

## DELIVERABLE T1.1.2

# DATA COLLECTION AND ELABORATION – TRANSNATIONAL REPORT

December 2018

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## PART 1: INTRODUCTION AND AIM OF THE REPORT

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SMILE (FirSt and last Mile Inter-modal mobility in congested urban arEas of Adrion Region) project is focused on first and last mile of mobility in the Adrion Region, where it aims to achieve a real sustainable mobility. This represents an interesting challenge for these variegated urban areas that include costal, inland and bordering cities of different size. In fact, the municipalities involved in the project are capital, middle cities and little cities. Many problems affect them: transport network congestion and related waste time, transport accidents, air pollution and noise. The economic impacts are very large and effective solutions have not yet been found, due to the fact that there is also a problem related to the most appropriate institutional level to face it. For this reason, SMILE tackles the problem from a strategic point of view, involving some multilevel institutions that can be seen as knowledge providers. It involves 12 partners (11 project partners and 1 associated partner). The partnership has been built by involving institutions capable to have an inter-municipal coverage (Regional Agencies), local authorities with implementing capacity, supporting bodies providing consultancy, services and education in field of mobility, an academic-knowledge provider, a strategic planning body. So the Adriatic-Ionian Region municipalities and stakeholders, involved in the project, agreed to work together for the benefit of each country and the whole region. The point of view of the stakeholders and their knowledge of the territorial and transport problems represents a delicate part for the analysis of the current state of mobility. The acquisition of the opinions of the stakeholders and of the identified objectification data will consist of choosing the best strategies to face problems. The novelty and originality of SMILE resides in the elaboration of mobility scenarios and SUMP (Sustainable Urban Mobility Plan) scheme within a transnational context and in the mix of IT solutions that will be tested in order to the main transport issues, to promote intermodal solutions and to make more efficient traffic flows. The transnational approach is needed because it allows a comparison, exchange and share of experiences. In any way, the elaboration of a transnational SUMP-Sustainable Urban Mobility Plan as common cognitive umbrella under which to elaborate local SUMPs mirroring local specific situations. In fact, in the first/last mil, integrated actions are needed to equilibrate modal shift and promote a stronger inter-modality between different sustainable areas.

The report aims to recap the data collected and provide a complete overview about destination profile of each project partner's area. It wants to underline the general state of the mobility, the main negative externalities of mobility and the associated strengths. So, data collection, analysis and elaboration give a portrait of different urban and rural areas involved and a comparison between them, allowing subsequently to develop ad hoc measures and solutions. The figure 1 shows the process that the project has to follow in order to find the best solutions. Data collection is the key starting point of the process. IUAV has capitalized the outcome of the project MOBILITAS, designing a questionnaire in order to collect the data necessary to achieve the SMILE project objective.



Figure 1: Procedure to find the best solutions

## PART 2: PROJECT PARTNERS

SMILE project involves 12 project partners (of which one is associated) and 7 countries. More precisely, it involves:

- 5 regional agencies/bodies supporting local municipalities in developing transport/mobility policies & plans;
- 5 local authorities that have competences in mobility planning and road maintenance;
- 1 university that, in its role of WP T1 Coordinator, capitalises in SMILE its know-how and experience in supporting partners in designing its mobility scenarios;
- 1 educational/consultancy centre that provide consultancy and service on mobility to several towns;

Table 1 shows the various partners involved in the project.

Table 1: Project partners overview

PARTNER N°	ABBREVIATION	NAME	COUNTRY
1	RRC KOPER	Regionalni razvojni center Koper	SLOVENIJA
2	SCV	Šolski center Velenje	SLOVENIJA
3	Ragusa Municipal Consortium	Libero Consorzio Comunale di Ragusa (già Provincia Regionale di Ragusa)	ITALIA
4	IUAV	Università di venezia	ITALIA
5	ZADRA NOVA	Agencija za razvoj Zadarske županije	HRVATSKA
6	DURA	Razvojna agencija Grada Dubrovnika DURA	HRVATSKA
7	MoH	ΔΗΜΟΣ ΧΕΡΣΟΝΗΣΟΥ	ΕΛΛΑΔΑ (ELLADA)
8	RDA Banat	Regionalni centar za društveno-ekonomski razvoj – Banat doo	SERBIA
9	Tirana	Bashkia Tirane	ALBANIA
10	Agency "PREDA-PD"	Agencija za ekonomski razvoj grada Prijedora "PREDA-PD"	BOSNIA AND HERZEGOVINA
11	Gradiska	Opština Gradiška	BOSNIA AND HERZEGOVINA
12	ASSOCIATED	Ministero delle Infrastrutture e Trasporti	ITALIA

Moreover, also a strategic planning body (Strategic Planning Agency Rimini-IT, promoted by Municipality of Rimini, Province, Chamber of Commerce & many other entities) is involved. This balanced mix of different organizations which joint work should produce expected qualitative results. It owns all the necessary competences to implement the activities planned by SMILE and hence to achieve expected outputs and results.

## PART 3: DESCRIPTION OF SMILE WP2 AND ITS ACTIVITY T1.1

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The WP2 is coordinated by Università Iuav of Venezia and it consists of the following main actions implemented in each PP area. According to the application form of the project, the reference activities for this report are T.1.1 and T1.2.

T.1.1 – Common transnational template, data collection and elaboration: The elaboration of the Transnational action plan focuses on how to design sustainable mobility scenarios taking into account the variegated urban and rural areas involved, the different mobility scenarios depicted at local/regional level and the stakeholders point of view and knowledge. This document will represent the main knowledge base for developing a transnational SUMP concept, implement IT solutions, and prepare new policies for future sustainable mobility.

Activity T1.1 includes 3 deliverables:

- Deliverable T1.1.1 – *Common transnational template*: this document allows uniform and comparable data collection between all project partners. Through a questionnaire designed by IUAV, PPs have the opportunity to analyze the state of the territory-transport system and to identify the issues and the peculiarities;
- Deliverable T1.1.2 – *Data collection and elaboration – Transnational report*: Data collection, analysis and elaboration produced the transnational report that provides a portrait of the different urban and rural areas involved and a comparison between them;
- Deliverable T1.1.3 – *T1 capitalization meeting*: With the active support of the ADRIAN and DANUBE Joint Secretariats, organisation of at least one "T1 capitalisation meeting" between SMILE, MOBILITAS and CHESTNUT projects involving IUAV (Coordinator of WP T1), RRC Koper (LP) and a representative of CHESTNUT;

T.1.2 – Elaboration of the transnational action plan (including mobility scenarios): This document will represent the main knowledge base for developing a transnational SUMP concept, implement IT solutions, prepare new policies for future sustainable mobility. Transnational Action Plan will result from a close cooperation between WP coordinator, PPs and local stakeholders.

Activity T1.2 includes 2 deliverables:

- Deliverable T1.2.1 – *Mobility scenarios*: 1 transnational report will show the different local mobility scenarios singled out and designed by PPs;
- Deliverable T1.2.2 – *Transnational action plan for Sustainable Mobility Scenarios Design*: The elaboration of the Transnational action plan focuses on how to design sustainable mobility scenarios taking into account the variegated urban and rural areas involved, the different mobility scenarios depicted at local/regional level.

## PART 4: THE DESIGNED QUESTIONNAIRE

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### 4.1 THE COMMON TRANSNATIONAL TEMPLATE

IUAV has capitalized the outcome of the project MOBILITAS, designing a questionnaire in order to collect the data necessary to achieve the SMILE project objective. The common transnational template allows having a uniform and comparable data collection. The questionnaire consists of 4 sections:

- 1) Notes to Readers;
- 2) Destination Profile;
- 3) Transportation system;
- 4) Transportation scenario and policy.

The first section contains instructions for using the dataset tool. The second section helps IUAV to understand the peculiar characteristic of each PPs area to develop ad hoc measures and solutions. It contains: a general overview, geomorphological data, weather pattern, land use and built environment, demographic data and socioeconomic data. Transportation system section is the core of WP2 and it is composed by two main sections: TRANSPORTATION DEMAND and TRANSPORTATION SUPPLY. The two sections are necessary to understand the current state of the transport system and to investigate the relationship between demand and supply. The last section represents the current costs of mobility and the adopted policies in the areas from each PPs.

All the questions 4 of the questionnaire are followed below.

### 4.2 DATA COLLECTED

This section reports the data provided by the PPs, in the form and format in which they were supplied.

Each annex to this transnational report shows data referring to a municipality. In particular, the following attachments are included:

- Annex 1: questionnaire provided by RRC Koper;
- Annex 2: questionnaire provided by SCV;
- Annex 3: questionnaire provided by Ragusa Municipal Consortium;
- Annex 4: questionnaire provided by ZADRA NOVA;
- Annex 5: questionnaire provided by DURA;
- Annex 6: questionnaire provided by MoH;
- Annex 7: questionnaire provided by RDA BANAT;
- Annex 8: questionnaire provided by agency “PREDA-PD”;
- Annex 9: questionnaire provided by Gradiska.

## PART 5: HIGHLIGHTS OF THE RESULTS

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This section shows the main highlights that emerged from the survey carried out through the questionnaire. For the various areas of interest, the following peculiarities are reported:

- demographic and socio-economic data;
- transport demand and supply;
- general state of mobility;
- main negative externalities from mobility.

### 5.1 RRC KOPER

#### Demographic and socioeconomic data

Obalno-kraška statistical region is one of the twelve NUTS 3 territories in Slovenia, and covers the same area as Obalno-Kraška development region. Obalno-kraška region is the only region in Slovenia that borders to Croatia and Italy simultaneously. Its physical structure is characterized by two so-called subregions, namely Slovenian Istria, which borders to the only seashore in Slovenia, and Karst, which is characterized by limestone surface and typical cultural heritage. Both subregions have important political, economic, environmental, cultural, and touristic functions.

The region has 1043 km<sup>2</sup> and 113.961 inhabitants. The population density is slightly higher than national average, while 5 % of Slovenians live in the region. The region has the highest share of foreign population among residents in Slovenia (9,7 % of total population in the region).

The average age of permanent residents in 2017 was 44,5 years. Average age increased since 2007 by 2 years. Senior index increased from 146 to 148, even though it was 133 in 2013.

Both subregions differ in climatic patterns; the coastal subregion has a sub-Mediterranean climate, while the Karst subregion has a combination of sub-Mediterranean and continental climates.

More than two-thirds of gross value added is generated by service sector (trade, accommodation, transport). The region had the highest share of tourist overnight stays in Slovenia in 2016 (21 %). The region generates most waste per inhabitant; 577 kilograms yearly, while 57 % are collected separately (national average is 67 %).

Data regarding non-permanent residents does not exist, but many are assessed to be tourists in apartments or second homes, which are not registered by the statistical bureau. Students are also included in this number, but we do not know how many drives daily or stay closer to the educational centres. The region recorded 785.000 tourist arrivals and 2.384.000 overnight stays in 2016. Most popular tourist attractions in the region are old cores of cities Piran, Izola and Koper, Sečovlje Salina Nature Park, Lipica (Lipizzaner horses), Škocjan caves, and cultural heritage of Istrian and Karst villages. These are the favourite daily destinations for tourists.

Main public and private services are located in urban centres of Koper, Izola, Piran, and Sežana. The most important economic activities are the services (78,5 % of regional GDP), while trade, catering, and traffic are the most important activities with 36,4 % of total GDP value in the region. There are 41 primary schools, 10 secondary schools, and 1 university in the region. Main attractors in the region are also shopping centres in Koper, attracting people from 50 kilometres and further. Main governmental and public institutions are located in urban cores, while Izola general hospital is located on a hill between Koper and Izola (113 m above sea). Urban settlements in the region cover 44 km<sup>2</sup>, while Piran is populated most densely with 5462 inhabitants per km<sup>2</sup>.

### **Transport demand**

Many selected indicators related to transport demand and transport supply do not exist for the area. As one of the most visited areas in Slovenia by tourists and cargo freight, the area faces many challenges in addressing mobility; the number of arriving guests in summer season triples the total number of populations in municipalities Piran and Ankaran, while doubles in Izola. Cultural and natural heritage in other municipalities represent interesting destinations for one-day trips. The Port of Koper generates cargo and passenger traffic flows that are very challenging for the environment in the region. The Port represents an important line between the Adriatic Sea and Central Europe, and is considered as integral part of two European TEN-T networks. The port generates traffic with cargo vessels, trains and trucks, while it indirectly employs over 3000 inhabitants.

The railway connects five municipalities in the region, while the most frequent connections are in the Karst subregion. Koper is the only coastal municipality with a railway station that is used by passengers. The timetable and length of travelling are uncompetitive against other transportation modes. The area is well connected by bus, the schedule is adapted to the polycentric level of settlements, and is supported by special school buses which take pupils to primary and secondary schools from practically anywhere in the municipalities. School buses have different rules than passenger traffic, especially regarding technical requirements by a bus station.

The share of commuters who work outside their residential municipalities increased in all eight municipalities since 2007. The highest increase is recorded in municipality Divača (68 % in 2007 to 78 in 2017), while the lowest is recorded in Sežana (39 % in 2007 to 41 % in 2017). 77,3 % of trips are done by personal car, 2,4 % by bus, 0,4 % by train, 17,5 % by foot, and 2,4 % by bicycle. The number of trips by person is three per day, while residents make slightly lower number of trips compared to daily commuters. 16 % of trips are done for work reasons, 2 % for study reasons, and 82 % for other purposes (shopping, recreation, visiting ...). From observation and assessment of traffic flows by personal cars, we estimate 67 % of trips for work are done during peak hours. Origin-destination matrix for the area does not exist, but we know that 92,8 % of trips start and end in the region, which is the highest share in any Slovenian region. In 2015, 58 % of tourist arrivals were done by personal car, 30 % by airplane, and 12 % with other means.

## Transport supply

Number of trips between 2007 and 2017 was acquired in 2016, while prior to that in 2002. Number of registered personal cars has increased since 2007 by 9 %, while the motorisation rate increased by 5 %. The number of electric cars in 2017 was 25, while there was 39 e-scooters, and one e-bus. Two motorcycles and 315 cars were hybrid.

The area is keen to personal traffic with many wide and fast-lane roads and available parking lots. The cost of parking varies between 0,5 and 5 €, depends on the locations. The average price is 1 €/hour. Monthly parking ticket can be purchased in each municipality and costs approximately 30 €. Public transport is not competitive because it is not comfortable, efficient and fast, although it is affordable. Besides train and bus, alternatives to personal car are car-pooling and shuttle services. They operate between cities and major points of interest, especially airports of Pula, Trieste, Ljubljana, and Venice.

Where cycling counters are operating, the approximate ratio between summer and winter number of cyclists is 1:5. Approximately 11.000 parking places, and 27 public charging stations for electric vehicles are available in the region.

## General state of mobility in the area

Lack of railway connections and unimproved intercity bus connections in the region create greater pressures on roads, making areas overloaded with pollution, lost productive time, and negative health impacts because of physical inactivity. While in the region the share of railway commuting is negligible, other regions in Slovenia with better connections, surpass railway shares significantly. With more frequent and comfortable bus connections, the total public transport mode could rise from current 2.8 % of trips to 5 %. With improved bicycle infrastructure and more promotion, we assess that share of 2.4 % commuters by bicycle could rise above 5 %, with more people surpassing municipal borders in a single trip, rounding up the regional structure of mobility. Currently only a small share of commuters use bicycle within distances less than 2 kilometres.

Freight transportation in the region is not managed comprehensively with a certain strategy. The Ministry of Infrastructure recently prepared and adopted Transportation Development Strategy in Republic of Slovenia until 2030, which addresses cargo and passenger transportation simultaneously. Freight transport represents an important element in the region, especially between Koper, Divača, and Sežana. The number of road accidents has decreased by 62 % since 2007, while the number of injuries in traffic accidents is approximately the same throughout all the years. The number of fatalities is varying between 13 and 3 every year. Number of accidents without injuries decreased by 54 %. In 2017, 977 road accidents happened. Main reasons for congestion are border control, absence of highway connections between Slovenia and Croatia, and ineffective supply of alternative modes of transportation (pedestrian areas, bicycle routes, vehicle-sharing supply ...).

The only campaign, which alerts and rises awareness about active mobility, is European Mobility Week, which is a European initiative in September.

## Main negative externalities from mobility

Data and statistics from mobility sector are collected, monitored or evaluated with limited capacity. Further activity in acquiring necessary data in this field is recommended and necessary. Agency for the Environment or single municipalities do not measure the quality of air so specifically, that representative data could be used for transportation planning.

## 5.2 SCV

There are highlights explained in four primary worksheets:

### Destination Profile:

Because the area of municipality is small the area of survey was treated in one homogeneous. Also, there is no division of traffic analysis zones (TAZ).

The collected data gives enough data, that gives a general overview of the destination.

There are some problems with collection of data, where it doesn't exist in the way it is expected in the survey (WEATHER PATTERN – number hours of sunshine, LAND USE – share of uses) or there is not even data available at all in the statistical databases (DEMOGRAPHIC DATA – some of the data is not available (or just for some years) in the databases of Slovenian statistical department). It is also surprise that there is a lack of quite important general data on socio-economic data.

It is vital opportunity to address the issue of providing data for socio-economic section. Since it is maybe one of the important information for future work.

### Transportation system:

Since municipality of Velenje achieved in 2017 to implement Integrated transport strategy it is the basic document and data source for the area of transport demand.

- TRANSPORTATION DEMAND

As mentioned above it is also here the biggest challenge to obtain the right data. For example, we have data of commuters, but there are some missing data that cannot be obtained. Since we have integrated transport strategy it is a start, but also there this data of trips is not monitored in the way the survey is expecting. So the problem is that some data is still missing or is only available from the survey that was made through the phase 1 of the making for Integrated transport strategy of Velenje (in 2016). There is sadly no other way to get this data. Especially there is a big lack for number of trips for different types of transport and travelers. And also, in different types of motors or fuel supply. Or the section of freight transport and trips.

Other issue is specific data in the field of tourism, that is totally not monitored or it started only in 2018. It would be good that this kind of data could be monitored in the future.

- **TRANSPORTATION SUPPLY**

There is a good overview of the different transport supply in the area. There is good net of city bus transportation that is free for all residents and bike rental system. Also parking lots are spread around the area of city center satisfactory. There are some challenges that are obtained in the Integrated transport strategy that would have to be addressed in the future. Which are in general addressed in the scenario section below. One of the interesting issues by transport supply is big lack of electric transport possibilities.

**Transportation scenario and policy:**

- **GENERAL STATE OF MOBILITY**

The current state of transport links has a very negative impact on the development of the local and regional economy. At this time there is a general economic downturn, positive trends in tourism, good accessibility and mobility play an important role in this, and these positive changes will only be strengthened.

The main issues that Municipality is dealing with are written in CPS document (Integrated transport strategy), which has identified that today's Velenje is burdened with dense motor traffic, which further increases the needs of road infrastructure and endangers the weaker road users, while still facing low public transport infrastructure (PPP), disorder and the danger of cycling routes and footpaths.

The modern approach, for which we have decided and successfully obtained grants, is not only the preparation and adoption of the strategic transport document of the Velenje Municipality, but also the beginning of the long-term process of creating a sustainable transport system, where construction is only the last step in solving the challenges of transport. The current planning practice is being upgraded with a thorough analysis of the situation, the vision of transport development, strategic goals and pillars, which comprehensively include the areas of long-term action, such as sustainable planning, walking, biking, public passenger transport and motor transport.

The decision for sustainable mobility is thus a decision for green Velenje, which will maintain the balance between social equity, the quality of the living environment and the success of economic development. We have adopted a common challenge.

In the analysis of the traffic situation, it was found that, despite the progress made in recent years, Velenje is faced with a number of strategic challenges that are directly or indirectly related to transport:

- **Demographic image is negative;**
- **The impact of transport links on the economy;**

- The quality of life can be further improved;
- The car is too much a choice of mobility;
- Traffic planning is not comprehensive.

There is big lack of incentive strategies to promote sustainable mobility for tourists, inhabitants and commuters.

- MAIN NEGATIVE EXTERNALITIES FROM MOBILITY.

Most of the data is still missing. One of the reasons is the data for fuel sold, that all the fuel companies didn't want to give.

By Air quality there is a chance to obtain this information, but until now we have didn't get it. As a heavily industrial area we have good air quality monitoring arranged in the whole valley. Because the data is monitored to accurate, it takes too much time to filter out all the data that is needed in the survey.

For number of road accidents and congestion areas we are still waiting to get the data. It will be refreshed as soon as we get it.

## 5.3 RAGUSA MUNICIPAL CONSORTIUM

### Demographic and socioeconomic data

The number of permanent residents in Ragusa Province registered an increase around 7% in the period between 2007 and 2017, changing from 299.372 to 321.359 units, with a growth of male population compared to the female population.

The higher demographic development was registered in the Municipality of *Acate*, with an increase of 38% compared to 2007. While in Municipalities of *Giarratana* and *Monterosso Almo* the population registered a decrease respectively of -7% and -11%.

Nowadays, in 2017 the most populated Municipality is Ragusa with 73.500 residents, followed by Municipalities of *Vittoria* (53.906 inhabitants), *Modica* (54.522 inhabitants) and *Comiso* (30.209 inhabitants). The last populated Municipality is *Monterosso Almo* with 2.995 inhabitants.

Consequently, crossing this data with the territorial extensions of Municipalities, the average density of population increased in all the towns, with exception for *Giarratana* and *Monterosso Almo*. The average population density of the overall province is equal to 197,90 inhab/km<sup>2</sup>.

In particular, the maximum values in 2017 are recorded in *Pozzallo* (1.268,50 inhab/km<sup>2</sup>), with a very small municipal area, *Comiso* (461,91 inhab/km<sup>2</sup>) and *Vittoria* (350,22 inhab/km<sup>2</sup>).

On the basis of the available data and the resulting statistics analysed, it is noted that, during the period considered, the average age of the resident population in the province of Ragusa increased by almost two years, from 41 in 2007 to 42,8 in 2017.

Likewise, the "senior index" value increased from 114,8 in 2007 to 136,4 in 2017, highlighting an aging population as in the rest of the Italian context.

Instead, the birth rate value decreased from 10,4 in 2007 to 8,9 in 2017.

These data are explained by observing the population distribution for each age group: the "0-14 years", "15-24 years" and "25-34 years" ranges recorded a decrease of about 1.000 units for each group between 2007 and 2017.

On the other hand, the "45-64 years" and "over 65 years" ranges recorded a significant increase of 14.457 and 8.252 units respectively.

In the province of Ragusa, the number of families in the last decade has increased from 120.837 units to 128.737 units. From 2007 to 2012 it recorded a steady decline, going from 2,60 to 2,40 members per household, maintaining from 2013 to 2017 an average value of 2,50 units per nucleus.

Analyzing economic sectors on the basis of the added value, it results that the primary sector maintained itself about 10%, with a slight increase between 2007 and 2015 from 9,95% to 10,25% of the total added value, despite a slight decrease in the two-year period 2009-2010 in which attested to 8,2%-8%.

On the other hand, the secondary sector recorded a decline from 17,06% to 13,84% up to 2015.

Finally, the tertiary sector confirmed its prevalence over other sectors, even recording an increase from 72,99% in 2007 to 75,91% in 2015.

The main economic activities, in 2015, are "public services" which guarantee over than 27% of the tertiary sector, exceeding the national average of about 7%.

The "commerce" and the "financial and professional activities" instead develop about 22% and 26% respectively of the result, remaining below the national average of about 2 and 3 percentage points respectively.

Regarding the school sector, there is a slight decrease in enrolment for both primary and secondary schools, in line with the decline of the number of youth population recorded above.

From 2007 to 2015, the province of Ragusa recorded a decrease in the number of operators of about 4.000 units.

In particular, the agricultural sector has increased from 19.500 units in 2007 to 22.400 units in 2015; on the contrary, the industry sector recorded a sharp reduction in workers between 2007 and 2015, from 23.900 to 16.000 units.

Finally, the tertiary sector recorded a decline in workers for public services and a simultaneous increase in work units for private services.

At the provincial level, the number of unemployed augmented from 10.000 units in 2007 to 25.000 units in 2017, registering a strong increase between 2011 and 2012 from 15.000 to 23.000 units, with a trend worse than the national trend.

Finally, at the regional level, average per capita income decreased by around € 1.000, from € 22.938 in 2009 to € 21.946 in 2015, remaining below the national average.

## Transport demand

On the basis of regional statistics, the number of total daily trips registered a general decrease, from 2.451.000 units in 2007 to 2.287.000 units in 2016.

Specifically, about 40% of the daily trips was made for study purposes while the remaining 60% was made for work reasons.

According to the data of the national census of 2011, for the province of Ragusa 138.406 daily trips are attributed to the resident population and 4.146 daily trips to the population residing in another province and therefore identified for the purposes of the survey as "commuter".

The same census, highlighted the amount of transport originated (O) and destined (D) for the twelve Municipalities of the province.

In particular, Ragusa (O: 24,35%, D: 27,96%), Vittoria (O: 18,91%, D: 18,96%) and Modica (O: 17,95%, D: 18,19%) were the three municipalities with the greatest incidence in the provincial territory for the number of daily trips.

At regional level, statistics on passenger travel by means of transport registered a decrease in the use of cars over then 100.000 units, from 1.565.000 in 2007 to 1.410.000 in 2016.

The same trend was recorded for the use of buses and trams (from 345.000 to 306.000 units), trains (from 31.000 to 25.000 units) and motorcycles (from 132.000 to 117.000).

However, significant increases were recorded for the use of metropolitan railway transport services (from 10.000 to 29.000 units) and bicycles (from 7.000 to 18.000 units).

The number of pedestrians (from 511.000 to 508.000 units) is almost unchanged to go to the study and work places.

The number of cars registered to the Public Automobile Register recorded a general decrease between 2011 and 2013, from 207.448 to 206.567 units, and a significant increase in the following years until 2017 when the presence of 215.407 private cars, 36.360 motorcycles and 25,455 commercial vehicles was recorded.

About 80% of the commercial vehicles, have a fully laden mass (m.p.c.) of less than 3,5 tonnes.

The number of hybrid/electric vehicles registered in the area in question (431 cars, 15 commercial vehicles and 7 motorcycles) is still weak in 2017.

The quantity of cars compared to the resident population decreased between 2011 and 2014, from 674,2 to 648,2 units per 1.000 inhabitants, and a subsequent trend reversal until 2017, achieving a value of 670,3 unit per 1.000 inhabitants.

Regarding the other vehicles, in the same year it was registered a very high value for motorcycles (113,2 units per 1.000 inhabitants) and for commercial vehicles with m.p.c. less than 3,5 tonnes (79,2 units per 1.000 inhabitants).

In 2017, the number of licensed drivers in the province of Ragusa is equal to 210.244 units.

The occupancy rates of passenger cars registered at regional level from 2007 to 2015 has changed between 1,46 and 1,58 units per car.

Between 2007 and 2012 there was a constant presence of private cars belonging to the EURO 2 class followed by the EURO 0 class.

However, between 2013 and 2017 there was an increase of less polluting cars belonging to the EURO 4 class, followed by the EURO 3 class.

Finally, in 2017, the EURO 5 and EURO 6 classes are still at an average residual level of less than 20% overall.

Also, as regards the commercial vehicles, similar distributions have been found both for units with full load mass less than 3,5 tonnes than for those ones with an higher mass.

In any case, a prevalence of vehicles with diesel engines of f.l.m. less than 3,5t compared to the rest of the registered categories was found.

## Transport supply

Within the area under examination, almost all means of transport classified according to the common statistical categories are available for the daily home-study and home-work displacements, with the exception of metro/subway and tram transport systems.

On the other hand, for freight transport there is the possibility of using all the means of transport statistically detected in the distributed questionnaire.

In the context of Local Public Transport, the main companies operating in the province of Ragusa are:

- AST S.p.A., active since 1947 both in urban and interurban range, with a total fleet of 154 vehicles used for urban transport and 460 vehicles for extra-urban transport;
- SAIS Autolinee, active since 1926 in the interurban range.

The rail travel between the town of Ragusa and the other urban centres of the Province have a duration ranging from 21 minutes to 56 minutes, with travel tickets price starting from € 2,50 up to € 4,30 per single journey depending on the distance travelled.

Bus trips between Ragusa and the other centres of the Province cover mileages between 15,7 km and 37 km, with a maximum duration of 1 hour and 30 minutes and the travel ticket price starting from € 2,70 up to € 4,00 per single journey.

There are 3 lines of urban public transport in the city of Ragusa that make the journey in a maximum time of 60 minutes with a single rate of € 1,20.

As regards the sea connections present in the area, the only statistically relevant shipping line services affect the Pozzallo-La Valletta route served twice a day by the catamaran of the "Virtu Ferries" shipping company, covering 127 km in 1 hour and 45 minutes with rate between € 62,00 and € 104,00.

On the territory there are 3 taxi service companies and 5 short-term rental companies for private vehicle (without driver).

The municipality of Ragusa has also authorized 16 companies to carry out rental services with driver, which mainly operate transfer services from/towards the airports of Comiso and Catania, the port of Pozzallo and the other urban and tourist centres of the South-Eastern Sicily.

Connections to the Comiso airport are provided by taxi and bus services covering an average distance of about 27 km in 30 minutes with an average rate of € 35,00.

In the tourism sector, two thematic routes have been activated that take advantage of existing rail and road networks:

- the "Train of the Baroque", which connects Siracusa and Modica, with a ticket cost equal to € 20,00;
- the "historical train of taste" that connects Siracusa, Modica, Ragusa and Donnafugata, with a ticket cost equal to € 20,00;
- the "Ragusa Night Tour" urban bus line, connecting Ragusa and Ragusa Ibla, with a ticket cost of € 3,00;
- the "Baroque Tour Bus" extra-urban bus line, connecting Ragusa and Scicli, with a ticket cost of € 15,00;
- the "Castello" line, which connects Ragusa to the Donnafugata Castle, with a ticket cost of € 5,00;
- the "Modica Tour Bus" urban line, inside the Modica urban circuit, with a ticket cost of € 5,00.

### General state of mobility in your municipality

There is not an effective and widespread local public transport system. This criticality is mainly due to a low population density and a weak and widespread transport demand because of the urban, demographic and orographic characteristics of territory.

The main issues related to mobility and to be tackled in the Province of Ragusa are the following:

- weak transport demand;
- public transport services on road;
- lack of upgraded and electrified railway network;
- road and railway connections to main intermodal terminals and main towns at regional level;
- lack of economics resources for public investments.

About the development of local transport network in the province, with the exception of Airport of Comiso, in the last ten years no relevant infrastructures were built. Motorway from Catania to Gela is still under construction in Province area. Moreover, the Province is developing the upgrading of local roads for the connections to the airport of Comiso.

At the meantime, the Free Municipal Consortium of Ragusa is defining the updating of planning tools in order to achieve a more sustainable mobility inside the province.

Within its proper administrative tasks, the Consortium is defining an EV Supply Equipment network to promote electric transport in main urban centres as well as in weak demand area of smaller towns.

In addition, the Consortium is planning to implement IT tools for info-mobility services in weak demand areas.

About the implementation of transport policies in the last ten years, the territory reached the improvement of regional port of Pozzallo, the operative reopening of local airport of Comiso, the re-development of local road network connecting the main local towns to the port of Pozzallo and to the Airport of Comiso.

As regards the planning tools implemented at regional level, the Sicilian Region approved on 2017 the new "Regional Transport Plan" affecting also the territory of Ragusa Province.

At local level, the current Provincial Spatial Plan of Ragusa (PTCP) was approved by the Free Municipal Consortium of Ragusa and affects also transport policies and intermodal infrastructures.

The Provincial Spatial Plan has to be updated on the basis of the new infrastructure network and the transport demand as well as on the basis of the new socio-economic scenario which changed during the last ten years.

At urban level, the 12 Municipalities adopted their Local Urban Plans. Moreover, the Consortium adopted the Provincial Spatial Plan of Ragusa (PTCP) affecting also transport policies and intermodal infrastructures.

Finally, as regards the regulation framework, Sicilian Region recently approved the Law n. 15/2015 by reforming the old "Provinces" in "Free Municipal Consortia" and their administrative tasks, by including also the transport field.

### Main negative externalities from mobility

Regarding to fuel sales in the region, between 2007 and 2017 there was a decrease in purchases related to Gasoline (-40,68%) and Diesel (-5,41%) and a significant increase in sales of LPG (+ 86,20%).

In the period 2015-2017 the quality of the air registered an exceed of the European concentration thresholds of NO<sub>2</sub> (>40µg/m<sup>3</sup>) for 9 days/year and concentration of PM<sub>10</sub> (>40µg/m<sup>3</sup>) for 39 days/year.

The cities where there are more vehicular traffic by road are Ragusa, Modica, Vittoria and Scicli.

In any case, in the territory of the province, a preponderance of the demand for passenger and road freight transport is reported, which is mainly due to a low service level of local rail network (totally with single track) and to a population density and demographic weight reduced in urban centres of the province that do not allow a significant load factor.

## 5.4 ZADRA NOVA

### Demographic and socioeconomic data

City of Zadar population slightly increased during the last ten years. In relation to previous decades, this increase is rather small. However, along with Zagreb and other settlements in its vicinity, Zadar is one of the rare settlements in Croatia which has recorded an increase in population number according to the last official Population Census. Majority population within the City of Zadar lives in Zadar settlement, especially in its peripheral residential districts. In 2016, City of Zadar had 76 114 inhabitants. In the overall population number of women (52%) exceeds the number of men (48%).

There is no official data on non-permanent residents in the City of Zadar. Since out of an overall number of around 5500 students on the University of Zadar around 2/3 have permanent residence outside Zadar County it indicates that along with permanent residents in the City of Zadar there were around 3500 students. Similar estimates cannot be done for seasonal workforce especially in tourism and construction since there are no official data and only assumptions could be provided. Based on the above data it can be concluded that the number of inhabitants of the City of Zadar is much higher than the figures shown.

In 2011 95.2% of total population of City of Zadar lived in the central settlement – Zadar. The population density was 387.5 inhabitants per km<sup>2</sup>; the average for the Republic of Croatia was 75.8 inhabitants per km<sup>2</sup>. Highest population density is in the narrow littoral zone with over 1000 inhabitants/km<sup>2</sup>. On islands within the City of Zadar, population density is small in relation to average population density for the Republic of Croatia. It should be mentioned that islands settlements are very small so the majority of islands is not settled. Population density influences various social and economic activities. The most densely populated areas are also the areas with the highest traffic density, the highest concentration of goods and services and occasional collision between different consumers for the same spatial resources.

Areas with highest population density is Zadar in City of Zadar with 1,374.64 ab/km<sup>2</sup> and Višnjik in Zadar settlement with 17,046.23 ab/km<sup>2</sup>.

Taking into account the above mentioned data, it can be characterized that the space is relatively good but little improperly inhabited, since from the City of Zadar to the interior and the islands the density of population decreases. This is in some sense normal because most people are gravitating to the urban area.

Age structure in Croatia is determined every ten years for official Population Censuses. In 2011. the average age in the City of Zadar was 40.8 years which is slightly below Croatian average (41.7 years). In 2011. portion of young population was 22% (0-19), mature (20-59) 55% and old (over 60) 23%. Such age structure is the consequence of gradual population aging and population decrease in younger and increase in old age group. Population age structure is important since it indicates the population's biological vitality and economic dynamics. The city of Zadar recorded a decrease of both mentioned components. Also, gradual population aging and longer average life expectancy generate the need for more intensive health and social care. Within the City of Zadar, there are differences in age structure of certain settlements: the youngest is the population in Zadar settlements and the oldest island's population.

On the other hand, the population of County of Zadar is incomparably older than the population of the City of Zadar which is a result of modernization process and lack of opportunity for young people in rural areas. In 2011 in the City of Zadar there were 41,003 apartments, 3,035 of them being second homes and another 1,384 apartments for renting to tourists. Number of households was 27,461 (average number of household members was 2.7). It is obvious that a large number of apartments is rented to tourists.

The economic sector is divided into primary, secondary and tertiary. In the primary sector 1.90% of the population is employed. In the secondary sector, 16.15% of the population is employed, while in the tertiary sector there are 81.55% of the population employed. According to data from 2017. the most developed activities in the mentioned sectors are education where it was employed 2702 inhabitants City of Zadar, respectively 13.1%, and public administration and defence; compulsory social security where it was employed 2345 inhabitants, respectively 11.3%.

Zadar County economy is based on trade, manufacturing industry, tourism, maritime transport, construction, fisheries, and agriculture. The most developed activities within the tertiary sector are transport and accommodation and food service activities. Spatial distribution companies in Zadar County points to the extreme concentration of entrepreneurial activities in and around the City of Zadar and the low level of entrepreneurial activity in the rural areas of the County.

A number of students in high schools in recent years (except 2015. and 2016.) are higher than the number of pupils in elementary schools since children from neighbouring municipalities also attend secondary schools in Zadar. These students are also involved in daily circulations from their place of residence to high schools located in Zadar settlement. According to available data, in 2016., the total number of pupils in elementary and high schools and students in the City of Zadar was 18 245. Number of pupils in elementary schools was 6607, in high schools was 6036 and number of students was 5602.

According to all economic indicators, tourism is one of the most important economic branches. In addition to numerous benefits, tourism-based economic development also has certain weaknesses, of which the primary seasonality is the significant seasonality caused by bathing tourism as the most common form and the problem of non-critical apartmanization leading to degradation of space. The attractive tourist areas have to create the atmosphere of the primary tourist space through their spatial design, organization, presentation of cultural and historical heritage, numerous manifestations and so on. Considering that tourism is one of the main activities in Zadar County, according to data from 2016. population employed in tourism were 6.5%. That is little higher than national average which were 4.5%. During the last decade, there is a constant increase indicating the importance of tourism but also the deterioration of some other economic activities, especially within primary and secondary sector activities.

The registered unemployment rate is calculated as a ratio of unemployed persons in relation to the total active population (labor force). The average unemployment rate in Zadar County in 2016. was 16%. It is approximately equal to the national rate (16.9%). Average income in City of Zadar in 2016. was 5404 KN and national average income was 5696 KN.

## **Transport demand**

In 2016. number of residents in City of Zadar was 75 437. That is small increase in comparison to 2015 (75 346). Number of commuters was 3901, and number of tourists was 451 166. Number of tourists increased for 11.41% in comparison to 2015 (399 716).

The number of registered vehicles in Zadar Conuty in 2016. was 34 776, of which 27 985 passenger vehicles or 80%. Number of registered vehicles in Zadar Conuty in 2015 was 33 511, of which 26 993 were passeneger cars. The number of buses increased during this period form 152 to 162. Accordingly, the number of vehicles per 1000 inhabitants is 367.7. The number of licensed drivers was 40 880. In 2017. there was an increase in the number of licensed drivers for 1% (41 161).

From the above allegations, it can be concluded that the main problem is the large increase in the number of personal cars compared to sustainable forms of transport. To achieve a sustainable transport system, it is necessary to reduce the number of personal cars and increase the number of sustainable modes of transport.

Distribution of passenger cars by fuel supply and Euro emission standards was made for three engine classes: < 1,4l, 1,4l - 2l, > 2l.

In the <1.4l class, the most personal cars with gasoline engines are in the Euro 2 emission standard and diesel-powered cars are most in the Euro 3 emission standard. For 1,4l – 2l class, the most personal cars with gasoline engines are in the Euro 2 emission standard and diesel-powered cars are most in Euro 3 emission standard. For class >2l, most personal cars with gasoline engines are in the Euro 4 emission standard and diesel-powered cars are most in Euro 3 emission standard.

Distribution of freight vehicles by fuel supply and Euro emission standards was made for two types of freight vehicles, under <3,5 t and above >3,5 t. Most vehicles under 3.5 t with gasoline engines are in the Euro 5 emission standard. With diesel engines, most of them are in the Euro 4 emission standard. Most vehicles above 3.5 t with diesel engines are in Euro 3 emission standard. Average distance covered by freight vehicles under 3.5 t in Zadar area in 2017. for gasoline and diesel motors was 34 075 km. For freight vehicles above 3.5 t with diesel motors average covered distance was 28 452 km.

Most personal cars and freight vehicles are in the Euro 3 emissions standards, which would mean that the fleet is of older production years and that their engines do not fulfill the current environmental standards.

There is no official data on traffic modal share in the City of Zadar. Detail survey should be conducted to determine traffic modal share. One research was done for the purpose of dissertation Development of Zadar County transport system in the context of the littoralization process in Croatia. The survey was conducted in the Sukošan, Gračac and Veli Iž settlements. The aim was to determine to what extent the population of these settlements takes part in the transport system of Zadar County and to which degree are they satisfied. Data from the survey determined that daily commuters mainly travel up to 30 minutes from the place where they live to the place where they work or go to school. Although the analyses of statistical indicators determined a relatively high concentration of roads in all towns/municipalities in the County, a large portion of the surveyed population is not satisfied with their quality. The survey also showed a high degree of dissatisfaction of Gračac and Sukošan population with the rail network while the population of Veli Iž is relatively satisfied with the number, frequency, and the speed of the ship lines.

During the last 10 years, the number of tourist arrivals increased but the average number of overnight stays did not. The number of overnight stays in tourist accommodation, which reflects both the length of stay and the number of visitors, is considered a key indicator for tourism statistics. The decrease in the number of overnight stays is partially the result of increased tourist mobility. Tourists coming to Croatia usually visit more than one place, therefore, they stay in Zadar three, four or five days and go to other Croatian tourist destination. Another reason for this decrease or stagnation of the total overnight stay number is an insufficient number of accommodation units in Zadar. Tourist arrivals are concentrated during summer months which relate to main motives for visiting City of Zadar: leisure and recreation, sun, sea, swimming and some other cultural, entertainment or sports exhibitions. Majority of tourists coming to the City of Zadar are from European Union countries. In comparison with tourists from other tourist generating markets, they stay the longest. Category World in all tables mainly includes tourists coming from Japan, South Korea, USA and some other countries. Tourists coming from Japan and South Korea usually stay in Zadar only for one or two nights since they visit numerous destinations during their trip to this part of Europe.

Tourists can reach Zadar by road, air, and sea. Until recently the majority of tourists who came to Zadar travelled by cars and after the introduction of low-cost carriers, the portion of tourists coming by plane has increased. Annual arrivals by airplane is 35.4%, by car is 32.30%, by bus 18.40% and by boat/ship is 13.9%. There are no official records on the means of transport used by tourists in the City of Zadar. Within Zadar, the most used means of transport are cars (own or taxis) and buses. To travel from Zadar to islands, it is necessary to go by ferries or boats.

Average tourist expenditure is not recorded regularly but there are estimates based on survey. According to the data in 2010 average daily expenditure in Zadar County was 40 €, the lowest among all Croatian Littoral Counties (the highest was in Dubrovnik-Neretva County – 89,8 €). In 2014 average tourist expenditure (per person/per day) in Zadar County was 78,04 € and it was the second highest if compared to other Croatian Littoral Counties (the highest was in Dubrovnik-Neretva County – 92,63 €). This is the significant increase indicating improvements in tourism offer in Zadar County. Mentioned data can generate insight into new marketing opportunities and growth prospects for future tourism development.

As regards gender of tourists, in 2017 the share of female tourists (51%) was higher than that of male tourists (49%). Most of them are visiting this area in couple (30.4%) and with friends (36.8%).

Main road network in Zadar settlement consists of:

Franje Tuđmana Street, which is the main transport axis through centre of city in east-west direction, from crossroad with Ante Starčevića Street to Ivana Gundulića Street

Road section on D407 from the crossroad with D8 to Passenger's port on the Peninsula (old part of the city) consisting of Ante Starčevića Street, Nikole Šubića Zrinskog, Marka Marulića and Liburnska obala

Road section of Vlatka Mačeka Street and Biograd Street which is the extension of Franje Tuđmana Street from crossroad with Ante Starčevića Street in east direction towards Gaženica Maritime Port and eastern exit from Zadar settlement (connection to D8 and D434)

Road section Bana Josipa Jelačića Street – Obala kneza Branimira – Square of Duke Višeslav (Jazine)

Road section Nikola Tesla Street – from Ivana Mažuranića to Josip Juraj Strossmayer Street

Road section Miroslava Krleža Street – Oko Vrulja Street – Josip Juraj Strossmayer Street to Ban Josip Jelačić Street.

The most congested roads/zone due to tourism flows:

- a) Franje Tuđmana Street
- b) Ante Starčevića Street
- c) Old city center (Zadar settlement)
- d) Put Nina
- e) Put Bokanjca

Main reasons for the congestions (Infrastructure size, the physical condition of infrastructure, private traffic, etc.)

- a) inadequate road infrastructure on some road sections,
- b) tourist flows in summer months and
- c) increased number of vehicles due to tourist arrivals.

## Transport supply

Transport modes available in Zadar County for passenger trips are cars, taxis, buses, train, bicycles, motorcycles and walking. Transport modes available in Zadar County for freight trips are cars, light commercial vehicles (<3.5 t), heavy good vehicles (>3.5 t), train, airplanes, ships, bicycles and motorcycles.

Transport of people and goods is mainly done by road transport, while rail as a sustainable mode of transportation has been neglected due to inadequate investment and maintenance. With that rail traffic has become totally uncompetitive. In order to achieve a sustainable transport system, it is necessary for the railways to restore the competitiveness and transport ability of people and goods.

Transport infrastructures in the Zadar County is divided into urban roads, extra urban roads, freeways and railways. Length of urban roads is 439.35 km, length of extra urban roads is 563.4 km, length of freeways is 38.31 km and length of railways is 20.29 km.

Liburnia is a public transport operator in City of Zadar. There are 87 buses in Liburnija's fleet that transport around 8 mil. passengers per year. About 62% of these buses have engines between Euro 1 and Euro 3 emission standard, which means that they do not fulfill the current environmental standards. Line network consists of urban and suburban lines. The main urban lines are 11, with a total length of 106.62 km. There are 10 suburban lines, with a total length of 366 km. One of the problems of public transport is inadequately marked public transport stations which create great problems for tourists and other visitors.

Zadar, as the primary urban center in Zadar County, has only about 15 kilometers of cycling lanes of questionable quality and have one Urban Cycle rental system with four stations. One of the ways to improve mobility and solve some of public transport system problems is to encourage cycling as a new mobility solution. During the last decade, the number of tourists, as well as their overnights in entire Littoral Croatia, has been continually growing. In the course of the second half of the 20th and the beginning of the 21st century, Zadar County went through a comprehensive socio-economic change followed by the modifications of the transport system. In the coastal area, demographic, economic and transport concentration, reached their maximum, at the same time creating pressure on the environment. The increasing number of tourists coming to Littoral Croatia on bikes or those who hire bikes after arrival was not followed by adequate infrastructure provided for cycling.

Total surface of the pedestrian area in Zadar County is 1.24 km<sup>2</sup>. The length of the pedestrian paths is 151.90 km. Road analyses indicate that 74% of roads in the City have no sidewalk, 7% have a sidewalk on one side and only 19% have sidewalks on both sides of the road. In statistical circles closer to the city center the portion of roads with a sidewalk is higher while the situation deteriorates in peripheral statistical circles. In addition, it should be highlighted that in the majority of statistical circles the function of the sidewalk is being neglected. They are no longer an area designated for pedestrians, but they became parking places for automobiles. Therefore, it is necessary to adapt the streets to pedestrian traffic for safety and increase the share of walking in modal distribution.

The City of Zadar has organized parking system. The concessionaire, Obala i lučice Ltd. Operates public parking places. Public garages are under the authority of shopping centres. The overall number of parking

places under concession is 1.749. The total number of free parking places is not known. Prices change during the year. Parking lots of charge on public land in the area of Poluotok (peninsula) and the street Branimirova obala are divided into two zones - blue and white, i.e. the first and second parking zones, which differ in mode and price. The occupancy of parking areas during the season exceeds 90%, while the off-season is below 40%, so that the parking offer on the Zadar area off-season is on satisfactory level. During the season is the lack of parking spaces.

In the City of Zadar, there are no Park and ride facilities. Tourists and local residents after arriving in Zadar can leave a car on one of the open or closed parking lots or park alongside some streets. Unfortunately, there are no organized parking lots with public transport connections that allow commuters and tourists going to the city centre to leave their vehicles and transfer to for example bus. There are parking places in the vicinity of Main bus station or Maritime port and where tourists often leave their cars and take the bus to the centre or some other parts of the city. With some efforts and market analyses, bike and ride system could be introduced.

In the City of Zadar, only public bus transport is in function. There is only one shuttle connecting Zadar Airport and Main Bus station.

Soft mobility and sharing services is available in City of Zadar and that is public bicycle transport service. It consists of 4 stations (Poluotok, Main bus station, Borik and Bili brig) and 25 bicycles. In the period from 24th May until 20th November 2016, 1170 users were registered, 39% of them being tourists. Since public bike sharing is the only available a sustainable mobility system, there is space for increasing the number of other sustainable modes of transport (car sharing, cargo – bike, ....).

Although the developments of the Zadar County transport system at the beginning of the 21st century had an exclusively positive influence on the economy there is still evident disproportion between road, air and sea passenger transport in relation to rail and commercial sea transport. At the moment train line Zadar – Knin does not operate. Train passenger transport became unprofitable and it is nowadays replaced by road and air transport. The journey from Zadar to Zagreb by train lasted almost 8 hours and by car it lasts 3 hours 20 minutes. As mentioned above, in order to achieve a sustainable transport system, it is necessary for the railways to restore the competitiveness and transport ability of people and goods.

Zadar is (after Split) the second largest passenger port in the Croatian part of the Adriatic Sea. It is the departure point of one international ferry boat line (Zadar – Ancona) in length of 175 km, and 11 regional and local ferry boat lines, total distance of 525 km, and it also serves as a cruise ship terminal. Majority of traffic (via ferry boats) takes place in the new Gaženica port, while the old town port is still used for passenger transport via ships and hydro-buses that connect Zadar with surrounding islands, not only with those incorporated within its territorial boundaries but with all of the islands in its archipelago.

Number of taxi companies with the permission of City of Zadar in 2016 was 115, number of marked (official) taxi stands is 52 (with additional places for taxies in Gaženica port where all 115 taxi operators have concession issued by Zadar Port Authority. There are no official data for total number of taxi vehicles in Zadar and there are no data of taxi trips compared to total modal share. Number of vehicles rental

companies is 22. Rent a car companies are listed on Zadar Tourist Board official page. There are no official data for number of leased vehicles per month.

There are connection from airport to the City. Travel time is around 25 min. One-way bus ticket price is 25 kn (3,4 €), baggage transportation included. There are no other transport service available in City of Zadar. In 2016 in the City of Zadar only official taxi operators, Liburnija Ltd. and several entrepreneurs provided transport services.

The only location within the City of Zadar where the intermodal terminal is located is passenger and freight port Gaženica. Terminal has shore length of 60 m (for the birth of ships under 190 m) and shore depth from 10,3 to 12 m; the size of ships under 40.000 DWT. The terminal contains tanks for oil derivatives (Tankerkomerc) 60.000 m<sup>3</sup>, tanks for chemicals (Kepol) 15.000 m<sup>3</sup>, tanks for VCM (Polikem) 9.000 m<sup>3</sup>, 16 pipelines and it is equipped with an anti-fire system for extinguishing fire with foam.

There were several campaigns and initiatives that encourage low carbon mobility on the territory of the City of Zadar. Most of them were funded from EU projects like Intensify, ASPIRE, CitiZEN, CityMobilNet, eGUTS, LOCATIONS, OptiTrans, PRO-E-BIKE, SMART COMMUTING, Mobilitas, SMILE, Chestnut etc.

Most of the above-mentioned projects are focused on promoting sustainable urban mobility either by promoting activities related to lowering CO<sub>2</sub> levels in the air, by developing comprehensive policy plans and strategies or by promoting eco-friendly transport options.

Total number of companies wick offering sustainable transport service to passengers is more then 10 (Nextbike, Zadar-bike, Zzuum, Zadarbikerent, e-bikeZD, Mobil centar...). It is hard to tell the exact number as there are no official data.

There are several companies that offer shuttle service in the Zadar area. Most of them are taxi companies that offer shuttle service and are focused on the Zadar Airport. It is hard to find exact number of companies as along with specialized shuttle-transport firms most of the taxi companies offer shuttle transport.

There are six locations of recharging stations in the Functional Urban Area of Zadar with total of 13 stations for recharging electrical vehicles. Four locations are stationed in the City of Zadar, while the other two are located in Petrčane and Tromilja. There is no data for number of electrical vehicles in City of Zadar.

### **General state of mobility**

General state of mobility in Zadar area is satisfactory. Although the geographical characteristics present some objective problem, there are no major traffic jams outside summer months. Biggest problem with mobility in Zadar area happens during tourist season when large influx of tourist congests roads in Zadar areas. Besides old city-centre largest traffic jams happen on the western approach to the town, from Nin and Zaton.

Public transport is optimally solved, with city-bus lines that cover most of the town. Public transport network could be better organized, but it would demand large-scale investments and in the current state of the economy would be unprofitable.

City of Zadar is connected with the islands with frequent ferry-lines and the location of Zadar Airport offers good connection with 32 national and international destinations. Close vicinity of highway and motorway that were built in the last 15 years brought Zadar closer to the rest of the country and opened new transport possibilities.

Biggest downfall is the lack of rail transport and it presents significant problem for the Port of Zadar.

The main issue related to mobility is the lack of parking spaces, especially during the summer months and unoptimized public transport network which does not follow the needs of the citizens. During the summer months it is almost impossible to find parking space in the city centre. Public transport is not sufficiently used which causes frequent traffic jams on specific locations. Other big problem is insufficient road network in the east entrance to the town which gets congested during the season and leads to traffic stand-still.

In the last ten years City of Zadar underwent several major infrastructure changes. Biggest one is relocation of port from the centre of the town to the Gaženica area which helped to unload the pressure from old city centre. New shopping centre opened on the outskirts of the town that resulted in higher traffic volume in that area and demanded the introduction of new public transport lines.

The average cost of bus passenger transport per kilometre varies depending on if it is a case of urban or extra-urban transport. The cost is significantly higher for urban transport and is in range of 1 HRK per kilometre (0,13 EUR), while in extra-urban transport the cost is cut in half and totals 50 lipas per kilometre (0,07 EUR).

To achieve sustainable mobility in the Zadar area it is imperative to create more parking spaces and to redesign public traffic network in Zadar. More usable system of public transport should be put in place and delays should be put to minimum. Smartphone application qis a must in modern days as most of the younger people, both students and working population, uses them and it would provide them with information needed concerning bus schedule. There should be media promotions of sustainable mobility to familiarize people with progress made and to motivate them to use public transport system.

In the last ten years Zadar's city port has been relocated from town centre to the Gaženica area. Several new bus lines have been introduced and few kilometres of bicycle paths have been constructed allowing citizens to use more healthy means of transport. City of Zadar plans to implement IT tools and Smartphone apps (Zadar City Bus) that promote sustainable mobility are currently in the making.

During the last decade several comprehensive studies were written dealing with the City of Zadar and Zadar County transport system. Sustainable Urban Mobility Plan (SUMP) aims to coordinate development of road transport with economy development, improve transport safety, especially pedestrians and school children, protection of the environment, noise reduction, reduction of travel time and implementation of intelligent transport system in City of Zadar.

The most comprehensive study on transport in Zadar settlement so far is Study of transport system of City of Zadar: ITS (intelligent transport system) and reconstruction of roads in City of Zadar.

Promotion of electric vehicles in the City of Zadar is not constant, but there are several parking places in the town that offer the possibility of charging electrical automobiles. Local Tourist Information Center provides information on demand about soft mobility and sharing.

Incentive strategies to promote sustainable mobility of tourists are implementation or development of City Tourist Information System and pedal powered taxis.

Incentives to promote sustainable mobility of commuters are commuter pass that provides unlimited regional transport travel and discounts to use service.

There are several incentives to promote sustainable mobility of inhabitants. Travel passes are subsidized for large populations of the citizens and in the last few years there have been several projects directed to promote sustainable mobility like “City bike”, “CityBus Zadar” or “Zadar Smart City”.

As part of “City bike” project rent-a-bike stations are set up in different parts of the town – at the entrance to the old town, at the main bus station and at the largest residential neighbourhood.

As part of the project, “OptiTrans” main emphasis is put on car sharing, a relatively new idea that promotes the sustainable car use that aims to lower carbon monoxide levels in urban city areas.

“Zadar Smart City” project tends to offer options in the region of intelligent traffic system as it is directed towards e-ticket payment, creating and implementing smartphone apps to help citizens get valid information about public transport, smart bus stations with Wi-Fi, smart parking systems, semaforization etc.

In the last decade, several comprehensive studies were written about Zadar's transport system and Zadar area FUA. Some of them were focused on transport system (Study of transport and parking in Zadar, Ferry Terminal Zadar – transportation and technical solutions, Study of passenger transport in the road traffic), while the others are analysing transport system in relation with its spatial influence (Spatial plan of development of the City of Zadar). Largest transport study made in Zadar so far was Study of traffic system of the City of Zadar: ITS and reconstruction of roads in the City of Zadar. Along with the above mentioned, key strategic document connected with urban planning is Urban Development Strategy of the City of Zadar 2014. – 2020. enacted in 2016. that established main policy goals and strategic framework in which observed problems would be solved.

Units of local and regional government in Croatia do not have legislative power so it was not possible to adopted main laws and transportation plans in the last 10 years.

### **Main negative externalities from mobility**

Controls of air quality and noise pollution have not been carried out in the last more than ten years.

In recent years, the number of traffic accidents has been declining and also the number of traffic fatalities. In 2017 the number of traffic accidents was 980. The number of traffic fatalities in 2017 was 1. Regardless of the reduction in the number of traffic accidents, this number is still large. It is necessary to invest greater effort to increase road safety.

It is hard to point up the most congested roads due to traffic flow as it fluctuates a lot, depending on the time of the day. During the work days, most congested traffic areas in the City of Zadar are those in the old town center before and after working hours, but major traffic jams occur on several other places like intersection towards Nin, Bokanjac, and Bibinje, as well as near main bus station.

The main reasons for congestion in the roads of Zadar urban area are: tourist influx during tourist season, infrastructural size, lack of parking spaces in the city center, particular events like large-scale concerts, sports events, etc. and roadworks.

Road congestion usually occurs while citizens are commuting in the periods between seven and eight AM and four and five PM. Traffic jams usually last for about an hour. It is hard to estimate the length of road and average waste time for each vehicle as there is no official data.

In order to reduce the negative impact of mobility, it is necessary to reduce the number of trips by private vehicles, the freight transporting should increasingly shift to rail and sea, increase the share of sustainable modes of transport, promote pedestrian and cycling traffic and focus more on creating a sustainable transport system.

There is no systematic data collection in Croatia, much of the information needed for this report was not available and could not be analyzed for the purpose of better understanding the needs of the coverage area.

## 5.5 DURA

This section refers to the collection and processing of data in Dubrovnik. The aggregate data refers to the four main parts.

The first part is the introduction to data capture and processing, the second part refers to a landing profile divided into a general overview, geomorphological data, time display, land use and built environmental, demographic data and socioeconomic data.

The third part refers to a transport system divided into two subchapters, transportation demand transportation supply.

Part four refers to transportation scenario and policy which is divided into two parts. First part is general state of mobility and the second part is main negative externalities from mobility.

With respect to the chapters listed in this document, all the information provided is an essential starting point for the process and understanding of the areas for further development of measures and options applicable in this area.

## General overview

The city of Dubrovnik is a tourist center with a very preserved nature and cultural heritage. The culture, literature, painting, architecture, philosophy, science, music and diplomacy of Dubrovnik are an irresistible part of the cultural heritage of Europe and the whole world. UNESCO has placed Dubrovnik under its special protection. The interior area of the administrative territory of the City of Dubrovnik is divided into 8 districts: Lapad, Montovljena, Gruž, Pile-Kono, Historical City Center, Ploče iza Grad, Komolac, Mokošica. There are not some physical geographic separators placed on the territory of the town so Dubrovnik is considered as one homogenous zone. There is no railway in Dubrovnik, just main bus station. Dubrovnik has a port from where there are several lines connecting Dubrovnik with nearby islands and where cruise ships arrive on the daily bases. The other and most important location where there is a lot of traffic is the Old town center, especially Pile Gate as one of most congested traffic area in Dubrovnik.

Main attractors in Dubrovnik are City walls of Dubrovnik (Old town), island of Lokrum (protected as Nature Reserve), Srđ hill (with viewpoint on Dubrovnik), Trsteno Arboretum and Elaphite island group. Also there University of Dubrovnik are one of main attractors that attracts a lot of students from other parts of Dubrovnik – Neretva County and Croatia.

The area of the municipality of Dubrovnik is 143,35 km<sup>2</sup>. Dubrovnik is located in the southern Adriatic. The town developed on the eastern coast of the Adriatic Sea, where it stops along the Adriatic islands and begins the open sea. It lies on the southern slopes at the foot of Mount Srđ. The wider area of Dubrovnik covers a narrow coastline of about 250 km, stretching from Klek to the west to the eastern coast of Sutorina and Prevlaka.

Land use is shared by housing (35%), trade (10%), offices (15%), industrial zone (20%) and other mixed part (70%). The population of Dubrovnik has been around 40,000 in the last ten years. In 2016. Dubrovnik had 43 951 inhabitants. The average population density in 2016. was 307 inhabitants per km<sup>2</sup>, while the most populous settlements were Mokošica, Lapad and Gruž. The average age of permanent residents in 2016. was 42.8. Since the average age of permanent residents in 2007. was 40.8, this is an increase of two years. There is no official data on the temporary residents of the City of Dubrovnik. Bearing in mind the fact that many foreigners bought houses in the city of Dubrovnik, many students come here to study, and there are many temporary residents. Similar estimates can not be implemented for seasonal work force, especially in tourism, as there is no official data and only assumptions can be given. Tourism is the main activity in Dubrovnik. In 2016. it represented 45% of GDP and 16.7% of the population was employed in tourism (national average is 4.5%). Dubrovnik annually visits over one million tourists and from year to year this number is increasing.

## Transport demand and supply

The number of registered vehicles in Dubrovnik – Neretva County in 2017. was 66,467, of which 51,108 passenger vehicles. Accordingly, the number of vehicles per 1000 inhabitants is 51,1. The number of licensed drivers is 70,233. Occupancy rate of passenger cars is the average number of passenger in a car

during a trip. In 2016, occupancy rate of passenger cars was 1.6. According to the mode of transport 49% of arrivals in Dubrovnik are done by plane, 43% by car, while the rest is done by bus and boat. Means of transport used by tourists within destination areas are bus (55%), taxi & uber (25%), car (15%) and boat (5%) (in the absence of data these are all estimated values).

The length of the road in the area of Dubrovnik - Neretva County is 645.7 km. Available modes of transportation in Dubrovnik are cars, taxis, buses, walking, motorcycles and bicycles and transport modes available for freight trips are cars, light commercial vehicles (<3.5 t), heavy goods vehicles (>3.5 t), ships, airplanes and motorcycles. Public city transport is organized by buses. The company Libertas has 117 vehicles that transport around 10,000,000 passengers annually. Bus network consists of 11 main urban lines and 9 main suburban lines. Total distance of these lines is 318 km. Ship transportation in Dubrovnik is organized with the six main lines. In the area of Dubrovnik there is a pedestrian zone (Old Town) and a walking trail (the promenade of King Zvonimir). The number of parking spaces is 10 649, and parking spaces are divided into outdoor parking (1610), closed parking (6750) and on street parking (2289). The park - and - ride service in Dubrovnik is not available as a car or bicycle sharing service. The railway line is located only in the Dubrovnik – Neretva County and it is the Ploče - Metković line (M304). Distance of that line is 21,9 km and the time of the trip amounts 0,35 h. The number of taxi cabs in Dubrovnik is 241, while the rent a car companies currently has 17. The airport of Dubrovnik is connected by bus service and other services (uber, taxi). There is also a shuttle bus service. Three companies in the area of Dubrovnik offer a bus service to the airport. The first is the Atlas shuttle bus. It operates on the line Pile/Main bus station – Airport and the one-way ticket price is about 5 € (return ticket is 9 €). Second company is Autotrans. It also operates on the line Pile/Main bus station – Airport and the one-way ticket price is about 5 € (return ticket is 9 €). Public transport is also organized to the airport. Operator is Libertas and it does not run so often. His price is about 5 €.

### General state of mobility

General state of mobility in Dubrovnik area is not satisfactory. Infrastructure of the road is not able to digest all the traffic that is occurred, especially during the season. A lot of traffic jams, lot of car accidents on the road is usual thing on the road during the summer. Also, lot of streets are small and not made for buses, and considering big tourists' impact, those buses use that streets and the traffic jam is inevitable. Public transport network could be better organized, but it would demand large-scale investments and in the current state of the economy would be unprofitable. The biggest problem is the area around Old Town and Port of Gruž, where traffic jams occur very often, especially on the day when there is a lot of cruise ships in the port and a lot of planes arriving to Dubrovnik.

The main problem for mobility are traffic jams, no adequate infrastructure, great amount of cars (not enough parking space), taxi and buses on the road, just one road connecting Dubrovnik with Airport Dubrovnik (22 kilometers distance) and a large number of tourists (pedestrians) visiting the Old Town. All of this leads to excessive traffic loads and generating major problems for the transport system.

Average distance run by residents and commuters for work and study purpose is 5 - 10 km for citizens of Dubrovnik and for suburban area 20 - 40 km.

Incentive strategies to promote the sustainable mobility of tourists used in the City of Dubrovnik is a tourist card that provides unlimited use of public transport and entrance to numerous tourist attractions. Adopted IT tools or Smartphone apps to promote a sustainable mobility in Dubrovnik are smart parking, respectively parking sensors on parking lots and one smart street.

Some major laws and transport plans adopted in the last 10 years are General Urbanistic Plan and Transport Study of the City of Dubrovnik.

General urbanistic plan (GUP) defines the areas on which it is possible to build, which can be built on them (surface area) and the size of the building. The GUP is a plan that is made only for the construction area of the city, while the entire administrative area of the city is determined by the spatial plan of the city. According to the new Law on Physical Planning and Construction of the GUP is no longer obligatory. However, the GUPs that came into force until the adoption of the new Act remain in force until the new spatial plan for the area.

Transport Study City of Dubrovnik

The city of Dubrovnik has accepted a traffic study from 2012. which still serves as the main document in traffic planning. The task of the study was an analysis of the existing spatial planning plans, studies and projects related to the traffic system and analysis of traffic research and conclusions.

### **Main negative externalities from mobility**

One of main negative externalities from mobility are number of traffic accidents. In Dubrovnik – Neretva County in 2017. was 863 traffic accidents and number of traffic fatalities in them was 11. Most congested roads/zones due to traffic flows are Old town – Port Gruž, road from Airport to the City of Dubrovnik and Pošta Lapad. Main reasons of congestion in those places are bad infrastructure (one road that connects airport with City of Dubrovnik - one lane per direction), too much vehicles on the road, border crossings are 30 km from the Dubrovnik - a lot of traffic is generated from people going to other countries, narrow streets in Dubrovnik city centre and not enough parking space in city centre for so many cars. Periods when road congestion occurs are in summer, respectively during the season. Annual transport costs for the construction in 2016. was 1.2 mil. €, maintenance was 2.2 mil. € and management of the transport infrastructures was 0,25 mil. €.

There is no systematic data collection in Croatia, much of the information needed for this report was not available and could not be analyzed for the purpose of better understanding the needs of the coverage area.

## 5.6 MoH

### Demographic and socioeconomic data

The permanent population of the Hersonisos Municipality according to the latest census (2011) is 26,717 inhabitants, representing 4,29% of the population of the Region of Crete. It is a dynamic municipality that has increased its population over time due to the developed tourism sector that creates increased employment opportunities. In the period 2001-2011 the population increased by 12% and the population density is 98.4 inhabitants per km<sup>2</sup>. A total of 32.9% of the population is in the 30-39 and 40-49 groups. Respectively, the population of 50 years and over represents 34.6% of the total population, while the remaining 33.8% of the population is aged less than 30 years.

The dominant sector of employment of the residents is the tertiary sector (81% of the employed). The secondary sector accounts for 13% of the employed and the primary sector accumulating the remaining 6% of the employed. With regard to the coastal areas of the Municipality where population concentration is much higher, the employment rates of the inhabitants in the primary sector are very low, which is not the case for the hinterland, where the respective percentages are higher.

The Number of employed in 2011 was 12470 people. The Population employed in tourism accounts for 37,73% while the national average is at 10,93% The retail sectors employs 18% and the construction related activities 7%. The unemployment rate in 2017 was 20,9% while the national average was 21.5% The average income in 2017 was 11.712 € while the National Average was 15.717 €.

The Hersonisos Municipality is one of Crete's most popular and developed tourist destinations. Tourist activity develops in the coastal communities of Limenas Hersonisos, Gouves and Malia, while in the hinterland there is almost no tourist activity. It gathers approximately 29% of the beds in the Region of Crete. In particular, 65,600 beds operated in the Municipality in 2012, of which 81% corresponded to hotel accommodation and 18% to rooms to rent. The remaining 1% was for tourist furnished houses / villas and camping.

There is an increased interest in improving mobility conditions in the Municipality of Hersonisos, both for the every day needs and also for the touristic period and consequently for citizens and tourists. Sustainable mobility is a key challenge for the future in both transportation and urban development, hence Hersonisos is making an important effort towards this direction. This effort is expressed through its participation in EU projects such as SMILE and also via formulating and promoting related local policies, in cooperation with the transport authorities in the island of Crete.

In addition to the above, in order to evaluate the current situation, plan further steps and formulate a realistic sustainable mobility plan for the future, data is needed to be collected for several transport categories and sectors which would be indicative and useful for decision making in the future. Though, there is an important gap on related data for the previous years, since the collection of this data was not obligatory through the national legislation or the local framework significant and focused work needs to be conducted by the Municipality in order to gather the needed data from the responsible authorities, such as the Hellenic Ministry of Transport, the Hellenic Statistical Authority, the Ministry of Tourism, the Hoteliers Association, local authorities, business unions etc.

## Transport demand and supply

Important data is missing that would reveal the needs and the demand for transport both for citizens and goods in the area. As an indicative example we can point out that there is no available data for the modal share of Hersonisos citizens that could reveal the needs and also their mobility habits, also for tourists. To that same direction, there is lack of data for trips, for origins of movements, for destinations of movements, for urban and inter-urban logistics/mobility/transfer of goods, etc.

For recent years, there is only a clear touristic Municipality profile, which is being followed by specific touristic mobility needs. These needs are not being served today in the most efficient or the most sustainable way (using a variety of alternative sustainable mobility means and solutions), resulting in most cases to common car-oriented solutions (private cars or car/motorbike rentals). Though it is important to point out that in recent years there is an important increase in arrivals and overnight stays in Hersonisos, which reveals a chance for new solutions that could also prevent future mobility issues derived from tourism related mobility.

On the other hand, there is a local public transport operator - the company “KTEL Heraklio – Lasithi S.A.”, - which conducts local and supra-local public transport bus links that serve the Municipality of Hersonisos (movements within the Municipality and its connections with Heraklion and other neighboring cities). These lines’ operation is important on the local level, mostly for promoting the use of public transport, though further improvements could be done in order to expand the existing bus lines’ system for better service in the area. Moreover, and up to now, there is no available data for service capacity or movements with “KTEL” buses in Hersonisos, either inside the Municipality or between Hersonisos and the neighboring cities, such as Heraklion. It is also important to point out that there are no municipal buses in operation that could serve local needs in smaller distances that could also motivate citizens to avoid the use of private cars.

There is no cycling network available for those wanting to commute by bike in Hersonisos and also there is a significant lack in walking infrastructure. These create further difficulties to those who want to use an alternative means of transport in Hersonisos, especially for small distances inside or outside the capital city. Additionally, the lack of network or infrastructure disadvantages, create further difficulties to disabled people or people of certain vulnerable categories (sensitive users), such as elderly, students, small children, etc. who could not walk or cycle in safety and/or comfort.

Transport of goods in Hersonisos is also not very well organized or formally regulated, in terms of sustainability. There is no specific loading or unloading areas, or specific time windows for similar activities, or even specific eco- friendly lorries (e.g. electrical ones). There is also no available data for transfer of goods in Hersonisos or for origin /destination movements for logistics purposes.

Additional issues that could provide elements for the overall transport profile of Hersonisos and the commuting profile of its citizens, are the increased cases of illegal parking in everyday life and function of the Municipality, which generate many problems and road safety issues which need specific attention. There is no official parking charging system, which in combination to the function of many illegal parking areas, create a fully disorganized mobility and parking behavior for all. This creates negative externalities

and a non-attractive profile for the Municipality, both in terms of economic activity and also in quality of everyday life.

Considering all the above, we need to further support all the efforts that are being done in recent years in order to:

- Promote sustainable mobility in Hersonisos, e.g. via its participation in awareness raising initiatives such as European Mobility Week or additional initiatives (like Bike to work, or bike to school, etc.);
- Use smart technologies and tools in service of improving mobility options, e.g. apps for mobility options by using alternative means or smart tools for urban logistics, etc.;
- Promote new means and ways of transport, contributing to low carbon policies, e.g. car sharing, car-pooling, park and ride options, bike sharing systems, etc.;
- Develop new walking – cycling- public transport infrastructure and regulate private vehicles' circulation.

## 5.7 RDA BANAT

The analysis of the collected data through the questionnaire for the city of Zrenjanin shows a decrease in the total number of the population, while at the same time the number of non-permanent residents and tourists arriving in Zrenjanin is increasing. All this, in addition to other factors, affects the general increase in mobility.

It was recognized as disadvantage for purpose of future plans and scenarios missing data in the given template, due to no reliable information that data are being collected or existing for area of Zrenjanin, especially data related to movements (productions and attractions of travel). Also, last traffic study in Zrenjanin was realized back in 1973. Since then, no similar study has been produced to track the needed and satisfaction of transport needs in Zrenjanin.

In order for Zrenjanin to further develop in the right direction and in a better way towards sustainable mobility, it is necessary to proceed to the development of a new traffic study in the coming period.

Investing in infrastructure is visible, investing in the bypass, construction of the highway Belgrade - Zrenjanin and the express motorway Novi Sad – Zrenjanin, investing in cycling lanes and in plans related to this mode of traffic. All this is an indication that Zrenjanin is seeking to move towards to establishment of sustainable mobility and makes priorities - planning for people and the environment, not for cars and traffic.

A more detailed overview of the conclusions is given in the text below, classified in the following chapters:

- Demographic and socioeconomic data;

- Transport demand;
- Transport supply;
- General state of mobility in your municipality;
- Main negative externalities from mobility.

### **Demographic and socioeconomic data**

From the aspect of demographics data, Zrenjanin has no complimentary data due to the negative population growth that is increasing from year to year. Population of the city of Zrenjanin on yearly period is in a limited decline (growth rate of app. -0.5% per year). For the period of 10 years the number of inhabitants has decreased by almost 10,000 inhabitants. In 2017, number of permanent residents is 117735. Average age of permanent residents from 2006. to 2017. year is 42.5 years. Average members for household are 2,77 members.

There is a trend of increasing the population of over 65 years (in the period of 10 years it has increased by just over 14000), and a decrease in the number of inhabitants from 0-14 years (in the period of 10 years it has decreased by almost 6000).

It is noted that the densest areas of the City of Zrenjanin are Zrenjanin itself, then settlements Ecka, Klek, Stajicevo, Lukicevo and average population density amounts 89 inhabitants per km<sup>2</sup>. The problem is in the data on non-permanent residents (transfer student, transfer workers, etc.) about which there are currently no records.

From the aspect of socioeconomic data, as well as in demographic data, Zrenjanin has decrease in the number of students, so for a period of 10 years the total number of students decreased for more than 25%. As for the number of employees, it was spotted gradual increase in the number of employees in public sectors as well as the industry, while the reduction in the number of employees occurs in the private sector as well as in agriculture. Positive are data on the number of unemployed residents which, for the period of 10 years, decreased by more than 2.5 times (from 15365 (in 2007) to 6052 unemployed (in 2017)).

As for income, in relation to the national total number for 2016. year, Zrenjanin makes 1.5%. The income of Zrenjanin ranges from 25.3 to 41.5 million euros per year.

### **Transport demand**

From aspect of transport demand, observing the data collected with the questioner it can be concluded that while number of residents declining over time, at the same time the number of commuters is increasing. Also, average number of tourists is 14,753.00. Great changes are also observed in annual level of total trips in Zrenjanin, it is noticeable that the number of trips has grown from year to year, so in 2017 it was higher for 448,427.0 trips, or 2.2 times. Next, in regard to reason of transport, the largest number of trips are trips for work, then trips for study.

In aspect of mode of transport, the largest number of trips in Zrenjanin is done walking, immediately after walking are travels made by car and by bus. Also, a huge number of people use a taxi as their travel mode choice.

Also, data on the number of registered vehicles by categories, number of cars per 1000 inhabitants, are different from year to year, and also shown an evident increase in the degree of motorization, especially in the number of passenger cars.

When collecting the necessary data, all relevant institutions in the city of Zrenjanin were contacted to get the accurate data collection for the needs of the formation of more mobility scenarios for the city of Zrenjanin. A major drawback to the transport demand is the lack of important data among which are number of originated and attracted trips, data on freight trips, freight movements, data of fuel distribution for engine classes, modal share of freight transport, etc.

This chapter also deals with a various tourist information. Tourists arrivals by means of transport in Zrenjanin has a distribution so 60% is by car, 25% by bus, 5% by bike and 1% by boat. Daily spending per overnight tourist on accommodation, food, drinks, and other services is ranging from 63 to 75 euros, and daily spending per same day visitors is ranging from 16 to 23 euros. Highest number of tourists is in the age group of 45-64 years. The motivation for visiting Zrenjanin is various, but according to the data, tourists are coming mainly because of cultural holiday, natural, active or relax and wellness holiday.

The problem is also the lack of data on traffic flows on local roads in Zrenjanin. Data are available for State roads IB category passing through Zrenjanin.

Zrenjanin should in next period work on elaboration of transport model which will use to evaluate existing conditions and to project future effects and needs of transport.

## Transport supply

In Zrenjanin there are several transport modes available. For passenger trips there are car, taxi, bus, train, bicycle, motorcycle, walking, and for freight trips there are car, light and heavy vehicles, train, airplane and motorcycle. Transport infrastructure of Zrenjanin consists of 68.2km of urban roads, 129.3km of extra urban roads, 55km of railways, 35km of cycling lanes, 2.4km<sup>2</sup> of pedestrian area.

Urban and suburban public transport is entrusted to Net Bus company, which has 50 vehicles with which it can transport a total of 3,855 passengers and each year it travels 4,000,000 km.

Currently, there is no bike sharing and car sharing system in the city.

Number of parking lots in Zrenjanin is 2191 of outdoor parking lots among which 662 is closed parking lots and 1529 is on street parking lots. Parking charge is carried out by zone, where in I zone is 0.42 €/h, in the II zone is 0.33 €/h and in the III zone is 0.25 €/h.

Main problem related to mobility is insufficiently built infrastructure that would significantly change the traffic image on the network and thus impact the redeployment of modes of transport which would significantly affect the overall mobility. Resource management requires the introduction of new methods for understanding mobility in order to sustain the city's development.

In the last ten years, there have been new open-source sites in the city that have influenced the mobility i.e. layout of the user's movements on the network. All the changes that happened on the traffic network they were not accompanied by its impact on the transport process.

### **General state of mobility in your municipality**

Zrenjanin, like many cities of today, faces a multitude of challenges related to traffic jams, noise, air quality, health, safety, quality of life and various other problems in the field of urban traffic. On a global level, the challenge of climate change and their impact on the environment, health and economy is strongly related to traffic and behavior that is accompanied by unsustainable mobility. Promoting a long-term change in the commitment of the users of the traffic system to more efficient and less polluting traffic are some of the goals that are set out today in many strategic decisions.

In driving demand management, encouraging alternative transport models include measures to encourage the use of environmental transport models through different campaigns. The basic concept of these models is an attempt to raise the level of awareness about the environment in which users move and the ways in which their movement affects the environment, but also on them. Increase in the number of campaigns related to the improvement of the public transport system, the promotion of the participation of bicyclists and pedestrians in traffic, the integration of different modes of transport, all in order to increase the quality of alternative urban mobility.

Transport information and public campaigns can affect people's awareness, attitudes and behavior of passengers in such a way as to encourage the use of bicycles, hiking and the use of public transport. Campaigns can be conducted to raise awareness of the general public, target groups, or as individualized campaigns.

One of the goals of mobility management is finding ways to meet the need for moving through more efficient and integrated use of existing alternative modes of transport and infrastructure, as well as to improve cooperation among different modes of transport, facilitating the interconnection and functioning of existing transport networks.

The use of public transport includes walking, both at the beginning, at the end of the road, as well as during the transit. In general, walking is an alternative to short trips. Street design refers to factors such as the size of residential blocks, intersection (number, width and use of traffic lanes, parking lots, traffic islands, and sidewalks), traffic calming characteristics, pavement conditions, street mobilier (benches, poles, bins, gardeners) The application of street design that reduces the speed of motor vehicles, improves connectivity, favors alternative modes of transport and improves conditions for walking and cycling, striving to reduce the use of cars and encourage the use of alternative modes of transport.

Motorcycles are generally considered recreational vehicles, although there is a growing tendency for their use in our area when traveling to work. The primary advantage of these vehicles in urban environments is their efficiency in terms of space and fuel.

Taxis are considered to be an integral part of public transportation systems in some countries. In any case, there is also a taxi service that represents an important part of traffic for those who do not own a car, older citizens and categories of citizens with reduced mobility. In the last few years, this type of transport has become equal with other forms of public transport, and in some cases, taxi is the most viable mode of transport.

Measures to use a private car are undertaken in order to make it more efficient. The measures are concentrated primarily on improving the traffic flow itself and increasing the utilization rate of the vehicle itself.

In the last ten years, there have been new open-source sites in the city that have influenced the mobility i.e. layout of the user's movements on the network. A new Medical School was opened and it was significantly built on a brand-new location. Two industrial centers "Istok" and "Jugoistok" with completely new infrastructure were opened. Various facilities were opened in these locations, which enabled the opening of thousands of new jobs.

### **Main negative externalities from mobility**

The main parameters for negative externalities from mobility are quantity of sold fuel, air quality (traffic emissions), noise pollution, number of road accidents, number of most congested zones.

In Zrenjanin there are devices intended for measuring and control of air quality and noise pollution. Devices are located in many locations in the city. Main negative side is that air quality measurement devices do not measure data related to CO2 emissions.

As for noise, based on the measured data for a period of 10 years, it is characteristic that the noise in the zone of the school, both day and night, is higher than the allowed. The same is in the hospital zone. There is noise in the industrial zone, as well as on the main roads, where there is a distinctive higher sound than allowed from 2007 to 2015. In the last two years, the noise in these two zones is moving within the limits of allowed values.

Another problem is the phenomenon of road congestions. Main reasons of congestion are overloading of traffic infrastructure, the number of vehicles exceeds the projected possibilities of the road. The old infrastructure inherits new traffic situation (industrial development, increase in the number of vehicles...). Periods when road congestion occurs is: 07:00-09:00 h and 14:00-16:00 h.

Congestions in Zrenjanin arose after the closure of the central street near the city square and the lack of alternative roads (the above intersections took over the entire burden of traffic through the city center). These places are:

- Intersection Zitni trg - Nikola Pasic - Djurdja Smederevac;

- Intersection Zmaj Jovina - Skadar and intersection Zmaj Jovina;
- Vojvode Petra Bojovica - Djure Jaksica;
- The roundabout of the main road - Brigadier Ristic and Obala Sonja Marinkovic.

The transnational data model for Zrenjanin is filled with all the available data that were found for the requested areas and for the requested period. For a large part of missing data in the given template, there is no reliable information that data are being collected or existing for area of Zrenjanin.

Good example of planning, development, monitoring and development of the traffic system was realized through the 1973 Zrenjanin Traffic Study. Since then, no similar study has been produced to track the needed and satisfaction of transport needs in Zrenjanin. Considering the past period from which the study was developed to date, as well as the development of Zrenjanin in last 40 years, the study data is not relevant for further use. Proposal is, especially due to the bypass construction planning, to make a traffic study in the coming period to gather all the necessary data for the further development of the city.

Data requested for the needs transnational data model are very important for the development of the city, proposal for the city of Zrenjanin is to establish a methodology for collecting data on transport characteristics and to form an information system that would monitor all areas defined in the transnational template in the coming years.

## 5.8 AGENCY “PREDA-PD”

### **Demographic and socioeconomic data**

The total area of City of Prijedor is 834.05 km<sup>2</sup>. In the surface of the Republic of Srpska, City of Prijedor participates with 3.38%, and in the area of BiH with 1.63%. The City consists of 71 settlements. In administrative and political terms, the City of Prijedor is divided into 48 local communities. In the Prijedor mesoregion, in addition to the City of Prijedor, there are municipalities of Kozarska Dubica, Kostajnica, Krupa na Uni, Novi Grad and Oštra Luka. Only the urban settlement of Prijedor is defined by the Spatial Plan of the Republic of Srpska until 2015 as a cross-regional center. All the surrounding municipalities within the mesoregion Prijedor are very strong functional connections connected with the City of Prijedor. The area of City of Prijedor is with functional high-ranking relationships especially related to the Entity Center Banja Luka. The northeastern and eastern border of the City of Prijedor is 12 - 16 km from the state border with the Republic of Croatia. According to the results of the population census, in Prijedor on 01 October 2013, 89,000 inhabitants settled in 71 settlements (organized in 49 local communities), of which about half are rural population. Natural increase is negative and the number of inhabitants is decreasing. Reasons for migration are numerous, from education and employment to the quest for a better quality of life.

Traditionally, Prijedor is an industrial area that based its economic development on exploitation of natural resources of iron ore, gypsum, clay, quartz sand and wood. Important mineral - raw material complex, wood mass as well as fertile land enabled the development of mining, agriculture, wood and metal

industry. By richness of raw materials that metal processing activity is based on (iron ore), the City of Prijedor is amongst the richest areas in Republic of Srpska and Bosnia and Herzegovina.

### Transport supply

In the territory of the city there are several main roads - main road no. 4 Banja Luka - Prijedor - Novi Grad and main road no. 15 Kozarska Dubica - Prijedor - Sanski Most. The territory of the city runs through several regional roads: R475 Sana - Dragotinja - Karan, R405a Omarska (from the fifth unplanned) - Gradina, R477 Prijedor - Mrakovica and R406 Prijedor - Ljubija - Stara Rijeka. The main road M4 Banja Luka - Prijedor - Novi Grad on the territory of the City of Prijedor is mostly parallel with the railway line which together divide the city into the northern and southern parts. Regarding the local roads, in relation to the size of the territory and the settlement of the settlements on it, it is a good connection since the roads are narrow and mostly macadam.

### Transport demand (referring both to people and to goods)

In the territory of the City of Prijedor there is Autotransport company organized for the transport of passengers and goods, as well as JGPP. In the central zone of the city there is also a bus station with incoming and outgoing platforms. The company AD "Autotransport" is owned by the city. The bus station performs its function. A train station is also located near the bus station. The railway network is operational in the entire Prijedor area. There is a possibility to connect with other cities in RS / FBiH by local passenger and wagon trains. Connections with cities of other countries are realized by international vehicles for the transport of passengers. The international rail line is Zagreb - Prijedor - Sarajevo - Ploče. In the territory of the City of Prijedor there are also two industrial railway tracks: Brežičani - Ljubija and Omarska - Tomašica. In the period of intense work on iron ore mines in the area of Ljubija and Tomašica, there was an intensive traffic on the mentioned tracks. Today, railway traffic does not take place on industrial tracks. There is a sports airport in the northern part of the city.

### General state of mobility and main negative externalities from mobility

The main road M 4 and M 15 pass through the central area of the city, which reduces the capacity of the entire main road, and at the same time, by bringing in transit traffic to the city, it creates a higher load on the roads in the center of Prijedor. Outside the city, the quality of the road is undiminished by frequent crossing points with local roads, and even with individual households. In the territory of the City, the biggest deficiencies in the road network in terms of bypasses, roads that pass through the narrower city area, bridges over the Sana River and poorly adjusted crossings over the railway. The main road M 15 Kozarska Dubica - Prijedor - Sanski Most passes through the very center of the city, i.e. transit traffic makes local traffic difficult. Settlements are poorly connected at higher geographical heights.

The main issues can be summarized into:

- small representation of public transport in total traffic in the city area;
- insufficiently developed awareness of the use of public transport;
- lack of infrastructure for the development of cycling routes;
- the tradition of using the vehicle when performing daily activities;
- poor infrastructure in rural areas;
- traffic caused by the lack of bypass around the city;
- connection of the southern and the northern part of the city with one corridor.

## 5.9 GRADISKA

### Demographic and socioeconomic data

The administrative division of Bosnia and Herzegovina includes two equal entities, the Republic of Srpska (49% of the total territory of Bosnia and Herzegovina) and the Federation of Bosnia and Herzegovina (51% of the total territory of Bosnia and Herzegovina). The Municipality of Gradiška is located in the north-western part of Republic of Srpska, covering Lijevece polje and Potkozarje, with an area of 762km<sup>2</sup> (76173ha). The Gradiška Municipality is geographically positioned on the very border of the European Union and is only half an hour away from the City of Banja Luka, which is the capital administrative centre, 20 minutes from the airport in Laktaši and 1h 30min from the airport in Zagreb (EU).

The last census in Bosnia and Herzegovina was conducted in 2013 and before that in 1991 year. The number of residents in the Municipality in 2013 were 49196 and current estimation is that there are 48385 permanent residents. The population density is calculated as 64,6 ab/square km. Based on data on distribution of population by age classes it can be concluded that the population is getting older since higher number of people belong to the groups of 45-64 and over 65. Combine for those two groups, 49% of population is older than 45 years of age. In recent years, the trend of migration of the population to the western European has become noticeable in entire country, primarily because of better jobs and quality of living. The exact data of this trend is missing on state as well as municipality level.

The main economic activities in Municipality of Gradiška are trade, with 48% of total revenues, agriculture with 11% of total revenues, construction with 8%, metal processing with 7% and production of food and drinks with 2,5% total revenues.

Number of unemployed persons in 2013 were 8948 and data for recent years are missing for the municipality level. There are data for the region of Banja Luka, where Gradiška is included. In the region here were 44293 unemployed persons on average in 2013 and 35018 unemployed person in 2017. The positive trend of unemployed reduction should be analysed with certain degree of precaution because there were changes in procedures for evidence of unemployed persons in the meantime.

Average monthly income of the population on the level of Republika Srpska in 2017 was gross 680 EUR. The net income was 425 EUR and remaining amount are state taxes and contributions. The data on the municipality level are missing.

### Transport demand (referring both to people and to goods)

The number of commuters in the municipality in 2017 is estimated on 4920 and is in constant decline as consequence of decline of total number of residents. Number of passenger trips in 2017 was estimated on more than 2,4 millions and freight trips just below 128 thousands. The majority of passenger trips are made by car (94%). The public transport are used only in 3,5% of passenger trips and taxi services in 1% while other travel modes, namely bicycle, motorcycles and walk are used in less than 1% of cases each. In freight transport, cars are main travel choice in 88% of cases, while light commercial vehicles are used in 7% and heavy goods vehicles in 5% of cases.

In 2016, there were in total 16137 registered vehicles. There were 13763 cars, 476 motorcycles, 51 buses and 1847 light and heavy good vehicles registered. There are no electric or hybrid vehicles registered in the municipality.

The total number of licensed drivers were not available and the number of issued licensed each year from 2007 to 2017 varies between 1374 and 6426. It can be deduced that the large percentage of residents older than 18 years of age, have obtained driving license.

There are approximately the same number of passenger vehicles with Euro emission standards 2-4. The lowest number of vehicles have Euro 5 standard. The 65% of vehicles are on diesel fuel and 35% on gasoline from which 40% have installed LPG tanks.

The main traffic flow of people and goods on the municipality territory is at the border crossing with Croatia, that is currently located in the centre of the urban area of the Municipality. On average 4000 vehicles, out of which 300 freight vehicles, pass through this border crossing each day. The frequent traffic jams (the jams can often be up to 5 km long) on the border can paralyse traffic flow in the Municipality. The traffic jams are the highest on week days including Friday and on national holiday both in BiH and EU.

Highway Banja Luka – Gradiška was finalized in 2011 and a new bridge and border crossing into Croatia are planned, reducing the traffic flows through the centre of Municipality of Gradiška. The highway connects to the major regional highway Belgrade – Zagreb, resulting in very favourable transportation conditions for Gradiška.

All data concerning transport demand were based on expert estimations and calculations from few available data.

## Transport supply

The transport supply in Gradiška is characterised mainly by transportation by personal cars and the number of registered cars is growing, despite the fall in number of residents in recent years. A small number of taxis are registered and operating on the territory. Public transport is operated by 6 private companies with 23 vehicles and providing extraurban and suburban transport – connecting the centre of the municipality with rural areas. There is no urban public transport service.

The municipality is well covered by roads and is connected to all neighbouring municipalities and with a bridge over river Sava with Croatia to the north. On the territory of the municipality exists 282,8km of urban roads, 245,1km of extra urban roads, 26,8km of freeways and 3240,43km of uncategorized roads. Cycling infrastructure does not exist and there are no cycling lanes or bike-sharing systems. The pedestrian paths are limited to the centre of the municipality and do not exist in extra urban and rural areas. The municipality operates 862 open parking spaces, located in the centre with the same established prices for all locations. The awareness of the population on sustainable mobility is very low and most trips are taken by personal cars.

## General state of mobility in your municipality

Mobility in Municipality of Gradiška is undeveloped, reliant on fossil-fuel passenger and freight vehicles. There is low awareness on use of sustainable mobility modes among the general population and most trips are taken by cars. The location of the most frequent border crossing and customs terminal of BiH in the very near vicinity of the city centre is causing major issues for the flow of traffic towards and around the border crossing. The local population is forced to use byroads and avoid the main roads to the border during peak hours. The waiting times for the border crossing are 2,5-3 hours during the peak weekends and the congestion paralyses the main roads leading into the city centre. The planned construction of the new bridge and border crossing has been delayed many times and is currently scheduled to start at spring 2019 with estimated 30 months for construction. Currently there are no dedicated cycling lanes in the Municipality and pedestrian paths are located mostly in the urban part of the Municipality. The Municipality has not implemented any soft-mobility measures, or bike-share measures. The public transport service is provided by private companies operating exclusively on extra urban lines, no urban lines exist or are planned.

## Main negative externalities from mobility

As stated above, the main reason for traffic jams in the municipality is that the border crossing with Croatia and customs freight terminal is located in the centre of the urban area of Gradiška. In period Friday –Sunday and on national holidays in EU in BiH the length of road tail can be up to 5km with the period of waiting up to 3 hours. The situation regarding border crossing and customs terminal is in process of resolving since the Highway Banja Luka – Gradiška was finalized in 2011 and a new bridge and border crossing with Croatia should be finished relatively soon, since the tender procedure for the contractor is ongoing and in the beginning of the 2019 the works should begin.

The number of traffic accidents in 2017 were 452 with 38 severe injuries, 88 slight injuries and 4 fatalities. The number of accidents and traffic related injuries are relatively in constant decres over the years but number of severe and slight injuries as well as number of fatalities remains the same.

Another negative aspect of the traffic in the municipality is relatively old passenger and freight vehicles the estimated same number vehicles with engines with Euro emissio0n standards two, three and four. The older vehicles are manifested in more pollution and bigger risks for traffic accidents.

## PART 6: SOME CONSIDERATIONS

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From the data collected by the various partners, it emerges that in the municipalities of their interests there are no monitoring centres of the mobility and traffic that allow having a detailed and exhaustive dataset. The lacunas concerns, especially, the question of traffic and in much measure the mobility of goods, point of fundamental importance in the first and in the last mill. Also the data referred to the mobility external costs are not very good. It is in these contexts, which becomes crucial the support of the stakeholders, which with their knowledge can help the planners to identify and classify the problems, even from the point of view of the importance. In fact, considering the less and less available economic resources, it is important to correctly identify the crucial problems and to create a ranking of the same in order to identify the priorities for intervention. Clearly, it is important not only to take into account the economic aspects, but also the technical feasibility and the effects on the surrounding environment. Every design choice or alternative scenario must take into account a series of impacts of different kinds:

- environmental pollution;
- noise pollution;
- traffic accidents;
- Traffic congestions;
- social and cultural impacts;
- energy impacts;
- time and costs impacts;
- etc.

An excellent design solution should try to solve all these negative effects of mobility or at least most of the most crucial ones. In any case, a good solution must try to avoid improving one aspect and making others worse. For this reason, it is necessary to develop more mobility scenarios according to the "what if" model, highlighting consequences of business as usual as well as of different measures of change. So the identification of the best strategies depends on the identification of the problems and on the transport impacts. If these impacts are unsustainable, we need to rethink new strategies.

The next step of the project is to develop mobility scenarios in order to identify sustainable and common strategies. Each territorial PP will design some different sustainable mobility scenarios to enable policy makers and stakeholders to better understand effects of their choices. Based on the results coming from the mobility scenarios a Transnational Action Plan will be prepared, in order to identify new policies for the future sustainable mobility.