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Analysis and perspectives of liner maritime passenger transport in the Republic of Croatia

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ABSTRACT

The analysis of liner maritime passenger transport provides a basis for recommendations for the further development and improvement of liner maritime passenger transport in the Republic of Croatia. The purpose of this research is to analyze the structure, intensity, and spatial distribution of liner maritime passenger transport; analyze key challenges and provide future perspectives; and contextualize Croatia's position within the broader European maritime transport system, including a comparative perspective with the Mediterranean countries Italy and Greece. The research is based on an analysis of relevant statistical indicators for 2024 and 2025, and the legal and strategic framework. The research findings indicate a substantial spatial concentration of passenger flows and regional disparities in liner maritime passenger transport in the Republic of Croatia, while the available data also indicate differences in passenger volumes between the observed periods. The results highlight the need for an improved liner network adapted to users, stronger implementation of sustainable transport solutions, fleet modernization, and infrastructure investment. This paper contributes to the literature by presenting the current state of liner maritime passenger transport, positioning it within a Mediterranean comparative context, and providing recommendations to improve and ensure the long-term development of liner maritime passenger transport in the Republic of Croatia.

1 Introduction

Maritime passenger transport is an important component of the global transport system and economy, contributing significantly to tourism development, regional connectivity, and the accessibility of coastal and island destinations. As tourism demand increases and mobility patterns become more complex, the importance of efficient and sustainable maritime passenger transport systems continues to grow. Therefore, systematic research on liner maritime passenger transport is necessary to identify key development factors, improve service quality, and support long-term sustainability.

Liner maritime passenger transport is a specific form of organized passenger transport that operates on predefined routes according to fixed timetables and es-

tablished schedules. Its main characteristic is the regularity of service between fixed ports or terminals, with predetermined departures and arrivals that ensure continuity and reliability of transport. Shipping companies are responsible for managing the operational, technical, and commercial aspects of these services, while the state often plays an important regulatory and financial role, particularly in maintaining public service obligations on strategically important routes.

The Republic of Croatia has traditionally placed a strong emphasis on maritime transport due to its exceptional geographical characteristics. With a highly indented coastline, more than a thousand islands, and numerous inhabited island communities, maritime transport is essential for national territorial cohesion and economic development. It plays a particularly im-

portant role in coastal, near-coastal, and island areas, where alternative transport connections are often limited or unavailable. Ensuring reliable year-round connectivity between islands and the mainland is, therefore, not only a transport or tourism issue but also a matter of social inclusion, regional development, and quality of life for island residents.

Croatia has developed a comprehensive system of liner maritime passenger transport, which serves both resident populations and a large number of domestic and international tourists. The importance of this system is further strengthened by the continuous growth of tourism demand, especially during the summer season, when passenger flows increase significantly. At the same time, the number of maritime routes and the overall intensity of maritime passenger transport continue to expand, creating new challenges related to infrastructure capacity, fleet modernization, environmental sustainability, and service optimization.

The purpose of this research is to analyze liner maritime passenger transport in the Republic of Croatia and to provide recommendations for its further development. The main goal is to examine the structure, intensity, and spatial distribution of maritime passenger transport, with particular emphasis on the role of different line types and regional shipping line areas, as well as to identify key challenges for improvement and long-term sustainability.

Based on the identified research gap and the available statistical data, the paper addresses the following research questions:

- RQ1: How is liner maritime passenger transport in Croatia structured and distributed across different line types and shipping line areas?
- RQ2: What spatial and operational patterns can be identified from liner passenger transport data for 2024 and 2025?
- RQ3: What are the main challenges and recommendations for the development of liner maritime passenger transport in Croatia?

This paper contributes to the existing scientific literature by: (1) providing an integrated descriptive analysis of passenger transport intensity by line type and spatial distribution across shipping line areas; (2) combining statistical, regulatory, and policy perspectives to identify structural characteristics and development challenges of the Croatian liner maritime passenger transport system; and (3) providing a recommendation framework for the future development of maritime passenger transport in Croatia.

2 Theoretical background

This section presents the theoretical framework for understanding liner maritime passenger transport and

its key characteristics. It includes a review of the relevant literature concerning liner maritime passenger transport in the Republic of Croatia, as well as an overview of the legal framework that directly regulates its management and operation. Furthermore, the section discusses the basic characteristics of liner maritime passenger transport. The purpose of this section is to establish a conceptual foundation for the analysis and to identify the main research gaps addressed in this paper.

2.1 Review of previous research

Previous research on maritime passenger transport in Croatia covers a wide range of topics, including its impact on tourism, island development, regulatory frameworks, service quality, and sustainability.

Early research primarily focuses on the relationship between maritime transport and tourism. Brčić and Vidučić (2004) highlight the economic role of ferry services in supporting tourism and regional economies, noting the importance of fleet modernization for maintaining service quality [1]. Cottam, Roe, and Challacombe (2007) analyze the impact of transitional changes in maritime passenger transport on tourism development in Croatia, including fleet structure, market opportunities, and the need for reforms to improve service quality [2]. The authors emphasize the crucial role of maritime transport as a primary, and in some cases the only, means of access to island destinations, thereby directly influencing coastal tourism development.

Pupavac, Plazibat and Krčum (2015) provided a quantitative model demonstrating how tourism flows and economic factors drive passenger demand in maritime networks [3]. Mišura, Sopta and Perić Hadžić (2020) analyzed how connections between islands and the mainland affect demographic trends, economic activity, and social development [4]. Research shows that improved connectivity contributes to the growth in passenger and vehicle traffic and supports the development of island communities, with state investment playing an important role. Aksentijević (2025) analyzed the relationship between transport connectivity and island development, concluding that insufficient and unreliable connections represent a major barrier to sustainable development [5].

Several research focus on regulatory aspects of maritime passenger transport. Stupalo, Jolić, and Žgaljić (2012) discuss the transitional period of aligning Croatian maritime transport with EU regulations [6]. Rathman, Tijan, and Jugović (2016) emphasize the role of IT and digital management systems in improving service efficiency and meeting regulatory standards [7]. Mandić (2017) analyzed the legal framework governing maritime transport and the liberalization of the market following Croatia's accession to the European Union,

with particular emphasis on cabotage regulations and market opening to foreign operators [8]. Jugović, Aksentijević, and Zaninović (2021) analyze the impact of economic policy measures, particularly state subsidies and regulation, on shipping companies [9]. The research highlights the importance of government support in maintaining coastal lines, while also addressing demand fluctuations driven by tourism seasonality.

Infrastructure and economic aspects are also discussed in the literature. Stupalo, Jolić, and Jugović (2012) describe the structure of the coastal passenger transport system, including different types of vessels and routes, and emphasize its importance for national cohesion and the sustainability of island communities [10]. Naletina and Perković (2018) analyze the importance of this maritime transport mode for tourism and the economy [11]. Sušić, Ivčević, Zekić and Paparić (2021) analyze the capacity of Croatian ports to accommodate RO-RO vessels and identify the need for infrastructure modernization to improve the efficiency of liner passenger transport [12]. Plazibat, Krčum, Bacalja and Peronja (2024) focus on intercity fast-ship lines and analyze their economic, environmental, and energy impacts [13]. Peričin and Grbić (2025) examine the impact of the construction of the Port of Gaženica on maritime infrastructure development and the growth of passenger and vehicle traffic in Zadar County, highlighting its potential as an international passenger and intermodal hub [14].

Service quality and user experience have become increasingly important research topics. Rathman, Tijan, and Jugović (2016) also highlight the role of digital systems in improving passenger communication and service efficiency [7]. Amižić Jelovčić and Bolanča (2021) focus on the implementation of European regulations concerning passenger rights, especially for persons with disabilities and reduced mobility, and analyze the role of national institutions in enforcing these regulations [15]. Mikuličić, Kolanović, Jugović and Brnos (2024) conduct a systematic review of methods used to evaluate service quality in passenger transport, particularly in maritime contexts, and highlight the growing interest in this field as well as the need to incorporate new technologies [16].

Recent studies emphasize sustainability and innovation. Sirotić, Žuškin, Rudan and Stocchetti (2021) propose a methodology for sustainable and multimodal transport in the Italy – Croatia cross-border area, emphasizing the importance of port–hinterland connections [17]. Plazibat, Krčum, Bacalja and Peronja (2024) emphasize the importance of combining infrastructure modernization, digital systems, and sustainable practices to ensure long-term viability [13]. Glavinović, Vukić, Peronja (2025) explore the integration of electric ferries into the Croatian transport system, identifying key challenges and influencing factors [18]. Mišura,

Vukićević, Gulić (2025) develop optimization models for vessel allocation aimed at improving energy efficiency and service quality [19]. Vukić and Juranović (2026) analyze the integration of maritime passenger transport into sustainable mobility systems, demonstrating its potential to reduce emissions and traffic congestion [20].

Although these research provide important insights into individual dimensions of Croatian liner maritime passenger transport, they are generally examined separately. In particular, there is limited research combining passenger-volume statistics with a spatial analysis of shipping line areas and line types in order to describe the structure and intensity of the national system. Furthermore, previous research provides limited systematic comparison of Croatia with other major Mediterranean maritime passenger systems such as Italy and Greece. This research addresses these gaps by bringing together statistical, spatial, regulatory, and policy perspectives. Its contribution is therefore primarily descriptive and integrative: it identifies the distribution and intensity of passenger transport by line type and shipping line area; places the Croatian system within a broader Mediterranean context; provides perspective for future development.

This research does not directly evaluate service quality, operational efficiency, passenger-kilometres, market competitiveness, fleet condition, or environmental performance. Instead, the passenger-volume analysis provides a system-level empirical baseline that can support future research into these dimensions. In this respect, it complements previous research by showing where passenger transport intensity is concentrated, how it differs between line types and spatial areas, and which structural issues warrant more detailed operational and policy analysis.

2.2 Legal framework of the liner maritime passenger transport in the Republic of Croatia

The legal framework governing maritime passenger transport in Croatia includes the Maritime Code [21], the Act on Liner Shipping and Seasonal Coastal Maritime Transport [22], and the Maritime Domain and Sea Ports Act [23]. These Acts, in addition to legally defining the rules of port management and business, also regulate the status of port land as maritime property or as a public good of special interest for the Republic of Croatia.

The Maritime Code is supplemented by the Act on Liner Shipping and Seasonal Coastal Maritime Transport which specifically addresses regulations for liner and occasional coastal shipping services, including passenger transport. It details the legal framework for these services, including how concessions are granted and how the transport of goods and passengers is regulated within Croatian waters [21].

The Act on Liner Shipping and Seasonal Coastal Maritime Transport provides a framework for a public passenger transport system in the Republic of Croatia, ensuring regular connections between inhabited islands and the mainland, as well as between inhabited islands and coastal cities, with an appropriate number of daily lines and two-way connections to improve living conditions on the islands and stimulate their economic development [22].

The Maritime Domain and Sea Ports Act introduces the division of ports open to public transport, classifying them into three categories based on their importance and size within the Republic of Croatia: ports of special (international) interest, ports of county importance, and ports of local importance [23].

This categorization defines the founders and port authorities, as well as the method for collecting funds required to construct port infrastructure and superstructure [23]. In addition to ports open to public transport, the Maritime Domain and Sea Ports Act also regulates special-purpose ports such as military ports and nautical ports. Ports may be intended exclusively for domestic or international transport. Operations related to the management, construction, and maintenance of ports open to public transport are carried out by the port authority. In contrast, the management of a port for special purposes is entrusted to the concessionaire [23].

Before the Republic of Croatia joined the European Union, the market for liner maritime passenger transport was mainly reserved for domestic shipping companies. Only Croatian shipping companies had the right to transport passengers and cargo between Croatian ports. However, with the expiry of the transitional period and current concession agreements, the market has also opened to European shipping companies. Therefore, the Republic of Croatia has had to adapt its legal framework to regulate liner maritime passenger transport.

In 2006, the Government of the Republic of Croatia, in accordance with the Act on Liner Shipping and Seasonal Coastal Maritime Transport, established the Coastal Liner Services Agency [22, 24] as the main regulatory body for liner maritime passenger transport. The Agency's most important task is to select shipping companies through public tenders to provide transport services on state ferry, ship, and high-speed boat lines in public liner maritime passenger transport, conclude contracts with the selected shipping companies, and supervise their implementation [25]. The tasks performed by the Agency include granting the right to provide public transport services, establishing IT public transport, and exercising the right to preferential transport.

After the introduction of the International Safety Management Code (ISM Code), established by the International Maritime Organization (IMO), the goal is to ensure safe work on board and prevent marine pollution

[26]. The emphasis is on continuous improvement of management, professional development of the crew (knowledge, skills, qualifications), and preparation for emergency situations. The ultimate goal of the Code is to reduce the number of accidents.

In addition to the aforementioned laws, liner passenger transport is also regulated by various decrees, regulations, and decisions, which ensure compliance with relevant EU regulations.

2.3 Characteristics of liner maritime passenger transport

Liner maritime passenger transport is characterized by direction, volume, and type, all of which are essential for effective transport planning and management.

According to the Act on Liner Shipping and Seasonal Coastal Maritime Transport, lines in public liner maritime transport are classified into lines with public service obligations and lines without public service obligations [22].

A line with a public service obligation is a line of national, county, inter-county or local importance, the establishment of which is in the general economic interest of the state or a local or regional self-government unit, for which the shipowner is obliged to perform a public service or this obligation is entrusted to the shipowner on the basis of a concluded public service contract [22]. Public service obligation lines are classified according to the importance of the route, the type of transport and the profitability of the line.

According to the importance of the route, public service obligation lines are classified into state, county, inter-county and local lines [22]. According to the type of transport, lines with public service obligations are classified into ferry, high-speed boat and ship lines [22].

Lines without public service obligations are lines that are not of general economic interest and on which the operator of that line does not perform a public service, but maintains transport on the line for its own economic interest and at its own entrepreneurial risk, according to the publicly published transport price list. These lines must be approved by Coastal Liner Services Agency [22].

There are also lines listed as other lines, which can be established to improve and support existing lines, especially in the season. These lines are approved by Coastal Liner Services Agency.

Regular public lines, including ferry, high-speed, and classic ship lines, operate on fixed routes with schedules that adjust seasonally to meet fluctuating tourist demand. These routes are vital for connecting the Croatian mainland with islands and the Adriatic coast. Understanding these fundamental characteristics provides the basis for a detailed analysis of transport intensity, types

and development perspectives presented in the following sections.

The specific characteristics of maritime passenger transport are [27]:

- direction (line) of transport,
- intensity (volume),
- type of maritime passenger transport.

The direction or line of maritime passenger transport refers to the route along which passengers travel by specific transport vehicles, such as ferries or traditional passenger ships. Planning passenger transport is essential to increase service efficiency, reduce congestion at ports and terminals, enhance travel safety, and optimize routes to connect key maritime destinations.

Volume, often referred to as the intensity of liner maritime passenger transport, is the number of passengers using a specific line within a given time period (e.g., daily, weekly, seasonally). The intensity of passenger transport refers to the total number of passengers traveling on a specific route, by a particular means of transport, or through a specific transport hub (such as ports or terminals) within a unit of time.

The intensity of maritime passenger transport indicates the concentration of passengers during certain peak periods (for example, coastal countries experience high intensity during the tourist season). There are two types of intensity: dynamic and static. Dynamic intensity refers to the number of passengers transported within a certain period and area, while static intensity represents the number of passengers to be transported.

Types of liner maritime passenger transport are classified according to different movement patterns and performance characteristics, based on passenger needs, means of transport, and the geographical distance to be covered (Table 1) [28].

Regular lines typically operate several times a day, and the number of seasonal departures depends on the

tourist season and demand. Ferry lines are essential for transporting people and vehicles between the mainland and islands, as well as for connecting different parts of the Adriatic coast. The routes, passenger volumes, ship types, and regulatory and operational roles of key service providers form the basis for deeper analysis and optimization of the maritime passenger transport system in the Republic of Croatia.

3 Methodology

This research combines descriptive statistical analysis and comparative analysis of liner maritime passenger transport in the Republic of Croatia. The analysis focuses on three key dimensions of maritime passenger transport: (1) structure (types of lines and operators), (2) intensity (passenger volumes), and (3) spatial distribution (regional and hub port-based distribution).

Statistical data for the analysis of liner maritime passenger transport are obtained from the Croatian Bureau of Statistics, the main institution responsible for collecting, processing, and disseminating official statistical data in the Republic of Croatia. The bureau collects data on regular maritime transport through official reports submitted by shipping companies and ports. Statistical data on passenger transport in liner maritime transport, monitored by the Coastal Liner Services Agency, pertain to the transport of passengers and vehicles on state lines in public coastal maritime transport. The statistical data include the total number of transported passengers and vehicles, transport on individual lines, data on shipping companies, and the share of individual shipping companies in total transport. Shipping companies are required to submit data, which are then sent electronically to the Coastal Liner Services Agency. For example, statistical data on liner maritime passenger transport monitored by Jadrolinija include the number of transported passengers and vehicles, types of lines, and ships, annual comparisons, and geographical coverage.

Table 1 Types of liner maritime passenger transport

TYPES OF LINER MARITIME PASSENGER TRANSPORT					
SPATIAL DISTRIBUTION				TIME DISTRIBUTION	
LOCAL PASSENGER TRANSPORT	INTER-CITY OR INTER-COUNTY PASSENGER TRANSPORT	INTERNATIONAL PASSENGER TRANSPORT	PORT PASSENGER TRANSPORT	SEASONAL PASSENGER TRANSPORT	PENDULAR PASSENGER TRANSPORT
Short passenger transport routes between the coast and the islands.	Passenger transport between two cities or two counties	Passenger transport between ports of neighbouring countries	Movement of passengers at terminals or within the port.	The most pronounced passenger transport during the tourist season in coastal countries	Regular lines are used daily for commuting to work, school, and similar activities.

Source: Adapted according to: Kesić, B., Jugović, A. (2006) Menadžment pomorsko-putničkih luka. Rijeka: University of Rijeka, Faculty of Maritime Studies

The dataset includes annual and quarterly data on passenger and vehicle transport, line characteristics, and port activity for the period 2024-2025. The analysis of transport intensity covers three main categories of maritime lines: ferry lines, high-speed ship lines, and classic ship lines. Additionally, a spatial analysis is conducted by dividing the system into five principal shipping line areas: Rijeka, Zadar, Šibenik, Split, and Dubrovnik. This spatial analysis is conducted by dividing the data into five shipping-line areas, defined by the authors based on major regional centers (cities) and according to the division used by Jadrolinija shipping company. Routes connecting ports in different shipping line areas were assigned to the area of the port of origin.

The analysis is based primarily on passenger volumes and their year-on-year changes (2024-2025); therefore, it does not directly measure vessel capacity, fleet age, infrastructure capacity, service frequency, reliability, fares, passenger-kilometers, service quality, emissions, or market competitiveness.

A comparative perspective is provided by analyzing key indicators of maritime passenger transport in selected European countries, particularly Italy and Greece. Statistical data regarding the EU and comparative analysis with Italy and Greece are obtained from Eurostat, the official EU Bureau of Statistics and other relevant literature.

The methodological approach enables a descriptive assessment of the current structure, intensity, and spatial distribution of liner maritime passenger transport, as well as the identification of selected development challenges and areas for further research.

Several limitations should be considered when interpreting the results of this study. First, the principal statistical comparison covers the period 2024-2025, which provides a recent period but limits the assessment of long-term trends, structural changes, and system resilience. Second, the analysis is based primarily on passenger volumes and their year-on-year changes. Passenger counts do not directly capture passenger-kilometers, vessel capacity, service frequency, occupancy, reliability, fares, service quality, emissions, or competitiveness. Third, the available data do not distinguish systematically between island residents, daily commuters, domestic tourists, and international tourists. Finally, the comparative analysis with Italy and Greece is limited to selected indicators for which sufficiently comparable data were available. Differences in statistical definitions, coverage, and data collection methods may affect direct cross-country comparisons. The Mediterranean comparison should therefore be interpreted as contextual rather than as a comprehensive benchmarking. These limitations could provide directions for future research based on longer time series, more detailed operational indicators, and harmonized international datasets.

4 Results and Discussion

This section presents the main research results and discusses the key structural, operational, and spatial characteristics of liner maritime passenger transport in the Republic of Croatia. The analysis focuses on transport intensity according to line type, regional distribution across shipping line areas, and comparative positioning within the broader Mediterranean maritime transport system. Based on the identified trends and system limitations, the discussion further addresses the main development challenges, identifies development challenges and proposes directions for future improvement.

The analysis of relevant indicators for the formation of liner maritime passenger transport in this part of the research includes structure, intensity and spatial distribution of passenger transport, based on the available statistical data.

The intensity of liner maritime passenger transport is analyzed in detail according to the types of lines, including ferry lines, high-speed ship lines, and classic ship lines. Furthermore, to provide a detailed analysis, liner maritime passenger transport is analyzed through shipping line areas in relation to major ports: Rijeka shipping line area, Zadar shipping line area, Šibenik shipping line area, Split shipping line area, and Dubrovnik shipping line area.

4.1 Basic indicators of maritime passenger transport in the Republic of Croatia

In the period from January to December 2025, there were 0.7% more arrivals of ships in Croatian seaports than in the same period of 2024. A total of 36.1 million passengers embarked or disembarked in Croatian seaports in 2025, which was 0.3% less than in 2024. [29].

In the fourth quarter of 2025, 4.8 million passengers embarked or disembarked in Croatian seaports. Compared to the same period of 2024, this represents a decrease of 2.2%. In the fourth quarter of 2025, the number of passengers carried on ferries and passenger ships amounted to 4.4 million, which was 2.3% less than in the same period of 2024. A decrease in the number of passengers carried was recorded in the national traffic of passengers [29].

Before detailed analysis of the liner maritime transport, the following table provides insight into structure of domestic and international maritime passenger transport in selected Croatian ports in 4th quarter of 2025.

Table 2 shows the structure of domestic and international maritime passenger transport in selected Croatian ports during the fourth quarter of 2025 and confirms the strong dominance of domestic passenger transport within the Croatian maritime passenger system. Out of the total 4.756.444 passengers recorded in Croatian seaports, as many as 4.441.202 passengers, or

Table 2 Structure of domestic and international maritime passenger transport in selected¹ Croatian ports in 4th quarter of 2025

Port	Passengers (total)	Indices X – XII 2025 X – XII 2024	Domestic passengers	Indices X – XII 2025 X – XII 2024	International passengers	Indices X – XII 2025 X – XII 2024
Split	813.897	96.6	704.195	99.2	109.702	82.8
Zadar	491.836	104.7	436.299	101.2	55.537	143.6
Dubrovnik	389.239	102.2	263.291	100.2	125.948	106.7
Preko	388.765	101.3	388.765	101.3	-	-
Supetar	345.548	102.4	345.548	102.4	-	-
Korčula ²⁾	341.262	102.0	338.724	102.2	2.538	83.7
Cres	236.758	97.4	236.523	97.4	235	99.6
Krk	195.305	98.9	195.305	98.9	-	-
Jablanac	184.670	102.5	184.670	102.5	-	-
Rab	134.830	102.0	134.830	102.0	-	-
Biograd	133.460	94.6	133.460	94.6	-	-
Pula ³⁾	125.676	81.4	124.732	81.3	944	98.0
Stari Grad	123.400	103.8	123.345	103.7	55	-
Šibenik	100.009	69.2	91.624	67.1	8.385	105.2
Novalja	75.605	104,4	75.605	104.4	-	-
Rogač	69.262	92.9	69.262	92.9	-	-
Makarska	58.351	92.1	58.351	92.1	-	-
Vis	51.995	96.0	51.995	96.0	-	-
Rabac	47.964	93.0	47.964	93.0	-	-
Hvar	43.929	62.2	42.310	61.0	1.619	136.7
Sućuraj	43.460	97.4	43.460	97.4	-	-
Trogir	41.164	138.5	41.076	139.7	88	28.3
Vela Luka	40.646	116.7	40.646	116.9	-	-
Božava	29.605	98.3	29.605	98.3	-	-
Sobra	28.294	102.9	28.294	102.9	-	-
Rovinj	7.378	58.9	5.339	49.0	2.039	124.4
Ploče	4.841	84.6	4.831	84.6	10	83.3
Trpanj	4.831	85.8	4.831	85.8	-	-
Poreč	1.493	15.9	1.365	15.8	128	17.3
TOTAL	4.756.444	97.8	4.441.202	97.5	315.242	101.5

¹ Ports that have achieved a total passenger transport of 200,000 or more in the previous three years

² Includes transport in the Port of Orebić

³ Includes transport in the Ports of Brijuni and Fažana

Source: Croatian Bureau of Statistics (2025) Traffic in seaports, fourth quarter of 2025. Available at: <https://podaci.dzs.hr/2025/en/97500> (Accessed: 21 March 2026)

more than 93%, were transported in domestic traffic, while international passenger transport accounted for only 315.242 passengers [29]. International passenger transport is significantly more concentrated in Port of Dubrovnik and Port of Split. Port of Dubrovnik recorded the highest number of international passengers (125.948), exceeding its domestic international share and reflecting its strong orientation toward tourism and international maritime transport. Port of Zadar also showed notable growth in international passenger transport, with an increase index of 143.6, indicating a strong post-season recovery and growing importance in regional passenger mobility. This clearly indicates that liner maritime passenger transport in Croatia primarily

serves the function of national mainland-island connectivity rather than international maritime mobility.

The leading port with the highest number of transported passengers is the Port of Split, with a total of 813.897 passengers, primarily in domestic passenger transport, which accounts for 704.195 passengers [29]. The next busiest port in domestic transport is the Port of Zadar, with 436.299 passengers, followed by the Port of Preko (388.765), the Port of Supetar (345.548), the Port of Korčula (338.724), and the Port of Dubrovnik (263.291) [29]. The high intensity of passenger transport in Preko and Supetar reflects the strong dependence of nearby islands on daily ferry connections with mainland urban centres.

The indices values further confirm the dominance of domestic passenger transport, with most ports recording values close to or slightly below 100, indicating mild fluctuations rather than significant structural changes in passenger flows.

Smaller island ports such as Cres, Korčula, Jablanac, and Rab remain highly dependent on domestic transport, with almost no international passenger traffic. Their role is therefore primarily social and functional, ensuring daily accessibility and territorial cohesion rather than commercial or tourism-driven transport. These differences confirm that Croatian ports perform highly differentiated transport functions, ranging from large multimodal hubs such as Split and Zadar to smaller ports whose primary purpose is maintaining year-round island connectivity.

The results highlight a strong spatial concentration of passenger flows in a limited number of major ports, while many smaller ports remain strategically important despite lower traffic volumes. This confirms the need for differentiated development policies, where

large passenger hubs require infrastructure expansion and capacity optimization, while smaller island ports require stable public support and service reliability to preserve long-term accessibility.

4.2 Intensity of liner maritime passenger transport by types of maritime lines

The Coastal Liner Services Agency monitors line passenger transport and identifies three main types of lines:

- ferry lines,
- high-speed ship lines,
- classic ship lines.

In Croatia, along the coast and among numerous islands, these lines play an important role in ensuring connectivity and supporting the development of island communities and tourism activities. In 2025, the Coastal Liner Services Agency operated 51 lines including 24 ferry lines, 11 classic ship lines, and 16 high-speed ship

Table 3 Intensity of liner maritime passenger transport on ferry lines in the Republic of Croatia in 2024 and 2025

LINE	SHIPPING COMPANY	PASSENGERS 2024	PASSENGERS 2025	INDICES 2024/2025
Valbiska – Merag	Jadrolinija	1.279.475	1.289.485	100.8
Porozina – Brestova	Jadrolinija	538.927	549.501	102.0
Prizna – Žigljen	Jadrolinija	975.616	968.492	99.3
Mišnjak – Stinica	Rapska plovidba	1.012.908	1.061.524	104.8
Lopar – Valbiska	Jadrolinija	156.166	165.752	106.1
Zadar/Gaženica – Ist/Kosirača-Olib- Silba – Premuda/Krijal – Mali Lošinj	Jadrolinija	31.016	32.944	106.2
Preko – Ošljak – Zadar/Gaženica	Jadrolinija	1.489.923	1.514.743	101.7
Tkon – Biograd na moru	Jadrolinija	494.215	489.596	99.1
Zadar/Gaženica – Rivanj – Sestrunj – Zverinac – Molat – Zapuntel – Ist/Kosirač	Jadrolinija	21.789	22.946	105.3
Brbinj – Zadar/Gaženica	Jadrolinija	221.438	222.052	100.3
Zadar/Gaženica – Bršanj – Rava – Rava Mala	Jadrolinija	47.767	48.088	100.7
Šibenik – Zlarin – Obonjan – Kaprije – Žirje	Jadrolinija	44.060	44.917	101.9
Vis – Split	Jadrolinija	319.035	325.575	102.0
Lastovo/Ubli-Vela Luka – Hvar – Split	Jadrolinija	211.179	216.196	102.4
Drivenik Veliki – Drivenik Mali -Trogir/Soline	Jadrolinija	112.775	121.640	107.9
Supetar – Split	Jadrolinija	2.107.585	2.084.469	98.9
Sućuraj – Drvenik	Jadrolinija	407.512	408.230	100.2
Ploče – Trpanj	Jadrolinija	46.979	44.022	93.7
Korčula/Dominče – Orebić	Jadrolinija	878.691	886.554	100.9
Stari grad – Split	Jadrolinija	754.002	760.303	100.8
Rogač- Split	Jadrolinija	421.788	427.240	101.3
Sumartin – Makarska	Jadrolinija	146.112	163.708	112.0
Sušurađ – Lopud – Koločep/Donje Čelo – Dubrovnik	Jadrolinija	37.107	37.233	100.3
Sobra – Papratno	Jadrolinija	164.545	168.107	102.2
TOTAL		11.920.610	12.053.317	101.1

Source: Coastal Liner Services Agency (2025) Passenger and vehicle traffic 2024-2025. <https://agencija-zolpp.hr/wp-content/uploads/2026/02/Promet-putnika-i-vozila-2024-2025.pdf> (Accessed: 21 March 2026)

lines [24]. These lines are operated by various companies, with Jadrolinija being the most dominant, holding a total share of 84.9%. The second largest operator is Rapska plovidba with 7.3%, while other operators hold a total share of 7.8% [25].

Ferry lines are the primary means of transport connecting the Croatian islands with the mainland, providing regular transportation of passengers, vehicles, and cargo. Ferry lines have a key role in maintaining the quality of life for island residents, supporting economic development, and promoting tourism.

Table 3 presents the intensity of liner maritime passenger transport on ferry lines in 2024 and 2025.

In 2025, a total of 12.053.317 passengers were transported on ferry lines, representing an increase of 1.11% compared to 2024. The most intensive ferry lines were Supetar-Split line (2.084.469), Preko-Ošljak-Zadar/Gaženica line (1.514.743), Valbiska-Merag line (1.289.485), and Mišnjak-Stinica line (1.061.524) [25].

The indices values indicate relatively stable passenger demand on ferry lines, with most routes recording values slightly above 100, confirming moderate growth

between 2024 and 2025. Only a small number of lines show a decline, suggesting that ferry transport remains resilient and represents the most stable segment of maritime passenger transport.

Ferry lines carry significantly more passengers than classic and high-speed lines. All lines, except the Mišnjak-Stinica route, are operated by Jadrolinija. The Mišnjak-Stinica line is operated by Rapska plovidba.

The usual method of maintaining high-speed ship lines involves establishing routes between two or, at most, three centres where docking is justified by significant passenger turnover. High-speed ship lines are generally not intended for intra-island transport, as such transport can be provided by public land transport at significantly lower costs. From a cost perspective, high-speed ship lines require higher fuel expenses compared to public passenger transport. Similarly, ship maintenance and crew costs are significantly higher and are justified only if maximum transport efficiency is achieved.

The following table shows the intensity of maritime passenger transport on high-speed ship lines in 2024 and 2025.

Table 4 Intensity of liner maritime passenger transport on high-speed ship lines in the Republic of Croatia in 2024 and 2025

LINE	SHIPPING COMPANY	PASSENGERS 2024	PASSENGERS 2025	INDICES 2024/2025
Pula – Unije – Susak – Mali Lošinj – Ilovik – Silba – Zadar	Kapetan Luka Krilo	82.361	78.540	95.4
Mali Lošinj – Ilovik – Susak – Unije – Martinšćica – Cres – Rijeka	Jadrolinija	72.569	71.299	98.2
Rijeka-Rab-Novalja	Jadrolinija	75.604	74.743	98.9
Olib – Silba – Premuda/Krijal – Zadar	Miatrade /TP Line	59.538	58.351	98.0
IST/Široka – Zapuntel – Brgulje – Molat – Zadar	Jadrolinija	41.695	43.019	103.2
Brbinj – Božava – Zverinac – Sestrunj – Rivanj – Zadar	Jadrolinija	30.771	28.828	93.7
Zadar – Iž Mali – Veli Iž – Rava Mala – Rava	Jadrolinija	30.354	30.230	99.6
Zadar – Sali – Zaglav – Iž Mali/Bršanj	G&V Line ladera / TP Line	103.621	100.353	96.8
Žirje – Kaprije – Šibenik	Miatrade	38.060	37.448	98.4
Milna – Rogač – Split ¹	Krilo shipping company	66.292	69.323	104.6
Vis – Hvar – Milna – Split	Jadrolinija/ Kapetan Luka Krilo	56.342	52.650	93.4
Jelsa – Stari Grad – Bol – Split	Jadrolinija	110.075	110.363	100.3
Lastovo/Ubli – Vela Luka – Hvar – Split	Jadrolinija/ TP Line	110.773	109.767	99.1
Korčula – Prigradica – Hvar – Split	Kapetan Luka – Krilo/ TP Line	137.197	133.107	97.0
Lastovo/Ubli – Korčula – Polače – Sobra – Šipanska Luka – Dubrovnik	TP Line	48.823	48.405	99.1
Lastovo/Ubli – Korčula – Dubrovnik ²	TP Line	35.544	35.189	99.0
TOTAL		1.099.619	1.081.615	98.4

¹ Includes Port of Sutivan

² Includes Port of Sobra in summer season

In 2025, a total of 1.081.615 passengers were transported on high-speed lines, representing a slight decrease of 1.64% compared to 2024. The most intensive high-speed lines were the Korčula-Prigradica-Hvar-Split line (133.107), the Jelsa-Stari Grad-Bol-Split line (110.363), the Lastovo/Ubli-Vela Luka-Hvar-Split line (109.767), and the Zadar-Sali-Zaglav-Iž Mali/Bršanj line (100.353) [25].

Unlike ferry transport, indices values for high-speed ship lines are predominantly below or close to 100, indicating stagnation or a slight decline in passenger demand. This suggests higher sensitivity of high-speed services to seasonal fluctuations and operational costs.

The structure of operators is more diverse than in ferry lines. Jadrolinija is still dominant, but there are also other operators (with some of them Jadrolinija shares transport on few lines), the following also operate on state high-speed ship lines in the Republic of Croatia: TP Line, Kapetan Luka Krilo, Miatrade and G&V Line ladera [25].

A classic passenger ship refers to a traditional type of ship designed to transport passengers, often on local or regional routes, rather than long overseas journeys.

The following table shows the intensity of maritime passenger transport on classic ship lines in the Republic of Croatia in 2025 and 2024.

In 2025, a total of 1.496.700 passengers were transported on classic ship lines, representing a slight decrease of 0.11% compared to 2024. The most intensive classic ship lines were Preko-Zadar line (460.520) Orebić-Korčula line (255.511), Vodice – Prvić Šepurine-Prvić luka-Zlarin-Šibenik line (243.281), and Suđurađ-Lopud-Koločep/Donje Čelo-Dubrovnik (221.843) [25].

Index values for classic ship lines remain close to 100, indicating a relatively stable level of passenger demand with minor fluctuations. This stability reflects

their primarily local and social transport function rather than market-driven growth.

The structure of operators is diverse, as in the case of high-speed lines. Jadrolinija is slightly dominant, but there are also other operators: Porat Ilovik, G&V Line ladera, RPZ Vrgada, Gradski parking Šibenik, Nautički centar_Komiža [25].

The analysis of transport intensity by line type clearly confirms the dominant role of ferry lines within the Croatian liner maritime passenger transport system. In 2025, ferry lines transported a total of 12.053.317 passengers, representing by far the largest share of total public coastal maritime transport, while classic ship lines recorded 1.496.700 passengers and high-speed ship lines 1.081.615 passengers.

This indicates that ferry transport remains the backbone of national maritime connectivity, primarily due to its ability to transport both passengers and vehicles and to ensure stable year-round connections between the mainland and inhabited islands. These most intensive ferry lines (Supetar-Split; Preko-Ošljak-Zadar/Gaženica Valbiska-Merag and Mišnjak-Stinica) connect highly populated islands or strategically important island corridors with major mainland urban centres, confirming that transport intensity is strongly influenced by both permanent resident mobility and seasonal tourist demand. Ferry lines also showed a slight annual increase compared to 2024, indicating stable and growing demand.

High-speed ship lines serve a different transport function, primarily focused on faster passenger mobility and longer-distance island accessibility, particularly for islands where daily commuting and tourism flows require shorter travel times. However, their total passenger volume remains significantly lower. Unlike ferry

Table 5 Intensity of liner maritime passenger transport on classic ship lines in the Republic of Croatia in 2024 and 2025

LINE	SHIPPING COMPANY	PASSENGERS 2024	PASSENGERS 2025	INDICES 2024/2025
Mali Lošinj – Unije – Vele Srakane – Susak	Jadrolinija	26.987	27.174	100.7
Ilovik – Mrtvaška – Mali Lošinj	Porat Ilovik d.o.o.	17.243	18.471	107.1
Rava – Mala Rava – Veli Iž – Mali Iž – Zadar	G&V Line ladera	49.668	51.545	103.8
Zadar – Sali – Zaglav	G&V Line ladera	35.358	35.404	100.1
Vrgada – Pakoštane – Biograd	RPZ Vrgada	82.143	87.527	106.6
Preko – Zadar	Jadrolinija	468.923	460.520	98.2
Krapanj – Brodarica	Gradski parking Šibenik	85.443	85.363	99.9
Vodice – Prvić Šepurine – Prvić luka – Zlarin – Šibenik	Jadrolinija	246.881	243.281	98.5
Komiža – Biševo	Nautički centar_Komiža	9.140	10.061	110.1
Orebić – Korčula	G&V Line ladera	250.889	255.511	101.8
Suđurađ – Lopud – Koločep/Donje Čelo – Dubrovnik	Jadrolinija	225.716	221.843	98.3
TOTAL		1.498.391	1.496.700	99.9

Source: Coastal Liner Services Agency (2025) Passenger and vehicle traffic 2024-2025. <https://agencija-zolpp.hr/wp-content/uploads/2026/02/Promet-putnika-i-vozila-2024-2025.pdf> (Accessed: 21 March 2026)

lines, high-speed ship lines recorded a slight decline which may indicate higher operational costs, seasonal demand sensitivity, and stronger competition from road transport alternatives where available.

Classic ship lines primarily perform a local and social transport function, connecting smaller island settlements and supporting short-distance mobility where ferry infrastructure is not fully developed. Although total passenger volumes are lower compared to ferry lines, these services remain essential for territorial cohesion and the daily mobility of island residents. Their passenger volume remained relatively stable, with only a marginal decrease in 2025.

4.3 Analysis of liner maritime passenger transport by shipping line area

The spatial distribution of liner maritime passenger transport in the Republic of Croatia reflects the geographical structure of the Adriatic coast, the dispersion of inhabited islands, and the concentration of population and tourism activity in major coastal urban centres. Unlike the previous section, which analyzed transport intensity according to the type of maritime lines (ferry, high-speed, and classic ship lines), this section focuses on the spatial distribution through the five shipping line areas: Rijeka, Zadar, Šibenik, Split, and Dubrovnik.

This spatial approach is important because the function and intensity of maritime passenger transport differ depending on local demographic conditions, island accessibility, tourism demand, and port infrastructure capacity. In some shipping line areas, maritime trans-

port primarily serves the daily mobility needs of the local population, while in others it is strongly influenced by seasonal tourism flows. The distribution of transport demand also determines the level of investment required in fleet modernization, terminal infrastructure, and service frequency.

A large number of Croatian islands are connected to the mainland by only one state line throughout the year, while larger and more populated islands are usually served by multiple connections to ensure transport continuity, especially during adverse weather conditions and periods of high seasonal demand. This system structure confirms that liner maritime passenger transport has both an economic and a strong social function, particularly in ensuring the accessibility of island communities.

Table 6 presents the intensity of liner maritime passenger transport in the Rijeka shipping line area, which represents one of the most important maritime transport regions in the northern Adriatic.

The Rijeka shipping line area is particularly important for the connectivity of the northern Adriatic islands, including Cres, Lošinj, Rab, and Krk. In 2025, the Rijeka shipping line area recorded a total of 4,304,981 passengers, indicating a slight increase of 1.58% compared to 2024. A total of ten lines operate in this area, including five ferry lines, three high-speed ship lines, and two classic ship lines. The transport structure is dominated by ferry lines, while high-speed ship and classic ship lines have a supplementary role in connecting smaller island communities and ensuring regional accessibility. In 2025, the most intensive line was Valbi-

Table 6 Intensity of liner maritime passenger transport (ferry lines, high-speed ship lines and classic ship lines) for the **Rijeka shipping line area** in 2024 and 2025

RIJEKA SHIPPING LINE AREA	SHIPPING COMPANY	PASSENGERS 2024	PASSENGER 2025	INDICES 2024/2025
FERRY LINES				
Valbiska – Merag	Jadrolinija	1.279.475	1.289.485	100.8
Porozina – Brestova	Jadrolinija	538.927	549.501	102.0
Prizna – Žigljen	Jadrolinija	975.616	968.492	99.3
Mišnjak – Stinica	Rapska plovidba	1.012.908	1.061.524	104.8
Lopar – Valbiska	Jadrolinija	156.166	165.752	106.1
HIGH-SPEED SHIP LINES				
Pula – Unije – Susak – Mali Lošinj – Ilovik – Silba – Zadar	Kapetan Luka Krilo	82.361	78.540	95.4
Mali Lošinj – Ilovik – Susak – Unije – Martinšćica – Cres – Rijeka	Jadrolinija	72.569	71.299	98.2
Rijeka-Rab-Novalja	Jadrolinija	75.604	74.743	98.9
CLASSIC SHIP LINE				
Mali Lošinj – Unije – Vele Srakane -Susak	Jadrolinija	26.987	27.174	100.7
Ilovik – Mrtvaška – Mali Lošinj	Porat Ilovik d.o.o.	17.243	18.471	107.1
TOTAL		4.237.856	4.304.981	101.6

Source: Authors according to: Coastal Liner Services Agency (2025) Passenger and vehicle traffic 2024-2025. <https://agencija-zolpp.hr/wp-content/uploads/2026/02/Promet-putnika-i-vozila-2024-2025.pdf> (Accessed: 21 March 2026)

ska-Merag, connecting the island of Krk with Cres, with 1.289.485 passengers, followed by Mišnjak-Stinica with 1.061.524 passengers and Prizna-Žigljen with 968.492 passengers. The Rijeka area continues to balance the transport needs of permanent residents with strong tourism demand during the tourist season.

Table 7 presents the intensity of liner maritime passenger transport in the Zadar shipping line area.

The Zadar shipping line area has a particularly complex transport structure due to the large number of islands in the Zadar archipelago and the importance of both local and inter-island transport. In 2025, the total passenger volume reached 3.226.146 passengers, representing a slight increase of 0.56% compared to 2024. A total of fifteen lines operate in this area, including six ferry lines, five high-speed ship lines, and four classic ship lines. In 2025, the Preko-Ošljak-Zadar/Gaženica line remained the most intensive line, with 1.514.743 passengers, followed by the Tkon-Biograd na Moru line with 489.596 passengers and the Brbinj-Zadar/Gaženica line with 222.052 passengers. The relocation of ferry traffic to the Port of Gaženica significantly improved operations, reduced congestion in the city cen-

tre, and strengthened the port's role as a regional transport hub. The Zadar area demonstrates the importance of combining transport planning with infrastructure development, particularly where strong seasonal tourism overlaps with daily commuting.

Table 8 presents the intensity of liner maritime passenger transport in the Šibenik shipping line area.

Compared with Rijeka, Zadar, and Split, this area records considerably lower passenger volumes, with a total of 411.009 passengers in 2025, which is 0.83% lower than in 2024. A total of four lines operate in this area, including one ferry line, one high-speed ship line, and two classic ship lines. Despite lower transport intensity, maritime passenger transport in this area has an important social and territorial function for nearby island communities. The most intensive route was the classic ship line Vodice-Prvić Šepurine-Prvić Luka-Zlarin-Šibenik with 243.281 passengers, while the ferry line Šibenik-Zlarin-Obonjan-Kaprije-Žirje recorded 44.917 passengers. The high-speed ship line Žirje-Kaprije-Šibenik transported 37.448 passengers in 2025.

Although the total transport volume is relatively modest, the social importance of these lines is signifi-

Table 7 Intensity of liner maritime passenger transport (ferry lines, high-speed ship lines and classic ship lines) for the **Zadar shipping line area** in 2024 and 2025

ZADAR SHIPPING LINE AREA	SHIPPING COMPANY	PASSENGERS 2024	PASSENGERS 2025	INDICES 2024/2025
FERRY LINES				
Zadar/Gaženica – Ist/Kosirača-Olib- Silba – Premuda/Krijal – Mali Lošinj	Jadrolinija	31.016	32.944	106.2
Preko – Ošljak – Zadar/Gaženica	Jadrolinija	1.489.923	1.514.743	101.7
Tkon – Biograd na moru	Jadrolinija	494.215	489.596	99.1
Zadar/Gaženica – Rivanj – Sestrunj – Zverinac – Molat – Zapuntel – Ist/Kosirač	Jadrolinija	21.789	22.946	105.3
Brbinj – Zadar/Gaženica	Jadrolinija	221.438	222.052	100.3
Zadar/Gaženica – Bršanj – Rava – Rava Mala	Jadrolinija	47.767	48.088	100.7
HIGH-SPEED SHIP LINES				
Olib – Silba – Premuda/Krijal – Zadar	Miatrade /TP Line	59.538	58.351	98.0
IST/Široka – Zapuntel – Brgulje – Molat – Zadar	Jadrolinija	41.695	43.019	103.2
Brbinj – Božava – Zverinac – Sestrunj – Rivanj – Zadar	Jadrolinija	30.771	28.828	93.7
Zadar – Iž Mali – Veli Iž – Rava Mala – Rava	Jadrolinija	30.354	30.230	99.6
Zadar – Sali – Zaglav – Iž Mali/Bršanj	G&V Line Iadera / TP Line	103.621	100.353	96.8
CLASSIC SHIP LINE				
Rava – Mala Rava – Veli Iž – Mali Iž – Zadar	G&V Line Iadera	49.668	51.545	103.8
Zadar – Sali – Zaglav	G&V Line Iadera	35.358	35.404	100.1
Vrgada – Pakoštane – Biograd	RPZ Vrgada	82.143	87.527	106.6
Preko – Zadar	Jadrolinija	468.923	460.520	98.2
TOTAL		3.208.219	3.226.146	100.6

* Zadar/Gaženica – Ist/Kosirača-Olib- Silba -Premuda/Krijal -Mali Lošinj line is included according to the port of origin

Source: Authors according to: Coastal Liner Services Agency (2025) Passenger and vehicle traffic 2024-2025. <https://agencija-zolpp.hr/wp-content/uploads/2026/02/Promet-putnika-i-vozila-2024-2025.pdf> (Accessed: 21 March 2026)

Table 8 Intensity of liner maritime passenger transport (ferry lines, high-speed ship lines and classic ship lines) for the **Šibenik shipping line area** in 2024 and 2025

ŠIBENIK SHIPPING LINE AREA	SHIPPING COMPANY	PASSENGERS 2024	PASSENGERS 2025	INDICES 2024/2025
FERRY LINES				
Šibenik – Zlarin – Obonjan – Kaprije – Žirje	Jadrolinija	44.060	44.917	101.9
HIGH-SPEED SHIP LINES				
Žirje – Kaprije – Šibenik	Miatrade	38.060	37.448	98.4
CLASSIC SHIP LINE				
Krapanj – Brodarica	Gradski parking Šibenik	85.443	85.363	99.9
Vodice – Prvić Šepurine – Prvić luka – Zlarin – Šibenik	Jadrolinija	246.881	243.281	98.5
TOTAL		414.444	411.009	99.1

Source: Authors according to: Coastal Liner Services Agency (2025) Passenger and vehicle traffic 2024-2025. <https://agencija-zolpp.hr/wp-content/uploads/2026/02/Promet-putnika-i-vozila-2024-2025.pdf> (Accessed: 21 March 2026)

cant because they represent the main year-round connection for smaller island communities. This confirms that transport importance cannot be measured exclusively through passenger volume, but also through its role in territorial cohesion and accessibility.

Table 9 presents the intensity of liner maritime passenger transport in the Split shipping line area, which represents the largest and most important maritime passenger transport region in Croatia.

Among all shipping line areas, the Split area represents the most intensive and strategically important mar-

itime passenger transport zone in Croatia. The Port of Split is the largest passenger port in the country and the central hub of Adriatic ferry transport. It performs three key transport functions: connecting the Croatian coast longitudinally, linking the mainland with central Dalmatian islands, and maintaining international passenger connections, particularly with Italian ports.

In 2025, the Split shipping line area recorded a total of 4.859.525 passengers, 0.56% more than in 2024, confirming its dominant position within the Croatian maritime transport system. A total of thirteen lines op-

Table 9 Intensity of liner maritime passenger transport (ferry lines, high-speed ship lines and classic ship lines) for the **Split shipping line area** in 2024 and 2025

SPLIT SHIPPING LINE AREA	SHIPPING COMPANY	PASSENGERS 2024	PASSENGERS 2025	INDICES 2024/2025
FERRY LINES				
Vis – Split	Jadrolinija	319.035	325.575	102.0
Lastovo/Ubli-Vela Luka – Hvar – Split	Jadrolinija	211.179	216.196	102.4
Drivenik Veliki – Drivenik Mali –Trogir/Soline	Jadrolinija	112.775	121.640	107.9
Supetar – Split	Jadrolinija	2.107.585	2.084.469	98,9
Sućuraj – Drvenik	Jadrolinija	407.512	408.230	100.2
Stari grad – Split	Jadrolinija	754.002	760.303	100.8
Rogač- Split	Jadrolinija	421.788	427.240	101.3
Sumartin – Makarska	Jadrolinija	146.112	163.708	112.0
HIGH-SPEED SHIP LINES				
Milna – Rogač – Split ¹	Krilo shipping company	66.292	69.323	104.6
Vis – Hvar – Milna – Split	Jadrolinija/ Kapetan Luka Krilo	56.342	52.650	93.4
Jelsa – Stari Grad – Bol – Split	Jadrolinija	110.075	110.363	100.3
Lastovo/Ubli – Vela Luka – Hvar – Split	Jadrolinija	110.773	109.767	99.1
CLASSIC SHIP LINE				
Komiža – Biševo	Nautički centar_ Komiža	9.140	10.061	110.1
TOTAL		4.832.610	4.859.525	100.6

Source: Authors according to: Coastal Liner Services Agency (2025) Passenger and vehicle traffic 2024-2025. <https://agencija-zolpp.hr/wp-content/uploads/2026/02/Promet-putnika-i-vozila-2024-2025.pdf> (Accessed: 21 March 2026)

Table 10 Intensity of liner maritime passenger transport (ferry lines, high-speed ship lines and classic ship lines) for the Dubrovnik shipping line area in 2024 and 2025

DUBROVNIK SHIPPING LINE AREA	SHIPPING COMPANY	PASSENGERS 2024	PASSENGERS 2025	INDICES 2024/2025
FERRY LINES				
Suđurađ – Lopud – Koločep/Donje Čelo – Dubrovnik	Jadrolinija	37.107	37.233	100.3
Sobra – Papratno	Jadrolinija	164.545	168.107	102.2
Ploče – Trpanj	Jadrolinija	46.979	44.022	93.7
Korčula/Dominče – Orebić	Jadrolinija	878.691	886.554	100.9
HIGH-SPEED SHIP LINES				
Lastovo/Ubli – Korčula – Polače – Sobra – Šipanska Luka – Dubrovnik	TP Line	48.823	48.405	99.1
Lastovo/Ubli – Korčula – Dubrovnik ²	TP Line	35.544	35.189	99.0
Korčula – Prigradica – Hvar – Split*	Kapetan Luka – Krilo/ TP Line	137.197	133.107	97.0
CLASSIC SHIP LINE				
Suđurađ – Lopud – Koločep/Donje Čelo – Dubrovnik	Jadrolinija	225.716	221.843	98.3
Orebić – Korčula	G&V Line Iadera	250.889	255.511	101.8
TOTAL		1.825.491	1.829.971	100.2

* Korčula – Prigradica – Hvar – Split line is included according to the port of origin

Source: Authors according to: Coastal Liner Services Agency (2025) Passenger and vehicle traffic 2024-2025. <https://agencija-zolpp.hr/wp-content/uploads/2026/02/Promet-putnika-i-vozila-2024-2025.pdf> (Accessed: 21 March 2026)

erate in this area, including eight ferry lines, four high-speed ship lines, and one classic ship lines. The most intensive line was the Supetar-Split ferry line with 2.084.469 passengers, followed by Stari Grad-Split ferry line with 760.303 passengers.

The high passenger intensity in this area results from strong dependence of island populations on mainland connections, concentration of economic activities in Split, and pronounced seasonal tourism demand during the summer season. The Port of Split functions as the central Adriatic passenger hub and performs multiple transport functions, including connecting islands with the mainland and linking coastal regions longitudinally.

Most lines recorded stable or slightly increasing passenger demand, while some seasonal routes showed stronger fluctuations. High-speed ship lines play an important complementary role by reducing travel times between islands and the mainland, particularly during the tourist season.

The dominance of the Split area is a direct result of strong island dependence, high population concentration, and the seasonal concentration of tourism demand.

Table 10 presents the intensity of liner maritime passenger transport in the Dubrovnik shipping line area.

The Dubrovnik shipping line area records the lowest overall passenger intensity after Šibenik, but it has a specific transport function due to its geographical isolation and the structure of the southern Dalmatian islands.

The Dubrovnik shipping line area recorded 1.829.971 passengers in 2025, which was 0.25% more than in 2024. Although this area has lower transport intensity compared with Rijeka, Zadar, and Split, it has a strategically important role due to the geographical isolation of southern Dalmatia and the dependence of island communities on maritime connectivity. A total of nine lines operate in this area, including four ferry lines, three high-speed ship lines, and two classic ship lines.

The transport structure includes ferry, high speed ship, and classic ship lines connecting Dubrovnik with nearby islands such as Mljet, Lopud, Šipan, and Koločep. The most intensive route was the Korčula-Dominče-Orebić ferry line with 886.554 passengers, while the Orebić – Korčula classic ship line transported 255.511 passengers. High-speed ship services recorded lower passenger volumes but remain important for faster regional accessibility. At the same time, the Port of Dubrovnik maintains a strong international and cruise orientation, creating a dual transport function between local accessibility and international tourism.

Table 11 presents total intensity of liner maritime passenger transport in shipping line areas and share of each area.

The Split shipping line area recorded the highest passenger intensity in 2025, with 33.21% of total passenger transport, confirming its position as the central maritime passenger hub in Croatia. The dominance of the Split area is primarily the result of intensive ferry connections with the central Dalmatian islands, high population concentration, and seasonal tourism demand.

Table 11 Total intensity of liner maritime passenger transport (ferry lines, high-speed ship lines and classic ship lines) for the Rijeka, Zadar, Šibenik, Split, and Dubrovnik shipping line area in 2025

SHIPPING LINE AREA	PASSENGERS 2025				
	FERRY LINES	HIGH-SPEED SHIP LINES	CLASSIC SHIP LINE	TOTAL	%
RIJEKA AREA	4.034.754	224.582	45.645	4.304.981	29.42
ZADAR AREA	2.330.369	260.781	634.996	3.226.146	22.05
ŠIBENIK AREA	44.917	37.448	328.644	411.009	2.81
SPLIT AREA	4.507.361	342.103	10.061	4.859.525	33.21
DUBROVNIK AREA	1.135.916	216.701	477.354	1.829.971	12.51
TOTAL	12.053.317	1.081.615	1.496.700	14.631.632	100,0

Source: Authors, according to statistical data

The Rijeka shipping line area ranked second with 29.42% of total transport, reflecting the importance of northern Adriatic ferry corridors connecting the islands of Cres, Krk, and Rab with the mainland. The Zadar shipping line area accounted 22.05% of total passenger transport, highlighting the importance of the Zadar archipelago and the strong role of inter-island and mainland-island connectivity.

In contrast, Dubrovnik and Šibenik shipping line areas recorded significantly lower passenger volumes, with shares of 12.51% and 2.81% respectively. Despite lower transport intensity, these areas remain strategically important because maritime transport represents the primary year-round connection for many smaller island communities. Their transport function is therefore more strongly related to territorial cohesion, accessibility, and social inclusion than to transport volume itself.

Overall, the results demonstrate considerable regional differences in transport intensity and confirm the need for differentiated development policies. High-intensity areas such as Split, Rijeka, and Zadar require continuous investment in port infrastructure, fleet modernization, and operational improvement, while lower-intensity areas such as Šibenik and Dubrovnik require stable public support aimed at preserving accessibility and the long-term sustainability of island communities.

4.4 Comparative analysis of liner maritime passenger transport in Croatia, Italy and Greece

Liner maritime passenger transport plays a significant role in the mobility of EU residents and regional connectivity. Unlike international cruise shipping, liner services are predominantly domestic or intra-EU, linking islands, archipelagos, coastal regions, and neighbouring countries across the Mediterranean, Baltic, North Sea, and Atlantic areas.

In 2024, EU ports recorded around 417.8 million maritime passengers, representing a 6.2% increase compared to 2023 and a near-complete recovery to pre-COVID-19 levels (approximately 0.1% below 2019 figures) [30]. This recovery reflects both the growth of

tourism demand and the strengthening of national ferry systems serving residents and visitors [30].

From a port perspective, the busiest passenger hubs are predominantly located in the Mediterranean region. Italian ports, including Messina (11.3 million) and Reggio di Calabria (11.1 million), consistently rank among the busiest in Europe, while the Greek port of Piraeus is also among the leading EU passenger ports (9.6 million) [31].

In the long term, EU maritime passenger transport has demonstrated strong recovery following the sharp decline in 2020, when passenger numbers fell by nearly 45 % compared to 2019 due to COVID-19 restrictions [32]. Since then, traffic has steadily increased, although variations remain across countries and seasons.

Beyond passenger volumes, maritime transport plays a crucial role in regional cohesion within the EU, often representing the only year-round connection for island and remote communities. It supports local economies, daily mobility, and tourism flows across coastal regions. Despite positive trends, several challenges remain, including the need for sustainable fleet modernization, emission reduction, and improved integration with broader transport systems. EU policies continue to emphasize safety standards, operational efficiency, and environmental sustainability.

Table 12 presents a contextual comparison of Croatia, Italy, and Greece using selected indicators of maritime passenger transport. The comparison is deliberately limited to indicators that are sufficiently defined and comparable across the three countries. It focuses on geographical context and reported maritime passenger volumes. The comparison is therefore intended to provide contextual information about the relative scale and functional characteristics of the three systems rather than to constitute a comprehensive performance ranking or benchmarking.

The length of the Croatian coast is 6.278 km, comprising 1.880 km of mainland coastline (29.9% of the total) and 4.398 km of island coastline (70.1%). This type of indented coastline is known worldwide as the Dalmatian coast (characterized by islands, the coastline,

Table 12 Comparison of liner maritime passenger transport in Croatia, Italy and Greece

Indicator	Croatia	Italy	Greece
Geographical characteristics	6.278 km lng coast (1.880 km of mainland coastline and 4.398 km of island coastline. Archipelago of 1.244 islands, islets, rocks and reefs (52 inhabited) [33]	7.600 km long coast Peninsula with two major islands (Sicily, Sardinia) [34]	13.676 km long coast Large archipelago with 6,000+ islands and islets (227 inhabited) [34], [35]
Annual maritime passengers	36.1 million passengers [29]*	93.5 million passengers [30]	81.1 million passengers [30]
Annual ferry passengers	12.053.317 passengers* [25]	18.670.057 passengers* [36]	over 20 million passengers* [37]
Share in EU maritime passenger transport	Smaller share within the EU, but regionally important in the Adriatic Sea*	22.7% of EU maritime passenger transport [30]	19.7% of EU maritime passenger transport [30]
Structure of liner operators	Limited competition (strong dominance of Jadrolinija, especially in ferry lines) . Few small companies Krilo, TP Line, G&V Line, Komiža_Nautički centtar, Miatrade) [25]	Multiple operators (e.g., Blu Ferries, Blue Jet, Consorzio 5 Terre, Grimaldi Lines, Tirrenia, Siremar, Caremar, Medmar) [38]	Multiple operators (e.g., Attica Group, ANEK Lines, Blue Star Ferries, SeaJets, Minoan Lines, Golden Star Ferries, Levante Ferries) [39]
Function of liner maritime passenger transport	Primarily domestic mainland-island transport. Essential regional connectivity for island populations	Mixed function: regional mobility, tourism, international lines – Mediterranean ferry routes	Core national transport system. Extensive mainland-island and inter-island transport system
Service frequency	Highly seasonal: very frequent in summer, reduced in winter	Relatively stable year-round, with peaks in summer, focus on longer routes (mainland-islands)	Very high frequency, especially on major island corridors; still essential in winter

* value for 2025

* value for 2025

* value for 2023

* data based on market research for 2023 (exact value not available)

* exact value not available in Eurostat

Source: Authors, according to available data

and mountains running parallel to one another). Off the coast lie 1.244 islands, islets, rocks, and specifically 78 islands (52 islands are permanently inhabited), 524 islets, and 642 rocks and reefs. Italy and Greece have longer coastlines and larger archipelagic systems than Croatia, providing important geographical context for the scale and organization of their maritime passenger transport systems.

Croatia has a relatively smaller maritime passenger transport system, with 36.1 million passengers in 2025 [29], primarily focused on domestic mainland-island connectivity. Italy and Greece are consistently among the largest contributors to maritime passenger volumes in the EU, together accounting for around 42% of total traffic [30]. In 2024, Italian ports handled approximately 93.5 million passengers (22.7 % of the EU total), while Greek ports recorded around 81.1 million passengers (19.7% of the EU total) [30].

Croatia records around 12 million passengers on coastal ferry lines, whereas Italy around 19 million passengers and Greece record around 20 million passengers [29, 33, 34]. These differences are largely influenced by geographical factors, such as Greece's extensive archipel-

ago and Italy's long-distance routes to major islands like Sicily and Sardinia.

Croatia's liner maritime passenger transport primarily serves domestic mainland-island connectivity and plays a crucial role in ensuring accessibility for island populations. In contrast, Italy combines regional mobility with tourism and international ferry services across the Mediterranean, while Greece relies on an extensive network of mainland-island and inter-island connections that form a core component of its national transport system. These differences reflect the geographical characteristics and transport needs of each country.

From a structural perspective, the three countries differ in the organization and scale of their maritime passenger transport systems. Croatia is characterized by a dominance of Jadrolinija in domestic liner transport, while Italy and Greece have more diversified operator structures.

The functional differences between the three countries are also important. Croatian liner transport is primarily oriented toward domestic mainland-island connectivity and the accessibility of island communities, whereas Italy combines regional mobility, tourism,

and international ferry services, and Greece relies extensively on mainland-island and inter-island connections. Thus, although Croatia operates on a smaller scale, maritime passenger transport has a particularly important territorial and social function within the national transport system.

The comparison of service frequency further highlights the different functions of the three maritime passenger transport systems. Croatia is characterized by strong seasonality, with very frequent services during the summer and reduced frequency in winter. Italy provides relatively stable year-round services, while Greece maintains very high frequencies on major island corridors. These differences reflect the distinct geographical, tourism, and connectivity requirements of each country. For Croatia, the strong seasonal variation indicates the need to balance increased capacity during the peak tourism season with reliable year-round services for island communities.

Overall, the indicators highlight that Croatia's maritime passenger transport system is smaller in scale, but it has a crucial role in national connectivity and regional development. In contrast, Italy and Greece operate large-scale, highly integrated maritime passenger systems with greater economic significance at the EU level.

4.5 Discussion of key development challenges and future perspectives

First, the findings support the connectivity, tourism, and island development literature [1–5]. Previous studies emphasize the importance of maritime connectivity for tourism, island accessibility, and regional development. The present results complement these findings by showing where this function is most intensive. The dominance of ferry transport and the high passenger volumes in the Split, Rijeka, and Zadar areas confirm the central role of mainland-island connectivity, while lower-volume areas such as Šibenik and Dubrovnik remain important for territorial accessibility and social cohesion.

Second, the findings are consistent with the regulation, governance, and public service obligations literature [6–9]. Previous research highlights the role of regulation, state support, and public service obligations in maintaining coastal passenger services. The strong concentration of traffic on ferry lines and the dominant position of Jadrolinija provide empirical evidence of the structure within which these mechanisms operate, indicating that the Croatian system cannot be assessed solely in terms of market efficiency.

Third, the results complement the infrastructure, transport organization, and system development literature [10–14]. While the present study does not directly measure infrastructure capacity or operational efficiency, the concentration of passenger flows identifies areas

where capacity, infrastructure, and operational improvements are likely to be most relevant. The differences between high-intensity areas and smaller regional systems therefore support a differentiated rather than uniform development approach.

Finally, the findings relate to the service quality, sustainability, and innovation literature [15–20]. Previous studies emphasize digitalization, service quality, multi-modal integration, fleet modernization, and environmental sustainability. Although these dimensions are not directly measured here, the spatial and line-type distribution of passenger flows indicates where such improvements may be most relevant. High-intensity hubs require capacity and modernization, while smaller and more remote areas require solutions that preserve reliable year-round accessibility.

Based on the current state of maritime liner passenger transport in the Republic of Croatia, previous research and the analysis of strategies and plans, Table 13 below presents the key challenges and recommendations for improving maritime liner passenger transport in the Republic of Croatia.

The comparison of all three line types demonstrates a clear structural imbalance in favour of ferry transport, which remains heavily concentrated under the dominant operator Jadrolinija. At the same time, high-speed and classic ship lines show a more diversified operator structure involving several private companies. This suggests that future development policies should not focus exclusively on ferry transport modernization, but also on strengthening the operations, service quality, and long-term sustainability of high-speed and classic ship lines, particularly in smaller and more remote island regions.

High-intensity hubs require capacity expansion, terminal modernization, and better multimodal integration, while smaller regional systems require stable subsidies, service reliability, and targeted infrastructure support to preserve territorial accessibility.

Therefore, the optimization of liner maritime passenger transport should not rely on a uniform national model, but on a regionally adapted approach that recognizes the different operational, demographic, and economic functions of each shipping line area. Such an approach would improve both transport efficiency and the long-term sustainability of maritime connectivity in the Republic of Croatia.

Future development of liner maritime passenger transport must therefore be based on a balanced approach that combines economic efficiency with social accessibility and environmental responsibility. Strategic planning should not focus exclusively on increasing passenger volumes, but also on strengthening year-round island accessibility, improving transport resilience, and supporting sustainable regional development.

Several strategic documents define the development framework and measures for improving maritime liner transport: the Transport Development Strategy of the Republic of Croatia 2017-2030 [40], the Maritime Development and Integrated Maritime Policy Strategy of the Republic of Croatia 2014-2020 [41], the National Development Strategy of the Republic of Croatia 2018-2030 [42], and the National plan for the Development of Coastal Maritime Traffic Lines 2030 [43].

Although some of these documents pertain to previous periods, the measures they list remain relevant, and all strategies and plans are interconnected.

The Transport Development Strategy of the Republic of Croatia 2017-2030 is a key national document that outlines the country's long-term vision for improving the transport system. It plays a crucial role in supporting economic growth, enhancing regional connectivity, and improving the quality of life for citizens, especially those living in remote and island areas. By aligning with European Union standards and environmental goals, the strategy also strengthens Croatia's position within the EU and ensures access to funding for infrastructure development. Focusing on sustainability, safety, and modernisation, the strategy promotes the use of greener transport modes and new technologies. It provides a clear and coordinated framework for investment, planning, and decision-making, making it an essential tool for building a more efficient, accessible, and future-ready transport network across the country.

The Republic of Croatia strives to achieve a high level of quality and a developed market for transport services, and it is important to improve all types of transport evenly to achieve optimal results.

Improvement of liner maritime transport is essential for sustainable economic growth and for enhancing the quality of life on the islands and in coastal areas. Measures for the implementation should align with the overall goals of shipping development, adding value to the entire sector. However, it is necessary to ensure better and more frequent connections between the mainland and the islands, replace the existing fleet by newer ships. Furthermore, the concession system can be improved to achieve greater efficiency.

For example, the ferry and high-speed ship between Šibenik and the islands of Zlarin, Kaprije, and Žirje operate twice a day during the season, while there is only one daily connection during the off-season. It is also necessary to improve access to remote islands. For example, the town of Vis on the island of the same name, which has about 3,700 inhabitants and is approximately 33 nautical miles from Split, has four daily connections with Split during the season, there are three ferry and one high-speed line. During the off-season, there are three daily lines-two ferry lines and one high-speed line.

The Maritime Development and Integrated Maritime Policy Strategy of the Republic of Croatia 2014-2020

has set two key goals, which are still relevant for the development of maritime liner passenger transport.

The first goal is to improve the public service system connecting islands with the mainland and vice versa, aiming to contribute to the sustainable development of island areas. This will be achieved by developing socially sustainable, economical, and efficient coastal liner maritime transport. Implementation includes changes to the regular transport system, adjusting the relationship between classic, ferry, and high-speed lines, and integrating with other modes of transport. Emphasis is also placed on establishing an accessible, efficient, and transparent system of preferential transport for the island population.

The second goal is to ensure public services based on the principles of safety, consistency, punctuality, and comfort. This includes encouraging the adoption of new technologies in liner shipping and the use of more environmentally friendly ships. The construction of specialized ships for lines serving islands not connected by road infrastructure is also planned, as well as the digitalization of the coastal maritime transport system to increase service availability. These investments are expected to have a multiplier effect throughout the entire national economy.

The National Development Strategy of the Republic of Croatia 2018-2030 also includes liner maritime passenger transport, highlighting its importance. The main goals for maritime liner passenger transport are part of the priorities for implementing policies in the water sector development and improvement of ports and waterways, and investments in public passenger transport in maritime and inland waterway transport [42]. In the maritime sector, investments will continue in constructing new ports and reconstructing or relocating existing passenger and ferry ports to further increase the capacity of coastal liner transport and improve communication with the islands. The transformation of the ports of Rijeka, Split, and Ploče, as well as other cargo ports in Croatia, will continue, including the development of additional container capacities and better multimodal connectivity with the hinterland. The improvement of access roads on the islands that directly connect ports for coastal liner transport and the purchase of new, environmentally friendly means of maritime transport will be financed.

The National Plan for the Development of Coastal Maritime Traffic Lines 2030 provided a detailed analysis, including: legal, technological, and planning aspects of maritime liner transport; analysis of the lines, including economic, transport, and state aid aspects, to evaluate service quality; analysis of shipping capacities (the condition of ships from transport, economic, and energy perspectives; analysis of port infrastructure analysis of port infrastructure (transport capacity, technical conditions, urban aspects, and environmental aspects); the influence of coastal liner marine traffic on the standard

of living and economic indicators in the Republic of Croatia; and analysis of transport safety and navigation in port areas of coastal line marine transport.

The Plan resulted in a model for managing the future coastal liner maritime transport system through 2030, along with specific measures that include: recommendations for amendments to the legislative framework as the basis for establishing a new coastal liner shipping system; recommendations for measures to support and improve the coastal system; a proposal for a financial model for implementing the coastal liner shipping sys-

tem; recommendations for future measures regarding state aid issues; and a proposal for the timeline of implementing these measures. The Plan is not publicly available, so specific examples of the measures will not be listed in this paper.

The Plan was adopted as a basis for applying for tenders for the allocation of EU grants, which are an essential funding source for projects aimed at developing maritime liner passenger transport.

The challenges presented in Table 13 indicate that the Croatian liner maritime passenger transport system

Table 13 Development challenges, implications and recommendations for liner maritime passenger transport in the Republic of Croatia

Key challenges	Implications	Recommendations
Seasonal demand fluctuations	High variability between peak (summer) and off-season demand leads to operational inefficiencies and underutilization of capacity.	Introduction of dynamic scheduling models; promotion of off-season tourism demand; implementation of flexible pricing strategies.
Limited or insufficient connectivity	Inadequate connections between islands and the mainland hinder regional accessibility and negatively affect social and economic development.	Expansion of essential routes; development of regional transport hubs; improved coordination of schedules.
Aging fleet	Older vessels reduce operational efficiency, safety, and passenger comfort, while increasing maintenance costs and environmental impact.	Fleet modernization through energy-efficient and hybrid/electric vessels; regular maintenance and safety upgrades.
Port infrastructure	Limited capacity for RO-RO vessels, underdeveloped infrastructure in smaller ports, and insufficient accessibility for passengers with reduced mobility.	Modernization of port infrastructure, especially in smaller ports; implementation of barrier-free accessibility; development of smart terminals with real-time passenger information systems.
Regulatory complexity and market liberalization	Administrative burdens and regulatory constraints reduce operational efficiency and competitiveness in an increasingly liberalized market.	Streamlining of regulatory procedures; reform of concession models; implementation of transparent and consistent policy frameworks; institutional support for operators.
Service quality and passenger experience	Inconsistent service quality, limited onboard amenities, and low adoption of digital solutions reduce overall user satisfaction.	Improvement of onboard services (Wi-Fi, seating, catering); implementation of unified booking systems, digital ticketing, and passenger feedback platforms across operators.
Sustainability and environmental impact	High emissions from conventional vessels and limited adoption of green technologies contribute to environmental pressures.	Introduction of electric and hybrid ferries; use of alternative fuels (e.g., hydrogen); development of shore power infrastructure; implementation of energy-efficient and waste-reduction measures.
Limited integration with other transport modes	Poor coordination with land transport systems reduces accessibility and overall transport efficiency.	Development of multimodal transport systems, including integrated timetables, unified ticketing, park-and-ride systems, and improved bicycle and vehicle transport options.
Funding constraints	High dependence on state subsidies and the risk of unprofitable routes threaten long-term sustainability.	Targeted subsidies for essential routes; development of public-private partnerships; diversification of revenue streams through tourism; support for access to EU funding mechanisms.
Inconsistency in statistical monitoring	Lack of standardized and reliable statistical data limits accurate assessment of passenger flows, service performance, and long-term transport planning. Inconsistent methodologies among operators and institutions reduce comparability of data.	Establishment of a unified national statistical monitoring system for maritime passenger transport; standardization of data collection methodologies and reporting procedures across operators and institutions; implementation of digital real-time passenger counting and reporting systems; integration of transport statistics into national and EU transport databases; strengthening institutional cooperation.

Source: Authors

is characterized by strong seasonality, uneven connectivity, infrastructure constraints and increasing environmental requirements.

Seasonal demand fluctuations remain one of the most significant challenges, resulting in underutilization of capacity during the off-season and operational pressure during peak tourist periods. At the same time, limited connectivity and insufficient frequency of services negatively affect the quality of life and economic development of island communities. In addition, the aging fleet and outdated vessels reduce operational efficiency, increase maintenance costs, and limit the potential for environmental improvements.

Port infrastructure, particularly in smaller island ports and regional passenger terminals, remains insufficiently developed, which further constrains system performance, accessibility, and service quality. Smaller regional ports often lack adequate infrastructure for RO-RO vessels, modern passenger terminals, barrier-free access for persons with reduced mobility, and digital passenger information systems. Their modernization is essential because these ports represent the main year-round transport connection for many island communities and play an important role in preserving territorial cohesion and balanced regional development.

Regulatory complexity and market liberalization create additional challenges for operators, while service quality and digitalization levels remain uneven across the system.

Furthermore, limited integration with other transport modes reduces overall transport efficiency and accessibility.

An additional challenge identified in the analysis of liner maritime passenger transport in the Republic of Croatia is the inconsistency in the statistical monitoring and presentation of passenger transport data. Different institutions, primarily the Croatian Bureau of Statistics and the Coastal Liner Services Agency, Eurostat, apply partially different methodological approaches, coverage criteria, and classifications of maritime passenger transport. As a result, discrepancies occur in the reported numbers of transported passengers, line categorizations, and spatial distribution of transport flows.

In response to these challenges, future development should focus on several key directions.

Route planning should prioritize high-demand seasonal corridors, particularly along the Adriatic axis connecting Rijeka, Zadar, Split, and Dubrovnik. At the same time, year-round connections should be strengthened between major islands, such as Korčula, Hvar, and Brač and mainland urban centers. The establishment of regional maritime hubs in Rijeka, Zadar, and Split can optimize network efficiency by serving as central transfer points, enabling improved schedule coordination and reduced passenger waiting times. Another possibility is to estab-

lish smaller regional port hubs. Furthermore, cross-border integration with neighboring countries, including connections such as Rijeka-Venice and Piran-Trieste, should be encouraged to enhance international accessibility and support multimodal travel options.

Modernizing the fleet and port infrastructure is essential to increase service quality, operational efficiency, and capacity. Prioritizing the introduction of fuel-efficient and environmentally sustainable vessels, including hybrid or electric ferries, is necessary. A positive step forward is Jadrolinija's plan to replace 10 older ferries.

At the same time, investments in port infrastructure, especially in smaller island ports and regional terminals, should focus on capacity expansion, accessibility improvements, real-time passenger information systems, and smart terminal solutions. The development of smaller regional ports should be recognized as a strategic priority, not only to improve local accessibility but also to reduce pressure on major passenger hubs such as Split and Zadar. Strengthening these smaller ports can improve transport resilience, reduce regional disparities, and support local economic activities such as tourism, fisheries, and small-scale logistics. Enhancing onboard comfort, safety standards, and service quality is also necessary to improve the user experience.

Digitalization is a critical component of system optimization. Developing a unified national booking platform that integrates all maritime services with other transport modes would facilitate seamless travel planning. Real-time information systems, mobile applications, and electronic ticketing solutions can enhance operational transparency and efficiency, while dynamic pricing strategies may improve demand management and service utilization.

Multimodal integration is fundamental to ensuring seamless passenger mobility. This includes synchronizing ferry services with land-based transport systems, such as buses and railways, and providing integrated timetables and ticketing. Additional measures, such as infrastructure for bicycles, micro-mobility solutions, and park-and-ride facilities, can further support first- and last-mile connectivity.

Effective policy and regulatory frameworks are essential to support system development. Establishing a national maritime passenger transport strategy with clearly defined performance indicators can guide long-term planning. Targeted subsidies should ensure the viability of essential routes, especially for island communities, while financial incentives can encourage the adoption of innovative and sustainable technologies. Regulatory harmonization across the Adriatic region can further facilitate market entry and operational consistency.

European Union funds represent one of the most important financial instruments for achieving these development goals. Investments in fleet modernization, port

reconstruction, digitalization, and sustainable transport solutions often require significant financial resources that exceed the capacity of national and local budgets alone. Therefore, the use of EU funding mechanisms, particularly through cohesion policy instruments and cross-border cooperation programmes, is essential. An example is the FRAMESPORT project (Framework Initiative Fostering the Sustainable Development of Adriatic Small Ports), implemented within the Interreg Italy – Croatia Programme [44]. The project focused on improving the sustainability, accessibility, and operational efficiency of small Adriatic ports through infrastructure improvements, digital solutions, and stronger cross-border cooperation. Such projects demonstrate how EU funds can directly support the development of smaller regional ports, improve passenger mobility, and strengthen the long-term resilience of maritime transport systems. Future strategic planning should therefore include stronger institutional support for preparing and implementing EU-funded maritime infrastructure projects. For example, Greece is set to invest 2 billion euros in maritime transport and island policy, sourced from public European funds and private investments, with a focus on the green transition, fleet renewal, and improved connectivity [45]. Public-private partnerships for the replacement of outdated ships in the coastal shipping routes for remote islands (also referred to as “barren routes”) were initially budgeted at 80 million euros. However, following successful negotiations with the European Commission, this amount has increased to 265 million euros [46].

Marketing and branding strategies play a significant role in increasing system attractiveness and demand. Collaboration with tourism stakeholders can enable the integration of maritime transport into broader travel offerings, such as island-hopping itineraries and thematic routes. International promotion, particularly in key markets, can further enhance visibility and competitiveness.

Sustainability and community engagement must underpin all development efforts. Environmental objectives should include reducing emissions through the adoption of cleaner propulsion technologies and implementing waste management practices. At the same time, active collaboration with local communities is essential to ensure that transport services meet regional needs and contribute to local economic development.

The inconsistency in statistical monitoring limits the possibility of establishing a fully integrated analytical framework for maritime passenger transport in Croatia. It also creates challenges for transport planning, infrastructure investment prioritization, policy evaluation, and international comparative analysis. Therefore, future development of the Croatian maritime passenger transport system should include stronger harmonization of statistical methodologies, improved institutional coordi-

nation, and the establishment of a unified database for maritime passenger transport indicators. Standardized statistical monitoring would significantly improve the reliability, comparability, and transparency of transport data and support more efficient strategic decision-making. Integration and standardization should also include Eurostat statistical monitoring.

The comparative analysis with Italy and Greece further confirms that Croatia’s future development should be based on a more regionally diversified and operationally flexible maritime transport model. Greece demonstrates the importance of a dense network of smaller regional ports and frequent inter-island connections, which ensure strong territorial cohesion and continuous accessibility even for remote island communities. Italy, on the other hand, provides an example of stronger multimodal integration, where ferry services are more effectively connected with rail, road, and airport infrastructure, improving overall passenger mobility and transport efficiency. Both countries also show a more diversified operator structure and stronger private sector participation, supported by targeted state subsidies for socially necessary but economically less profitable routes. These international examples suggest several areas that could be considered in future Croatian transport policy, including strengthening smaller regional ports, improving intermodal connectivity, supporting an appropriate degree of market competition, and making effective use of EU funding mechanisms for infrastructure modernization and sustainable fleet development.

By modernizing the fleet, upgrading infrastructure, strengthening smaller regional ports, improving access to EU funding, and enhancing service integration, Croatia can strengthen its transport system while supporting tourism, regional development, and environmental goals. Continued investment and strategic planning are essential to meeting future demands and improving the overall maritime liner passenger transport experience.

5 Conclusion

Liner maritime passenger transport in the Republic of Croatia represents a key component of national connectivity, particularly in ensuring continuous links between the mainland and inhabited islands. Due to the country’s highly indented coastline, large number of islands, and strong dependence on seasonal tourism, this transport mode performs both an economic and a pronounced social function. It supports tourism and regional economic activity while simultaneously ensuring daily mobility and quality of life for island residents.

The analysis in this paper identifies a high concentration of passenger traffic on ferry lines and significant regional disparities between shipping line areas. The

year-on-year comparison for 2024 and 2025 also indicates relative stability at the aggregate level, accompanied by differences between individual line types and regions. Although seasonal demand is an important contextual factor for Croatian maritime passenger transport, the present dataset does not allow its magnitude to be quantified directly.

Ferry transport remains the backbone of the system, while high-speed and classic ship lines play an important complementary role, particularly in connecting smaller and more remote island communities. Transport intensity is spatially concentrated in the Split and Rijeka areas, whereas areas such as Šibenik and Dubrovnik, despite lower volumes, remain strategically important for territorial cohesion.

The findings also highlight the dominant position of Jadrolinija within the system and point to several development challenges identified through the broader policy and literature review, including fleet modernization, port infrastructure development, multimodal integration, and the need to accommodate variations in demand. These dimensions, however, were not directly measured by the passenger-volume dataset used in this study.

A comparative perspective with Italy and Greece further emphasizes Croatia's specific position within the Mediterranean context. Although smaller in scale, the Croatian system plays a disproportionately important role in domestic territorial connectivity. Unlike more market-oriented systems, Croatia's model remains strongly dependent on public service obligations and state support.

Future development should therefore focus on achieving a balance between economic efficiency and social accessibility. Key priorities include fleet modernization through low-emission technologies, upgrading port infrastructure, particularly in smaller island ports, enhancing multimodal integration, and advancing digitalization of services. In addition, more flexible and demand-responsive scheduling could contribute to improved system efficiency and should be examined in future research.

Long-term sustainability will depend on coordinated policy measures, strategic investments, and effective use of European Union funding instruments. Strengthening public-private partnerships, improving concession frameworks, and aligning subsidy mechanisms with actual transport needs can further enhance system resilience. At the same time, ensuring reliable year-round accessibility for island communities must remain the central objective of national transport policy.

In conclusion, liner maritime passenger transport in the Republic of Croatia is not merely a transport service, but a strategic instrument of regional development, social inclusion, and national cohesion. Its future development requires a regionally differentiated, sustainable,

and technologically advanced approach capable of ensuring both efficiency and long-term connectivity.

Future research should extend the present analysis beyond the 2024-2025 observation period in order to assess long-term trends, resilience, and changes in passenger demand. More detailed datasets should incorporate passenger-kilometres, vessel capacity, service frequency, occupancy, reliability, fares, and service quality. Further research should also distinguish, where possible, between island residents, commuters, domestic tourists, and international tourists. Finally, advanced models for demand forecasting, fleet allocation, and schedule optimization could be developed using these expanded datasets.

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