

## D.3.2.6. Methodology for the identification of needs and gaps on ICT, Mobility services and behavioral change

WP3 Understanding mobility needs and trends

A.3.2 Mobility needs and gaps in ICARUS region

---

AUTHOR: Helena Luketić  
PP No.4 HZPP  
Status: Report 01  
Distribution: Public  
Date: 30/10/2019

---

## **DISCLAIMER**

This document reflects the author's views; the Programme authorities are not liable for any use that may be made of the information contained therein.

# 1 Table of Contents

1	Table of Contents .....	2
	<i>Acronyms</i> .....	3
2	Introduction.....	4
3	Identification of mobility gaps.....	5
3.1	Survey to users to identify mobility gaps.....	5
3.2	Key Performance Indicators.....	5
3.3	Needs.....	6
3.4	Involved public and private bodies and their role .....	7
4	Current transportation’s status in the area .....	9
4.1	Current transport situation .....	9
4.2	Planning and policy documents .....	10
4.3	Multimodal integrated tariff schemes and tickets.....	13
4.4	ITS, ICT & MaaS solutions .....	13
5	Identification of future challenges in the area .....	15
6	Definition of priorities in each involved area.....	17
7	Recommendations.....	17
8	Conclusions.....	19

## Acronyms

PP	PP Partner
LP	LP Lead Partner
SC	SC Steering Committee
TMB	TMB Technical Management Board
FM	FM Financial Manager
PC	PC Project coordinator
PM	PM Project manager

## 2 Introduction

At present, public transport in the Republic of Croatia is not integrated, as there are no coordinated timetables or single tickets that can be used as one for different modes of transport. Intermodal terminals, which enable transit from one mode of transport to another, do not exist or are extremely rare. On certain lines, bus and rail carriers have "parallel routes". The contribution of rail transport is penalized by the fact that the average age of the rolling stock is close to the end of its service life, while in the road transport the average age of buses is approximately 15 years. In real terms, the number of passengers in all PT modes was increasing in the last years. However, the modal split has increased in favor of private traffic during the recent years since the increase of private traffic is much bigger than in PT. This trend is due to higher availability of personal cars and public transport systems that are not integrated. Poor infrastructure of certain PTs also impacts to this negative trend in modal split.

## 3 Identification of mobility gaps

### 3.1 Survey to users to identify mobility gaps

Based on survey conducted within general population of Zagreb County, most of public transport users are bus users. However, there are registered trams and train users as well. Among them general public and experts had similar responses. Common point to all of them is the fact that none of them use bike as main mean of transport.

General opinion from public are the facts that old trams and buses are not equipped with air conditioning, which makes a ride on the tram or bus very uncomfortable during the summer. Old trams should all be replaced by the new ones. On the other hand, the new trams have not sufficient space for passengers at peak times – the older ones are far better. Sometimes air conditioning isn't working properly during the summer. Trams and buses could offer refreshments in vending machines. Information on events taking place in the city, which could be announced via loudspeaker, could also be very useful. Conclusion is that passengers would like from service providers to produce more valuable service and more comfortable journey.

On the other hand, all experts agreed on documents used for transport planning and incentives for the usage of public transport. However, their recommendations for overlapping mobility gaps are making influence of people mentality, connecting different modes of transport, too big walking distances between modes, irregular time tables, too high ticket prices etc. Solutions could be integration, education and information. Improvement and more care for service users, enhancing comfort, creation of unified timetables and intermodal terminals.

### 3.2 Key Performance Indicators

A bicycle is a very useful mean of transport that can be implemented for transport on shorter distances and in urban areas. There is a great potential to change the travel behaviour in favour of bicycles, public transport, e-mobility etc., which would bring a significant reduction of greenhouse gas emissions and enable the application of multi-modal transport systems.

Measure: Potential for the development of a specific bike system (infrastructure and bikes) in particular in relation to e-mobility. This measure is based on European Cyclist Federation; Croatian Bureau of Statistics (CBS); National Traffic Model for the Republic of Croatia (NTM), EuroVelo.

Key findings are:

- Travel behaviour research that was conducted within the NTM project shows that around 5% of all trips is by bikes
- Koprivnica, Varaždin and Osijek are good examples of the use of bicycles in Croatia

- The use of e-bike has a great potential for the development of bike system in cities with unfavourable morphology.

### 3.3 Needs

**General measure** (first) and need for public transport users is Improvement of passenger intermodality and development of intermodal passenger hubs. To ensure the sustainability of the transport sector as a whole, it is important to increase the interoperability to be able to use the potential of each transport mode. A network of intermodal terminals should be established to allow passengers to easily interchange between transport modes. A well-conceived, balanced, intermodal network is key to maximizing the efficiency of the overall system, minimising nuisances to users. Location and modes of each terminal can be determined according to a specific area study (e.g. Masterplan). In the road sector it is important to ensure the proper accessibility to demand generation/attraction nodes (such as ports, airports, railway stations, working areas, commercial zones, etc.). An increase in the number of parking spaces linked to public transport systems, port and airports will help to increase the modal shift in favour of public transport and consequently reduce the congestion on the roads. Regarding railway and urban/suburban transport, the big fluctuations in the recent years can be explained by modification in the method of counting passengers carried by ZET and HZPP. In 2011 the City of Zagreb stopped providing financial support for a joint ZET-HZPP ticket. The passengers carried by ZET (Zagreb PT) and HZPP (railway) are now counted separately, which resulted in a sharp decline in the number of railway passengers carried in 2011. The reduction of the City and national subsidies to certain population groups for the purchase of tickets was another contributing factor to the lower number of passengers carried.

Figure below shows that the number of passengers carried by railway has been decreasing constantly, though the latest decline from 2014 to 2015 is very modest; from 21.92 million in 2014 to 21.68 million in 2015. During the same period road and air transport fluctuated but remained within the 3-point margin throughout the period observed.

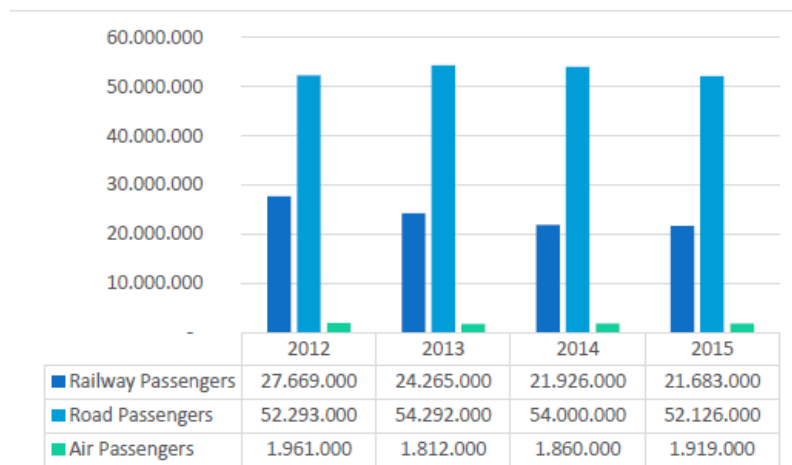


Figure: Number of passengers carried in Croatia for period 2012-2015 (Source: CBS)

Figure shows the trend line of the number of passengers carried by trams and buses in urban and suburban PTs in Croatia. The reference year is 2011, and the indices are given accordingly. The number of passengers carried by trams has increased over the last years, with a surge in 2014 and 2015. Bus transport has also increased over the last three years.

For the time being, there is only one operator of public service transport by rail in Croatia, HZ Putnički prijevoz d.o.o. (HZ Passenger Transport Ltd.).

**Second measure** or need is improvement of the public perception of the transport system in Croatia. Promoting and creating a positive image of the public transport system as a reliable, safe and environmentally friendly mean of transport is important for encouraging the demand, and consequently the investments. For better promotion, it is necessary to have complete and up to date information and knowledge of the infrastructure, possibilities and development plans.

In the transport sector is very important to inform users of the current situation of the traffic and weather conditions to reduce the amount of traffic jams and accidents by offering information's on alternative routes. It is also important to inform of adoption of new laws in the sector relevant for the users and to provide instant information on the incidental situations that might require changes in the journey planning. For that reasons, the need to constantly revise and update the information technologies and channels is very relevant for the improvement of the sector. It is important as well to increase the involvement of the media as a crucial partner for the transmission of the information. It is necessary to continuously modernize and integrate IT platform in order to ensure reliable and comprehensive data and information for all users.

### 3.4 Involved public and private bodies and their role

<i>Type of stakeholder</i>	<i>Stakeholders and brief description</i>	<i>Role in implementation plan</i>
<i>Decision maker</i>	<i>The Ministry of the Sea, Transport and Infrastructure</i>	<i>Plays significant role in the functioning of the public railway transport service itself, as they regulate the level of public investments (i.e. those from the Budget), or potentially the EU funds, and govern the strategic orientation of the market development, the level of passenger rights, etc. MMATI is responsible for drafting laws, supervising and controlling law enforcement, issuing licenses, inspection and other expert activities. It also plans, drafts and implements strategic documents and project for transport infrastructure, recommends development</i>



		<p>strategy, does strategic infrastructural projects and investment programs of strategic importance for Croatia and prepares project suggestions for Government to approve and implement. From the managerial point of view, the Ministry deals with reconstruction, maintenance and other investments of strategic importance for the development of Croatia, which are completely or mostly financed by the state, coordinates these activities and supervises investments. State also covers the difference between costs and revenues, ensuring railway transport on non-profitable lines, and contracts operators.</p>
Public authority	HŽ Infrastruktura d.o.o.	<p>Responsible for management, maintenance and availability of the rail infrastructure, which also involves a significant part of the IT infrastructure (e.g. time scheduling, planning system, etc.) of the company and of other suppliers, mainly those providing their services and products to the railway industry.</p>
Public authority	HŽ Putnički prijevoz d.o.o.	<p>Founder and sole member is Republic of Croatia. This is sole public railway operator in Croatia. Our mission is: connecting regional centres with each other and with local areas, mass passenger transportation in the suburban and urban areas of large cities, seasonal connecting of inland regional centres with coastal tourist towns, connecting Croatia with Central and Western Europe cities.</p>
Public operator	ZET – Zagreb Bus and tram operator	<p>Zagreb’s public transportation system is called ZET, short for Zagrebački Električni Tramvaj. It is made up primarily of buses and trams that zigzag throughout the city and extend beyond to neighboring cities including Velika Gorica where the airport is located. Zagreb’s public transport is deservedly recognized as one of the symbols of the city, adding to its iconic image that is well-known throughout the world. For this reason, public transport plays an active role in the organization of tourist attractions offered by the city.</p>

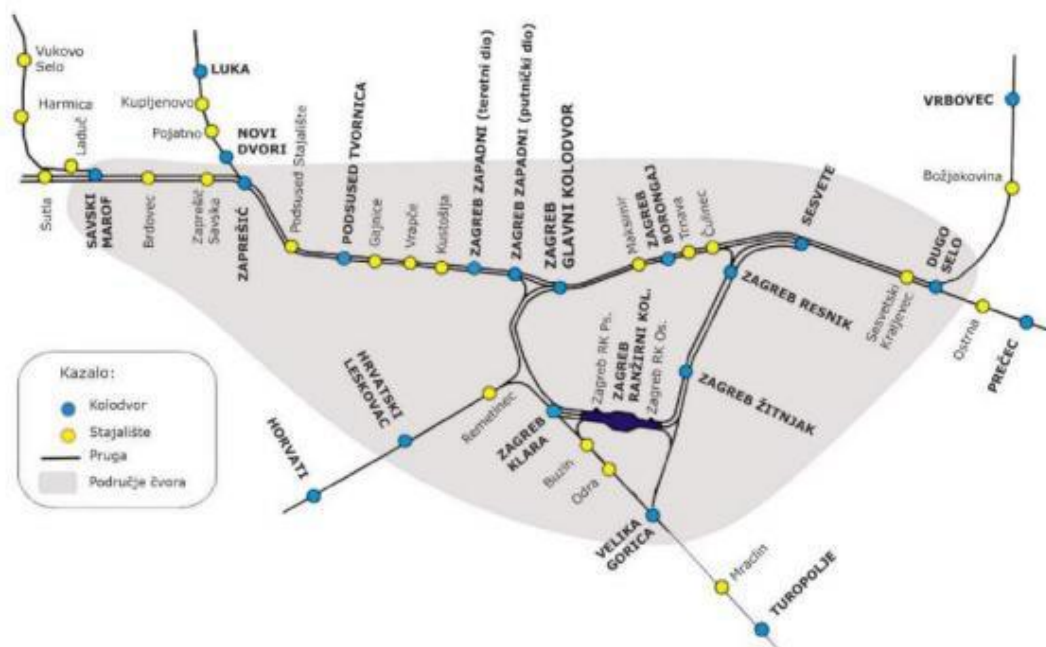
## 4 Current transportation's status in the area

A proper analysis of the existing situation and expected developments of the Transport System and socio-economic context in urban and regional areas, in a perspective of functional region, should identify the needs of rehabilitating/upgrading existing infrastructure or of creating new ones where mobility levels will justify it. On the other side, this might also mean to dismiss or functionally downgrade some parts of the network where expected mobility levels become non-relevant. Infrastructure investments will be primarily focused on public transport and low/zero emission modes and will be accompanied by complementary mobility management policies and interventions, together with appropriate ITS installations. Station development will be primarily focused on improving passenger's accessibility, especially for persons with reduced mobility, assuring safety and security of the passenger movements and introducing

There are three ways of public transportation - trams, buses and city railway. They operate all day (every few minutes) and night (every hour).

### 4.1 Current transport situation

Zagreb is a large railway hub. Two of the three most important European corridors in Croatia are going through Zagreb. As Croatia joined European Union, it is expected that the railway sector will be adjusted and aligned with the strategic vision of the railway sector development at EU level.



*Figure: Zagreb railway node*  
*Source: Studija razvoja željezničkog čvora Zagreb*

When we talk about traffic in the modern context, choosing travel mode is becoming more and more the focus of traffic solutions planning. Mobility of nowadays people plays an extremely important role since everyday life involves a range of activities that depend on traffic opportunities, from going to school (or to work) to leisure travel. Transport needs are increasing, demand for transport is growing, and as a result, there is a need for a quality planning of efficient transport system. When we add spatial, energy and ecological rationality, it is clearly seen that new approach is required to address the needs of developed societies. Today, transport mode decision is extremely complex and influenced by several factors. For this reason, exploring the ways how to change structure of traffic usage in favour of public transport becomes the point of interest of many traffic planning experts and development of quality integrated transport systems is becoming a global trend and need.

Also, European Union transport policy considers continuous increase in transport needs and accordingly seeks to tackle the challenge of creating a safer and more energy-efficient mode of transport. The emphasis is on market liberalization and the creation of integrated modes of transport that will ensure a smooth, faster and more efficient journey. Accordingly, European Union ensures financing opportunities and promotes investment in transport sector. The railways play a major role in integrated and intermodal modes of transport due to its comparative advantages.

In Croatia, low level of investment in railway sector modernization has undoubtedly affected ability to provide high quality services that are competitive with other forms of transport. Due to the well-developed highway network and the airports and maritime ports network, the railways could not compete efficiently with other traffic segments, regardless of their energy, ecological and capacitive advantages. The problem is mostly single-track railway, low traffic speeds, a large distance between stops, outdated traffic signalling and outdated traffic management system.

Due to the growth potential HŽ Putnički prijevoz d.o.o., which is responsible for passenger's public transport in Croatian national and also international traffic, aims to focus on the offer development by identifying new opportunities and taking into account market trends and challenges it has to face. HŽPP endeavours to adopt its activities in a way to offer services in accordance to the needs of passengers who expect fast, efficient and on-time service.

## 4.2 Planning and policy documents

From the very beginning of its existence until today, European Union devotes special attention to the regulation of EU transport system, as well as to the regulation of the member states transport systems and their traffic integration with surrounding countries. In that way transport system is put into the function of sustainable development of the entire economy through all transportation modes and transfer of cargo, information and news; in the function of environmental protection and in the function of realizing the personal mobility of all its inhabitants.

The whole range of documents supports such claims. Namely, already published "White Papers"

of traffic policy are one of the basic documents of the EU legal system, and the goals and measures defined in those documents implies several obligations to the Member States. Those obligations are followed by precise deadlines and activities in accordance with the rules and implementation procedures. Therefore, the goals and measures of EU transport policy should also be predefined goals and measures at national level, i.e. as an integral part of Croatia 's transport policy.

1. **White Paper:** Roadmap to a Single European Transport Area provides a number of different measures to improve the mobility of goods and passengers, reduce congestion of the key European traffic nodes and increase employment rates in transport and related sectors. AT the same time, special emphasis is on sustainable development and environmental protection, where until the end of 2050, the main goal is to reduce environmental pollution caused by the traffic up to 60%. Regarding the transport of passengers and goods, the emphasis is primarily on improving the railway traffic system, what is continuation of already existing strategy of promoting greater use of rail transport, especially in passenger sector.
2. **EU Strategy for the Adriatic and Ionian Region (EUSAIR).** This macro-regional EU strategy for the Adriatic and Ionian region includes four-member states (Croatia, Greece, Italy, Slovenia) and Albania, Serbia, Montenegro and Bosnia and Herzegovina, focusing on benefits of co-operation in four key areas: blue growth, traffic, quality of the environment and sustainable tourism. The project is in line with the action plan of the strategy, specifically with pillar 2: „Connectivity“: to develop reliable transport networks and intermodal links with the hinterland, for the cargo and passengers. The project is also in line with the measure which suggests re-establishment of a cross-border connection by bus or train.
3. **EU 2020 Strategy** for smart, sustainable and inclusive growth. One of the main goals of the European strategy for smart, sustainable and inclusive growth is to reduce greenhouse gas emissions by at least 20% compared to 1990 levels or by 30% if conditions permit, increase the share of renewable energy in our final energy consumption 20% and achieve a 20% increase in energy efficiency. One of the targets of this strategy is "Resource efficient Europe" to help decouple economic growth from the use of resources, support the shift towards a low carbon economy, increase the use of renewable energy sources, modernize our transport sector and promote energy efficiency. The goal is to encourage the transition to a low-carbon economy that efficiently uses resources, which is efficient because of the way it uses resources. Although there is no special attention to the promotion of the railways, the promotion of rail and intermodal transport affects this goal.
4. **Trans-European Transport Networks Regulation.** The Trans-European transport network infrastructure consists of the infrastructure of rail, inland navigation, road transport, maritime transport, air transport and multimodal transport. With regard to the promotion of railways within this document, the priorities for the railway are the development of the railway infrastructure. Thanks to its large scale, the trans-European

transport network should provide the basis for the large-scale deployment of new technologies and innovation, which, for example, can help to enhance the overall efficiency of the European transport sector and reduce its carbon footprint.

5. **Urban Mobility Action Plan and Package.** The Urban Mobility Action Plan is primarily concerned with policies and measures that effectively resolve issues related to traffic in urban areas, encompassing all modes of transport. The Plan promotes a shift towards sustainable modes of transport and proposes an integrated set of measures to improve efficiency and cost-effectiveness in relation to the stated goals.
6. **The South East European (SEE) - SEE 2020 strategy.** Strategy of Southeastern Europe 2020. is a regional initiative for the growth of competitiveness within strategy of the EU, Europe 2020. The main goal of the South East Europe (SEE) 2020 strategy concerns the improvement of living conditions in the region and brings competitiveness and development back in focus, closely following the vision of the EU strategy Europe 2020. Its 4 pillars that depicts SEE 2020 vision refer to integrated, smart, sustainable and inclusive growth and the strategy answers on the need to adjust the EU 2020 strategy to region's needs.
7. **Transport Development Strategy of the Republic of Croatia for the period 2017 to 2030** is assessing and defining the future measures (infrastructure, operation and organization) in the transport sector related to international and national transport in all transport segments independent from the funding source. The TDS (2017) provides the framework for the development of interventions and defines the interfaces to other strategies or assessments (Functional Regional Concepts-FRC, Master Plans, sectorial strategies, etc.). It considers the European strategies and requirements (TEN-T, ERTMS, TSI, environmental protection, climate protection etc. – general objectives) and is based on a thorough analysis of the Croatian situation.

The general goals of the strategy are, among other things:

- change the distribution of passenger traffic in support of public transport and forms of transport with zero emission of harmful gases,
- develop a transport system according to the principle of economic viability,
- reduce the impact of the transport system on climate change and the environment,
- increase the interoperability of the transport system and improve the integration of transport modes in Croatia.

In all the above-mentioned, rail transport plays a role and specific objectives for improvement of railway sector include:

- Better use of the Croatian railway system within and between functional regions (sub regions),
- Better integrate the rail system into local traffic systems (station security and protection, links to other modes of transport, etc.),

- Increase the efficiency of the Croatian railway system (traffic management, business operations, etc.).
8. **Master plan of HŽ Putnički prijevoz d.o.o. – Strategic programme for the period 2015-2020.** Master plan is a document created in June 2015 by external experts with purpose of analysis of exterior environment in macroeconomic, socio-economic, political and technological characteristics, which directly influence on business operations of company. This document has to strategically direct company in next time period until year 2020. The goal of research for this document was to explore profitability and stability of business, larger scale of passenger service quality and recognizable brand of Company. Identified goals of society development are: Profitability and business stability, Higher passenger satisfaction with the quality of service provided and Recognition of culture and image of society. Based on the strategic goals, the initiatives are grouped into four strategic pillars, i.e. strategic programs. As part of the strategic pillar, Long-term Growth and growth in revenues as one of the strategic initiatives, development of strategy and operational model for participation in intermodal transport is second, proactive approach to participation in intermodal transport as third and Provide additional source of income as fourth strategic pillar.

### 4.3 Multimodal integrated tariff schemes and tickets

In the absence of a single tariff system, the intermodal travel becomes more expensive and the planning is difficult, what demotivate users to make decision of using intermodal transport. Generally, the decrease in the use of PT has to be looked at in relation to the increase of the motorization rate in the country and the effects of the global economic crisis, which has impacted the mobility in general. Regarding railway and urban/suburban transport, the big fluctuations in the recent years can be explained by modification in the method of counting passengers carried by ZET and HZPP. In 2011 the City of Zagreb stopped providing financial support for a joint ZET-HZPP ticket. The passengers carried by ZET (Zagreb PT) and HZPP (railway) are now counted separately, which resulted in a sharp decline in the number of railway passengers

In today's world, travelling expenses are one of the key factors in choosing transportation mode, which is often associated with the financial situation of the passenger. This factor is also dynamic, as the willingness to pay a certain price changes based on urgency and need to travel/transport. In addition to the cost of travel, the price structure also affects decision on selecting particular transport mode. Namely, as the price is "more complex", potential travellers will easier give up on such a trip. In practice, this applies to journeys which involve multiple transport modes and don't have integrated tariff system.

### 4.4 ITS, ICT & MaaS solutions

Promoting and creating a positive image of the public transport system as a reliable, safe and environmentally friendly mean of transport is important for encouraging the demand, and consequently the investments. For better promotion, it is necessary to have complete and up to date information and knowledge of the infrastructure, possibilities and development plans.

In the road sector is very important to inform users of the current situation of the traffic and weather conditions to reduce the amount of traffic jams and accidents by offering information's on alternative routes. It is also important to inform drivers of amendments to the existing or adoption of new laws in the sector relevant for the users and to provide instant information on the motorways of the incidental situations that might require changes in the allowable speed or restrictions to the use of lanes.

For that reasons, the need to constantly revise and update the information technologies and channels is very relevant for the improvement of the sector. It is important as well to increase the involvement of the media as a crucial partner for the transmission of the information.

In the transport sector, it is necessary to continuously modernize and integrate IT platform in order to ensure reliable and comprehensive data and information for all users. It is also necessary to establish network services of e-business for all users of public services, to establish a unique information system in in order to improve business processes and raising the competitiveness of transport modes, to establish hydrographic information system, to improve services, to develop ICT solutions for operation and to improve and to develop the information service as public product.

In times when 90% of the world's population lives in areas with mobile network coverage, informatisation has become a process which increasingly impacts the life of every human being. Furthermore, it is expected that numerous smart devices will connect to the Internet, thus creating the so-called "Internet of Things". This will enable remote control, localisation and tracking of those devices, which will contribute to the enhancement of the quality of life in various areas, with solutions applicable in e.g. healthcare, energy, transport, environmental protection and recycling of products and raw materials.

Moreover, the quality and accessibility of public services in isolated and remote locations, has been lagging significantly behind other areas. There is a need to provide adequate services to the population, and the easiest way to do it is via the Internet. The problem of accessibility also concerns people with disabilities, vulnerable and socially endangered groups. Additional efforts are needed to adjust e-services to different groups of people with disabilities and to adapt e-content to ensure the accessibility of the services for everyone. This will result in the creation of equal conditions and possibilities for the use of e-public services and the Internet for the entire population.

## 5 Identification of future challenges in the area

### Strategic priorities at the regional level

In the context of the rail sector, the strategic development priorities at the regional level have been defined mainly through the following three strategies:

- The EU Strategy for the Danube Region (EUSDR) comprising 14 countries in the Danube Basin which places emphasis within the Priority Area: To Improve Mobility and Multimodality on, among others, reducing the travel time in passenger rail transport, building potentially a new rail corridor in the region and developing efficient multimodal terminals along the Danube that will connect waterways with rail and road transportation. In this context, improving intermodal traffic and connecting the Danube Region with the Adriatic Coast are particularly important.
- the EU Strategy for the Adriatic and Ionian Region (EUSAIR) comprises, in addition to Croatia, another seven Member States and highlights the development of a reliable transport network and intermodal connections for passenger and freight transportation between the coast and coastal areas. Some of the proposed indicative initiatives in the traffic segment are: developing an integrated transport network of the countries in the western part of the Balkan Peninsula, implementing railway restructuring (e.g. establishing the route lease costs focused on direct costs, a transparent and non-discriminating access to railway terminals in seaports and river ports using infrastructure concessions, etc.) and the elimination of issues at border-crossings. Surely, the representative of the Croatian railway sector is to act as required and expected.
- Central-European Initiative (CEI) is an international forum dedicated to providing support to European integrations through the cooperation among the Member States, other related public institutions or private and non-governmental organisations as well as international and regional institutions. The key priorities for the rail transport have been defined in the following segments: contribution to the overall TEN-T Network development in line with the EU 2020 Strategy and its extension in the Western Balkans through encouraged cooperation, connecting the macro regional strategy for the transport sector and improved efficiency of coordination and communication to facilitate the implementation of other regional initiatives as well as national and regional priorities.

### Strategic priorities at the national level

The following strategic development priorities in the rail sector of the Republic of Croatia have been defined as key in the Transport Development Strategy of the Republic of Croatia for the Period 2014–2030 ('the Transport Strategy') and operationalised in the context of EU financing through the Operational Programme: 'Competitiveness and Cohesion 2014 – 2020'. ('the Operational Programme' or 'the OPCC'). One of the financing options for the Company based on the EU funds has been ensured through the Operational Programme 'Efficient Human Resources



2014 – 2020' (the funds provided by the European Social Fund, the ESF) in the total amount of EUR 1.6 billion), designated mainly for HR capacity building projects. The ESF's priorities in this respect are as follows: high employability and mobility of the labour force, social inclusion, education and life-long learning as well as smart administration.

Based on the challenges and opportunities highlighted above as well as the necessary prerequisites for future development, HŽ PP has defined its strategic objectives for the next period. The objectives have been identified taking account of the reasonable constraints and infrastructure development plans at the national level, as the as-is infrastructure status has been defined as a key factor determining the scope, quality and timeliness of the service. Therefore, the Company's medium-term focus (until 2020) is to change the business model and improve internal efficiencies by changing the corporate culture as well as the perception of the Company on the market. At the same time, the objectives imply the modification of the transport services offered by the Company (mainly the regional and long-distance lines of business) and the organization of the transport service, i.e. the management of the rolling stock. In the subsequent period, as already noted, the Company will focus on those lines of business that will be the focus of the expected infrastructure modernisation (the regional and long-distance lines of business). The full market liberalisation, expected at the end of 2019, should affect the Company's business, and this makes the Company's operational, technological and strategic readiness for a level-playing field a necessity.

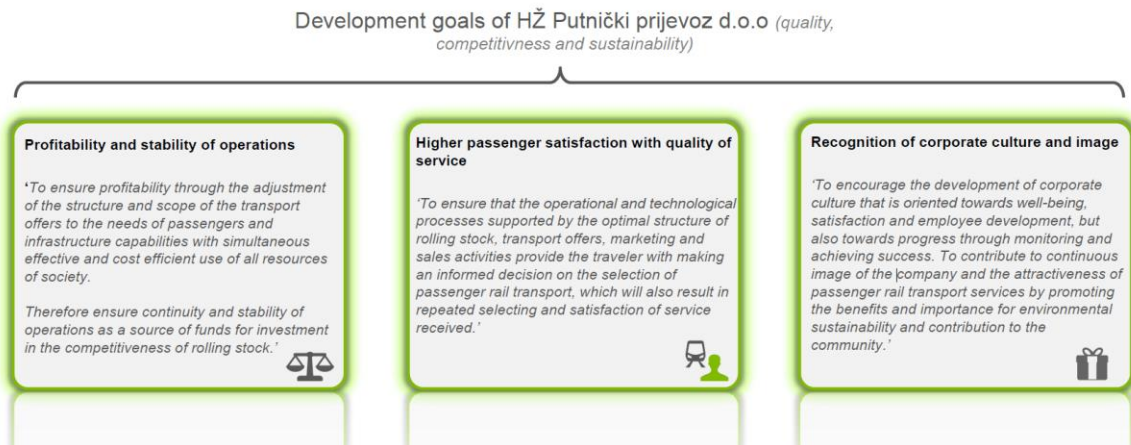


Figure: Development goals of HŽ PP

Achieving the set strategic objectives in the next period will be the Company's key task sought to be implemented by means of strategic programmes i.e. initiatives. Developing strategic initiatives represents a drill-down of the objectives, activities and responsibilities to the various parts of the organisation to ensure that they are implemented successfully and become a key performance indicator form measuring the progress along the path of meeting the strategic objectives.

## 6 Definition of priorities in each involved area

### **Improving traffic systems**

This priority aims to improve the mobility system and improve the safety of participants in traffic by improving the traffic infrastructure — street and road networks, bicycle traffic, pedestrian traffic, stationary traffic, air traffic, and public passenger traffic. This priority also aims to establish the system of traffic supervision and management.

### **Improving infrastructural systems**

The aim of this priority is to improve the quality of the existing infrastructure through its construction, reconstruction, and modernisation. This would ensure a modern, effective, and sustainable system of public infrastructure and other amenities.

### **Improving regional traffic connections**

This priority aims to increase the share of rail transport in suburban-urban traffic, while its modernisation and the reconstruction of the existing infrastructure and construction of new infrastructure aims to develop integrated public transport in the City of Zagreb and in the Zagreb County and the Krapina-Zagorje County by modernisation of suburban and urban rail traffic and development of integrated public transport.

### **Traffic reorganization**

Considers following:

- Support of non-profit groups in the transport area
- Traffic and logistics management and information
- Review/update local/regional Transport Masterplans
- Purchase of new rolling stock

## 7 Recommendations

The Transport Development Strategy observes the citizen mobility in the sense of the use of public transport (rail, tram, bus, waterborne, etc...), as well as individual mobility (transport by car or bicycle and walking). The emphasis is put on public passenger transport and zero emission modes for the purpose of daily migrations.

In recent years, public transport (PT) in Croatia reported a decrease in the number of passengers in all modes of transport. At the same time, an increase in the number of registered cars, passenger car mileage and the general use of passenger cars has been observed. The predominance of private transport is evident through the big traffic jams on access roads to urban

centres, which contribute to increased pollution and noise level, lack of parking space and rising costs for citizens. At present, public transport in the Republic of Croatia is not integrated, as there are no coordinated timetables or single tickets for the different modes of transport. Intermodal terminals, which enable transit from one mode of transport to another, do not exist or are extremely rare. On certain lines, bus and rail carriers have "parallel routes". The contribution of rail transport is penalized by the fact that average age of the rolling stock is close to the end of its service life, while in road transport; the average age of buses is approximately 15 years.

Cities suffer most from congestion, poor air quality and noise exposure. Urban transport is responsible for about a quarter of CO<sub>2</sub> emissions from transport and 69% of road accidents occur in cities. These issues are felt in the main urban nodes/metropolitan areas of Croatia, while the solutions differ due to the existing infrastructural provision, the geomorphologic characteristics and mobility patterns (e.g. presence of the sea and needs for connections to islands, etc.). In order to improve the situation, it is necessary to increase the modal split in favour of public transport and soft modes (pedestrians and cyclists). To achieve that, it is a priority to increase the efficiency and physical, operational and organisational integration of all the modes: railway, tram and bus. It is also necessary to provide good public transport connections to the main demand generator centres (such as airports, ports, cultural centres, city centres, etc.). In cities, switching to cleaner transport is facilitated by usually higher availability of public transport services and higher population density. Pre-trip/on-trip users' information, electronic booking and integrated ticketing covering all transport modes should facilitate multimodal travel. The support to public transport and soft modes should start at the policy level, by committing to prioritise these modes, at the same time limiting/restricting private cars usage especially in the city centres. An appropriate set of passengers' rights has to accompany the wider use of collective modes.

Further implementation of the ITS development strategies will stimulate the implementation of significant projects in the fields of transport systems, especially in urban areas (adaptive traffic management, management of public transport, parking management, intermodal transportation in big cities and ferry ports, management of fleets of vehicles...). Development of ITS in Croatia can be considered as a direct investment in the economic and tourism sector, by increasing the level of transport services and security.

With some exceptions, the current fleet of railway public transport vehicles is aged and based on outdated and inefficient technologies. In order to increase the competitiveness of public transport in comparison with private car it is necessary to modernise the rolling stock ensuring its compliance with the highest quality, safety and environmental standards and the accessibility for persons with reduced mobility. The purchase of new rolling stock should be performed in coordination to the foreseen improvements on the infrastructure and to the development/update of an EC Regulation 1370/2007 compliant PSC. The first step to develop this measure is to perform a comprehensive analysis of the current organisational, operational and maintenance setup of the relevant operators analysing the future requirements and operational and maintenance plan.

Offering competitive alternatives to the use of the private cars is important to achieve the objectives of the Transport Development Study and to ensure the sustainability of the transport system. The different transport modes' hierarchy will be rethought, traffic will be reorganized and integrated seeking prioritization of public transport against private car. At the same time, more pedestrian areas in urban centres has been constructed, bike paths for daily commuters has been built, public bicycle systems have to be implemented and traffic schemes planned to adapt the traffic to seasonal requirements.

The role of non-profit groups that promote the use of alternatives to the private car has proven to be very successful in numerous cities across Europe. Among others, there are groups that promote daily bike use, groups that watch out for passenger rights, for the maintenance of pedestrian areas or even for traffic surveillance. These groups (neighbourhood associations or common interest groups, non-governmental organisations, etc.) can help the local administrations and transport authorities in their duties and help to promote the use of the public transport. The participation of such associations, local groups and non-governmental organizations in the transport planning decisions should be promoted and considered.

New technologies allow among others for real time data gathering and control of traffic conditions and public transport use. To take advantage of these new technologies, centres for centralized management of the public transport should be constructed, equipped with the latest advances in ITS solutions. New public transport vehicles will be equipped accordingly, ITS platforms for trip planning will be used and traffic signalling will be modernized so as to be integrated in the centralized management system (e.g. "Smart Traffic Lights" or public transport prioritization measures). This will allow for a qualitative improvement in the planning and monitoring of public transport, passenger user information, traffic control and real time data gathering regarding congestion, public vehicles arrival times.

Regarding the transport planning obligations, the functional regions and/or cities will be required to develop proper Functional Regional Masterplans (following the Sustainable Urban Mobility Plans principles). These Functional Regional Masterplans will analyse current situation of the transport systems considering not only infrastructural but also operational and organisational aspects and based on the outcomes of these analyses the future needs will be identified. The existence of these plans is a pre-requisite for investing in public transport systems. These Masterplans will be periodically reviewed and updated and must be in line with the high-level planning instruments such as the TDS.

## 8 Conclusions

The need for the development of public transport system has been confirmed by the numerous examples of good practices from the developed European countries as well as national strategies with numerous measures, hypothesis and potential steps.

A bicycle is a very useful means of transport that can be implemented for transport on shorter distances and in urban areas. There is a great potential to change the travel behavior in favor of bicycles, public transport, e-mobility etc., which would bring a significant reduction of greenhouse gas emissions and enable the application of multi-modal transport systems.

In order to correct the existing traffic system deficiencies in near future plans should offer appropriate solutions and set the main goals of the traffic system development, which the following would be achieved by:

1. Improving transport accessibility to the whole region through the development of an efficient and sustainable transport system;
2. Enabling greater mobility of the population using the modes of transport that are environmentally friendly, and energy and cost effective for society;
3. Integrating transport subsystems through institutional, organizational and infrastructural improvements, with particular emphasis on the integration of public transport systems;
4. Increasing traffic safety.

Improvement of accessibility in passenger transport within the city of Zagreb and surrounding suburban area is planned through the integration of public transport with the following objectives:

1. The inclusion of neighbouring cities and regions in an integrated transport system with the City of Zagreb, in order to improve, through a common tariff coordinated organization of transportation and harmonized level of transport service quality;
2. Increase efficiency, as a result of physical, operational and organizational integration of all forms of transport; rail, tram and bus, as well as a variety of alternative forms of movement;
3. Applying one ticket for one trip for the integration area, an integrated transport system would provide greater quality and attractiveness of the public transport of passengers due to; shortening travel time, reducing travel costs, better informing public transport users, and increasing public transport availability.
4. In general, development has the task of exploring, in a mutual relationship of social, economic, political and special traffic elements with the aim of ensuring adequate development in the area of coverage.

Transport as an important aspect of the functioning of a specific area is key to the function and development of the economy and society in general. In the circumstances where the old challenges remain and the new ones appear, it is necessary to provide the answer to the question of how to meet the existing, as well as the future, traffic demand, taking into consideration the restrictions related to the resources and environment protection. From the transport planning perspective, certain transport documents will serve a basic

documents for considerations about the development of the transport system in accordance with the spatial abilities of the relevant area, economic demand and needs of the population. Special attention should be given to the development and improvement of environmentally friendly transport systems (including those with a low level of noise) as well as the transport systems with low CO<sub>2</sub> emissions. Furthermore, the attention will be paid to the multi-modal connections with an aim of promoting sustainable regional and local mobility.