobility** for Mediterranean, aimed at harmonizing, on the one hand, the establishment of effective, high-quality maritime connections, and so reducing the socio-economic imbalances between the Southern and Northern Countries bordering the Sea, which are among some of the **causes of migration movements**, and, on the other hand, at limiting pollution damages to the sea, taking action on climate change and enhancing cultural exchanges.

To do that, we think that the concept of sustainability should be applied in a more comprehensive, holistic perspective, protecting life below water, navigating to zero emissions, promoting sustainable development of ports in line with the **United Nations Sustainability Agenda**. Because ports are critical points of connection where cargo is passed between ships, railroads and trucks, improving their sustainability will trickle down to every element of the global supply chain. Likewise, by assessing port sustainability, we can identify which parts of the chain need fixing.

The **World Ports Sustainability Program (WPSP),** launched in Antwerp on 22nd and 23rd March 2018 by the **International Association of Ports and Harbours (IAPH)** in partnership with some of the world's major port industry-related organizations, aims to contribute to the sustainable development of world ports in line with the United Nations (UN) Sustainability Agenda and its **17 Sustainable Development Goals (SDGs)**. The WPSP Portfolio counts 120 projects from 71 ports, covering 38 countries and five continents. The World Ports Sustainability Program has developed a practical framework on how ports can implement each of the 17 UN SDGs in practice. Resilient Infrastructure, Climate and Energy, Community Outreach and Port City Dialogue, Safety and Security and, finally, Governance and Ethics are the main addressed domains. **So far, few projects have been delivered from Mediterranean Ports.**

In this article we would like to highlight some of the current project to which the Mediterranean Ports should involve themselves to make more efficient the supply chains and contribute to the sustainable growth of the Mediterranean Region, whilst maintaining and rebuilding ecosystems.

Resilient Infrastructure

Resilience is the capacity to anticipate and plan for disruptions, resist loss in operations and/or absorb the impact of disturbances, rapidly recover afterwards, and adapt to short- and long-term stressors, changing conditions and constraints. To successfully operate, the maritime transport system must be resilient. Stressors that affecting it include environmental, human-induced, energy-related, and others. Planning for mitigation to minimize disruptions from these and other potential stressors will serve to streamline operation of the maritime transport. In this regard, we highlight the importance of **digital solutions and an integrated approach to enhance its resilience.**

Digitalisation is one of the recent main factors driving the traditional port industry to fully reshape its business and make the industry more efficient and sustainable. The **International Port Community System Association (PCS)** promotes adoption of a Single Windows to manage port and logistic processes through a single submission of data and to connect transport and supply chains. The digital platforms provide also an intelligent exchange of information between public and private stakeholders, fostering PPP initiatives, co-developing innovation and cutting operational costs.

The **Building Information Modelling (BIM)**, a process for creating and digitally managing information on a construction project across the project lifecycle, also gives the opportunity to leverage business capability regarding lifecycle management of port and infrastructural assets in all phases - from project development, planning, building, operation and maintenance until the fading out of these objects. With the application of BIM since the feasibility studies, ports can allocate its resources more efficiently in the planning and building phases both on construction materials and personnel. Moreover, BIM models help with project control, especially for cost and time dimension. This information can be visualised via the digital twin and/or by mean of immersive experience through virtual and augmented reality, in order to help in the communication process with stakeholders. Once the objects are finished and ready for operational phase, the sensors built into these infrastructures are connected as IoT applications with artificial intelligence resulting in capability on predictive maintenance for better cost-efficiency in operation of infrastructural assets.

As regards **Climate Change**, a multi-stakeholder coalition so called **"Navigate Climate Change" (NaCC)** supports the sector encouraging operators and users of maritime infrastructure to face climate change reducing Greenhouse Gases (GHG) and improving preparedness to adapt to the changing climate. To this aim, the World Association for Waterborne Transport Infrastructure appointed in 2015 a Working Group of 20 experts, which provides methodological guidance to support climate change adaptation decision-making in the ports and navigation sector. It is a four-stage methodological framework based on: understanding the context of reference, understanding climate-related impacts, identifying vulnerability and risks, and identifying and implementing measures. The proposed methodology covers a range of day-to-day activities such as the management, operation and maintenance of infrastructure, conservancy, dredging, pilotage and engineering. It is also considering possible climate change implications for the design and construction of new development projects and it reflects on interdependencies such as hinterland connections. The foreseen outcome is a useful, well-structured and practical guidance designed. Templates are available to help in identifying relevant stakeholders, preparing an inventory of climate-vulnerable infrastructure assets and operations, and determining monitoring needs.

Climate and Energy

The reduction of CO_2 and Greenhouse Gases (GHG) from ships is the highest priority in the maritime domain. The initial strategy adopted in 2018 by IMO's **Marine Environment Protection Committee (MEPC),** envisages a reduction in GHG emissions from international shipping by at least 50% by 2050 compared to 2008. To do that, different initiatives of IAPH are ongoing, as well as **Onshore Power Supply (OPS), port calls optimization, port incentives for energy-efficient vessels** and **Clean Marine Fuels (CMF).**
Onshore Power Supply consists of connecting the ships to the port grid and turn-off ships engines. The solution appears effective to reduce air pollution in ports and GHG emissions from vessels, and it is giving momentum with an increasing number of ports that are adapting the infrastructure to this aim. The **port calls optimization** implements the Just-In-Time arrival of ships helping the reduction of GHG. A practical guide on this solution was developed by the IMO's **Global Industry Alliance. Port incentives** award cleaner vessels on the basis of an **Environmental Shipping Index (ESI),** calculated taking into account the amount of NO_x and SO_x emitted, and also based on the use of onshore power that reduces CO_2 and PM emissions. The **Clean Marine Fuels (CMF)** Working Group aims to tackle climate change and improve air quality by focusing on safe bunker operations for new fuels as well as **Liquified Gas Natural (LNG).**

It is worth to highlight also the **Global Maritime Energy Efficiency Partnership (GloMEEP)**, a joint initiative of IMO-GEF-UNDP, which delivered toolkits for ships and ports to understand the nature of emission and analyze strategies to reduce them. Trainings have been held in ports to instruct participants on how conducting emissions inventories and develop actions in port areas.

Port-Rail Integration

Connectivity to the hinterland is becoming ever more important for ports, which are upgrading their rail connections to turn them into a **competitive differentiator**. Port-rail connectivity is a strategic element of port development, both in economic and competitive terms and to reduce negative externalities on people and the environment. Rail connectivity expands the port hinterland, increasing the capture of new value-added freight and services for the port and also promotes growth in capacity, without affecting the port-city relationship, by linking "spatially" fragmented processes **without congesting the urban environment** surrounding the port.

The European Regulation (EU) No. 913/2010, concerning a European rail network for competitive freight, required Member States to establish international market-oriented **Rail Freight Corridors (RFCs)** in order to strengthen co-operation between Rail Infrastructure Managers on key aspects such as the allocation of paths, deployment of interoperable systems and infrastructure development, and to promote intermodality between rail and other transport modes by **integrating terminals and ports** into the corridor management process.

To this aim, a common **European web portal** was designed to provide a platform for service facility operators such as freight terminals, ports, marshalling yards, etc. to publish information about their facilities complying with the relevant EU regulations and to promote their facilities and services. At the same time, it is meant for shippers, rail undertakings, container terminal operators and other logistics service providers using rail to be a single source of information allowing them to identify relevant facilities for the planning of their services and the optimization of their transport and supply chains.

The above-mentioned freight Regulation provides also for the establishment of two **Advisory Groups**, namely Terminals and Ports Advisory Group and Railway Undertakings and MTOs Advisory Group. They are meant to act as a sounding board giving the Management Board of the Rail Freight Corridor advice on what actions to take to improve the offer to the customers. **Terminal Integrated Capacity Offer** is a concrete example of an innovative commercial service that was enabled thanks to a cooperation between Ports and RFCs. It consists in offering a pre-arranged **international path including the internal timeslot in the Terminal or Port**

Terminal, so that the applicant can book a service from ramp to ramp similarly to what is done in road transport European and Mediterranean Ports joined the product, which is available in RFCs capacity catalogue.

Sustainability KPIs

When we have multiple indicators that collectively represent sustainability, we can see how well ports do with regards to each sustainability goal. Then we can statistically combine these results **into a composite index** to rank their sustainability holistically. This way, we can use data to accurately compare ports for many different, but concrete, sustainability targets. However, we cannot accurately define, defend, and evaluate sustainability goals **without the help of data**, and we cannot progress toward goals without making that data public. With a balance between data, metrics, and stakeholders in mind, the path toward sustainability for ports and for other areas becomes a lot clearer.

Among the current tools to evaluate the project sustainability, the **Envision** rating system, developed by the Institute for Sustainable Infrastructure (ISI) and the Zofnass Program for Sustainable Infrastructure at the Harvard University Graduate School of Design, proves to be the most appropriate guidance tool to make informed decisions and provide sustainability metrics that can be applied to all types of infrastructure. The framework provides a **flexible system of criteria** and performance objectives to aid stakeholders and decision makers and help project teams identify sustainable approaches during planning, design and construction that will continue throughout the project's operations and maintenance and end-of-life phases.

Envision includes 64 sustainability and resilience indicators organized around five categories: **Quality of Life, Leadership, Resource Allocation, Natural World, Climate and Resilience**. Envision verification is available to all types and sizes of physical infrastructure including airports, bridges, dams, landfills, levees, parks, power generating stations, pipelines, railways, streetcars, stormwater management systems, wastewater treatment plants and other components that make up civil works. The majority of projects that have been verified under Envision have been **transportation or water focused**, and this specificity encourages to adopt the tool in supply chains assessment, also to provide a common language for collaboration and clear communication between the several involved actors. The **interdependency** between the credits allows the project team to maximize project benefits and evaluate competing ideas on how to achieve those goals. It also forces the issues of a holistic approach to maximize project sustainability. A qualified, ISI-trained verification team is assigned by ISI to review project documentation provided by the project team, and confirm it meets the Envision sustainability criteria. In this regard, credibility of a **third-party rating system** as Envision will increase public confidence and involvement in decision-making.

Projects that complete the verification process and achieve sufficient points earn an **Envision award**. Award levels are based on the number of applicable Envision points achieved: **Verified, Silver, Gold, Platinum**. To qualify for an award, a project must achieve a minimum of the total applicable Envision points.

A new Supply Chains Mediterranean Model

The implementation of a new initiative to implement the Mediterranean supply chains could be based on the following concrete actions:

- Carry out an in deep analysis of the Mediterranean context, assessing the conditions conducive to increase intermodal connectivity of the Mediterranean region, introducing a **"Inter-Mediterranean" network**, in which the supply chains play a relevant role in articulating relations between the different ports and countries.

- Create an **innovative maritime service model** with a clear definition of the characteristics and quality of the services to be provided, in order to increase the connectivity between the Mediterranean rims not as the sum of individual port connections, but through a system of coherent and synergic maritime services. The choice of the characteristics of the new maritime services and the selection of the ports could be made with the active role of the **MEDport Association**, launched in 2016.
- Update the **Trans-Mediterranean Network** map and focus on the objective of its validation, extending the policies, the financial instruments, the best practices and the operational models applied at European and international level. The validated map should take into account the plans to connect TMN-T with the African Transport Network, Arabian Peninsula and Asia, in order to achieve the vision of an enlarged and harmonized network.
- Analyse the **key performance indicators** needed to establish a sustainable, efficient, well-organized and frequent maritime service, including the environmental and social dimensions (socio-economic and environmental aspects), the energy issues, transport issues (ship equipment, road and rail intermodality, operations, efficiency of services and port facilities), economy (cost-benefit analysis, demand forecasts), the regional integration and the institutional framework. Sustainable indicators and outcomes of the **rating system** adopted for the project assessment will allow to select the projects **"highly sustainable".**

The selected projects could be endorsed by the Union for the Mediterranean for labeling, directly proposed to the IFIs for a further assessment, or submitted to the European funding mechanisms to move to the next steps of the project lifecycle (feasibility, detailed design, implementation, monitoring).

Conclusions

The analysis carried out highlights the existence of initiatives and working groups at international level, which are studying and developing concrete solutions aimed at introducing the concept of sustainability in maritime transport and at extending innovative processes and techniques to the entire transport supply chains. The Mediterranean institutions responsible for promoting concrete transport projects in the Mediterranean can benefit enormously from the projects already started, triggering a virtuous circle by stimulating potential stakeholders, starting the project concept and monitoring the subsequent stages of project maturation and implementation. Finally, it is essential to find resources at all stages of the project life cycle. To this aim, their active role in promoting projects included in a "system vision" that highlights their interdependence and overall, the long-term framework of the transport networks, can be carried out through the activation of technical workshops with the main International Financial Institutions.

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