



# D.T1.1.5 Baseline Study - Croatia

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## 1. Introduction

The deliverable D.T1.1.5 - “Regional Baseline Study” for the region of Croatia is prepared by KIP and will focus on analysing the status-quo and current state of rail freight transport in Croatia.

By respecting the instructions of the EU, the railway system of the Republic of Croatia includes the principle of the separation of railway transportation and infrastructure. Thus in 2006, HŽ Holding L.T.D., was founded as a single state operator of croatian railways. In the same year, the government made the decision to divide the company Hrvatske željeznice L.T.D. and to found the following companies: HŽ Putnički prijevoz L.T.D., HŽ Cargo L.T.D., HŽ infrastruktura L.T.D. and HŽ Vuča vlakova L.T.D. (OG 153/05). During July 2012, the company Vuča vlakova L.T.D. was divided and all assets, liabilities and rights were transferred to HŽ Putnički prijevoz L.T.D., and HŽ Cargo L.T.D.

HŽ Infrastruktura (HŽI) organizes and regulates traffic and is in charge of maintaining and building railway infrastructure. Its activities, in accordance with the Law on Railways, are financed from the state budget.

HŽ Passenger Transport is a public passenger transport operator. The main objective of the company is a sustainable labor market with minimal state budget support for lines that are of public interest and whose revenues do not cover costs.

HŽ Cargo is a freight transport operator whose aim is to conduct sustainable market operations in a liberalized market, without subsidies from the state budget. Beside HŽ Cargo, there are also other operators in freight transport: CER Cargo d.o.o., EURORAIL LOGISTICS d.o.o., ENNA TRANSPORT d.o.o., Pružne građevine d.o.o., RAIL CARGO CARRIER-CROATIA D.O.O., RAIL & SEA D.O.O., SŽ TOVORNI PROMET D.O.O., TRAIN HUNGARY MAGÁNVASÚT IPARI, KERESKEDELMİ ÉS SZOLGÁLTATÓ KORLÁTOLT FELELŐSSÉGŰ TÁRSASÁG, TRANSAGENT RAIL d.o.o.

## 2. Methodology and structure for baseline study

### A) Territorial Analysis (Regions/Ports)

The Republic of Croatia is a European country bordering with Slovenia to the north-west, Hungary to the north-east, Serbia, Bosnia and Herzegovina and Montenegro to the east, and sharing a maritime border with Italy. Croatia has a population of 4.28 million on an area of 56,594 square kilometres, which means the average density of the population is 75,8 people per square kilometre. The country is divided into 20 counties and the capital city of Zagreb. Croatia has four large cities with a population larger than 100,000, and those are the cities of Zagreb (802,338 citizens), Split (178,192), Rijeka (128,624) and Osijek (108,048) which are all the industrial centres of their respective counties. Croatia's main industries include: tourism, shipbuilding, construction, petrochemicals and food processing. Most of these industries are year-round, except for tourism, which is active during the summer months along the coastline, and in the snowy parts of the mountains during the winter months.

Picture 1: Map of Croatia with the four largest/most populated cities marked



Geomorphologically, the natural regions of Croatia are very diverse, and include the 5835 kilometre-long coastline stretching from Istria in the north-west to Southern Dalmatia; The continental part of the country which is located on the Pannonian Plain; and the two regions are separated by the narrow area of the Dinaric Highlands. The Adriatic coast allows for the development of fishing, shipbuilding and especially tourism; the fertile Pannonian Plain provides opportunities for agricultural development; The highland part of Croatia

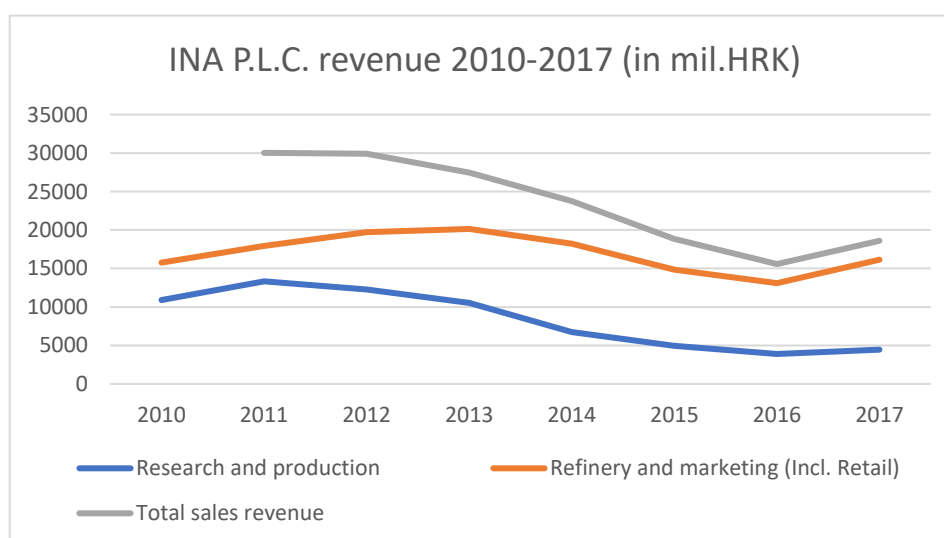
doesn't have as many development opportunities, but has been developing winter and rural tourism along with traditional activities related to the region.

Regions/Ports and their Hinterland/catchment area	
<b>Industrial clusters/branches</b>	As previously mentioned, Croatia's main industries include: tourism, shipbuilding, construction, petrochemicals, food processing and wood industry, and the following section will go through the state of each of those industries and the area in which they are represented.
<b>Industrial sites</b>	<p>Tourism is one of the most important economic branches of the Republic of Croatia. The history of tourism in Croatia goes back to the mid-19th century. It has been successfully developed to this day, and today Croatia is one of the most visited and important tourist destinations of the Mediterranean. Croatia abounds in natural beauties, over 1000 islands, 8 national parks, 11 nature parks, UNESCO-protected monuments such as Diocletian's Palace in Split, the cities of Trogir and Dubrovnik, the Euphrasian Basilica in Poreč and St. Jacob's Cathedral in Šibenik. Croatian tourism is mostly seasonal, and is most active during the summer months along the Adriatic coastline in the regions Istria, Kvarner and Dalmatia. Winter tourism is less developed due to the lack of accommodation, ski and winter resorts. There are several cities in Croatia which are visited year-long due to their cultural heritage and year-long touristic offers and activities. Most notable among these cities are Dubrovnik, which has the largest amount of Tourist nights in all of Croatia, with 4,058,636 Tourist nights in 2018; and the capital city of Zagreb which has the highest number of Tourist arrivals with 1,400,201 arrivals and 2,511,817 Tourist nights in 2018.<sup>1</sup></p> <p>Shipbuilding industry is generally considered as one of the key global industries, and is an industry of great significance in Croatia as well. This industry in Croatia encompasses 5 large, 14 medium and 352 small shipyards that produce, maintain and repair ships and offshore structures. The large shipyards in Croatia are: 3. Maj and Viktor Lenac in Rijeka, Uljanik in Pula, Brodosplit in Split and Brodotrogir in Trogir. "They manufacture custommade bulk carriers, chemical and oil tankers, car and wagon carriers, heavy lifters, passenger ferries, submarines, and dredgers. The Croatian shipbuilding industry, although relatively minor player at the global scene, plays a significant role in the total EU context with 27% of share in new orders, 14% in order book and 12% in deliveries." (Hadžić, Kozmar, Tomić; 2018) An average annual production of Croatian shipyards is approximately 15 ships. According to the Cross section of the Croatian shipbuilding industry, Croatia is the 9<sup>th</sup> largest shipbuilding country in the world, and 2<sup>nd</sup> largest in Europe. The large decline in contracting of almost all types and sizes of ships (except LNG gas tankers and passenger ships) has caused major problems in the shipbuilding industry worldwide, including Croatia where restructuring and sustainable business processes are currently taking place.<sup>8,9</sup></p> <p>Construction is a branch of the manufacturing industry based on building, maintaining and repairing structures. "Construction of new buildings includes building of new</p>

buildings on land where no buildings existed before, or if they did, they were demolished. Construction of new buildings also includes thorough reconstruction of demolished buildings (due to war damage, natural disasters, old age etc.) from the foundations on which only facades remained preserved.” (dzs.hr; 2019) Construction is largely represented in Croatia’s cities with Zagreb in the lead. Zagreb averages 1783 new completed dwellings per year from 2011 to 2018. The cities that come closest in the same time period are Split, Zadar, Osijek and Dubrovnik with an average of 298, 279, 158 and 150. A similar order remains with the floor area of newly completed residential buildings, with Zagreb covering the largest floor area with an average of 190,831 m<sup>2</sup> yearly, next up are Split with 35,133 m<sup>2</sup>, Zadar with 33,466 m<sup>2</sup>, and Dubrovnik with 24,805 m<sup>2</sup> in the same time period. Finally, we have the floor area of newly completed non-residential buildings, with Zagreb averaging 165,620 m<sup>2</sup> yearly, Pula comes second with 37,730 m<sup>2</sup> yearly, followed by Split with 34,249 m<sup>2</sup>, Trnava, Gorjani and Rijeka with 23,933, 22,860, 21,203 m<sup>2</sup> respectively.<sup>1,10</sup>

Petrochemical industry can be defined as an industry based on processing oil or petroleum. INA P.L.C. is the main representative in this field with two refineries in Rijeka and Sisak producing benzene, toluene and xylene. INA is engaged in the business of liquefied petroleum gas, natural gas transportation, oil and technical services, engineering, tourism and information processing. INA also owns a stake in the Adriatic oil pipeline system JANAF P.L.C. and developed business cooperation with foreign companies in the fields of oil and gas exploration, joint ventures and exports and imports. INA operates in Croatia, Egypt and Angola, and since 2003 has been operating together with the Hungarian strategic partner MOL, which has become the majority owner. Liquid fuels, or petroleum products, are the main energy source in Croatia, but their consumption and production have been decreasing in recent years.<sup>11</sup>

Graph 1: INA P.L.C. revenue from 2010 to 2017 (in mil. HRK)



Source: ina.hr; Yearly reports 2011-2017

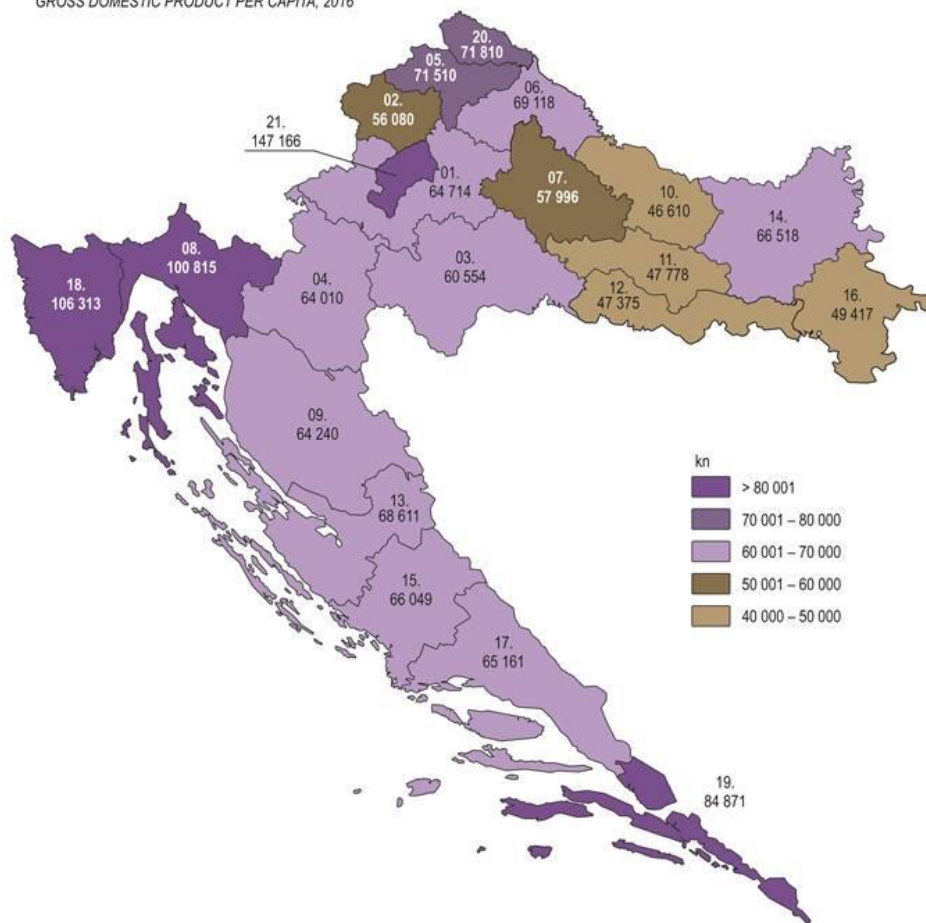
The food processing industry compared to other branches of the processing industry in Croatia, generated the highest total revenues and employed the most people. The sector is the most developed in the city of Zagreb and Zagreb County, northwestern Croatia and Osijek-Baranja County. The most profitable activities in this sector are

the production and processing of milk and cheese, the production of beer, the processing of tea and coffee, and the production of soft drinks, as well as one of the important branches of the Croatian food industry is the confectionery industry. According to the Croatian Bureau of Statistics' reports, the food processing industry had 3,253 registered companies employing 58,184 workers in 2018.<sup>1</sup>

Wood industry in Croatia consists of a larger number of small and medium-sized enterprises. The industry is resource-intensive, and as such doesn't have high added value, but it is important for the Croatian economy because of its notable share in employment, rural development and export. The importance of the wood industry for the entire Croatian manufacturing industry is great, as this sector employs around 10 percent of total Croatian employees and accounts for 8 percent of total national exports. Export and import of wood products are mostly oriented toward Italy, Germany, Slovenia, Austria and other countries in the EU.<sup>12</sup>

Picture 2: Gross domestic product per capita in 2016

K-1. BRUTO DOMAĆI PROIZVOD PO STANOVNIKU U 2016.  
GROSS DOMESTIC PRODUCT PER CAPITA, 2016



Source: dzs.hr



	<p>This map shows us that the capital city of Zagreb and three counties have high gross domestic product. The three mentioned counties are Istria, Dubrovačko-Neretvanska County and Primorje Gorski Kotar County. Istria has three cities of Pula, Poreč and Rovinj bringing it to the front. Poreč and Rovinj attract tourist year-long, but are especially popular during summer; Pula acts as the industrial center of the county. Dubrovačko-neretvanska county thrives on the popularity and touristic attractiveness of the city of Dubrovnik. Primorje-Gorski Kotar has Rijeka, which is one of the most significant industrial cities in the whole of Croatia.</p>																															
<b>Rail infrastructure</b>	<p>Croatia is a part of the TEN-T core network, belonging to the Mediterranean corridor with its two main railway points being Rijeka and Zagreb. The TEN-T Mediterranean corridor combines components of all transport modes - road, rail and maritime modes (Through Rijeka), and connects them to major traffic hubs. The main railway operator is HŽI (Croatian Railways Infrastructure) which is 100% owned by the Republic of Croatia and which controls 2,617 kilometres of railway network in length across the country. Part of that network also belongs to the Mediterranean railway freight corridor 6 (RFC6) connecting Spain, France, Italy, Slovenia, Croatia and Hungary. RFC6 connects around 90 terminals and 9 sea ports across a line distance of over 7000 kilometres. RFC6 belongs to the TEN-T railway network which was created in order to achieve reliable and high-quality rail freight services which would allow rail transport to compete with other modes of transport, especially road transport. HŽI is also a fully-fledged member of the RailNetEurope. Members of the RNE use the Path Coordinations System, Charging Information System and Train Information System, each of them contributing to the main goal of RNE, which is creating a common network for European railway operators in order to make international business as easy as possible.<sup>2</sup></p> <p>Table 1: Croatia’s railway transport of goods by type of goods and type of transport in 2018 (in thousands of tonnes)</p> <table><tr><th rowspan="3">Type of goods</th><th rowspan="3">Total</th><th colspan="4">Type of transport</th></tr><tr><th rowspan="2">National</th><th colspan="3">International</th></tr><tr><th>Loading</th><th>Unloading</th><th>Transit</th></tr><tr><td>Products of agriculture, hunting, and forestry; fish and other fishing products</td><td>2,326</td><td>179</td><td>460</td><td>39</td><td>1,648</td></tr><tr><td>Coal and lignite; crude petroleum and natural gas</td><td>1,934</td><td>-</td><td>1,854</td><td>26</td><td>54</td></tr><tr><td>Metal ores and other mining and quarrying products; peat; uranium and thorium</td><td>2,174</td><td>1,219</td><td>801</td><td>-</td><td>154</td></tr></table>	Type of goods	Total	Type of transport				National	International			Loading	Unloading	Transit	Products of agriculture, hunting, and forestry; fish and other fishing products	2,326	179	460	39	1,648	Coal and lignite; crude petroleum and natural gas	1,934	-	1,854	26	54	Metal ores and other mining and quarrying products; peat; uranium and thorium	2,174	1,219	801	-	154
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Food products, beverages and tobacco	512	29	134	7	341
Wood and products of wood and cork (except furniture); articles of straw and plaiting materials; pulp, paper and paper products; printed matter and recorded media	83	5	2	31	45
Coke and refined petroleum products	1,357	939	154	154	110
Chemicals, chemical products, and man-made fibres; rubber and plastic products; nuclear fuel	883	461	251	115	56
Other non-metallic mineral products	1,438	138	1,270	11	19
Basic metals; fabricated metal products, except machinery and equipment	833	24	265	134	410
Machinery and equipment	19	5	4	2	8
Transport equipment	30	5	3	4	18
Secondary raw materials; municipal wastes and other wastes	454	100	112	160	82
Equipment and material utilized in the transport of goods	46	13	15	17	1
Unidentifiable goods	896	118	524	247	7
Other goods	459	3	69	82	304
<b>Total</b>	<b>13,444</b>	<b>3,238</b>	<b>5,919</b>	<b>1,030</b>	<b>3,257</b>

Source: dzs.hr

Communication in train traffic regulation is done by telephone, teleprinter, radio and information devices, and all communication is done in the Croatian language. There is currently no automatic traffic management system on the railway network. The ASUS INDUSI (I 60) is in use on the rail network. In the railway network controlled by HŽI there is no specialised infrastructure. The term Specialised infrastructure can be

defined as railway infrastructure (or part of it) intended solely for a particular type of traffic, or giving priority to a particular type of traffic. There are no environmental restrictions - such as noise level restriction. Dangerous goods are transported on the railway network of the Republic of Croatia in accordance with the RID and the Law on the Transport of Dangerous Goods.<sup>2</sup>

The railway infrastructure managed by HŽI is constantly being renewed and modernized in order to increase the quality of service to its users. This means that there are lots of works planned for the modernization and construction of railway infrastructure. The possibility of realization of the planned works will depend on the amount of financial resources allocated by the Republic of Croatia each year from the state budget and on other sources of financing.<sup>2</sup>

The railway infrastructure in Croatia is also connected with the railways in ports. Those ports are: Bakar, Bibinje, Osijek Donji grad, Ploče, Rijeka, Rijeka Brajdica, Sisak, Slavonski Brod, Solin, Šibenik and Vukovar. The port of Rijeka is the largest port in Croatia, and its impact is immediate on all traffic modalities. The port handles large amounts of cargo, including containers, ore, sawn timber, grain, phosphate and crude and refined petroleum products. The 39 moorings accept all types of ships including tankers, dry cargo vessels, container vessels, general cargo vessels and passenger and Ro-Ro vessels. The public body in charge of its management is the Port of Rijeka Authority whose main activities include planning, coordinating, promoting and controlling operations and activities within the port. The Port of Rijeka Authority, with its development plans, affirms the role of the port of Rijeka, the largest port on the eastern Adriatic coast. The existing spatial-technical conception of the maritime and port system of Primorje-Gorski Kotar County is mainly concentrated around Rijeka, which is part of the urban whole of the city. The port of Rijeka is, however, primarily a cargo port, and the passenger traffic of the port of Rijeka focuses on long-haul passenger shipping lines that connect Rijeka with Split and Dubrovnik, as well as high-speed lines to the islands of Pag and Mali Lošinj. In 2018, a total turnover of 13.4 million tonnes of cargo was achieved, and in the same period approximately 150,000 passengers were transported.<sup>2</sup>

The advantage of the northern Adriatic ports stems from the shortest maritime connection between Europe and the Middle and Far East. As the Adriatic Sea is the deepest recessed part of the European mainland, it is precisely the Northern Adriatic that is the part of Europe that gives Central European countries the closest access to the world's sea. The port of Rijeka has an exceptional geo-traffic position with draft depth of more than 16 metres allowing for the reception of large ships.

Table 2: Total length of the Port of Rijeka's railway track towards the terminals

Name of the terminal	Distance
Zagreb terminal	1,437m
Bratislava terminal	777m
Prague terminal	3,986m
Visin's pier (Rijeka)	1,457m
Budimpešta terminal	751m
Orlando's pier (Rijeka)	823m
Vienna terminal	1,655m
De Francechi's pier (Rijeka)	1,306m
Senj terminal	289m
Sušak breakwater	1,247m
Delta south	886m
Delta north	189m
Brajdica north	977m
Bakar	2,759m
Škrljevo	3,410m

Source: Luka Rijeka Network report 2018


The Port of Rijeka Authority implemented a number of capital projects, including infrastructure projects for the construction and upgrade of the railway infrastructure in the port. This will improve the connectivity of the port and the hinterland, and speed up the transport on the Rijeka transport route. Strategic development seeks to contribute to the transformation of the Port of Rijeka into a strong intermodal centre in the northern Adriatic. During 2019, The Port of Rijeka Authority's work focused primarily on the completion of the works on the capital project Zagreb deep sea container terminal within the Rijeka Gateways project, and the seven projects co-financed by the EU.<sup>4,5</sup>

The two other large sea ports connected to the hinterland by rail are the Port of Ploče and the Port of Šibenik. Port of Ploče is one of the main strategic Croatian ports for transshipment of almost all types of goods in international maritime transport, as it is located on the southern part of the Adriatic coast, between Split and Dubrovnik, as the door of Corridor 5c, which is part of the pan-European network of transport corridors.<sup>5,6</sup>

The port of Šibenik has access to transshipment, transport and storage machinery as well as the necessary railway, road, electrical and telephone infrastructure. The most important cargo transshipment facilities are the terminals of the Port of Šibenik, which

	includes: Bulk Cargo Transshipment Terminal, Bulk Cargo Export Terminal, Wood Terminal, Passenger Terminal - Vrulje Pier. <sup>5,7</sup>																								
- lines	<p>HŽI controls 2,617 kilometres of railway within Croatia. There are 19 Border stations, 9 of which are with Slovenia (The Buzet station is exclusively used for passenger trains, Lupoglav is used for freight trains, and the rest are combined), 3 are with Hungary, 2 with Serbia, and 5 with Bosnia and Herzegovina. The railway infrastructure in Croatia is also connected with the railways in ports. Those include the ports of Bakar, Bibinje, Osijek Donji grad, Ploče, Rijeka, Rijeka Brajdica, Sisak, Slavonski Brod, Solin, Šibenik and Vukovar.<sup>2</sup></p> <p>Due to the topography of some railway sections and the wind intensity to which they are exposed, there are restrictions on the operation of rail transport in terms of wind intensity on the following railway sections: M202 Zagreb Gk - Rijeka on the Moravice - Rijeka segment; M604 Oštarije - Knin - Split on the Gračac - Knin segment.<sup>2</sup></p> <p>Towing trains with multiple locomotives adjacent to one another must not be carried out on the following sections of track: L103 Karlovac - Kamanje - DG on the Kamanje - DG segment; L204 Banova Jaruga - Pčelić on the Banova Jaruga - Sirač and the Daruvar - Đulovac segments. Train suppression is permissible on all railway sections except the following railway sections:</p> <p>Table 3: Railway sections on which train suppression is not allowed</p> <table border="1"> <thead> <tr> <th>Railway</th><th>Railway stock on which suppression is not allowed</th></tr> </thead> <tbody> <tr> <td>M402 Sava - Zagreb Klara</td><td>Zagreb RkSs - Zagreb RkPs</td></tr> <tr> <td>M405 Zagreb ZK - Trešnjevka</td><td>Zagreb Zk - Trešnjevka</td></tr> <tr> <td>M602 Škrljevo - Bakar</td><td>Škrljevo - Bakar</td></tr> <tr> <td>M603 Sušak - Rijeka Brajdica</td><td>Sušak-Pećine - Rijeka Brajdica</td></tr> <tr> <td>R106 Zabok - Đurmanec - DG</td><td>Krapina - Đurmanec - DG</td></tr> <tr> <td>R201 Zaprešić - Čakovec</td><td>Budinščina - Turčin</td></tr> <tr> <td>R202 Varaždin - Dalj</td><td>Đurđenovac - Našice</td></tr> <tr> <td>L201 Varaždin - Golubovec</td><td>Lepoglava - Golubovec</td></tr> <tr> <td>L204 Banova Jaruga - Pčelić</td><td>Pakrac - Pčelić</td></tr> <tr> <td>L205 Nova Kapela - Našice</td><td>Čaglin - Našice</td></tr> <tr> <td>L207 Bizovac - Belišće</td><td>Valpovo - Belišće</td></tr> </tbody> </table> <p>Source: HŽI Network Report 2019</p>	Railway	Railway stock on which suppression is not allowed	M402 Sava - Zagreb Klara	Zagreb RkSs - Zagreb RkPs	M405 Zagreb ZK - Trešnjevka	Zagreb Zk - Trešnjevka	M602 Škrljevo - Bakar	Škrljevo - Bakar	M603 Sušak - Rijeka Brajdica	Sušak-Pećine - Rijeka Brajdica	R106 Zabok - Đurmanec - DG	Krapina - Đurmanec - DG	R201 Zaprešić - Čakovec	Budinščina - Turčin	R202 Varaždin - Dalj	Đurđenovac - Našice	L201 Varaždin - Golubovec	Lepoglava - Golubovec	L204 Banova Jaruga - Pčelić	Pakrac - Pčelić	L205 Nova Kapela - Našice	Čaglin - Našice	L207 Bizovac - Belišće	Valpovo - Belišće
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	<p>Croatia's railway system has over 500 train stops across the country for passenger transport and over 200 stops for receiving, storing, preparing, handling and shipping various types of cargo. The entire network operates an average of about 630 passenger and 115 freight trains per day. HŽI does not operate any commodity terminals. However, HŽI enables the use of all railway stations and freight forwarding facilities, where loading, unloading and transshipment of cargo is possible to all railway undertakings in a non-discriminatory manner and at their request.<sup>2</sup></p>
- tracks	<p>2363 kilometres of 2617 are single track railways, and 254 of double track railways. The first of the double track railways starts at the railway hub Zagreb, goes through Zaprešić, Savski Marof and Dobova into Slovenia towards Ljubljana. The second double track railway goes from Novska, through Nova Gradiška, Nova Kapela-Batrina, Slavonski Brod, Striz. Vrpolje, Vinkovci, Tovarnik and Šid into Serbia towards Belgrade. The third and final double track railway is the shortest one in Croatia, going from Spilt's suburbs towards Split.<sup>2</sup></p>
- electrification	<p>980 kilometres of the 2,617 kilometres are electric rails. The picture below gives a clearer view of the railway electrification system in Croatia. The red lines and blue lines represent electric railways, green are non-electric, and white are the railways that are no longer in use. The red lines represent 25 kW, 50Hz railways, and blue lines represent 3kV railways.<sup>2</sup></p> <p>Picture 3: Railway electrification system in Croatia</p> <p>Source: HŽI Network Report 2019</p>

<p><b>- freight suitability</b></p>	<p>The Law on Railways defined "goods terminals" as an organized and organized space where the acceptance, storage, preparation, transshipment and shipment of various types of cargo is carried out. In terms of the above definition, HŽI does not operate any goods terminal. However, HŽI enables the use of all railway stations and freight forwarding facilities in which it is possible to load, unload and tranship freight to all railway undertakings in a non-discriminatory manner and at their request.</p> <p>The formation of freight trains as well as maneuvering can be performed in all railway stations with technical and technological possibilities. Freight wagons are garaged mainly on special tracks for garaging excess freight wagons in marshalling yards and some other larger stations. Stations in which this is possible are: Čakovec, Karlovac, Koprivnica, Knin, Moravice, Ogulin, Osijek, Rijeka, Slavonski Brod, Solin, Vinkovci, Zagreb Ranging Station.<sup>2,16</sup></p>
<p><b>Network classification</b></p>	<p>Croatian railways belong to the Mediterranean corridor of the TEN-T Network and represent two core network nodes with Zagreb and Rijeka. Zagreb serves as a link from Italy and Slovenia to Hungary and the north-eastern parts of Europe; and Rijeka serves as a port connecting rail and maritime transport.</p> <p>Picture 4: Main Croatian network nodes within the Mediterranean corridor</p>  <p>Source: <a href="http://lukarijeka.hr/en/geographical-position/">lukarijeka.hr/en/geographical-position/</a></p>
<p><b>Intermodal facilities</b></p>	<p>Intermodal facilities which include rail are located in the three already mentioned ports: Port of Rijeka, Port of Ploče and Port of Šibenik. Each of those ports connect the railway freight transport with maritime freight transport. Port of Rijeka, the largest Croatian port, is part of the Ten-T core network, and as such contains: 58 berth and two additional berths in the Liquid Cargo terminal, 150-hectare total port area and 335,000 m<sup>2</sup> of enclosed warehouses.</p>



	<p>The Port of Rijeka is comprised of several terminals:          Bulk Cargo Terminal - handles coal, iron ore and bulk cargo;          Cereal Terminal - handles and stores cereals and oilseeds;          Container and Ro-Ro Terminal - handles intermodal containers;          General Cargo Terminal - handles general cargo, salt and cement;          Timber Terminal; Škrlevo Terminal - handles, stores and processes timber;          Frigo Terminal - handles and stores refrigerated and frozen foods;          Bršica Terminal - handles livestock, timber and general cargo;          Passenger Terminal - has 11 piers, serving around 200,000 passengers per year;          Liquid Cargo Terminal - handles fuel and other liquid cargo; has two Capesize berths, with annual capacity of 24 million tonnes of oil; 130,000 tonnes storage capacity.</p> <p>Port of Ploče is the second largest cargo seaport in Croatia, and contains the following terminals:          General Cargo Terminal - handles general cargo;          Bulk Cargo Terminal - handles coal, iron ore and bulk cargo;          Liquid Cargo Terminal - handles fuel and other liquid cargo;          Grain Cargo Terminal - handles, ships, packages and stores cereals and oilseeds;          Wood Terminal - handles, stores and processes timber;          Alumina and Petroleum Coke Terminal - handles alumina and petroleum coke;          Container Terminal - handles intermodal containers;          Bulk Cement Terminal;          Slag Terminal;          Passenger Terminal - has two moorings, the first accommodates vessels up to 120m with an 8-meter draught; the second accommodates vessels up to 65m with a 5-meter draught</p> <p>Port of Šibenik is comprised of four main terminals:          Passenger Terminal Vrulje - with 4 berths          Terminal for transshipment of phosphates Dobrika - with 2 berths          Terminal for bulk and general cargo Rogač - with 4 berths          Wood Terminal - with 2 berths.</p> <p>Another intermodal facility worth mentioning is the Spačva Ro-La terminal, located at Spačva's railway station, 20 km from the border with Serbia to the west (corridor X) and 22 km from the border with Bosnia and Herzegovina to the north (branch of corridor Vc). The terminal was built in 2006, but hasn't been used much so far.</p>
<b>Transport flows</b>	<p>The port of Rijeka, as previously mentioned, is primarily a cargo port. It is the largest Croatian port, and in 2018, a total turnover of 13.4 million tonnes of cargo was achieved, and in the same period approximately 150,000 passengers were transported.<sup>4</sup></p>

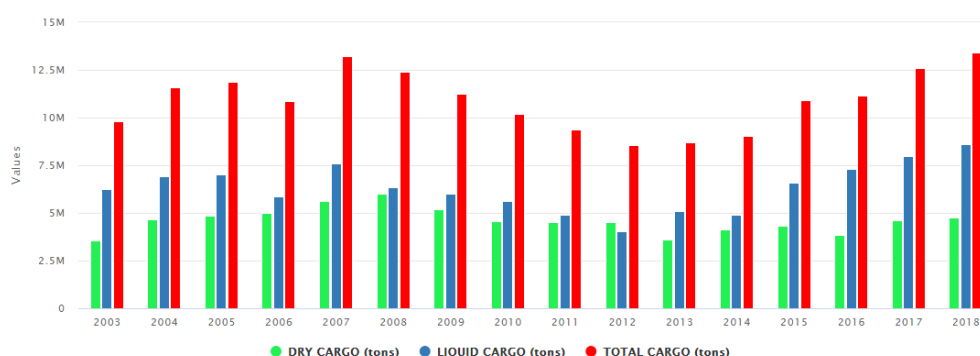


Table 4: Total cargo traffic for the Port of Rijeka Authority (January 2018 - November 2018)

Cargo structure	Amount (tonnes)
Dry cargo - Port of Rijeka P.L.C.	2,289,359
Dry Cargo - Jadranska Vrata P.L.C.	2,060,125
<b>Total amount of dry cargo</b>	<b>4,349,484</b>
Liquid cargo - Janaf P.L.C.	8,247,246
<b>Total amount of cargo</b>	<b>12,596,730</b>

Source: Port of Rijeka Authority - Annual work and financial plan for 2019

Graph: 2: Total cargo traffic for the Port of Rijeka Authority from 2003 to 2018



Source: [portauthority.hr/en/traffic-statistics/](http://portauthority.hr/en/traffic-statistics/)

Port of Ploče is one of the main strategic Croatian ports for transshipment of almost all types of goods in international maritime transport, and serves as the door of Corridor 5c, which is part of the pan-European network of transport corridors. The total annual transshipment capacity of the Port of Ploče is estimated at more than 5 million tonnes of general and bulk cargo, while the total storage capacity of liquid cargo is approximately 600,000 tonnes. size. The terminals are spread over 7 operational shores in Ploče with depth up to 18 metres. The terminals are directly connected to the gravitational hinterland by railway tracks, spanning the entire operational length.<sup>6</sup>

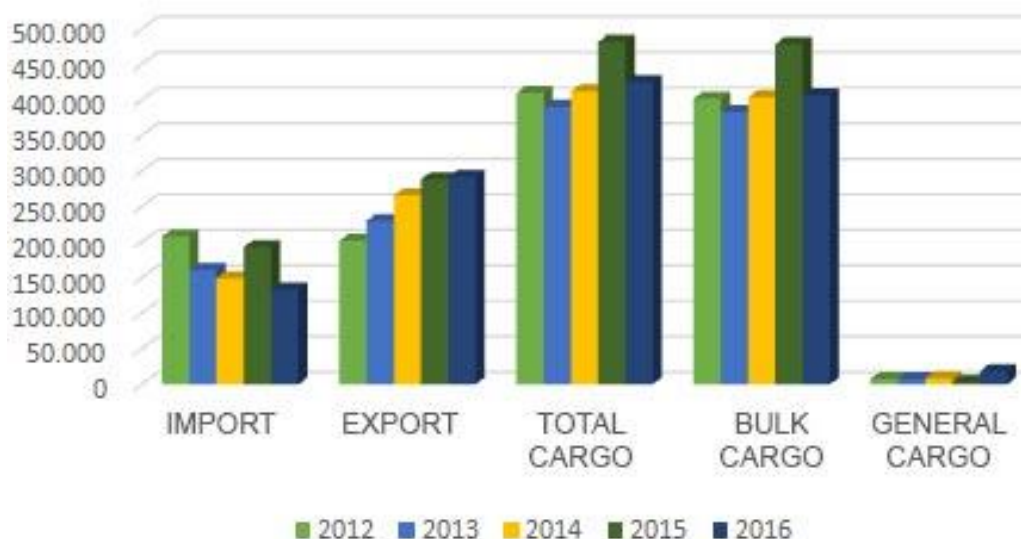
Table 5: Turnover by cargo type in the Port of Ploče in 2017 and 2018

Type of Cargo	2017	2018	Percentage of cargo type in 2018
General cargo	417,583	520,201	16,5%
Bulk cargo	1,973,160	2,124,999	67%
Liquid cargo	804,220	508,122	16%
<b>Total amount of cargo</b>	<b>3,194,963</b>	<b>9,153,322</b>	<b>100%</b>

Source: Port of Ploče; Audited annual report and consolidated and non-consolidated financial report for the Port of Ploče for 2018

As previously mentioned, the port of Šibenik has access to transshipment, transport and storage machinery as well as the necessary railway, road, electrical and telephone infrastructure, and it deals mostly in bulk cargo.<sup>7</sup>

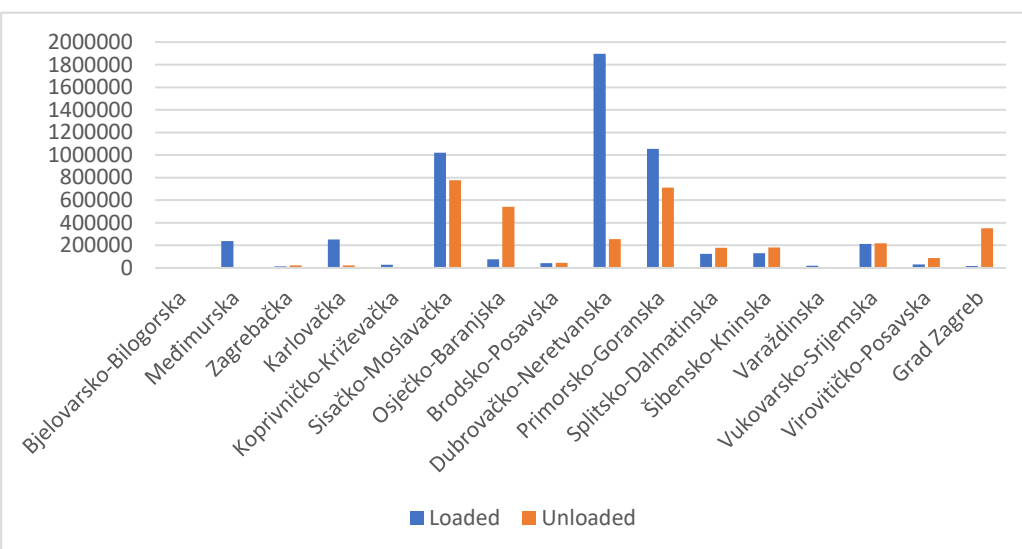
Graph 3: Port of Šibenik cargo traffic from 2012 to 2016



Source: Port of Šibenik Authority; Statistics

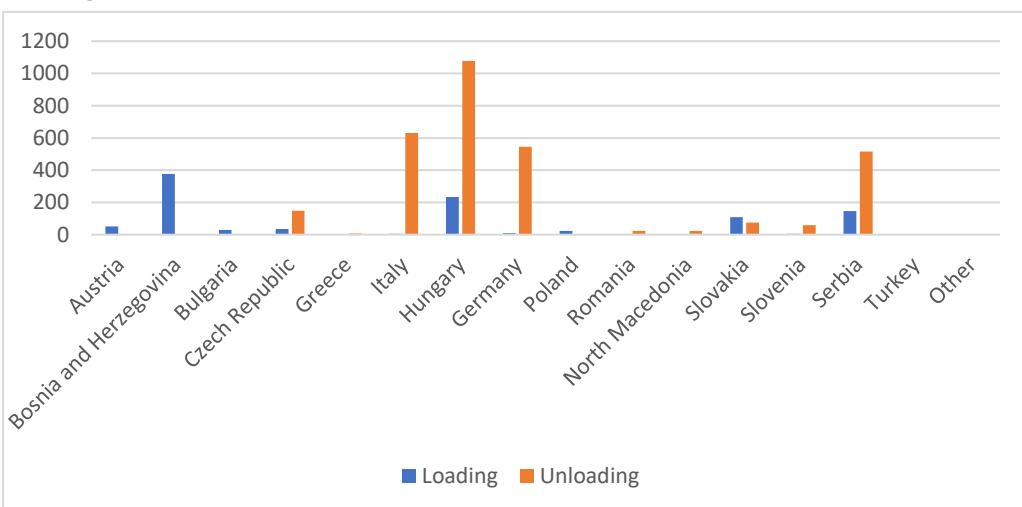
The next two graphs show the total amount of freight transported by rail to and from each Croatian county, as well as the international transport of goods by country of loading.

Graph 4: Loading and unloading of goods in tonnes in railway transport by Croatian county in 2018



Source: dzs.hr

Graph 5: International railway transport of goods in 1000's of tonnes by country of loading in 2018

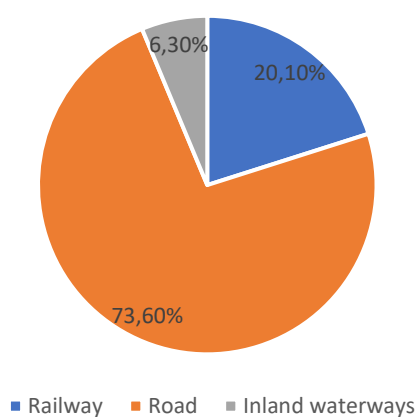


Source: dzs.hr

## Modal share development

Croatia's freight transport relies mostly on Road transport with over 70% of all freight being transported by road since 2011, and has remained very similar percentage-wise since 2008. Railways are the second most used transport mode, averaging around 20% of all freight transport in Croatia since 2008. Inland waterways are the least represented mode of transport for transporting freight.

Graph 6: Modal split of freight transport in Croatia in 2017



Source: ec.europa.eu/Eurostat

Table 6: Modal split of freight transport in Croatia from 2008 to 2017 (in percentages)

Year	Roads	Railways	Inland waterways
2008	71,7	22,6	5,7
2009	71,8	22,1	6,1
2010	69	22,8	8,2
2011	71,2	22,4	6,4
2012	70,5	22,2	7,3
2013	72,9	19,8	7,3
2014	72,7	20,4	6,9
2015	72,9	19,4	7,8
2016	76,3 estimated	16,4 estimated	7,3 estimated
2017	73,6	20,1	6,3

Source: ec.europa.eu/Eurostat

## B) Policy Analysis

This section will highlight the main policy documents on national and regional levels with an emphasis on their strategies and goals.

Transport Development Strategy of the Republic of Croatia 2017 - 2030, developed by the Croatian Ministry of Sea, Transport and Infrastructure, is considered the starting point in the process of planning the transport development in Croatia. This strategy evaluates and defines future infrastructural, operational and organizational measures in the transport sector related to national and international transport in all transport sectors regardless of their source of funding. The transport Development Strategy provides a framework for the development of interventions and defines interactions with other strategies and assessments, taking into account European strategies and requirements such as TEN-T, ERTMS, TSI etc. The strategy identifies the need for further data collection and defines the steps to be taken for future revision of the Strategy. The first hypothesis regarding railway freight transport states that there is considerable potential for increasing freight transport by rail between Zagreb and Rijeka. The following findings have been listed in the Strategy: Passenger traffic is represented more than freight traffic along the railway lines between Zagreb and Rijeka; due to the investments in the cargo terminals in the Port of Rijeka, higher growth rates in freight transport are expected; a logistics concept for the railway sector will be developed, and will rely on the existing Croatian network and will optimize cooperation with neighbouring countries. The second hypothesis regarding railway freight transport states that the general condition of the rolling stock for both the carriage of passengers and carriage of goods does not correspond to modern traffic requirements. The following finding have been stated: The investments in railway infrastructure have not been accompanied by the modernization of the rolling stock; The operational characteristics of the old rolling stock negatively affect the infrastructure in the form of a faster deterioration of the track's upper structure, and poor track maintenance affects the lower structure of towed and towing vehicles; Prior to the modernization of the fleet, it is necessary to design a study that will highlight the shortcomings of the existing fleet and the technical requirements that the new fleet must satisfy. The third and final hypothesis regarding railway freight transport focuses more on passenger transport, but affect railway transport as well, and it states that poor infrastructure maintenance imposes traffic restrictions and, in combination with low levels of safety at railway stations in rural areas, discourages passengers from using the rail transport system. The key findings for this hypothesis are: The main components of the railway network were not properly maintained due to the lack of funds; Some railroads were damaged or destroyed in the war in the 1990's and/or were not properly maintained; existing signalling devices are outdated and need to be replaced; most telecommunications equipment is at the end of its economic and operational life; most stations in rural areas do not meet modern security and access standards. The Strategy also states that increasing the level of interoperability of the Croatian railway network and railway systems of all neighbouring countries, especially Slovenia and Hungary, offers significant opportunities for achieving a more favorable share of railway transport in the structure of all modes of transport.<sup>13</sup>

National Railway Infrastructure Program 2016-2020 is the base document setting out development priorities, construction, modernization, renovation and maintenance of the functionality of the railway infrastructure system. The National Railway Infrastructure Program 2016-2020 establishes plans for the construction of new railways and the modernization and maintenance of the existing railway network; determines priorities and the dynamics of realization and the amount and sources of necessary financial resources. The planned investments in modernization and construction as well as the cost of maintaining the railway infrastructure from 2016 to 2020 are approximately 17,2 billion HRK, of which 2,23 billion HRK relates to reconstruction and modernization programs; 10,2 billion HRK for the construction of new and upgrading of existing lines and tracks; and maintenance costs (together with infrastructure management costs) are planned in the amount of 4,77 billion HRK. The opening of national freight and passenger markets for cross-border

competitiveness is a major step towards creating an integrated European rail area and market for rail in the EU. According to the Strategy for Transport Development of the Republic of Croatia (2014-2030), the following elements must be present in the National Railway Infrastructure Program in order to achieve the highest possible quality: The railway sector must be in function of the overall economic and social development of the Republic of Croatia and its international integration; the railway sector must be in the function of economic and social unification of the Croatian territory; the railway sector must be in the function of European cohesion Republic of Croatia (Republic of Croatia as South East Europe Logistics Platform); the railway subsystems must be harmoniously developed in order to maintain the target level of its overall functionality on a permanent basis; the railway sector must be in the function of safety of traffic routes and traffic flows; the development of the railway sector must be in line with the goals of the overall transport development of the Republic of Croatia and the protection of the environment and the environment; the railway sector must anticipate the National Energy Efficiency Program in its development; the rail sector must be developed strategically (technically and technologically) in the concept of the target capacity network.<sup>14</sup>

Territorial Development Strategy of the Republic of Croatia describes the Croatian railway infrastructure as above the European average in length according to the size of the population of Croatia, but the network is technologically not adapted to today's needs, with the exception of the line from the borders with Slovenia to the border with Serbia and several sections that have been modernized. The existing railway network is an integral part of the network of international and national railway corridors. Renovation and re-commissioning of the RH1 corridor, as well as the reconstruction and renovation of the RH2 corridor, have put the existing railway network in full operation. General goal number 5 out of 8 general goals of this strategy is the sustainable development of the economy and infrastructural systems, which relates to rail transport through moderate use of space and through directing development activities towards already used land, as well as more intensive development of rail transport systems. The Strategy also states that the transport network planning should take the reduction of greenhouse gas emissions, energy efficiency and redirection of transport from road to more energy efficient and environmentally friendly modes of transport such as rail and maritime transport into account.<sup>15</sup>

HŽ Infrastruktura's Railway Network Report is released yearly and its purpose is to provide a single source of information on railway infrastructure services managed by HŽ Infrastruktura. This report provides an overview of the railway infrastructure managed by HŽ Infrastruktura, information on conditions for access to the railway infrastructure and the allocation of infrastructure capacity, as well as payment models for services provided by the infrastructure manager.<sup>2</sup>

Croatian Railway Law regulates the manner and conditions of railway transportation, the status of railway infrastructure, the market for railway services, the management of railway infrastructure and conditions of access to infrastructure, the principles and procedures applicable to the introduction and determination of charges for railway services and the allocation of capacity of railway infrastructure, the criteria for issuing and revocation of licenses for railway undertakings and railway services of special national interest for which the Republic of Croatia provides part of the funds. Along with the Railway law, there are many railway regulations currently in use such as: Law on the Regulation of the Market in Railway Services; Railway Act; Railway safety and Interoperability Act; Law on Contracts for Carriage by Rail; Law on the Establishment of the Agency for Investigation of Air, Sea and Railway Accidents; Law on the division of the HŽ - Croatian Railways L.T.D. etc.<sup>16</sup>

Croatian Law on Combined Freight Transport regulates distances, incentive measures and conditions for the carriage of goods in combined freight transport. In the case of combined carriage of goods which is considered to be a carriage of goods between EU Member States, the truck, trailer, semi-trailer, with or without a towing vehicle, a removable crate or container of 20 feet or more, is used on the road at the

initial or final leg of the journey, and rail, inland or sea transport sections, this section must be longer than 100 km of the airline. In doing so, the road freight transport constitutes the initial or final section of road transport: between the place of loading of the cargo and the nearest appropriate loading station at the initial section, and between the nearest appropriate loading station and the place of unloading at the final section; or within a radius of not more than 150 km from the inland port or the port of loading or unloading. The combined freight services referred to in this Law shall be exempt from all quota and authorization systems in the EU Member States.<sup>17</sup>

### C) Regional Stakeholder Mapping

Stakeholder	Role	Importance	Contribution to the project	Benefits from the project	Conflicts	Current level of support	Strategies to improve support
HŽ Cargo	Railway cargo transporter	Medium/High	Exchanges data on trains and relevant freight flows	Increased knowledge	n/a	Low	Including stakeholder in workshop and sharing of information through publications
HŽ Infrastructure	Railway infrastructure manager	Medium/High	Exchange data on state of infrastructure	Increased knowledge	n/a	Low	Including stakeholder in workshop and sharing of information through publications



		INTERNAL	
		Low	High
INFLUENCE	Low	<b>Marginal Stakeholders: Importance = low</b>	<b>Operative Stakeholders: Importance = medium/high</b> HŽ Cargo HŽ Infrastructure
	High	<b>Relevant Stakeholders: Importance = medium/high</b>	<b>Key Stakeholders: Importance = high</b>

## D) SWOT Analysis

The SWOT Analysis serves to identify key internal (Strengths and Weaknesses) and external (Opportunities and Threats) factors in the regional rail freight transport. These factors are derived from the previous steps of the baseline study and are therefore an overview or a summary of the status quo of rail freight transport. Every PP fills in the table with the main findings and factors for the SWOT Analysis, so the results are presented in a matrix like the following one.

Strengths	Weaknesses
Three ports which connect the coast to the hinterland	Single track railway lines are less efficient in achieving a successful rail freight transport economy
Croatian railway network serves as a link from Italy and Slovenia to Hungary and north-eastern European countries	Poor railway infrastructure
Market liberalisation	Level of interoperability on Croatian corridor railway network is low.
Sustainable and environmentally friendly mode of transport	Often train delays and inaccurate timetables
	Insufficient train speed on some lines
	Relatively old rolling stock in comparison to other EU countries
	Unsatisfactory maintenance level of infrastructure which causes limitations in operation
	The old rolling stock is deteriorating the infrastructure and therefore the noise levels during operations are high



Opportunities	Threats
Increase the amount of electric rail in Croatia	Dominant road transport competition
Availability of funds for strengthening the railway infrastructure	Punctual, fast and reliable road transport service
Increase of the amount of freight transport in the following years	Modern highway network in Croatia
Policy on combined transport encourages modal shift and wider use of railways	Lack of compatibility between fleet and rail infrastructure
Congestion of road network might be used as an opportunity for the usage of railways	The drainage system along the corridor is insufficient and/or out of service.
Raised awareness about the necessity of the usage of more environmentally friendly modes of transport	Current operations of all three major companies in Croatian railway system are not sustainable without government support
Modernization of fleet	

## E) Recommendation/Outlook

Every baseline study should be concluded with a summary of the main findings and results. Importance should be given to a recommendation and outlook for the future work of the project. This will help to achieve the purposed aims and outcomes of every PP through the project and to compare and learn from the baseline studies in the REIF project.

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