DELIVERABLE D.T1.2.6

Territorial needs assessment for NUTS2_KONTINENTALNA HRVATSKA

Version 2.0
11/2017

1. Overview of the selected region

1.1. Delimitation and basic geographical description of the pilot area

Region (NUTS 2) *HR04 Continental Croatia*

Continental Croatia is one of the two NUTS-2 Regions of Croatia. The region forms the continental part of the country. The most populated cities in the region are Zagreb, Osijek, Slavonski Brod, Karlovac, Sisak and Varaždin. It accounts for 56% of the country's territory and 67% of the population. The pilot area is city of Zagreb and Zagreb County, due to the fact it represents hub and departure of all transport lines.

Figure 1: NUTS 2

Sub-region (NUTS 3) *HR041 City of Zagreb*

The counties of Croatia are the primary administrative subdivisions of the Republic of Croatia. Since they were re-established in 1992, Croatia has been divided into 20 counties and the capital city of Zagreb, which has the authority and legal status of both a county and a city (separate from the surrounding Zagreb County). As of 2015, the counties are subdivided into 128 cities and 428 (mostly rural) municipalities.

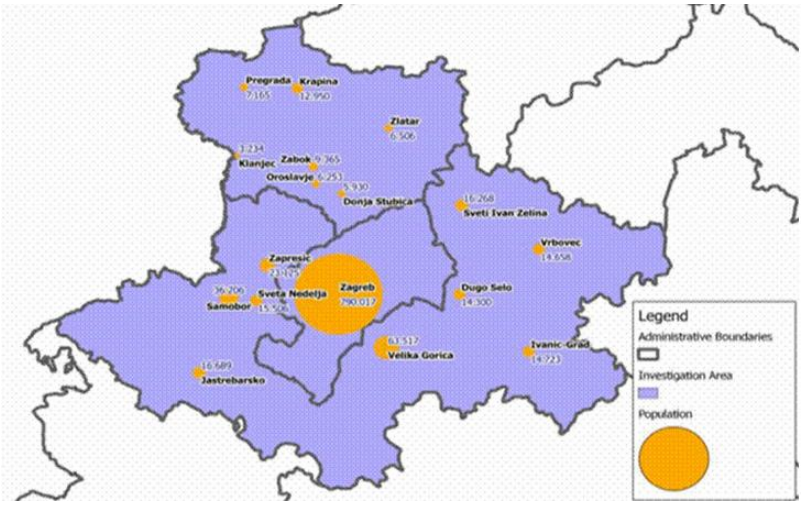

Figure 2: NUTS 3

The functional regions are defined and based on the key characteristics of the regions, establishing zones which are sometimes overlapping. Functional regions are based on the analysis of the transport interactions and are not necessarily identical with administrative regions and can be multinational.

With the current data available, the following functional regions have been defined:
- Central Croatia,
- Eastern Croatia,
- Northern Adriatic,
- Northern and Central Dalmatia and
- Southern Dalmatia.

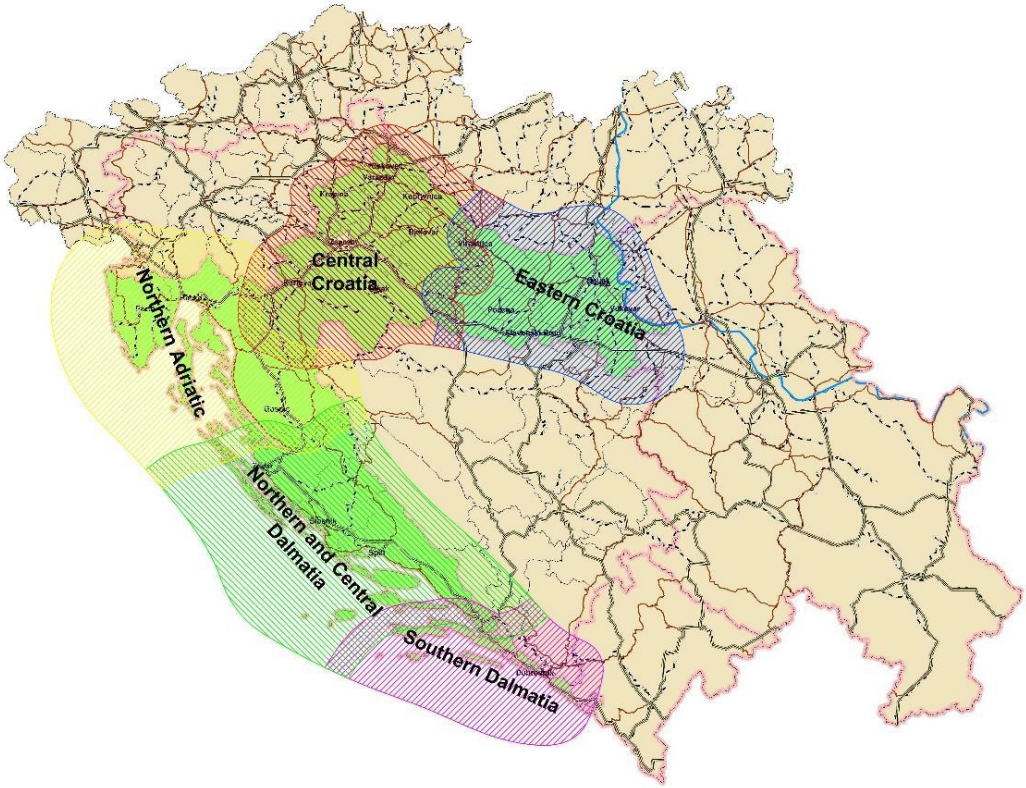

Figure3: Zones for Functional Regional Analysis

Given its geographic position, Central Croatia plays a prominent role in the transport network of Croatia and Central-Eastern Europe. To the north, the region borders with Hungary and with Slovenia to the west and Bosnia and Herzegovina to the south. The region also borders two of the other functional regions, the Northern Adriatic and Eastern Croatia, the west and east respectively. The region is characterised by mainly flat, but occasional hilly terrain having the Karlovačka County as the most mountainous area of the region. The Drava and Sava rivers cross the region and the main city of the region is the City of Zagreb.
Industry in Croatia is based mainly in Zagreb and its surroundings. Zagreb is primarily the center of government, science and culture. The industrial plants located in the region belong to the subsectors of steel industry, electronics, drug industry, clothing, trade and packing industry. Zagreb, the capital, is the most important economic centre of the country, and is home to 790.117 inhabitants. There are no other macro-regional centres in Central Croatia. The region is quite well known for its spas which lead to the creation of new health care services. Other touristic attractions, on a smaller scale, include fishing, hunting and active leisure activities (like rafting and kayaking). The role of Zagreb as a centre for economics makes it an attractive location for conferences, and therefore, business tourism. The reasons for considering Central Croatia as a functional region are varied. On one hand, the capital's economic-cultural potential; its central role means that it has a radial structure of the road network. Travel requirements are concentrated mainly on the Capital and a considerable level of daily traffic between the Capital and the counties can be observed. The border crossing traffic is quite concentrated on few available crossing points. The region and specifically the capital is a centre/hub for long distance traffic. It is the crossing point and the transport infrastructure axis for both road and rail. It also has an International airport. The traffic volumes are quite high both in road (for passengers and freight) and in rail traffic (passenger and freight traffic that is mainly linked to the ports). The ratio of railway kilometers over the population of the county is 1,6544, which is slightly greater than that for the Republic of Croatia, which is 1,566.
Regional traffic is characterized by the radial transport structure which is highly concentrated in Zagreb. A demand for transportation from the smaller settlements of the region to the Capital can be observed, mainly for commuting or for business purposes. However given that Zagreb is the location of education centers, many students commute on a daily basis. Out of the ten most populated cities in Croatia, three are located in Central Croatia (Zagreb, Karlovac, Velika Gorica). The attraction of the Capital for reasons of employment is greater than other bigger cities despite the concentration of industries in these municipalities. Therefore, road and rail infrastructure density is high and there are regular bus and rail services. The suburban rail transport system serves around 55,000 commuters daily.
Transport figures are mainly available for Zagreb. The size of the fleet of transport and amount of services is being progressively adjusted to meet demand, with the tramway network acting as the backbone of the system. The bus fleet is relatively new (the average age of the vehicles is around 8,1 years) and CNG engine vehicles are also in use. The average age of tram fleet is 21,667 years (motor cars: 18,12 and tram trailers 371,11 years).
The city of the functional region with own public transport systems is Zagreb with population of 790.017 inhabitants. In city operates rail suburban traffic, trams on 19 trams lines (15 day and 4 night lines) which transport 171 million passengers per year as well as busses with 118 day lines of which 100 lines are local only in the City of Zagreb, 18 lines connect the region and Zagreb (local and regional area) and 4 night lines. Zagreb`s bus transport transports 79 million passengers annually.

1.2 Recent population and demographic trends

Croatia sits at the crossroads of the Mediterranean, Southern Europe and Central Europe, and thus has very diverse climates. In 2015, the population is estimated at 4.25 million.
Croatia has been experiencing a population decline, although it's believed its population has increased slightly to 4.25 million in 2015 from the 2011 census figure of 4.28 million. This makes Croatia the 128th

most populous country in the world. Croatia has a population density of 76 people per square mile (196/square mile), which ranks 126th in the world.
The capital and largest city, Zagreb, has city population of 790,117. The next largest city is Split, with only 178,000 people.
Croatia is in demographic crisis and losing people each year. Its fertility rate is just 1.5 children per woman, one of the world's lowest, and its death rate has exceeded the birth rate since 1991. Natural growth is negative. Croatia is now ranked as the 14th fastest shrinking country in the world. It's predicted that Croatia's population will shrink to 3.1 million by 2050, after reaching its peak of 4.7 million in 1991.

Last UN estimate (July 1, 2017) population is 4,189,353, and population change since January 1st is number -2,754 (conclusion: negative balance). In 2015 urban population amounted 59% from total population and rate of urbanization was 0.11% annual rate of change for time period 2010-15 est.

Age structure:	Percentage	Male	Female
0-14 years	14.22%	315,971	297,339
15-24 years	11.4%	252,285	239,634
25-54 years	40.75%	878,971	878,707
55-64 years	14.83%	312,621	326,929
65 years and over	18.81%	320,418	490,832

Table 1: Population percentage for 2016

Mode of public transportation	Number of passengers (000)
Streetcar	193 152
Bus	89 172

Table 2: Number of passengers in public transport vehicles

Motor vehicles	Number of vehicles
Number of registered motor vehicles	346 230
Taxis	1 290
Passenger cars	289 706

Table 3: Number of motor vehicles

With 21 trains, the Zagreb suburban railway mainly covers the eastern and western parts of Zagreb. It mostly operates on the same standard-gauge lines used for Croatian Railways' long-distance trains. The trains normally operate on a 15-minute frequency, but reach only a portion of the city's suburbs.

Year ▾	Population	% Male	% Female	Density (km²)	Growth Rate
2017	4,189,353	48.20%	51.80%	74	-0.55%
2015	4,236,016	48.18%	51.82%	75	-0.43%
2010	4,328,153	48.17%	51.83%	76	-0.23%
2005	4,378,057	48.16%	51.84%	77	-0.23%
2000	4,428,072	48.14%	51.86%	78	-0.83%

Figure 4: Population history

Year ▲	Population	% Male	% Female	Density (km²)	Growth Rate
2020	4,115,947	48.25%	51.75%	73	0.00%
2025	4,002,885	48.32%	51.68%	71	-0.56%
2030	3,895,784	48.40%	51.60%	69	-0.54%
2035	3,790,127	48.49%	51.51%	67	-0.55%
2040	3,681,556	48.59%	51.41%	65	-0.58%

Figure 5: Population projections

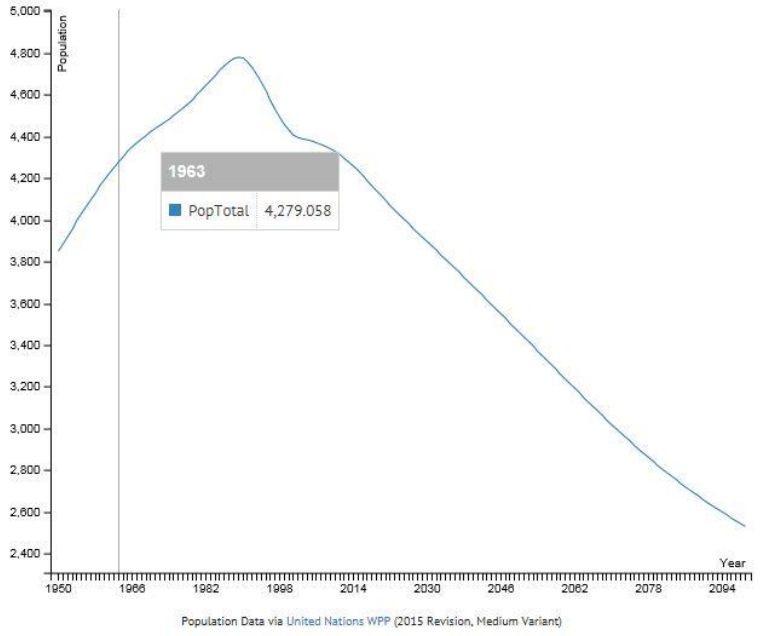

Figure 6: Population in general

1.3. Transport network and accessibility conditions

Public transportation in the city is organized in several layers: the inner parts of the city are mostly covered by trams, the outer city areas and closer suburbs are linked with buses and rapid transit commuter rail. The public transportation company ZET (Zagreb Electric Tram) operates trams, all inner bus lines, and the most of the suburban bus lines, and it is subsidized by the city council. The national rail operator Croatian Railways (HŽ Passenger transport) runs a network of urban and suburban train lines in the metropolitan Zagreb area, and is a government-owned corporation. The funicular in the historic part of the city is a tourist attraction. Taxis are readily available through a network of around 3000 taxi vehicles, but this type of Zagreb's public transport hadn't been particularly popular among the residents until the end of the 2000s due to the monopoly of only one taxi company. In early 2010, numerous transport companies have been allowed to enter the market; consequently the prices significantly dropped whereas the service was immensely improved so the popularity of taxis in Zagreb has been increasing from then onwards. The commuter rail network in Zagreb has existed since 1992. In 2005, suburban rail services were increased to a 15-minute frequency serving the middle and outer suburbs of Zagreb, primarily in the east-west direction and to the southern districts. This has enhanced the commuting opportunities across the city.

Figure 7: Railway network in Croatia

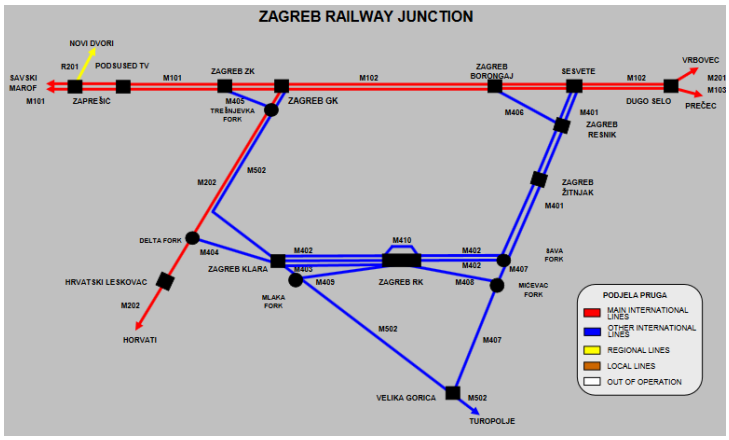

Figure 8: Zagreb junction

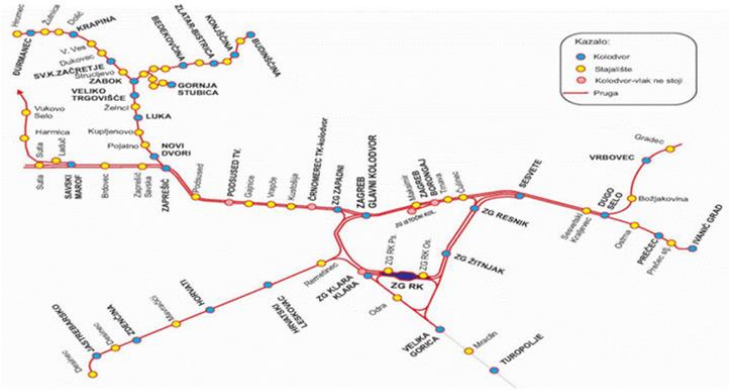

Figure 9: Network of urban-suburban railway

Urban and suburban railway passenger transport in the area of research is mostly located in the corridors of international and regional railway traffic.

The following main transport corridor and his branches traverse Croatia:

• Corridor X Salzburg – Villach – Ljubljana – Zagreb – Belgrade – Skopje - Thessaloniki.
The Croatian railway and road sections of that main corridor are 317 km and 306 km long, respectively.

The Croatian railway network comprises, in total, 2,722 km of track, of which 254 km (9.3%) is double track and 2,468 (90.7%) km is single track; 985 km is electrified. Croatia has the second largest portion (26%) of the SEE Core Rail Network which, in total, is 4,264 km long. Railway Corridor X, again on the SEE Core Network, is 1,058 km in length and accounts for about 50% of the overall length of the Corridor X. The Croatian part of Railway Corridor X on the SEE Core Network passes from Savski Marof via Zagreb and Vinkovci to Tovarnik on the eastern border and is 317 km long.
In terms of the density of the rail network, Croatia exceeds the EU average with 61 km per 100,000 inhabitants, as against 43 km per 100,000 inhabitants in the EU 27. During the war, great damage was inflicted on the railway infrastructure contributing to the fall in traffic on the railways. The lack of public funding during the past decade led to a backlog of investment and maintenance.

Northwest Croatia has a 60% higher density of road network in relation to the national average, in relation to other Croatian NUTS 2 regions it is the most developed according to this indicator. This is logical, since this region includes the City of Zagreb which is the hub of the local transport axes as well as it includes intersections of most branches of the international transport corridors that pass through Croatia. Furthermore, railway Corridor X passes through this region. However, with regard to the density of railway network being 39.18 km of railways per 100,000 inhabitants, Northwest Croatia is the worst positioned in relation to the national average (61.34 km per 100,000 population), and is also below average for the EU 25, which is 45 km per 100,000 inhabitants. Only Northwest Croatia has maintained the same volume of railway traffic.
The level of motorization in Zagreb is relatively high and ranges around 220 automobiles per 100 inhabitants. The most of these cars are in private ownership. The consequence of such concentration of vehicles, as well as other factors, is the low throughput capacity of traffic in the urban area, with the average speed of about 20 km/h. A special problem due to such large number of vehicles is the shortage of parking spaces, not only in the strict city centre, but also in other residential areas outside the very city centre. On urban highways, speed limits are used on bottleneck locations i.e. on locations where congestion occurs to improve their LoS. Usually, the bottleneck locations are related to places where on- and off-ramps are located. Since the traffic demand is changing during the day, variable speed Limit values are used today to change the speed limit according to the current traffic or weather situation.

Figure 10: Highways in Croatia

The tram network covers an area of approximately 50 km in length and is placed on the inner-city area.

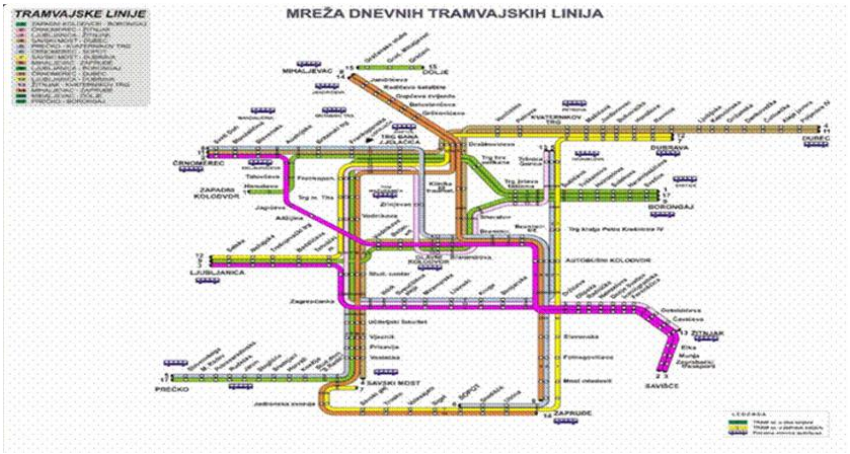

Figure 11: Tram network

Bus network covers the complete area of research in which the urban and suburban transport of passengers involves 32 transport operators, of which only 6 achieves more than 90 per cent of transport efficiency.

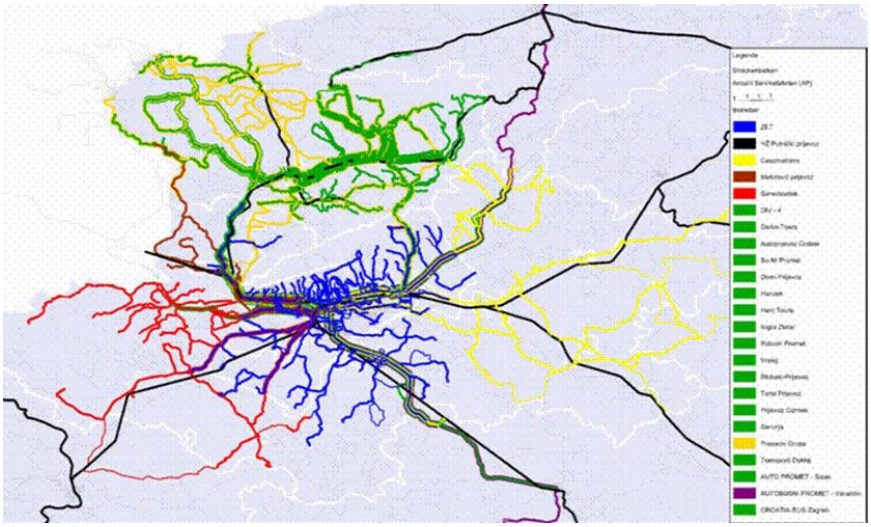

Figure 12: Bus network

1.4. Organisation of transport sector and key stakeholders

In Croatia, the public transport of passengers is conducted according to market conditions and railway operator needs to have permission as well certificate for conducting public services which for operator provides Ministry and Agency for railway safety. Operator is obliged to correspond to national legislation (Railway act) as well as EU legislations and laws. Ministry of Maritime Affairs, Transport and Infrastructure (MMATI) is one of stakeholders and also national responsible body for conducting national PSC contracts.
The transport sector in Croatia has an important role in the economic development with a share of about 8 percent of GDP, employing the same percentage of the labor – about 80,000 employees. Its significance has been additionally articulated by the fact that transport connection is a precondition of regional and tourist development of a country, as well as of a better geo-strategic positioning in the European integration processes. Integrated traffic of Zagreb area Ltd. (IPZP) is stakeholder and its regular business is involved in preparation and implementation of projects related to the establishment of a new model of passenger transportation and management of the same in the geographical area of the City of Zagreb, and Zagreb County.
In Croatia, however, there is no unambiguously defined integral transport development policy. Although formally in force since 1999, the Transport Development Strategy of the Republic of Croatia is not a consistent development document, but rather an infrastructure-oriented document per single transport branches. In principle, the actual concept of the transport development is concentrated per single branches of transport and focused to a greater extent on the transport infrastructure rather than on the organizational and administrative competence of the transport sector. HŽ Infrastructure Limited Liability Company for Management, Maintenance and Building of Railway Infrastructure is Company responsible for organization and railway transport regulation as well as infrastructure access. It is one of stakeholders, responsible for traffic operation and management, and their mission is to enable optimum use of traffic and transport capacities of the railway network, together with maximum safety.
The respective Ministry and its subordinate institutions are in charge of designing and implementing the transport policy, but actually, in the previous practice the main function of the ministry was reduced to designing, proposing and implementing the national strategies of single transport branches, creating conditions for the development of infrastructure, coordination of activities for the area of transport and participation in designing the transport safety policy as well as reduction of harmful impact of transport on the natural environment.
Legal framework consisting of applicable legislation for the rail sector:

- Railway Act (OG no. 94/13 and 148/13),

- Decision of the Classification of the Railway Lines of the Government of the Republic of Croatia (OG No. 03/14),
- Railway Safety and Interoperability Act (OG no. 82/13),
- Regulation of Railway Market Act Agency for railways services regulation Act (OG no. 71/14),
- Act on transport contracts in railway traffic (OG no. 87/ 96),
- Act on benefits in domestic passenger traffic (OG no. 97/ 00 and 101/00)

2. Territorial needs assessment

2.1. Connectivity

Total arrivals of passengers in the cross-border traffic in the Republic of Croatia in June 2017 amounted to 9.0 million, which is an increase of 13.5% compared to June 2016 when they amounted to 8.0 million. Arrivals of domestic passengers increased by 4.3% and of foreign ones by 17.2%, as compared to June 2016.

In June 2017, arrivals of passenger road motor vehicles in road cross-border traffic increased by 16.2%. Out of that, arrivals of passenger cars increased by 16.1% and of coaches by 22.3%, as compared to June of last year. Out of the total entry of passengers at road border crossing points, 4.8 million passengers entered across the Croatian-Slovenian border, which is by 15.4% more than in June 2016, and 2.4 million across the Croatian-Bosnian and Herzegovinian border, which is by 9.8% more than in June 2016.

Total number of domestic passengers is shown in figure below.

Cross-border traffic	Ulazak *Entry*			Izlazak *Exit*			
	promet, tis. *Traffic, '000*		indeksi *Indices*	promet, tis. *Traffic, '000*		indeksi *Indices*	
	VI. 2016.	VI. 2017.	VI. 2017. / VI. 2016.	VI. 2016.	VI. 2017.	VI. 2017. / VI. 2016.	
Ukupan granični promet	7 966	9 041	113,5	7 499	8 367	111,6	*Cross-border traffic – total*
Domaći putnici	2 298	2 397	104,3	2 311	2 314	100,2	*Domestic passengers*
Strani putnici	5 668	6 644	117,2	5 188	6 052	116,7	*Foreign passengers*
Cestovni granični promet	7 246	8 232	113,6	6 859	7 652	111,6	*Road cross-border traffic*
Domaći putnici	2 253	2 330	103,4	2 267	2 248	99,1	*Domestic passengers*
Strani putnici	4 993	5 902	118,2	4 592	5 404	117,7	*Foreign passengers*
Željeznički granični promet	35	25	71,8	30	20	67,0	*Railway cross-border traffic*
Domaći putnici	6	5	74,1	6	4	67,2	*Domestic passengers*
Strani putnici	28	20	71,2	24	16	67,0	*Foreign passengers*

Figure 13: Cross-border traffic

Strucutre of inland passenger transport by type of Transport in 2015 is divided on 29% of railway transport and 71% of Road transport.

15 **Prijevoz putnika i robe** — ***Transport of passengers and goods***

	Željeznički prijevoz *Railway transport*		Cestovni prijevoz *Road transport*		Cjevovodni transport *Pipeline transport*	Pomorski i obalni prijevoz *Seawater and coastal transport*		Prijevoz unutarnjim vodnim putovima *Inland waterway transport*	Zračni prijevoz *Air transport*	
	prevezeni putnici, tis.[1] *Passengers carried, 000*[1]	prevezena roba, tis. t *Goods carried, 000 t*	prevezeni putnici, tis. *Passengers carried, 000*	prevezena roba, tis. t *Goods carried, 000 t*	transportirano nafte i plina, tis. t *Oil and gas transported, 000 t*	prevezeni putnici, tis. *Passengers carried, 000*	prevezena roba, tis. t *Goods carried, 000 t*	prevezena roba, tis. t *Goods carried, 000 t*	prevezeni putnici, tis. *Passengers carried, 000*	prevezena roba, tis. t *Goods carried, 000 t*
2011.	49 983[2]	11 794	52 561	74 645	7 772	12 926	30 348	5 184	2 078	3
2012.	27 669	11 088	52 293	65 439	6 878	12 474	25 636	5 934	1 961	4
2013.	24 265	10 661	54 292	67 500	7 617	12 770	24 744	5 823	1 812	3
2014.	21 926	10 389	54 000	66 146	6 918	13 029	20 335	5 377	1 860	3
2015.	21 683	9 939	52 126	66 491	8 162	13 082	21 376	6 642	1 919	3

1) Uključeni su putnici u tranzitu.
2) Promjena u metodi obračuna broja putnika u unutarnjem prijevozu.

1) Including passengers in transit.
2) Change in the method of calculation of the number of passengers in the national transport.

Cestovna i željeznička infrastruktura — ***Road and railway infrastructure***

	Duljina cesta, km[1] *Length of roads, km*[1]						Duljina željezničkih pruga, km *Length of railway lines, km*		
	ukupno *Total*	autoceste[2] *Motorways*[2]	državne *State roads*	županijske *County roads*	lokalne ceste *Local roads*	od ukupnoga E-ceste *Out of total E-roads*	ukupno *Total*	elektrificirano *Electrified lines* km	elektrificirano *Electrified lines* postotak od ukupnoga *Percentage out of total*
2011.	29 410	1 254	6 843	10 967	10 346	2 250	2 722	984	36,1
2012.	26 690	1 254	6 581	9 809	9 046	2 251	2 722	984	36,1
2013.	26 814	1 289	6 711	9 720	9 094	2 200	2 722	985	36,2
2014.	26 778	1 290	6 723	9 628	9 137	2 251	2 604	970	37,3
2015.	26 706	1 310	6 758	9 640	8 998	2 251	2 604	970	37,3

1) Izvor: Hrvatske ceste d. o. o. Podaci se odnose na razvrstane javne ceste otvorene za promet.
2) U duljini autocesta prikazuje se dio brzih cesta koje su kategorizirane kao autoceste.

1) Source: Hrvatske ceste d. o. o. Data relate to ranked public roads that are open to traffic.
2) Length of motorways includes a part of express roads categorised as motorways.

Figure 14: Transport of passengers and goods vs road and railway infrastructure

2.2. Infomobility systems

Regarding infomobility public transport, ZET is leader with displays at stations as well as ticket validators in vehicles. Sever types of tickets that ZET offers are at higher level of IT. This refers to contactless ticket/card at a price of approx. 1,3 € at ZET sales points, TISAK and iNovine kiosks. It can be recharged with any amount from 1,3 to 133,3 €. Contactless tickets are transferrable and can be used to pay tickets for more people and to buy a ticket for several days. It is also valid for all zones and lines (buses, trams and funicular).

Via the official website, HŽ PP has possibility to offer ticket reservation as well as ticket purchase in the domestic transport and is considered advanced IT system. From the August 21st 2017 HŽ PP has started with delivering smart cards. It is be possible to create profile at all ticket offices and smart cards will replace HŽ PP cards which enables passengers to buy monthly or yearly tickets with discount. IT solution is also free download of mobile application for ticket purchase online from the app store. Ticket sale via the website/smartphone application is part of an integrated sales and ticket reservation system (ISPRO) of HŽ Putnički prijevoz. Another IT solution and advancement for HŽ PP was introducing mobile terminals with which conductor can validate and sell tickets on the train. Ticket vending machines are installed at Zagreb Main station and stations Osijek, Slavonski Brod, Vinkovci, Varaždin, Rijeka i Split where customers can purchase train tickets with cash or credit card. All terms of passenger transportation are regulated via internal tariffs and are published in General Terms and Conditions of performing station services.

Also, joint solution for customers is monthly and yearly tickets for ZET – HŽ PP public transport usage and can be bought at ZET offices and are valid for second class trains as well as all ZET busses and trams.

2.3. Integrated ticketing and tariff schemes

Planning, managing and operating Public Transport in a more efficient, transparent and financially sustainable way by means of a Public Service Contract (PSC) compliant with Reg. 1370/2007 falls also under this same perspective/vision. Also, unlocking the potential of private finances equally requires an improved regulatory framework and innovative financial instruments. Project assessment and authorization must be carried out in an efficient and transparent manner that limits time, cost and uncertainty.

The road network in major cities is prone to everyday recurring congestions. To solve this problem many approaches are applied, like intermodal transport, encouraging mode shift from car to public transport or non-motorized transport, building new transport infrastructure, etc. One of the approaches is the application of solutions from the domain of intelligent transportation systems (ITS) i.e. establishing various services to help the transport network users to optimally use it. A very important service from the domain of ITS is road traffic control, and it is applied to urban and rural road networks to improve its throughput, reduce congestion and vehicle emissions, improve the level of service (LoS) and reduce accidents. One special case of roads are urban highways built as bypasses around larger cities or to connect urban districts of mega cities including suburbs with the city center. They characteristic are a larger number of nearby on-and off-ramps.

The public transport network of Zagreb Electric Tram is divided into five tariff zones. Different ticket prices apply as per the valid Public Transport Rates. Tickets are divided per tariff zones and tariff areas. All trams and buses were equipped with ticket validation terminals that allowed travelers to select their travel zone and obtain tickets for more than one person at once. The terminals can be operated in four international languages, as well. The new system required an update of the tickets on offer in order to meet user requirements. Generally, all old tickets were replaced by the electronic version and some new types of tickets were added. Thanks to a broad marketing campaign, the citizens of Zagreb did not experience a rough transition from the old system to a new one. Online polls suggest that citizens are in general indeed satisfied with the new system! Furthermore, ZET invested in the introduction of a contact and information centre where citizens can quickly find out all relevant information such as opening times of ticket vendors, as well as information about time tables, present traffic conditions, prices, etc. A research study for an integrated public transport tariff system on national level was produced. The study can be considered as a first step towards integrated transport and a unified tariff system on the city and national level.

There are three ways of public transportation - trams, buses and city railway. They operate all day (every few minutes) and night (every hour). Tickets can be bought on board (1,3 €) or at newsstands (1,01 €). Daily tickets are available at a price of 3,33 €. Monthly or annual tickets can also be bought in ZET (Zagreb Electric Tram) offices at a reduced price (www.zet.hr). For a monthly/annual ticket it is needed to fill in a ZET-form, stamp it at the faculty/academy person works or are affiliated to. Then you person needs to go to the central office of the Zagreb Electric Trams where needs to purchase a pass (30 kn, app. 4€ + photo) and every month needs to buy a ticket for 360 kn, app. 48 €. This monthly ticket enables to use all buses and trams in the area of the city of Zagreb.

HŽ Passenger transport made possible that the train tickets can be paid in cash and in kunas, while some of the bigger stations have the possibility of paying by credit card.

HŽ Passenger transport has implemented a new integrated ticketing and booking system. The Management of the company HŽ Passenger transport has signed a contract with a selected community of bidders, which involves the company Scheidt & Bachmann GmbH from Germany, KING ICT d.o.o. from Zagreb and Četrta pot d.o.o. from Slovenia. The investment is worth HRK 43.3 million and includes an expert supervision.

New system involves implementation of the central ticketing system maintaining online ticketing 24/7 via Internet portal of the company HŽ Passenger transport and smartphone application, which the users are able to install on their cell phones free of charge. Ticketing via free standing vending machines is being introduced. Free standing vending machines are cash-free vending machines where users are able to buy tickets with credit cards at any time. Four free standing vending machines are placed at Zagreb Main Station. One free standing vending machine is placed at railway stations in Split, Osijek, Vinkovci, Rijeka, Varaždin and Slavonski Brod. With regard to free standing vending machines, an additional network upgrading to other points of sale is also introduced. New ticketing channel is implemented by train guards who are using 580 mobile terminals for ticket control and ticketing on board.

In addition, a modernization in terms of the existing method of ticketing via free standing terminals at ticket offices will be implemented. It involves 222 terminals, which will be placed at official points of sale (railway stations and stops). 150,000 smart cards will be introduced. They will replace the existing paperboard tickets, which are valid either for a month, several months or for the entire year. In addition, smart cards will be used for purchasing individual cards as prepaid cards, by means of which the customers will be able to buy tickets at ticket offices, via vending machines or from train guards.

The issuing concept in terms of tickets used up until now does not comply with market trends and requirements. Currently, there are 196 points of sale of the company HŽ Passenger transport. At 150 points of sale, tickets are sold via free standing terminals, whereas tickets are issued manually at the remaining points of sale. Payment by credit cards is possible at half the points of sale at the moment.

New system involves ticketing and reservation of tickets in domestic and international passenger transport by issuing electronic ticket solely. Besides collecting different data, which are important to the business of the company, the objective of the company HŽ Passenger transport is to increase revenue by upgrading the level of the quality of the service using several modes of payment, by making it possible for the customers to buy tickets 24/7, by offering new tariff models, by reducing time required to issue tickets and by business process automation.

3. SWOT analysis

Strengths	Weaknesses
• Prominent role in the transport structure and network of Croatia and Central-Eastern Europe • Favorable transport and geographical position of the region (intersection of two Pan-European Corridors) • Intense agriculture utilization • Concentrated industry • Hub of long distance traffic • Favorable geographical network positioning for the development of international traffic as part of the Pan-European transport corridors X, V and VII; • Croatia and its surrounding countries have the same railway gauge	• Some counties are not competitive compared to the rest of the region • Transversal connections are missing • The main roads and highways are quite busy with relatively high road toll charges • High prices for tickets for international journeys • Lack of international rail connections
Opportunities	**Threats**
• Economic-social development of the region • Faster Capital accessibility • Functional collaboration with the neighboring regions	• Developing competition to other transport modes

• The growth of cross-border traffic	

4. Overall conclusion

Due to the distinctive geographical shape of the Republic of Croatia, appropriate infrastructure and a developed transport system are of particular importance for the balanced economic development of the country. In addition to being essential for development, the transport sector, due to the geographical location of the country, can become the driver of its economic growth and, since Croatia is located on important pan-European transport corridors and adjacent to the Adriatic Sea it is in a favorable position to develop the transport network and associated activities. In order to use the advantages of its geographical location, it is important for Croatia to develop the transport sector not only in accordance with its own development needs, but also with international needs, and to integrate the transport sector into the trans-European transport network.

According to EU policy of stronger cross border cooperation between regions of neighboring countries, it is necessary to emphasize the importance of regional cross border corridors between EU countries. This is even more important after Croatian accession to "Schengen area", which provides easier way for these kinds of connections. In addition, the geographical situation of Croatia in Europe makes the consideration of the transport connectivity with neighboring countries of special importance, in particular the consideration of transit traffic in terms of freight and passengers. International traffic in Croatia (with origin or destination in Croatia and transit traffic) is relevant for all the transport modes: rail, road, air, maritime and inland navigation. For these reasons, it is crucial for a proper system planning to improve passengers' and freight's accessibility and to eliminate bottlenecks at national borders. Bottle neck in situation regarding Croatia and Slovenia railway traffic is long crossing procedures i.e. custom and police controls which delays train.

International transport of passengers in Croatia is of relevance mainly for road transport. Other modes have relevance for international passengers only for specific groups of passengers (maritime for tourists and air for tourist and business travelers). In order to enhance the role of Croatia as a transit country in terms of international mobility and to increase its positioning as a main tourist destination, it is necessary to improve passengers' international accessibility by completing the missing links on the main transit corridors and improving their accessibility.

Zagreb is the main economic and transport node of Croatia and the clear centre of the functional region in terms of long distance accessibility. The majority of the long distance trips inside Croatia start or end in Zagreb. The relevant transport modes for the functional region's long distance accessibility are road (high degree of completion of the motorway network), rail (high number of sections under modernization) and air (airport to be modernized and extended and its accessibility by public transport to be improved).

Given the considerations above on the relevance of this area and its main centre, it is of high importance to increase the long distance passenger accessibility to the functional region, with a specific focus on the city of Zagreb, in particular its public transport system - by road and by rail where justified.

Despite the long distance to the main economic centres (especially Zagreb) and the low population density of some of the regions in Croatia, it is very important for the sustainable growth of the country to provide these areas with adequate regional connectivity in order to stimulate economy and facilitate commuting. In order to optimize available resources and provide affordable public transport for all the citizens, it is crucial to identify the most suitable solution for each region. In this case, on top of the traditional rail and road modes, for the regional connectivity of some regions a good potential might be represented by some public transport solutions based on the development of railway regional public transport, in connection/as a complement to the traditional ground public transport. It is also important to optimize public transport operational schemes and in order to achieve that, it is a priority to increase the efficiency and physical, operational and organizational integration of all the modes: railway and bus with demand based public transport services, etc.