D.3.3.1 METHODOLOGY FOR ELABORATING A CROSS-BORDER MODEL OF TRANSPORT SUSTAINABILITY ACTION PLAN

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1. Introduction

The Italy-Croatia Cooperation Programme has among its fundamental objective that of addressing the socio-environmental sustainability of cross-border transport. Among the various critical aspects in this sense, the following are of particular importance: a) maritime transport-related emissions, b) excessive car use, c) connection to the interlands, islands and coastal areas.

The MIMOSA project is framed within the TSG2 EUSAIR macro-regional strategies, and specifically:

- pillar 1 (blue growth), s.o. 3 (to improve sea basin governance, by enhancing administrative and institutional capacities in the area of maritime governance and services);
- pillar 2 (connecting the region), s.o. 1 and 2 (to strengthen maritime safety and security and develop a competitive regional intermodal port system; to develop reliable transport networks and intermodal connections with the hinterland, both for freight and passengers.

The peculiar goal of MIMOSA is to steer a drastic change in the current situation, firstly by creating the premises for a cross-border coordination and for the adoption of a common vision between the two Countries, secondly by providing tools and methodologies to support the adoption of a sustainability-oriented transport plan.

This document deals, in particular, with defining the methodological guidelines for the preparation of a transport plan model rooted in the vision and the strategy of the EU as for the environmental, social and economic sustainability of European development.

The sustainability of maritime transport plays a central role in the strategy of the European Union. Within the overall context of the EU strategic long-term vision, expressed in the document "A clean planet for all"[1], the general framework of reference stands in the strategic approach to Maritime Transport of the European Union[2], which on his turn is a central part of the Integrated Maritime Policy of the European Union (IMP)[3].

[1] A Clean Planet for all - A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy COM (2018) 773 Brussels, 28.11.2018.

[2] https://www.europarl.europa.eu/factsheets/en/sheet/124/maritime-transport-strategic-approach (last checked: November 21st, 2020)

[3] For details about legal basis, background, objectives and achievements of the IMP see: https://www.europarl.europa.eu/factsheets/en/sheet/121/integrated-maritime-policy-of-the-european-union (last checked: November 21st, 2020)

The strategic goals of the EU in this field can be found in a series of documents, among which are of particular importance:

- The 2011 White Paper from the European Commission "Roadmap to a Single European Transport Area"[4], where the general premises are set. Among these, are mentioned: the reduction of 40% of maritime transport emissions by 2050 compared to 2005, the simplification of procedures for travelers within the "European Blue Belt", and the enhancement of safety, security and environmental protection through the SafeSeaNet – EMSA (European Maritime Safety Agency).
- The Communication 2009-8 of the EC[5], which highlights, among the rest: the need to improve the environmental performance also through incentives & taxation measures, to support actions specifically aimed at greener shipping, technological innovation, the enhancement of short-sea transport services, the promotion of a European Environmental Management System for Maritime Transport (EMS-MT).
- The "European Green Deal" and its annex[6], which defines the agenda and the roadmap for a set of "deeply transformative policies", also specifying a long list of prerequisites and targets that development must respect in order to be effectively able to be "sustainable", also in the sense of increasing the social, environmental and economic capital of the EU member states.

Particularly, the EC strategy for the Improvement of the environmental performance of maritime transport (COM2009-8 final) specifically mentions:

- a comprehensive approach to reducing greenhouse gas emissions (GHG) from international shipping, combining technical, operational and market-based measures;
- the strengthening of EU legislation regarding port reception facilities for ship-generated waste and cargo residue, improving the implementation arrangements;
- the reduction sulphur oxides and nitrogen oxides emissions from ships;
- the promotion of alternative fuel solutions in ports.

[4] EC-European Commission. (2011). Roadmap to a Single European Transport Area-Towards a competitive and resource efficient transport system. *White Paper,* COM(2011 - 144 final), Brussels, 28.3.2011

[5] Strategic goals and recommendations for the EU's maritime transport policy until 2018, COM(2009-8 final), Brussels, 21.01.2009.

[6] The European Green Deal, COM(2019 - 640 final), Brussels, 11.12.2019.

Communication also specifies the importance of exploiting the full potential of short-sea shipping and sea transport services for business and citizens in Europe, especially in terms of:

- removing unnecessary administrative barriers, duplicated cross-border controls, the lack of harmonised documents and all other factors that hamper the potential growth of short-sea shipping,

- reinforcing the EU strategy for ensuring the full deployment of "Motorways of the Sea",
- facilitating the start-up of innovative integrated inter-modal transport solutions,
- to facilitate better connection of islands and long-distance intra-EU passenger transport through quality ferry and cruise services,
- examine economic instruments (such as taxes, charges or emission trading schemes) for encouraging users to make use of short sea shipping alternatives addressing road congestion problems and, in general promoting market solutions that contribute to the sustainability of the transport chain as a whole.

Even if the priorities listed above were intended to orient the EU maritime transport strategy until 2018, it can be stated that they are still current, at least as regards the programme area. They must also be considered in the light of the specific strategies that the European Union has defined for ports, summarised in EC Communication 2013-295. This communication highlights the existence of structural gaps and the need for better environmental performance that require long-term interventions to be implemented according to a series of strategic indications.

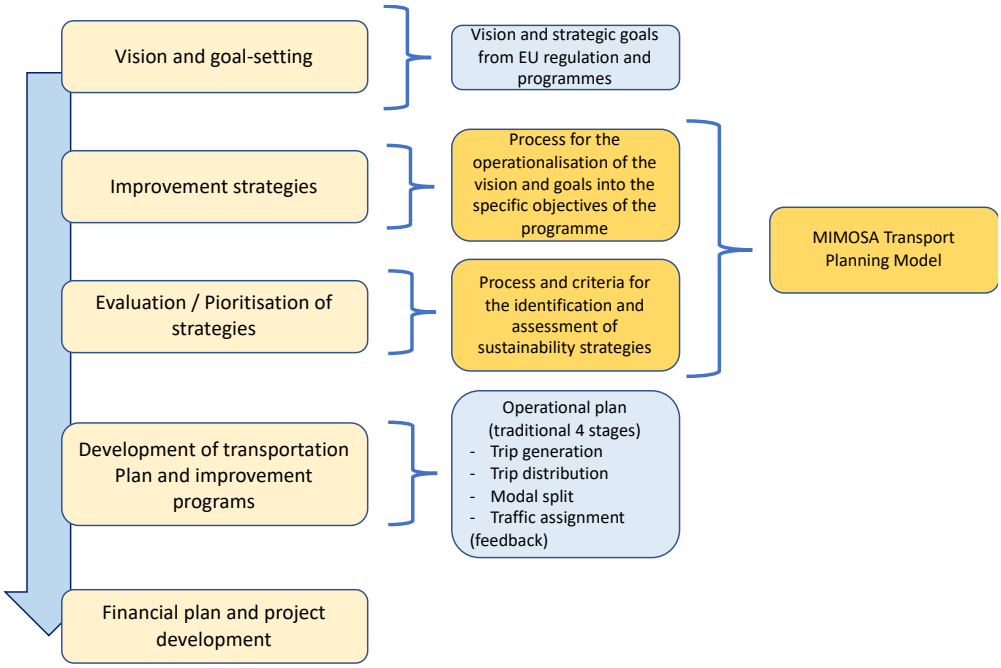
Among these, here is underlined to the most closely concern of the objectives and actions of MIMOSA project:

- coordinated development and management of ports, rail and inland waterways infrastructures and those which enhance port and shipping environmental performances,
- promotion of social dialogue,
- improvement of the environmental profile of ports.

As far as applicable to the MIMOSA project, these premises represent the *Vision* of the sustainable transport plan model to be implemented in the project, since they represent the current state of the strategic priorities defined by the European Union that can reasonably be applied to the

methodology for defining a planning model for sustainable and intermodal passenger transport between Italy and Croatia.
The transportation plan model referred to in this project refers to an integration of the traditional multi-stage strategic planning process in a logic of non-centralized, multi-stakeholder decisional context (figure 1).

Figure 1: the process for multi-stakeholder planning model[7]



This integration is necessary to overcome the limitations of traditional / circumscribed (e.g. local, regional) transport planning models[8], limitations that mainly consists in assuming a centralized and deterministic (i.e. equilibrium based) process, rather than a political one, strongly interrelated with socio- economic implications[9].
In a nutshell, the traditional approach to transport planning process includes the following steps: analysis of existing conditions, trends forecast, identification of current and future demand and

[7] Litman, T. (2017). Introduction to multi-modal transportation planning, Elaboration, Canada: Victoria Transport Policy Institute.
[8] Kane, L., & Del Mistro, R. (2003). Changes in transport planning policy: Changes in transport planning methodology?. *Transportation*, 30(2), 113-131.
[9] Zuidgeest, M. H. P., & Van Maarseveen, M. F. A. M. (2000). Transportation planning for sustainable development. SATC 2000.

supply, plus possible further needs, prioritization of issues, short and medium term action plan, operational strategy and financial plan[10]. An evident limitation in such process emerge to the extent the planning activities do not refer to a single coordinator / decision maker, but involve a multiplicity of stakeholders, each one operating in an area of relative autonomy, although within a unitary regulatory context. This is the case of the cross-border transport planning, in which the territorial jurisdictions, the regulatory aspects, the problems of interoperability, imply a very high order of complexity of the process. This complexity is even greater in the specific case of the Italy-Croatia program, in which aspects of intermodality and multimodality between maritime, coastal and hinterland competences are involved, and in which technological aspects have or might have (for better or for worse), a significant weight in conditioning development programs.

For all this, the transport plan model proposed here is a process necessary to share the operational vision (within the general one established by the EU Green Deal) among the stakeholders involved in the process of sharing the objectives and the roadmap. It is a sort of pre-guidance stage, expressed in form of guidelines, made necessary by the fact that the planning process cannot have a centralised coordination. Consequently, a participatory process in the definition of the shared targets, as well as a process of raising sensitization and awareness on goals, should be the premise of the plan of activities.

The transport plan model, and the related action plan, are therefore guidelines for the processes of analysis, negotiation and sharing of objectives which are a prerequisite for defining decisions on actions, investments and related financial plans in the cross-border context (i.e.: a context where subjects with different jurisdictions and potentially conflicting objectives must agree on a transport plan in the absence of a central hierarchical coordination body).

Coherently with the basic shared principles of the definition of the transport plans, taking the vision as the basis, the methodology will include the operationalization of those guiding principles for the strategy among the subjects of the participatory process.

[10] See Litman (2017),

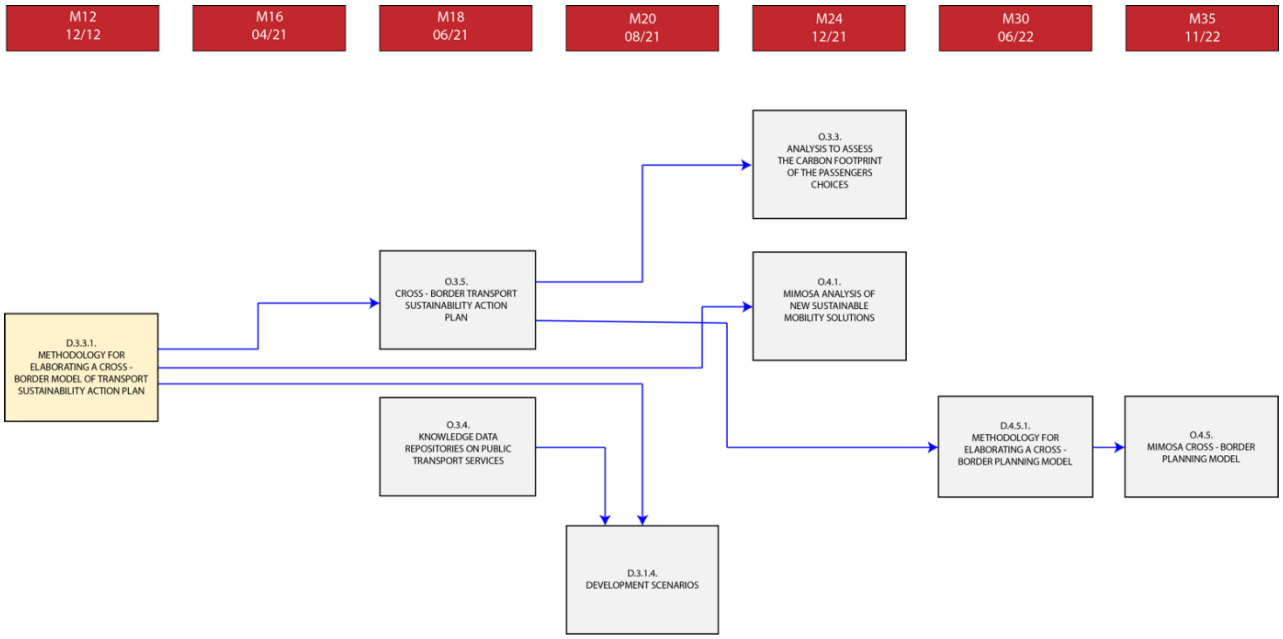
2. Aim and scope of this document

There are many reasons for considering sustainability as a central element in the planning of transport in general and maritime passenger transport in particular:

- the need to guarantee accessibility and freedom of movement for passengers, in particular for the inhabitants of the islands, by promoting forms of sustainable tourism which, over time, result in the creation of value and greater social cohesion,
- the need to reduce polluting emissions that are harmful to health and greenhouse gases, responsible for climate change,
- the need to improve the energy efficiency of transport and govern the transition towards renewable energy sources,
- the need to respond with concrete acts to the ever wider and more legitimate requests for social equity and reduction of environmental impact,
- the need to ensure the competitiveness of transport activities in the face of a regulatory framework destined to become increasingly stringent and penalizing for unsustainable activities,
- the need to bring transport back into the bed of social responsibility, considering that it has one of the highest socio-environmental impacts of all industrial sectors, with serious repercussions on air quality and quality of life.

The MIMOSA project is specifically oriented towards achieving the goal of increasing multimodality and info-mobility while at the same time reducing the carbon footprint (Green House Gas emissions) of transport modalities. The aforementioned implementation of innovative solutions for emphasizing the concept of sustainability of the multimodal transport on local, regional and cross - border level is aimed for the passenger demands as one of the main target group of the project. Therefore, to achieve a successful outcome of the goals of the MIMOSA project, it is of substantial importance to develop a methodology for elaborating a cross - border model of a transport sustainability action plan (Deliverable 3.3.1.). The specific role of this document is to provide the methodological guidelines for the definition of a planning model and action plan for maritime and coastal passenger transport between Italy and Croatia. This document is, therefore, a premise to further actions and deliverables of the MIMOSA project, as represented in figure 2.

Figure 2. The relevance and relatedness of D. 3.3.1. with future Outputs and Deliverables



The scope of this methodology includes:

- the methodological and classification options based on the concept of sustainability assessment regarding main transport nodes in the cross - border area (terminals as a hub), passengers, and multimodal transport options,
- A sequence of steps for the analysis implementation and the strategy formulation for the adoption of sustainable improvement measures.

The focus of this document is on the needs and boundaries of the MIMOSA project. However, the document is of multipurpose use because its content can be utilized for the maximum transferability on all actions concerning the improvement of transport multimodalities. The content of the document can be applied beyond the scope of the MIMOSA project.

The steps and phases of the sustainability assessment that can be realistically implemented with the provided information which is available regarding the cross - border area. The steps and phases are provided through a general framework of what would be the ideal procedure in a hypothetical context in which there are no limits to the information obtained.

Besides D3.3.1., (methodology for reviewing of technological solutions for the improvement of sustainable and multimodal / cross - border passenger services), the strategic importance of D3.2.1. includes a general description of the analysis, methods, and activities necessary to develop the sustainable action plan that will be part of deliverable 4.5.1 and output 4.5.

Furthermore, the focus of technological solutions within D.3.3.1. is for improving the quality, safety and environmental sustainability of marine and coastal transport passenger services and nodes with the cross - border area between Italy and Croatia. This document also has a nature of general guidelines that provide the outline of a broad and articulated analytical process beyond the needs of the MIMOSA project and which can be used in other similar contexts.

The importance of both Deliverables D.3.3.1. and D.3.2.1. is rooted in the fact that they are considered as cornerstones for the proper functioning and achievement of future Outputs and other Deliverables. Although D.3.2.1. has a higher rate of inclusiveness due to a broader range of connections, and therefore effects on the Outputs (O.3.3., O.3.4., O.3.5. and O.4.1.), the importance of D.3.3.1. can be determined on the impact it has on the realization of O.3.5. due to its interconnectedness within the WP3. Output 3.5. precedes and is directly connected with O.3.3., which will along with O.4.1. aid in the elaboration of the Methodology of a Cross - Border Planning Model (O.4.5.1.). It can be concluded that WP3 the is an amalgamation of approaches towards creating information and knowledge by collecting, surveying and analysing data from its interconnected outputs to create an objective insight with regard to the current situation of passenger demand and passenger terminal port assessment.

The aforementioned objective insight will be utilized as a principal constituent for the proper implementation and accomplishment of Deliverables (D.4.5.1.) and Outputs (O.4.5.) within WP4. Hence it can be stated that both D.3.3.1 and D.3.2.1. are significant due to the fact of transferability of the achieved Outputs from WP3. The Outputs from WP3 will affect the entire Programme Area to foster and thrive of passenger transport services at local, regional and cross - border level (D.4.5.1. and O.4.5.).

To achieve the best possible level of transferability of Outputs, the participation and collaboration of all stakeholders is an essential factor. The main enabler of transferability is the EUSAIR stakeholder platform and the permanent project cross - border network (O.6.2.). The members of O.6.2. will use and transfer the individual Outputs composed of other Project Partners for complementary scopes to fellow professionals and beneficiaries, with the inclusion of the updated

data and analysis constituted in O.3.1., O.3.2., O.3.3., O.3.4. Outputs O.3.5. and O.3.6. will serve as transfer points for improving the quality and depth of knowledge, expertise, and proficiency from project partners to decision-makers working on the topics within the scope of the MIMOSA project.

The aim is to assess the overall transport system, with a focus on passenger line service, within the programme area from a sustainability viewpoint to provide guiding principles for the future development of sustainable and multimodal / cross - border passenger services. The related research questions are:

1. Which organisational aspects within the cross - border passenger terminal ports need to be restructured in order to achieve a harmonization of multimodal transport options?
2. To what extent do travelers' behaviors contribute or can contribute to an overall improvement in the sustainability of tourism and travel in general?
3. What actions to raise sensitisation and awareness can be undertaken to guide travel behaviors towards more sustainable forms?
4. To what extent the connections with coastal areas and islands are adequate to ensure, in addition to satisfying tourist needs, also a fair level of inclusion of resident populations?
5. To what extent does port traffic affect (due to pollution, traffic movements and other negative externalities) the quality of life of populations residing in areas adjacent to ports?
6. Which technological states for cross-border passenger terminal ports needs to be improved in the function of passenger demands?
7. Which technological and organizational improvements need to be conducted for hinterland connection infrastructures?
8. Which technological improvements need to be conducted for cross-border passenger liner ships in the function of increasing safety awareness and reducing harmful environmental impact?
9. Which technological states and collateral activities, besides maritime technology could be improved in the cross-border action plan?

3. Background and theoretical framework

To promote sustainability and outreach the goals for sustainable development, the efficient development of transportation means in the Adriatic area requires a thorough analysis of economic, social and environmental aspects. Given that a static situation of non-development brings with it intrinsic conditions of non-sustainability, the development of maritime activities and the improvement of the conditions of sustainability are an objective to be pursued jointly.

In the particular case of transport between Italy and Croatia, the predominant aspects are inherently linked to the creation of short shipping and intermodality. While the potential benefits of short sea shipping have been highlighted in several studies[11], other contributions[12] have identified both weaknesses and strong points in the Italy-Croatia passengers maritime connection. Among the several weak points, the following are strictly related to the issues of integration, technological development and intermodality:

- lack of full integration of intercostals transport connections in a multimodal transport system,
- lack of standardization of documentation procedures in the short sea shipping,
- inadequate unification of the customs law regulations in the European Union,
- unclear/inadequate coordinated maritime strategy,
- the general negative perception of maritime transport linked to the pollution produced by vessels in coastal areas.

Further weaknesses are already known and mainly concern a) the socio-environmental impact of ports and ship pollution on the areas adjacent to the ports, b) the problem of the accessibility of islands and coastal areas in general, with respect to flows generated by tourism.

The search for an improvement direction on these issues often involves conflicts between stakeholders and controversial assessments. The quest for the direction of improvement on these issues often involves conflicts between stakeholders and controversial assessments. The typical

[11] Comi, A., & Polimeni, A. (2020). Assessing the Potential of Short Sea Shipping and the Benefits in Terms of External Costs: Application to the Mediterranean Basin. *Sustainability*, 12(13), pp. 53-83.
[12] Jugović A., Debelić B., Brdar M., (2011). Short Sea Shipping in Europe Factor of the Sustainable Development Transport System of Croatia, *Scientific Journal of Maritime Research*, vol. 25(1).

argument is the relationship between economic aspects and environmental damage, a particularly problematic issue since the contrast between benefits and disadvantages is overlapped by a very asymmetrical distribution of benefits, unbalanced in favour of large shipping companies.

The regulatory framework alone cannot make up for the lack of coordination capable of guiding decision makers towards a unitary plan for improving sustainability. A process of sharing objectives is also needed, starting from the vision of sustainability and participatory methods for the establishment of a common awareness of what are the actual criticalities of the system as a whole. The key to achieving this is tackling sustainability problems from the roots, through an holistic approach that take into consideration not current issues taken separately, but the overall unsustainable dynamics of the transport system as a whole.

A Background on Sustainability

The overall objectives and the concrete actions of the EU strategy for sustainable development are outlined in the Communication from the EU commission in 2009[13]. This document, together with the United Nations General Assembly resolution adopted on 25th September 2015[14], represents the reference points of any process of planning and development.

The typical problem that emerges in the planning of economic activities with a high environmental and social impact, lies in the identification of trade-offs between the demands of sustainability and economic needs. On the one hand the legitimate requests for economic growth and usability of transport, on the other hand, the need to contain environmental impacts, in particular the carbon footprint. Growth and development should take into account all existing limitations, pursuing the synergy and harmony of the economy, ecology, and quality of life of the social community. Thus, the assessment of the ports and multimodal transport options concerning passenger demands it should also include considerations on the sustainability of tourism. Sustainable development in tourism is a problem that typically involves highly complex trade-offs because it involves economic and socio-cultural dynamics that are often in contrast. When it comes to dealing with development dynamics in which the various stakeholders have mutually contrasting objectives, it is necessary to face change through participatory processes for the involvement of all interested parties. The

[13] Mainstreaming sustainable development into EU policies: 2009 Review of the European Union Strategy for Sustainable Development, COM(2009) 400 final, Brussels, 24.7.2009.
[14] *Resolution adopted by the General Assembly on 19 September 2016*. A/RES/71/1, 3 October 2016, a.k.a. "The New York Declaration".

fundamental issue lies in taking current and future needs into consideration, aware that in terms of sustainability there are no optimal solutions, but it is necessary to aim for constant and lasting progress. Two aspects have to be considered in particular: the essential needs of the passengers to which the priority is given within the cross - border area and, the limitations imposed by the state of technology and social organization (of ports and multimodal transport options) on the environment's ability (the cross - border area) to meet the present and future need. Such assessment may require the adoption of different organizational procedures and new hybrid (both analytic and participatory) processes such as the one known as “systems thinking”.

A Background on Systems Thinking

Systems thinking can be defined as a process to raise the awareness and understanding of the overall relationships taking place between elements in a complex system. It consists of a method of analysis that focuses on interrelations between fundamental parts of a system to create a general representation of the forces shaping the trends and dynamics of the analysed system.

System thinking is generally associated with a procedure based on the sharing of information and planning contributions by selected groups of experts and stakeholders on specific problems that present complex interactions of several elements. Such procedure provides a multi-stakeholder, participatory method to build an overall representation (“system map”) of the complex interrelations taking place among the set of interacting variables that affects the economic, social, and ecological systems[15]. The final representation of a participatory process adopting a system-thinking approach to a specific project is usually represented in the form of a diagram adopting the same rules and symbols of the system dynamic representations.

In the specific context of the MIMOSA project, through the application of systems thinking applied to sustainability management, it could be possible to identify the overall dynamics affecting the capability of the system (here represented by the crossborder area project partners, stakeholders and passengers) to trigger positive change, as well as the vulnerability of the system itself.
Systems thinking has the potential to be an effective problem-solving method for sustainability assessment in a situation such as that of cross - border transport, in which analysis, participation

[15] Aronson, D. (1996). Overview of systems thinking;
http://resources21.org/cl/files/project264_5674/OverviewSTarticle.pdf last checked: 9/12/2020

and decisions must be recomposed in a single action, shared as much as possible among the stakeholders.

4. Methodological Step for the implementation of a transport sustainability action plan

Thanks to the contribution of previous INTERREG projects it is possible to capitalize on the results of previous actions concerning themes similar to that of the MIMOSA project[16].
The generally acknowledged methodology for the implementation of an action plan includes the following steps:

Analysis of the existing situation. This first step will be developed mainly through the analysis of documents and literature, available data and experts & stakeholders' interviews. The quantitative and qualitative analysis of demand embedded in all activities of WP3 will be part of this step.
Taking advantage of contributions in the literature that have identified specific methodologies to analyse sustainability in transport[17], suggested tools to be privileged in this stage are Delphi Panel, PEEST Analysis, SWOT analysis.

Definition of the vision. The vision represents the desired future situation expressed by the stakeholders affected in various ways in the economic, environmental and social effects of maritime and coastal transport in the program area. The process for its definition joins the technical and social analysis, keeping into consideration primarily the shared values, principles and expected development, then through the composition of trade-offs and incompatibilities taking places because of divergent objectives among the various stakeholders.

Gap analysis. This step consists of the detailed identification, description and measurement of the divergences existing between the existing situation and the desired situation expressed by the shared vision.

Goal setting. This step consists of defining, through a participatory approach, the misurable goals apt to fill/reduce the gap between the existing situation and the vision.

[16] Specifically we refer to the projects TRANS TRITIA
[17] Melander, L. (2018). Scenario development in transport studies: Methodological considerations and reflections on delphi studies. Futures, 96, 68-78.

Road map. The actual action plan is defined in terms of specific actions to be taken in order to reach the goals defined in the previous stage. This includes the definition of support and monitoring tools needed to support the process over time.
Of course, the list above concerns steps defined in a generic way, while the specific declination of which for the purposes of the MIMOSA project is described in the following sections.

5. Methodology for the Assessment of Multimodal/Cross-border Passenger Ports from the Aspect of Sustainability for the Future Development of the Cross Border Area

In recent years, there has been a profound paradigm change towards growing awareness in the maritime industry around the world regarding the role of passenger terminal ports in the sustainability debate. Therefore, it can be inquired how can passenger terminal ports boost the efficiency of their regional status within the Cross - Border Area with the aim to foster greener transportation options for passengers. This has to embody criteria of smartness, sustainability and inclusiveness for passengers which will be achieved by following the priorities of decarbonisation in order to reduce GHG from shipping, digitalisation to promote a secure environment for automation of information (single window for information), investment to foster new and sustainable passenger services within the passenger port terminals and innovation to promote social inclusiveness by improving the quality of operations within passenger terminal ports. Furthermore, figure 3 depicts the aforementioned priorities and actions.

Figure 3. The four priorities and actions[18]

[18] https://ec.europa.eu/transport/modes/maritime/maritime-transport_en

The Cross - Border Transport Sustainability Action Plan should be based on five important areas to improve the economic, social and environmental characteristics of passenger terminal ports of the Cross - Border Area:

1. Driving and coordination of smart, safe and efficient business operations between internal (port employees) and external passenger terminal port stakeholders (Port Authorities, Transport Companies etc.) within the Cross - Border Area. (For example, the promotion of green business operations within passenger terminal ports would have a positive impact on target groups as they would identify themselves with social inclusivity).
2. Supporting scientific approaches for the understanding and upgrading of the passenger terminal environment (striving for the reduction of emissions of ships and port activities, reduction of noise within the port, implementation of waste reduction and recovery plans for both ships and ports, improving the energy sustainability of ports to reduce the pressure of greenhouse gas emissions in ports, reducing bottlenecks of passengers, vehicles and ships in the port waterfront and port hinterland) within the Cross - Border Area.
3. Promoting strength, diversity, security and safety with the transparency of information inside the passenger terminal ports (Promotion of sustainable and inclusive shareholder value via the implementation of Information Communication Technologies) of the Cross - Border Area.
4. Adoption of efficient, responsible and resilient approaches for future business conduct of passenger terminal ports (e.g. with external stakeholders, with regards to spatial planning and land-use efficiency, the promotion of stable passenger supply chain efficiency and resilience) within the Cross - Border Area.
5. Fostering and integrating communities via continuous learning (awareness-raising programs and campaigns for a wider community integration - outreach) to ensure better passenger terminal port integration with target stakeholders within the Cross - Border Area.

Passenger Terminal ports offer an important service for the transport of passengers within the Cross - Border Area as crucial transportation networks between the sea and land. Their assessment from the sustainability point of view would generate direct and indirect employment within the multimodal transport sectors (bike, bus, train), improve the quality of passenger terminal ports based operations with regard to infrastructure and superstructure, as well as foster growth for local, regional and cross - border economies of the cities and regions within which they are situated.

The passenger terminal ports of the Cross - Border Area possess promising opportunities concerning their sustainable growth and development (e.g. the length of operative coast, water depth, connection with the railroad, large area for expanding additional sustainability fostering activities like bicycle parks, bus stops, inclusive infrastructure for people with disabilities, waste reception facilities from ship and port activities etc.). Based on this, many promising potentials are expected to arise for the Cross - Border Area with regard to passenger terminal ports.

The reduction of car dependency is one of the most important points for improving the sustainability of cross-border transport. In this sense, an important aspect of the process consists in knowing the relative competitiveness (from the travellers' point of view) of car transport compared to maritime transport. Transport planning strategies can significantly shift competitiveness towards maritime transport as long as the conditions are created for better accessibility of the terminals and for an overall process (from booking to arrival) more comfortable for travellers. While the analytical part of this process mainly concerns the evaluation of the interconnections between the terminals and the coastal and hinterland nodes, the actual realization of an easy-to-use and comfortable multimodality for passengers requires coordination that goes beyond the port authorities.

To pursue this goal, the passenger terminal ports cannot function in isolation from their city authorities, municipal authorities, nor can they perform their business without combining their activities with stakeholders from both the private (transportation companies, logistics companies, tourist agencies, etc.) and public stakeholders (governmental institutions). In this regard it is important for the Cross - Border Sustainability Action Plan to connect selected project partners, private and public stakeholders to improve the offer of information and sustainable services within the passenger terminal ports of the Cross - Border Area. This is to be done to accelerate the commercial viability, technical feasibility and ecological soundness of the passenger terminal ports of the Cross - Border Area. Besides, a growing number of port stakeholders (e.g. regulatory authorities or customers such as citizens, tourists and passengers) are demanding better management of the negative externalities caused by port operations and thus a reduction in port-related pollution and emissions.

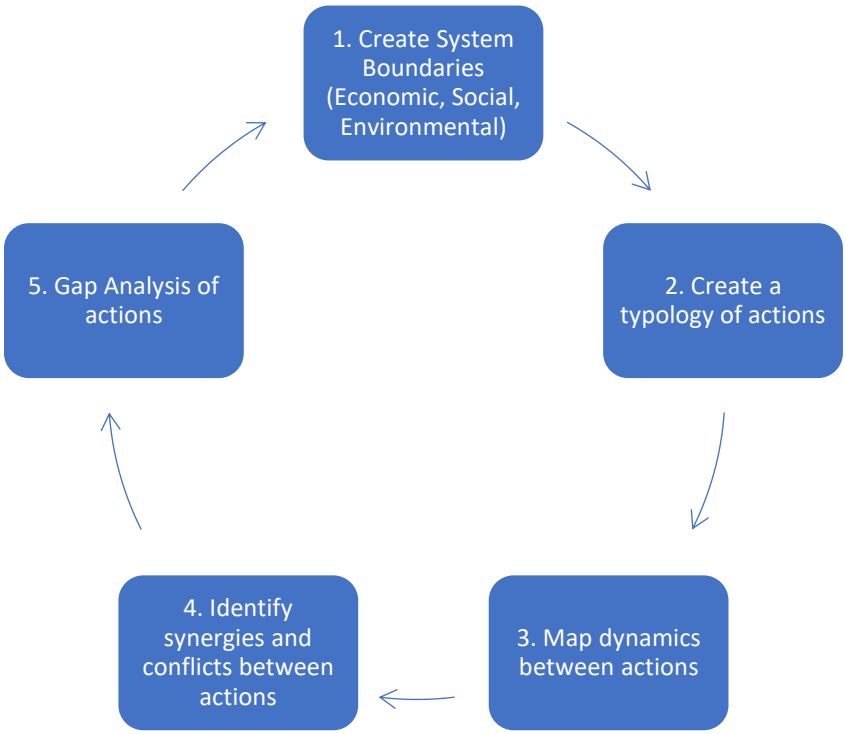
Therefore, the Cross - Border Transport Sustainability Action Plan has to focus on the coordination and harmonization of both the waterfront and hinterland multimodal transport operations as well as passenger terminal port operations. It is also important that the model takes into consideration the needs expressed by regional decision-makers, private and public stakeholders of the Cross -

Border Area. The Methodology for the assessment of passenger terminal ports from the aspect of sustainability for the future multimodal development of the Cross - Border Area can be depicted into five connected steps:

1. Create System Boundaries: Sustainability assessment of passenger terminal ports is the system boundary under which they are evaluated in adherence to economic, social and environmental criteria for improving passenger transport at local, regional and cross - border level.
2. Create a Typology of Actions: What activities, methods, measures and indicators have to be implemented by project partners and stakeholders to improve the sustainability of passenger terminal ports.
3. Map Dynamics between Actions: Evaluate how particular sustainability activities of particular project partners and stakeholders will promote the progress of sustainability in passenger terminal ports.
4. Identifying Synergies and Conflicts between Actions: Coordination and communication between project partners and stakeholders to promote positive outcomes and mitigate or remove nonpositive outcomes for achieving the sustainability of passenger terminal ports.
5. Gap Analysis of Actions: Utilize the gathered knowledge and results from the actions of project partners and stakeholders for the comparison of actual performance with the potential and desired performance as a method of self-correction and redirecting between the project partners and stakeholders.

The Methodology for the assessment of passenger terminal ports from the aspect of sustainability for the future multimodal development of the Cross - Border Area is depicted in figure 4.

Figure 4. The Methodology for the assessment of passenger terminal ports from the aspect of sustainability for the future multimodal development of the Cross - Border Area



Furthermore, the Action Plan must pursue a constant dialogue between project partners and the most relevant stakeholders of the cross border territory, during and after implementation of pilot activities.

6. Methodology for the Assessment of Cross - border Passenger Ships from the Aspect of Sustainability for the Future Development of the Cross - Border Area

The methodology for the assessment of passenger liner ships from the aspect of sustainability for the future development of the Cross - Border Area should be developed to integrate social and environmental aspects of shipping as well as the economic feasibility of the same activity. In order to study the efficiency of the ports within the Cross - Border Area it is also important that ships are included in the assessment to enable proper evaluation of the entire maritime passenger port terminal system. Ships play a key role within the Cross - Border Area due to a large number of passengers transported by them between passenger terminal ports.

The factors which can be considered when assessing passenger liner ships from the aspect of sustainability are:

1. continuity and regularity of transport with the passenger liner ships of a certain capacity type, and ensuring adequate quality of transport,
2. providing support to the shipper, without which it is not possible to ensure the continuity and regularity of public transport on certain routes,
3. technical and technological passenger liner ships characteristics in function of passenger demands,
4. ICT modernization concerning timetable harmonisation, ICT solutions for seamless information flow, intelligent and integrated multimodal payment systems, dynamic travel planning),
5. carbon footprint mitigation of ships activities (Retrofit ships with low - emission and zero-emission energy sources i.e. battery-electric operation, partial electrification in combination with LNG, biodiesel, and biogas).

From various literature analysis, the methodology for the assessment of passenger liner ships from the aspect of sustainability can be overviewed through:

1. European Law and European Directives - It is important to assess passenger liner ships from the aspect of sustainability due to the tightening of measures and instruments from national, international and EU source documents,

2. technical papers - to conduct a technical assessment of existing passenger liner ship characteristics in order to spot gaps for the implementation of sustainable solutions,
3. *best practice* in other EU countries according to European Directives for possible action plan development.
4. interviews and field research, in order to acquire the opinion of operators (shipowners) and include their knowledge on the subject in future outputs and deliverables.

Sustainability's increased presence in the maritime industry results with the emerging of new challenges that are changing the maritime landscape. Shipowners are obliged to elaborate more efficient shipping operations by taking into account new regulations (EU, international, national), technology and innovative business models. Even though shipping is considered as an efficient transport mode when compared to other transport modes concerning sustainability, it is important to state that there are various aspects where cross – border passenger ships can be assessed to improve the environmental quality, social safety and economic efficiency (competitiveness) of the cross border area. Shipowners of the Cross – border area can improve their operations by assessing the technologies of passenger ships from the aspect of sustainability in the following areas:[19]

1. Eco-efficient ship designs, improvements in engine design, propellers, hull forms and coatings
2. Slow steaming, speed optimisation and weather routing systems
3. Change of fuel usage from heavy fuel oils to natural gas, biofuels and fuel cells
4. Development in hybrid solutions, battery systems and ship electrification
5. Improving infrastructure to enable faster turnaround times and increase port capacity
6. Maturing technologies within scrubber and exhaust gas recirculation
7. System integrations, smart maintenance, automation and remote operations
8. Use of sensors, big data, computational fluid dynamics, performance management systems

Thus it is important that the action plan considers the assessment of the cross – border passenger ships from the aspect of sustainability for the future development of the cross – border area in the following ways: a) Providing ship owners' with the guidelines for developing green business models with regard to their passenger shipping operations, b) Providing ship owners' with the guidelines for adopting both alternative and cost-effective fuel technologies for their passenger shipping operations, c) Providing ship owners' with the guidelines for the improvement of technological

[19] https://www.hellenicshippingnews.com/sustainable-shipping-why-does-it-matter-and-what-does-it-entail/

specifications of ships (i.e. reducing fuel consumption for existing ships via implementation of ICT technologies and improving energy-efficient engines and hulls for newly built ships), and d) Providing ship owners' with guidelines for the reduction of air pollution from ships by reducing sulphur, nitrogen and particulate matter by the latest IMO mandatory regulations and measures (i.e. ship Energy Efficiency Design Index for new ships, and the Ship Energy Efficiency Management Plan for all ships[20]).

[20] http://www.emsa.europa.eu/we-do/sustainability/environment/sustainable-toolbox.html

7. References

1. Bergman, Z., Bergman, M. M. (2019). A Caste Study of the Sustainable Mobility Problem – Solution Paradox: Motility and Access to Metrorail Commuters in the Western Cape. Sustainability 2019, 11 (10), 2842.
2. Comi, A., & Polimeni, A. (2020). Assessing the Potential of Short Sea Shipping and the Benefits in Terms of External Costs: Application to the Mediterranean Basin. *Sustainability*, *12*(13), pp. 53-83.
3. European Commission, Directorate General for Energy and Transport (2006), Bottlenecks in Short Sea Shipping, Brussels, 2006.
4. Jugović A., Debelić B. & Brdar M., (2011). Short Sea Shipping in Europe Factor of the Sustainable Development Transport System of Croatia, *Scientific Journal of Maritime Research*, vol. 25(1).
5. Kane, L., & Del Mistro, R. (2003). Changes in transport planning policy: Changes in transport planning methodology?. *Transportation*, *30*(2), 113-131.
6. Litman, T. (2017). *Introduction to multi-modal transportation planning*. Canada: Victoria Transport Policy Institute.
7. Melander, L. (2018). Scenario development in transport studies: Methodological considerations and reflections on delphi studies. *Futures*,*96*, pp. 68-78.
8. Ports: an engine for growth, COM (2013-285 final), Brussels, 23.05.2013.
9. Runko Luttenberger, L., Ančić, I., & Šestan, A. (2013). The viability of short-sea shipping in Croatia. *Brodogradnja: Teorija i praksa brodogradnje i pomorske tehnike*, *64*(4), pp. 472-481.
10. Sánchez-Cambronero, A., González-Cancelas, N., & Serrano, B. M. (2020). Analysis of port sustainability using the PPSC methodology (PESTEL, Porter, SWOT, CAME). *World Scientific News*, *146*, 121-138.
11. Schuckmann, S. W., Gnatzy, T., Darkow, I. L., & Heiko, A. (2012). Analysis of factors influencing the development of transport infrastructure until the year 2030—A Delphi based scenario study. *Technological Forecasting and Social Change*, *79*(8), 1373-1387.
12. Strategic goals and recommendations for the EU's maritime transport policy until 2018, COM (2009-8 final), Brussels, 21.01.2009.
13. Zuidgeest, M. H. P., & Van Maarseveen, M. F. A. M. (2000). Transportation planning for sustainable development. SATC 2000.
14. http://www.emsa.europa.eu/we-do/sustainability/environment/sustainable-toolbox.html (last checked: December 5th, 2020)

15. https://ec.europa.eu/transport/modes/maritime/maritime-transport_en (last checked: November 21st, 2020)
16. https://www.europarl.europa.eu/factsheets/en/sheet/121/integrated-maritime-policy-of-the-european-union (last checked: November 21st, 2020)
17. https://www.europarl.europa.eu/factsheets/en/sheet/124/maritime-transport-strategic-approach (last checked: November 21st, 2020)
18. https://www.hellenicshippingnews.com/sustainable-shipping-why-does-it-matter-and-what-does-it-entail/ (last checked: December 5th, 2020)

7. APPENDIX A – Ports' questionnaire

Dear Sir/Madam,

Thank you for your time to complete this questionnarie.
The questionnaire will give us an insight into the state of passenger ports open to international traffic in 2018 and 2019.

The questionnaire consists of 8 parts that give us an insight into the situation in ports for passenger transport in Italy and Croatia:

A. General information
B. Port area
C. Service
D. Information
E. Safety and Security
F. Connecting land infrastructure and accessibility
G. Environment impact procedures
H. Maritime transportation lines
I. Passengers

Please fill in the questionnaire by entering it directly in an Excel spreadsheet.
You can only select the questions to be answered in the drop-down menu or if you type round.

Where you are asked to rate something, please follow that 1 is the worst grade/condition, and 5 is the best grade/condition.

If you have any doubts or ambiguities, do not hesitate to contact us by phone or email at the information below

General information for port									
A	**General information**		**Filled in by the Port Authority (PA)**						
1	Operational shore intended for international transport - (in meters):								
2	Piers (Berths)	Number of piers (Berths)							
3		Minimum sea depth per pier (in m)							
4		Maximum length of the ship per pier (in m)							
5	Ferry ramp	Number of ramps							
6		Width single (in m)							
7		Ramp type individually (select)							
8		Maximum length of ship per ramp							
9	Infrastructure condition (on a scale of 1 to 5 - select)		1 - 2 - 3 - 4 - 5						
10	**Necessary improvements - (please describe with 5 sentences) - this part will be in Action Plan for future port development**								
11	Port lighting - Describe								
12	Accessibility of the port to persons with reduced mobility								
13	The need to upgrade the accessibility of the port for people with reduced mobility (descr								
14	Municipal waste collection equipment (select)								
15	Possibility to accept waste from ships (select)								
16	Sufficiency of reception devices for ship waste (select)								
17	Capacity of receiving devices for ship waste (in m3)								
18	Sufficiency of receiving devices for waste oils and oily water (select)								
19	Capacity of receiving devices for waste oils and oily waters (in m3)								
20	Possibility for ship bunkering (taking fuel)								
21	Possibility for LNG ship bunkering (taking LNG fuel)								
22	Port plan for LNG bunkering (year of operability)								

Port area		
B	**Port area**	**Filled in by the PA**
23	Land area (in m2)	
24	Sea area in (m2)	
25	Certain boundaries of the port area	
26	Concession of economic activities	
27	If the answer to the previous question is YES, please indicate which:	
28	Problems with ownership in the port area - describe	
29	If the answer to the previous question is YES, please list the problems:	
30	Problem with spatial planning documentation	
31	If the answer to the previous question is YES, please list the problems:	
32	The functioning of the port causes conflicts with urban space	
33	If the answer to the previous question is YES, please indicate which:	

Service			
C	Service		Filled in by the PA
34	Passenger shelter - select		
35	Passenger shelter ugrade plan - please describe		
36	Benches for passenger rest		
37	Proper equipment for boarding passengers (tunnel boarding/disembarking passengers, etc.)		
38	If the previous question is YES, please indicate which:		
39	Luggage storage space		
40	Traveller & luggage management systems		
41	Appropriate conditions for ticket sales (vessel transportation line)		
42	Possibility to buy tickets online (vessel transportation line)		
43	Bus ticket sales (distance in m)		
44	Railway ticket sales (distance in m)		
45	Service to help people with reduced mobility		
46	Unaccompanied children assistance service		
47	Planning the introduction of a service to help people with reduced mobility and children		
48	If the previous question is YES, please indicate which:		
49	Children's play area		
50	Binding service		
51	Land gas station nearby		
52	Sanitary facilities	Select	
53		Select	
54	Service facility	Restaurant - distance in m	
55		Coffee shop - distance in m	
56	Shop (distance in m)		
57	Souvenir sales (distance in m)		
58	Possibility of charging electric vehicles		
59	Number of chargers for electric vehicles in port area		
60	Possibility of charging electric bicycles		
61	Number of chargers for electric bicycles in port area		
62	Wi-Fi service for passengers		
63	App-based services for passengers (information, booking, payment, etc.)		
64	ATM (distance in m)		
65	Exchange office (distance in m)		
66	First aid (distance in m)		
67	Hotel (distance m)		
68	Private accommodation (distance in m)		
69	Possibility of electric power supply of the device (mobile phone, laptop, etc.)		

	Information	
D	Information	Filled in by the PA
70	Passenger info board	
71	Passenger info display	
72	Real-time information systems for passengers	
73	Information on the schedule of maritime transportation lines	
74	Bus timetable information inside port area	
75	Railway timetable information inside port area	
76	Multilingual information	
77	If the question before YES, please indicate in which languages is the inscription available?	
78	List of emergency numbers	
79	List of main contacts (taxi, TZ, car mechanic, towing service, etc.)	
80	Map of destinations with main sights and contacts	
81	Map of the country and region	
82	Basic general information about the country (currency, language, religion, population, voltage, drinking water, travel documents, costoms regulations, information for drivers, etc.)	
83	If the question before YES, please indicate which one?	
84	QR code for tourist information	
85	Significance of destination and region	

Safety and Security		
E	**Safety and Security**	**Filled in by the PA**
86	The port is well protected in all weather conditions	
87	The need to protect the port in certain atmospheric conditions (wind direction, sea height) - describe	
88	Number of hydrants	
89	Sufficient fire-fighting equipment	
90	Professional fire service available in minutes	
91	Sufficient equipment to prevent pollution	
92	Proximity to pollution prevention equipment	
93	Distance of equipment (in m) or port (in nM) where the equipment is located	
94	Indoor / outdoor air quality monitoring	
95	Ladder to get out of the sea	
96	Life vest	
97	Defibrillator	
98	Defibrillator (distance)	
99	Number of employees authorized for security protection	
100	The presence of a port warden	
101	Police services (yes or no)	
102	Police services	
103	Custom services	
104	Check-in & boarding management systems	
105	Border & port security screening	
106	Passenger temperature scanners	
107	Secure internal communication system	
108	People counting technologies	
109	Number of staff trained to provide first aid	
110	Number of employees trained in fire protection	
111	Number of employees trained in marine pollution prevention	
112	Traveller data collection & warehousing systems	
113	Video surveillance of the port area	
114	Secured footpaths (zones)	
115	Automated vehicle access control	
116	Automatic license plate reader	
117	Vehicles traffic monitoring	
118	Any Cyber security attack recorded inside the port system?	
119	If Yes, which system is infected and how?	
120	Cyber security infrastructures	
121	Cyber security plan implemented	

Connecting land infrastructure and accessibility			
F	**Connecting land infrastructure**		**Filled in by the PA**
122	Road infrastructure	Type of road?	
123		Number of lanes	
124		Rate the condition from 1 to 5	
125		Need to upgrade	
126	Road vehicles cause congestion in the port		
127	The port is disrupting the functioning of road traffic		
128	Parking space	Number of cars/places (enter)	
129		Select	
130		Keeping (more then one day)	
131		Billing (yes or no)	
132		Billing	
133		Illumination	
134	Boarding waiting area for passengers		
135	Boarding waiting area for cars		
136	Need to upgrade - describe		
137	Railway infrastructure		
138	Railway station (distance in m)		
139	Existence of bus lines		
140	Bus station/stop (distance)		
141	Public city transport (distance) - if applicable		
142	Airport (distance)		
143	Taxi (distance in m)		
144	Car rental (distance in m)		
145	Rent-a-bike (distance in m)		
146	Number of services inside the port area for reaching the nearest bus stop/railway?		
147	Which service is used for reaching the nearest bus stop/railway?		
148	Sharing services inside the port area?		
149	If YES, specify the number and type of sharing services?		

Following initiatives or procedures for the reduction of environmental impact		
G		**Filled in by the PA**
150	Alternative energy production	
151	Alternative fuels / low sulfur bunkering	
152	Circular economies	
153	Climate initiatives	
154	Cold ironing	
155	Efficient vessel handling	
156	Emissions inventories	
157	Emissions monitoring	
158	Energy management system	
159	Environmental plan	
160	Environmental report	
161	Environmental risk management	
162	Footprint assessment	
163	Key environmental performance indicators	
164	Life cycle assessment	
165	Vessel impact-related incentives	
166	Vessel impact-related port dues / penalties	
167	Other (please specify)	

Maritime tranportation lines			
H	**Maritime tranportation lines**		**Filled in by the PA**
168	Number of existing transportation lines		
169	NEW transportation line in the future		
170	Port names in transportation line No. 1		
	Port names in transportation line No. 2		
	Port names in transportation line No. 3		
	Port names in transportation line No. 4		
171	Port names in NEW transportation line No. 1		
172	Itinerary of transportation line No. 1		
	Itinerary of transportation line No. 2		
	Itinerary of transportation line No. 3		
	Itinerary of transportation line No. 4		
173	Itinerary of NEW transportation line No. 1		
174	ship's name on tranportation line No. 1		
	ship's name on tranportation line No. 2		
	ship's name on tranportation line No. 3		
	ship's name on tranportation line No. 4		
175	Possibility to store bicycle onboard vessel on line No. 1		
	Possibility to store bicycle onboard vessel on line No. 2		
	Possibility to store bicycle onboard vessel on line No. 3		
	Possibility to store bicycle onboard vessel on line No. 4		
176	Possibility to store luggage onboard vessel on line No. 1 (in cbm)		
	Possibility to store luggage onboard vessel on line No. 2 (in cbm)		
	Possibility to store luggage onboard vessel on line No. 3 (in cbm)		
	Possibility to store luggage onboard vessel on line No. 4 (in cbm)		
177	Number of passengers on transportation line No. 1 (2017)		
	Number of passengers on transportation line No. 1 (2018)		
	Number of passengers on transportation line No. 1 (2019)		
	Number of passengers on transportation line No. 2 (2017)		
	Number of passengers on transportation line No. 2 (2018)		
	Number of passengers on transportation line No. 2 (2019)		
	Number of passengers on transportation line No. 3 (2017)		
	Number of passengers on transportation line No. 3 (2018)		
	Number of passengers on transportation line No. 3 (2019)		
	Number of passengers on transportation line No. 4 (2017)		
	Number of passengers on transportation line No. 4 (2018)		
	Number of passengers on transportation line No. 4 (2019)		
178	Number of canceled passenger transportation lines due to bad weather conditions or other extraordinary conditions(in days)	in 2017	
		in 2018	
		in 2019	

Passengers					
I	Tranportation lines		Filled in by the PA		
179	Total number of incoming passengers from Croatia	2017			
		2018			
		2019			
180	Total number of incoming passengers to Croatia	2017			
		2018			
		2019			
181	Do you have a file with the detection of the number of passengers by destination and origin?	YES	NO		
182	If "yes", would you share it with us for our research?	YES	NO		
183	If "yes": person to contact for requesting the dataset	(Contact person name, email, telephone)			

8. APPENDIX B – Technology Readiness Levels scale

TRL 1 basic principles observed
TRL 2 technology concept formulated
TRL 3 experimental proof of concept
--- TRL 1 – 3 not considered in this methodology ---

TRL 4 technology validated in lab
TRL 5 technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)
--- TRL 4 – 5 here considered only for medium-long term scenario analysis ---

TRL 6 technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
TRL 7 system prototype demonstration in operational environment
TRL 8 system complete and qualified
TRL 9 actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies)