

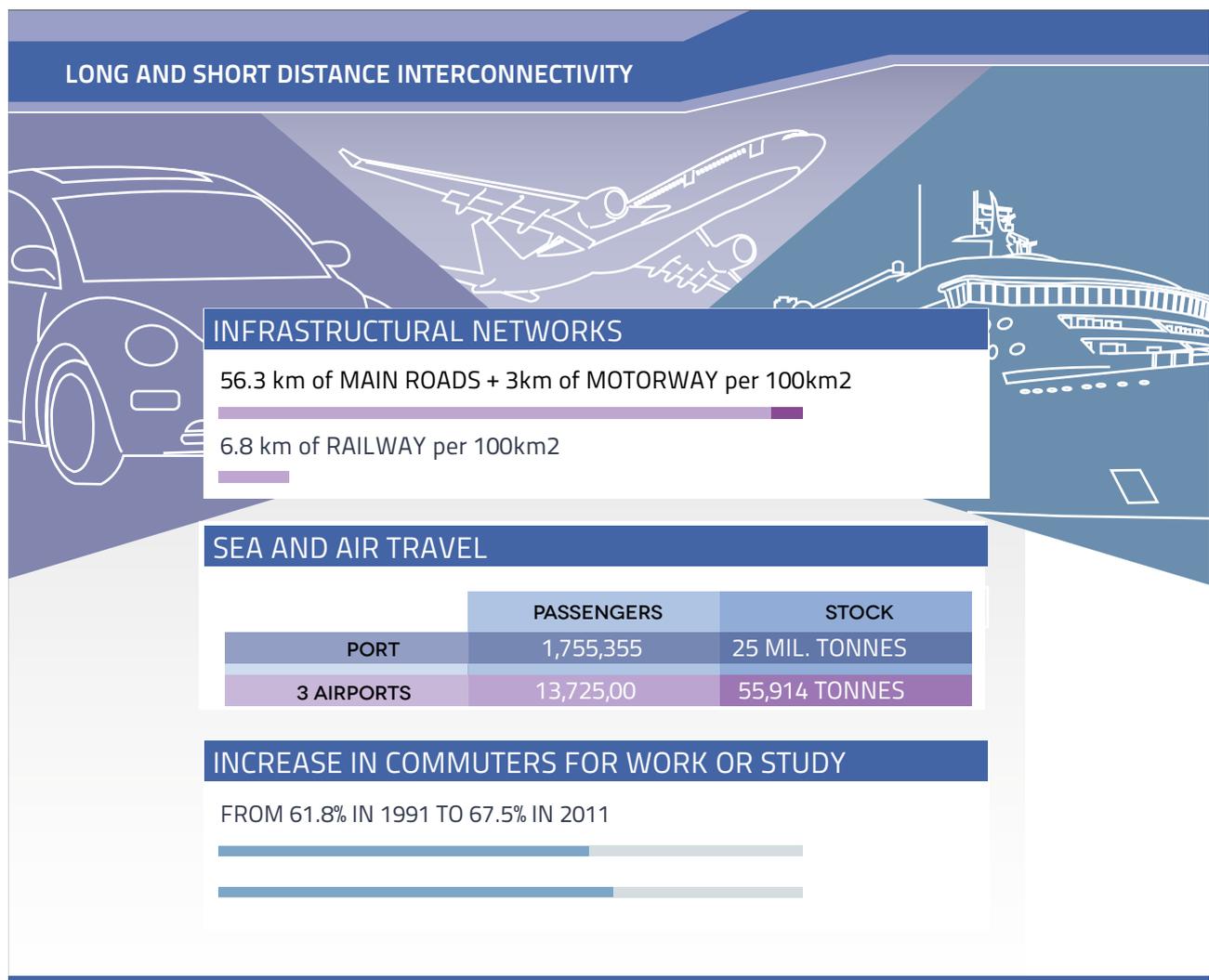
Cap.11 How will we travel in the future? Interconnected, for sure.

The concept of interconnectivity is perfectly embodied by the infrastructural network. Roads, motorways, railways, airports, ports were invented to connect people and stock. Veneto boasts 53.6 km of main roads per 100km² of surface area, 3 for motorways, 6.8 for railways, a port with 3,400 ships and over 1 million 700,000 passengers, three airports which overall allow 16 million people to travel.

Today daily commuters, either for work or study reasons, are an important component of mobility, a phenomenon that in the last 20 years has evolved and has strongly changed. This indicator measures the input and output flows of the municipal territory – given by the percentage report of the residing population of all ages up to 64 years old – it was 61.8% in 1991, it increased to 67.5% in 2011.

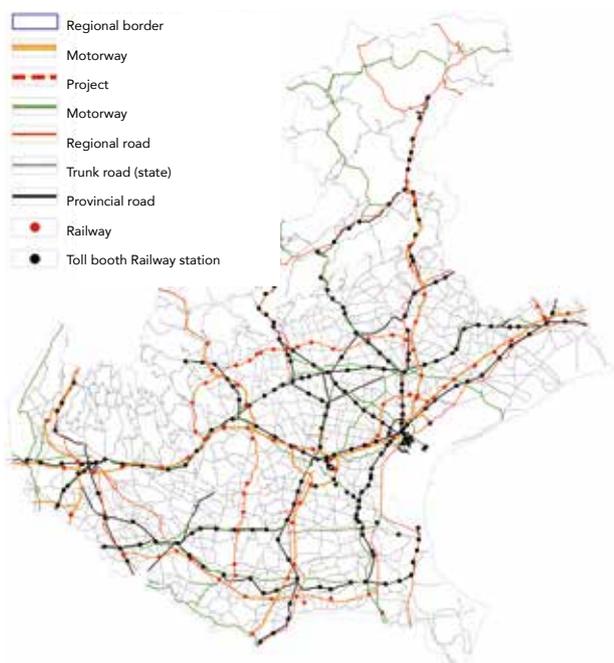
In terms of private mobility – or the percentage of the residing population who travel daily for work or study reasons and use a private motor-vehicle (car or motorbike) compared to the residing population who travel daily for either work or study reasons, there is a net growth in the last 20 years. In 1991, the majority of municipalities showed a percentage of private mobility use of less than 60%, whilst in 2011 most municipalities showed a significant increase with figures in excess of 70%.

A high level of mobility within the regional territory corresponds to a significant persistence of the phenomena of road traffic accidents. Falling from over 53% from 2001 to 2014, the mortality for incidents remains high especially in certain areas that are particularly at risk.



settlement plan, which gives the name to the so-called "urban sprawl". It is typical for the central and oriental area of our region, which develops along the main motorway and railway: you live in a place called "A", take the children to school in B, work in C, do the shopping in D, and so on. This shape signifies, consequentially, a growth in demand for transport, especially private and by residing citizens.

Fig.11.1.1 – The transport infrastructural network of Veneto. Regional border



Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Regione Veneto data - Pianificazione Territoriale Strategica e Cartografia Section

The road and railway network

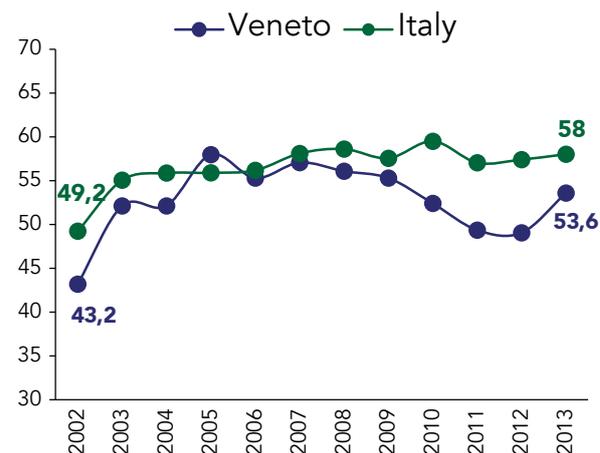
The physical road infrastructure (provincial and regional roads of international interest) in Veneto – in terms of kilometres covered per 100km² of surface area – over the course of the last 10 years is lower than the national average: 53.6km compared to 58 in 2013¹. However, the motorway infrastructure is greater: 3km compared to 2.2. In 2014, 3,903,220 vehicles were circulating on the Veneto road network (74% of these were cars) to which we add all transit traffic. In the same year 998,317 vehicles travelled on the motorways on average daily²

¹ The most recent year available

² For vehicles we intend all vehicles, which accessed the motorway, excluding the distance travelled.

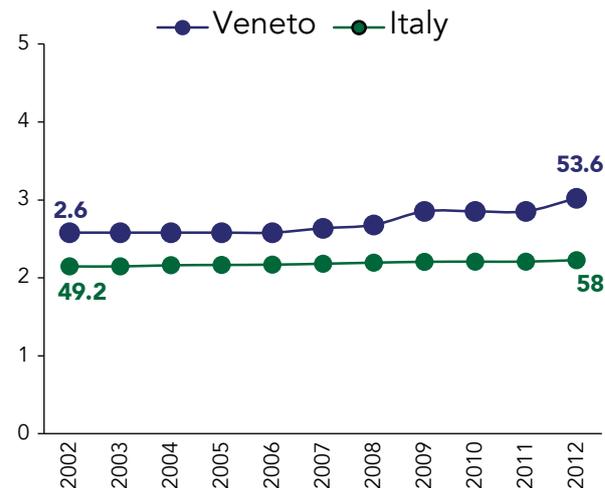
(770,709 for passenger transport and 227,608 for goods transport), which is a slight growth of +1.3% compared to the previous year, but still a loss compared to the years 2009-2011 (around -3/4%).

Fig.11.1.2 – Endowment index for the road network(*). Veneto and Italy – Years 2002:2013



(*): Provincial and regional highways of national interest on the region surface area (km per 100 km²)
Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Infrastructure and Transport Ministry data

Fig. 11.1.3 – Endowment index for the motorway network (*). Veneto and Italy – Years 2002:2013



(*): Motorway network of the regional surface area (km per 100 km²)
Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Associazione Italiana società concessionarie autostrade e trafori (up until 2006), AnasAiscat (from 2007) and Istat data

Tab.11.1.1 - Endowment index (*) for the railway network. Veneto and Italy – Years 2004:2010

	2004	2005	2006	2007	2008	2009	2010
Veneto	6.6	6.6	6.7	6.7	6.7	6.7	6.8
of which electrified (%)	62.1	62.0	62.9	62.9	62.9	62.9	-
of which are twin-tracked (%)	45.4	45.2	46.7	46.7	48.2	-	-
Italy	6.5	6.5	6.7	6.6	6.7	6.6	6.7
of which electrified (%)	63.4	64.1	64.8	-	-	65.2	-
of which are twin-tracked (%)	34.2	36.4	36.3	37.5	38.4	-	-

(*) Railway network of Ferrovie dello Stato: concession and administrative management on court order on the regional surface area (km per 100 km²)
 Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data, Infrastructure and Transport Ministry and Trenitalia RFI data



Ports and Airports

The data concerning the railway network is absolutely in line with the national data, 6.8km per 100km², 63% of which are electrified and 48% of which are twin-tracked.

The Veneto infrastructure also includes the port of Venice and the airport system Venice – Treviso – Verona, whose dynamics may be understood by observing their traffic of goods and people.

The port of Venice is certainly an important stopover within the Adriatic basin, acting as a European gateway for commercial flows from and to Asia. The global economic crisis also had an effect on its movements, particularly in terms of the number of incoming vessels, which has continued to decrease from 2008 to 2014, with a reversal of the trend in the last year. 2015 was characterised also as the second consecutive year of recovery of trade in goods (slightly more than 25 million tonnes) and, especially, a record year for container movements (560 thousand

TEU's³).

The airports of Veneto have been playing an increasingly significant role in recent years, with some of them having been more active in the passenger sector and others in the cargo sector.

At the end of 2015, the Venice-Treviso airport system showed very positive traffic-related results: +3.8% in terms of passengers, +5% movement of aircrafts. Venice's airport registered 8,751,028 passengers, an increase of 3.3% compared to the previous year. Treviso's airport totalled 2,383,307 passengers, +6% from 2014. The two increases reported an overall number of 11,134,335 passengers, a 3.8% increase from the previous year. The movement of aircrafts (arriving and departing) was 100,348, an increase of 5%. The analysis of the data referring to single airports draws particular attention to the further strengthening of the international role of the Marco Polo airport, an intercontinental gate

³ TEU, acronym for twenty-foot equivalent unit, it is the standard volume measure for ISO containers, corresponding to a total of 40m³.

Tab.11.1.2 - Venice port traffic – Years 2005:2015

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Arrived vessels	4,690	4,998	4,782	4,974	4,295	4,189	4,142	3,745	3,553	3,359	3,402
Of which cruise boats	437	423	510	539	541	623	654	645	668	568	606
Passengers	1,365,375	1,453,513	1,503,371	1,720,496	1,887,276	2,058,815	2,239,751	1,998,960		1,945,322	1,755,355
Of which cruise ship passengers	815,153	885,664	1,003,529	1,215,598	1,420,490	1,599,054	1,777,073	1,739,501	1,841,477	1,750,698	1,601,042
Movement of goods (tonnes)	29,099,041	30,936,931	30,214,699	30,247,587	25,191,473	26,389,758	26,301,207	25,349,248	24,350,327	21,765,590	25,104,217
Movement of containers (TEU's)	289,860	316,641	329,512	379,072	369,474	393,913	458,363	429,893	446,428	456,068	560,301

Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Autorità Portuale di Venezia data

for Italy alongside Rome and Milan.

The Verona airport surely benefits too from a geographically solid position in the Northeast, at the crossroads of corridor I with corridor V. It is located in one of the most competitive basins within Europe in terms of presence of businesses, becoming the perfect location for airlines' operations.

From Verona airport the motorways (A4 Milan – Venice and the A22 Verona – Brennero) may be accessed quickly and simply; additionally, it has a strong potential for growth either within the inbound or outbound markets. The Verona airport is less than an hour far from 6 UNESCO world heritage sites (Verona city, Vicenza city and Ville Palladiane, archaeological sites of Valcamonica and the whole Santa Giulia site at Brescia, Mantova and Sabbioneta, the Dolomites). Furthermore, the beaches and the coasts of Lake Garda are reachable in an hour. In the last year movement of goods has increased whilst the passenger movement has decreased, +8% and -6.7% in 2015. Road transport, however, is absolutely the most used and concerns 97% of the transported goods.

There are projects and initiatives favouring alternative ways of transport, but much work is needed. An important operative programme, for example, is "Infrastructure and networks" for the 2014-2020 period, adopted last Summer by the European Commission, with a financial budget amounting to 1.84 billion euros, and providing for investments in three sectors: railway infrastructure, port infrastructure and smart transport systems. It is a programme, which will contribute in making the Italian transport system more sustainable and competitive. The forecasted investments comply with the priority of the European policies relative to the transport infrastructure and will contribute in improving the connections between sustainable transport from an environmental point of view, with less noise pollution and less carbon emissions, including internal waterways and

maritime transport, ports, different connections and airport infrastructure.



Accessibility

In a world ever-more globalised and interconnected, the

accessibility of a territory is surely a driver of economic growth, thus enabling better standards of life for residents. Periodically certain indicators are calculated, in order to track factors such as distance, international circulation networks, the quality of public and private transport; resulting in information on the different European regions, based on their intercontinental and interregional accessibility, the latter via the roads and railways⁴.

The Veneto airport system works as an access point from abroad and enables further and easy connection of people and goods to the rest of the regional and national territory via the railway and road networks.

How far does the infrastructural network described here go in guaranteeing citizens and businesses connections to inter-urban and logistical nodes? A response can be found in the index of accessibility, which shows the travel times towards the inter-urban and logistic nodes, obtained by processing travel times, expressed in minutes, from the core centre of every municipality to the three nearest infrastructures, for each of the four considered categories (ports, airports, railway stations, toll booths)⁵.

⁴ Veneto Region – System for regional statistics, The regions of the alpine region – Chapter 2. The use of ground and accessibility (2004)

⁵ For the processing of travel times a commercial road graph was used which took into account the real road speeds (for which also the morphology of the territory) in ideal conditions, that is to say without traffic. In Sardegna there are not motorways, thus there is no data for their toll booths. The indicator was obtained using the average travel times to reach the three existing infrastructures.

Tab.11.1.3 - Traffic in Airports – Years 2005 and 2009:2015

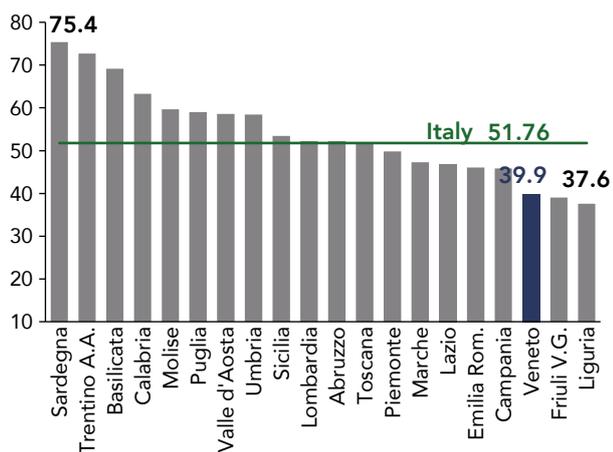
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	tonnellate								var%	Migliaia								var%
	2005	2009	2010	2011(*)	2012	2013	2014	2015		2015/14	2005	2009	2010	2011(*)	2012	2013	2014	
Venezia - Marco Polo	22,723	32,533	37,612	41,886	40,887	45,662	44,426	50,961	14,7	5,825	6,718	6,869	8,585	8,188	8,404	8,475	8,751	3.3
Treviso - Antonio Canova	17,907	2,763	2,932	868	53	0	0,2	0,1	-30,0	1,300	1,778	2,152	1,076	2,334	2,175	2,248	2,383	6.0
Verona - Valerio Catullo	10,888	6,335	4,634	5,381	4,992	4,745	4,578	4,953	8,2	2,650	3,066	3,024	3,386	3,199	2,720	2,776	2,591	-6.7

Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Assaeroporti data

HOW WILL WE TRAVEL IN THE FUTURE? INTERCONNECTED, FOR SURE.

The average time for Italy is 51.8 minutes, variable from a minimum of 37.6 in Liguria to a maximum of 75 in Sardegna: Veneto, with an average time of 40 minutes, was the third best region in the country.

Fig. 11.1.4 – Index of accessibility towards the inter-urban and logistics nodes (*) per region – Year 2013



(*) In Sardegna there aren't motorways thus there is no data for their toll booths. The indicator was obtained using the average travel times to reach the three existing infrastructures
Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data

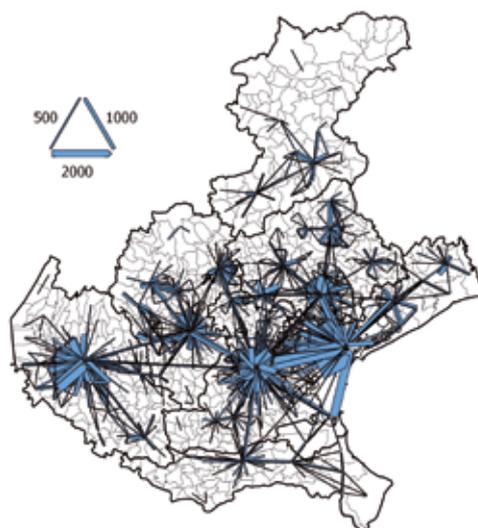
11.2 Commuting today

The links everyone establishes with the territory where they live, work or study can be well represented by the flows of commuters, that is to say the number of people out of the residing population who travel daily for work or study reasons.

The following graphical and numeric processing are aimed to provide information on the intercommunal mobility (from residence to work and/or study location) of the residing population.

Every day 2,603,830 people in Veneto have to travel from their homes to their place of work or study, in ten years the figure has grown by almost 300,000 (it was 2,319,188 in 2001). 70% of people travel for work reasons, and the remaining 30% for study reasons. Slightly more than a half of the travellers come from the same municipality of residence, and around 40% of them come from another municipality of the same province.

Fig. 11.2.1 – Cross-municipal relations with more than 100 commutes per day. Year 2011



Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data

Tab. 11.2.1 - Commute intensity for study or work reasons per province. Veneto – 2011

	Study		Work		Total	
	2011	var % 2011/01	2011	var % 2011/01	2011	var % 2011/01
Verona	149.627	8.5	342.935	15.3	492.562	13.2
Vicenza	148.268	10.3	325.806	8.9	474.074	9.3
Belluno	28.463	-1.8	76.164	4.7	104.627	2.9
Treviso	149.451	14.6	326.510	12.6	475.961	13.2
Venezia	128.939	6.4	306.836	10.2	435.775	9.1
Padova	156.349	9.9	344.977	14.7	501.326	13.1
Rovigo	32.455	-6.9	87.050	3.7	119.505	0.6
Veneto	793.552	10.2	1.810.278	13.2	2.603.830	12.3

Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data

On the map below the cross-municipal relations are displayed with more than 100 daily travels, (the tip of the arrow indicates the direction). Venice and Padua reported a strong mutual interaction in both directions; both as the origin and destination of one and other: the number of commuters from Padua-Venice is overall equal to 2,494 a day, whilst from Venice-Padua the figure is 2,808. There are also the interactions between these cities and their surrounding municipalities to consider: there are 7,106 daily commuters from Mira (VE) to Venice and 6,000 from Albignasego (PD) to Padua. Verona and Belluno tends to interact with their surrounding municipalities, whilst Rovigo and Vicenza show the largest number of daily commuters towards the municipality of Padua (842 and 1,315 respectively). Treviso is presented as an origin city with a large number of movements either towards neighbouring communes such as Villorba (2,070 commuters), or towards other capital cities such as Venice (1,699 commuters). The trips to Treviso originate mainly from the surrounding municipalities.



The commutes of workers

1.8 million people travel every day for work reasons, an increase of 13.2% compared to the previous Census. For 45% of the cases the travel is within the same municipality. Verona is the municipality which mostly contributes to the phenomenon this – over 91,000 commuters – followed by Venice (90,437), Padua (72,852), Vicenza (39,930), Treviso (27,595) and Rovigo (18,916). Chioggia, Bassano del Grappa and San Donà di Piave are the only “non capital” cities to generate more than 15,000 commuters. 86% of the Venetian municipalities generate less than 5,000 commuters.

The cross-municipal commutes for work reasons are principally directed to the cities enjoying status of province capital. The journeys with the largest number of commuters are headed to Venice, Padua and Verona. The largest flows concern the journeys: Mira-Venice (6,141), Spinea-Venice (4,884), Albignasego- Padua (4,545), Martellago-Venice (3,494), Chioggia-Venice (2,997), San Giovanni Lupatoto-Verona (2,568), Villafranca Veronese-Verona (2,454). The analysis of the commuter flow trend highlights which are the most attractive centres of the Veneto region, and it is not just a case of the capital cities. . The occupational mobility, different from the student mobility, generates multi-directional commutes, with some points of larger aggregation, in a context where the available jobs are widely distribu-

ted across the region.

In the province of Venice, the commutes of employed people take place within the same municipality of residence or towards other municipalities of the same province, or towards the provinces of Padua and Treviso. Thus, there is a triangle of interaction generated between these three provinces.

A considerable amount of commuters continues to travel from the surrounding municipalities of the Venice province towards the municipality of Venice. An increase from 2001 to 2011 is reported.

The municipalities of the province of Treviso report a considerable flow of commutes towards the municipalities within the same province or Venice. The most noteworthy is the number of commuters from Mogliano Veneto (TV) to Venice: 3,407.

The municipality of Treviso, in particular, shows a reciprocal relationship with the Villorba neighbouring municipality (1,707 from Treviso and 1,642 heading to Treviso) and with Venice city (1,182 from Treviso and 760 towards Treviso).

The commutes of the people from the Treviso municipality to the province of Padua are limited, while more commutes originate from the municipality of Castelfranco Veneto.

In the province of Padua most of the commuters travel within the same province and towards other municipality of the provinces of Venice and Treviso. The commutes originating from the municipalities around Padua are mainly headed to Padua. . The urban- residential expansion which has involved these municipality has certainly influenced the number of commuters who daily travel towards the capital city of the province for work reasons. The latest Census showed that this trend registers strong growth.

The interaction of Padua’s municipalities with the municipalities of other provinces is also in growth, in particular Venice and Verona; a flow which is more intensive at the borders between provinces, e.g. Piove di Sacco, Trebaseleghe, Montagnana and Gazzo. The mobility of employed people residing in the Vicenza province mainly features commutes headed to another municipality within the same province or to neighbouring municipalities within the Pauda province.

The Vicenza area hosts numerous centres of interest for workers. Vicenza, Schio, Thiene and Bassano del Grappa are the ones showing a growing trend in this department. Commuting for work reasons from the municipalities of the province of Verona seems to revolve around trips, for the main part, within the same territory. This area do not seem to interact



18,000) and Treviso (around 12,000). There are 15 Venetian municipalities which generate over 5,000 commutes daily.

The cross-municipal travels for study purposes are mainly headed to the capital cities of Padua, Verona and Treviso. More precisely, the following journeys involve the largest number of commuting students: Albignasego – Padua (1,515travels), Selvazzano Dentro – Padua (1,292), San Giovanni Lupatoto-Verona (1,290), and Vigonza – Padua (1,261), Negrar-Verona (1,060), Cadoneghe- Padua (1,049), and Paese-Treviso (1,045).

The relationship between Venice and Padua is interesting, the latter attracts 1,177 commuters every day coming from the capital for study reasons, whilst in 2011 only 708 commuters per day travelled daily from Padua to Venice for work reasons.

This information is particularly important if you consider that both Venice and Padua are university city and cultural nodes. In the last ten years Padua's attractiveness has been greater. This tendency is however strongly reduced if compared to year 2001. Most of the students residing in the municipality of Venice use to travel daily to other communes within the same province of Venice or to Padua or Treviso. The students of the municipalities of the province of Vicenza tend to prefer to travel to the municipalities of Vicenza, Schio, Thiene and Bassano del Grappa, in the same province; when travelling outside of the province they go mainly to Padua (for example from Vicenza 723 commuters and from Bassano del Grappa 233 commuters) and Venice (from Vicenza 235 commuters). In the Vicenza area, the journey with the largest number of daily commuters for study reasons is that between Cassola and Bassano del Grappa with 775.

Proceeding with the analysis of the students flows in Veneto we can observe that in the Treviso area the largest number of commuters is reported within the municipality or towards other municipalities within the same province, with the exception of an amount of commutes towards the provinces of Venice and Padua. In the Treviso province the largest number of commutes heads towards Treviso, Castelfranco Veneto, Conegliano, Montebelluna and Vittorio Veneto, with an increase in commuter flow compared to 2001.

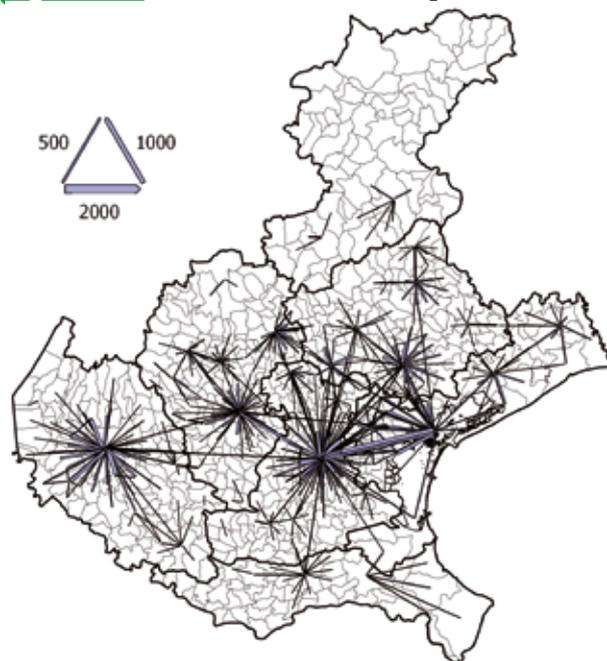
The provinces of Verona, Belluno and Rovigo, whilst showing substantial differences both in geographical and demographical terms, present similar trends. The commuting of students in these areas is mainly within the province, aside from a few exceptions.

67 out of 69 municipalities of Verona involved in the commuter flow for study reasons interact with municipalities in the same province. The journey from Lonigo (VI) to Padua is an example of the few interactions with locations outside of the province.

Some of the largest attractive centres, aside from the capital of the province, are Villafranca Veronese and Legnago.

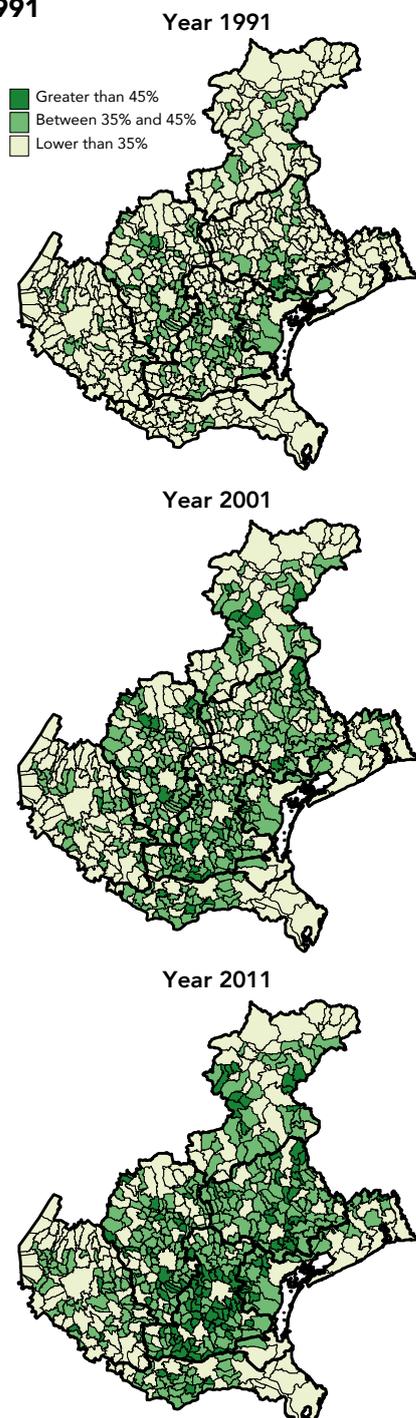
In the Belluno province, the interactions take place only within the same province. Students who travel daily chose to stay within their province of origin, in particular towards Belluno and Feltre. The location of the geographical area under analysis suggests that students who chose to travel to other provinces, especially those travelling due to specific university training reasons, relocate in order to live closer to their areas of interests. . These trends are very similar in the Rovigo region. Students prefer to commute within their municipality or towards other municipality within the same province: the most attractive centres appear to be Rovigo and Adria. One exception is the amount of travels towards Padua (238). Compared to 2001, the last census showed an increase in the flow of student commuters going from Chioggia and Padua to Rovigo, whilst the number of commuters going from Adria to the surrounding communes has decreased.

Fig. 11.2.4 – Commuters for study reasons. A



Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data

Fig. 11.3.1 – Rate of cross-municipal mobility (*) per municipality. Veneto. Years 1991-2001-2011



(*) Percentage ratio between the residing population who commute daily for study or work reasons outside the municipality where they have their habitual residence and the residing population up to 64 years of age.
Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data



Cross-municipal mobility for work reasons

habitual residence and the residing population

who travels daily for work reasons within the municipality where they have their habitual residence.

This indicator provides a measure of the flows of daily commuters leaving the municipality of residence to get to their workplace. Values greater than 100 indicates that daily cross-municipal mobility for work reasons is widespread, and indirectly indicate that the territory has a lower capacity to meet its labour demand.

In the last 20 years under analysis a phenomena has been constantly growing: the municipalities showing a rate greater than 100. Occupational mobility tends to grow in terms of distances and travel times with contextual increases in cross-municipal and abroad travels.

In 1991, a third of the municipalities in Veneto reported values lower than 100, whilst the other two thirds reported values greater than 100 (of which 41% reported values between 100 and 200 and 26% reported values greater than 200).

Occupational mobility outside the commune where the travellers have their habitual residence appears to be increasing in 2001: only 18% of municipalities reported values lower than 100. In particular, we observe a strong increase of municipalities reporting a rate greater than 200, which corresponds to a percentage of 38%.

The same trend was also reported in 2011, with 86% of municipalities experiencing a cross-municipal occupational mobility rate greater than 100: and 49.2% of municipalities experiencing a rate of over 200.

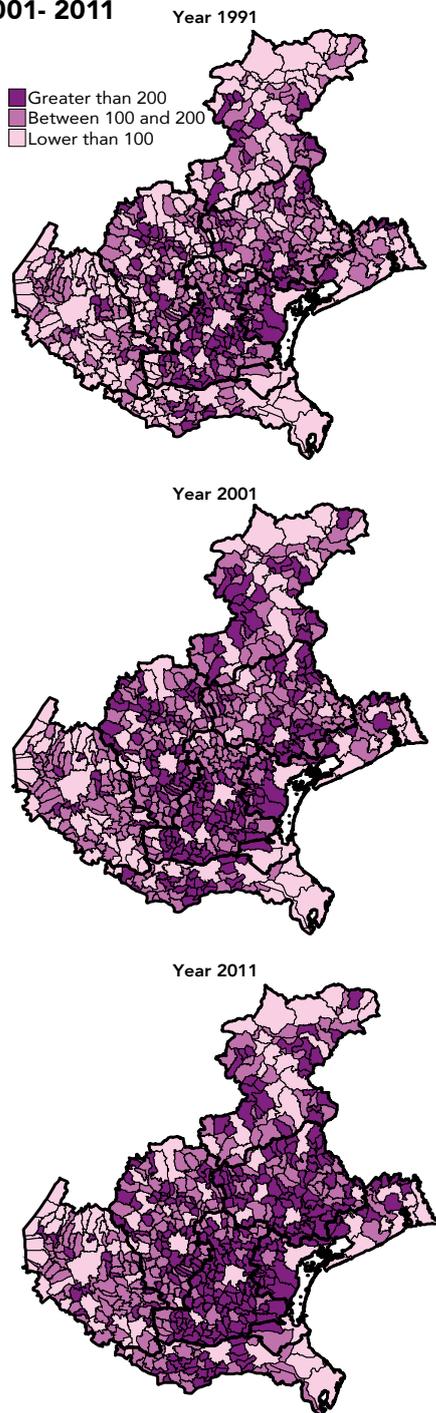


Cross-municipal mobility for study reasons

Similar to the occupational mobility rate,

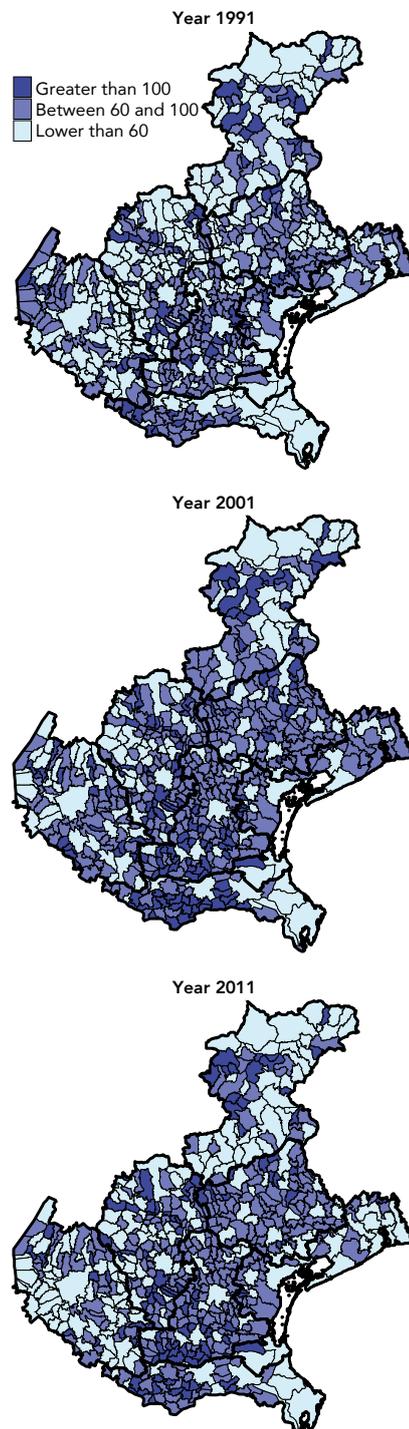
the student mobility rate is given by the percentage ratio between the residing population who travel daily for study reasons outside the municipality where they have their habitual residence and the residing population who travel the municipality where they have their habitual residence. The indicator measures the flows of daily commutes leaving the municipality where the travellers have their habitual residence in order to reach their study place. Values greater than 100 express a lower cross-municipal mobility for study reasons and express indirectly a lower inclination of the territory of interest towards the satisfaction of the internal need for learning and

Fig.11.3.2 – Cross-municipal occupational mobility rate (*) per municipality. Veneto – Years 1991-2001- 2011



(*) Percentage ratio between the residing population who commute daily for work reasons outside the municipality where they have their habitual residence and the residing population who commute daily for work reasons within the municipality where they have their habitual residence. Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data

Fig. 11.3.3 –i Cross-municipal student mobility rate (*) per municipality . Veneto – Years 1991 – 2001- 2011



(*) The percentage ratio is between the residing population who commute daily for study reasons outside the municipality where they have their habitual residence and the residing population who commute daily for study reasons within the municipality where they have their habitual residence. Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data

training.

In 1991, about 15% of municipalities reported a ratio value greater than 100, a percentage that grew to 24% in 2001. In 2001, however a countertendency phenomenon was reported: municipalities with which a value lower than 60 increased (181 municipalities, or 31.2%), whilst on the other hand the other segments under analysis seem to be decreasing. In particular municipalities with a value between 60 and 100 reduced to 285 (or 49.1%) whilst the municipalities with a value greater than 100 became 108 (or 18.6%).

Compared to the occupational mobility, the student mobility within the municipality of residence is much more limited.

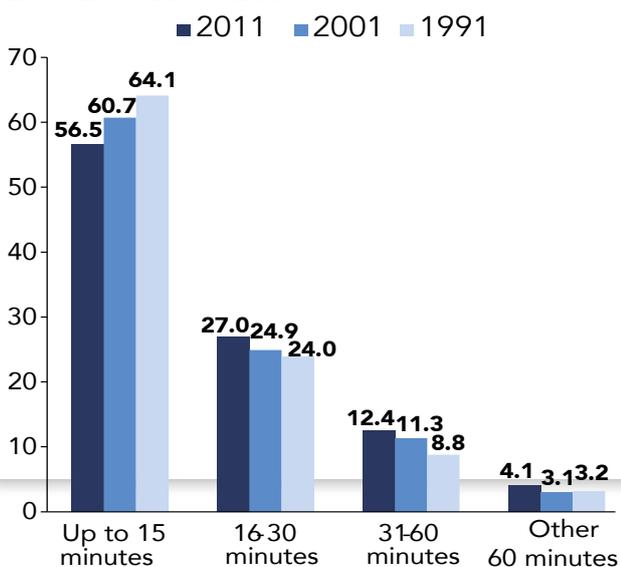


Characteristics of the commutes

Between 2001 and 2011 the quota of "privileged commuters"

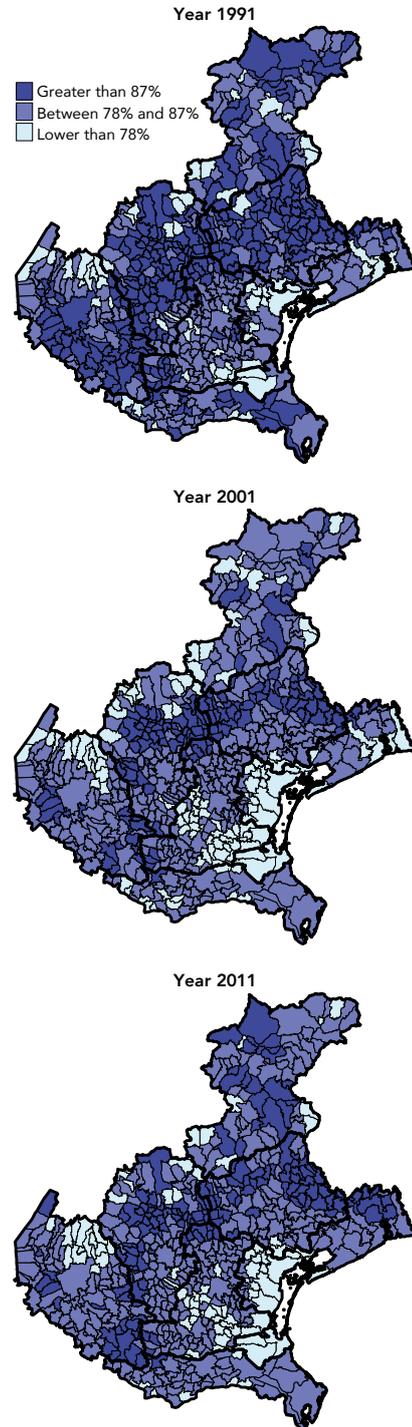
who were able to get to their workplace or study place in less than a quarter of an hour fell (from 61.4% in 2001 to 56.5% in 2011) and the quota of those who have to travel for more than an hour grew (from 2.7% in 2001 to 4.1% in 2011). On average, those who study had to travel less to get to their study place, now 63.2% of them can get there in 15 minutes, whilst the figure for those who work drops of almost 10 points at 53.6%, and the figure grew to 30.6% for commutes up to half an hour.

Fig. 11.3.4 –Duration of commutes for study of work reasons (% values). Veneto – Years 1991-2001-2011



Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data

Fig.11.3.5 – Short mobility (*) per municipality. Veneto – Years 1991-2001-2011



(*) Percentage ratio between the residing population who commute daily for work or study reasons and need up to 30 minutes to their destination and the residing population who commute daily for work or study reasons.

Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data

To get to their work or study place nine people out of ten (89%) use a mean of transport with preferences largely similar to that reported in the previous census. The car remains the most widespread choice: 50% of residents drive it and 14% of residents are passengers. Only 14.2% use public (or private) collective transport: train, tram, metro, coach, 3% use two-wheeled motor vehicles (motorbike, moped or scooter) and another 7% bike.

Those who commute for work reasons prefer using private transport, either cars or motorised vehicles (78.3% of cases); anyway, they get to work preferably independently: 8.3% walk, 6.8% bike and only 5.4% use collective transport. However, those for commute for study reasons, although still preferring private transport (41.2%), use a larger variety of means: 34% use a collective method of transport, 17% walk and 7.4% bike.

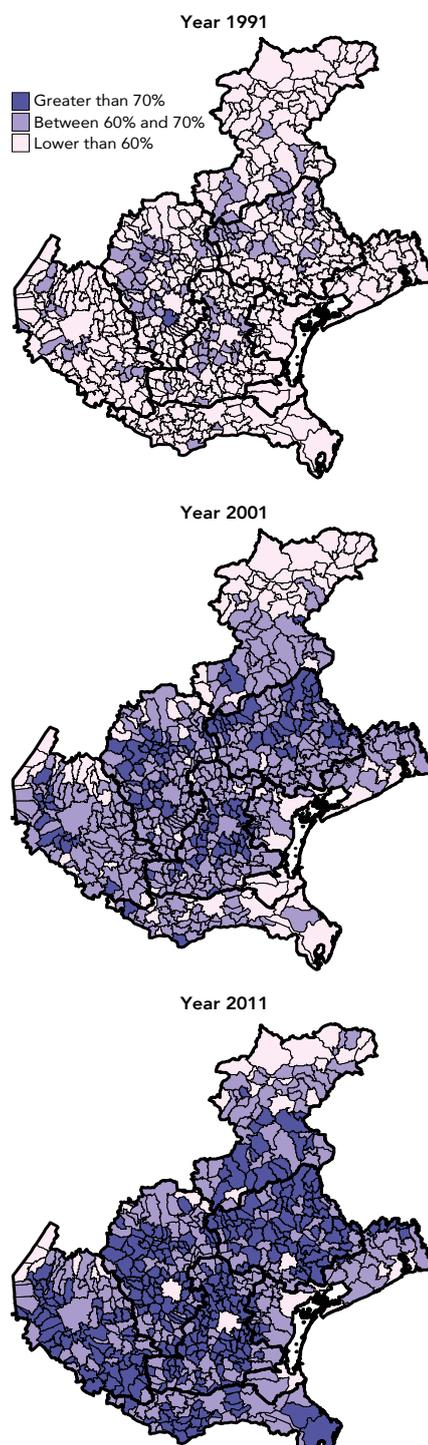
Private mobility, or the percentage of the residing population who commute daily for work or study reasons and use a motorised private method (car or motor vehicle) compared to the residing population who commute daily for work or study reasons, has grown overall in the last 20 years. In 1991, the large majority of municipality reported a percentage of private mobility lower than 60% with some exceptions in the municipality of Padua, Vicenza, Bassano del Grappa and Conegliano, exceeding this amount. In 2001, the presence of municipalities with a private mobility rate lower than 60% dropped significantly, the majority of the municipalities under analysis reported a percentage of private mobility between 60% and 70%.

This trend is confirmed by the data reported in 2011 where there is an ever increasing use of private transport: in almost all of the municipalities it is greater than 60%. The number of municipalities with greater than 70% of daily commutes using private transport largely increased too.

11.4 Road safety remains an open challenge

The statistics on road accidents, included in the statistics on mobility for the purposes of our analysis, are carried out by Istat - Central Directorate for social statistics and population census. This is due to the close connection with social themes, as well as with mobility and health. In this scenario, both the social-economic issues linked to the travels of people, and the health and prevention issues linked to

Fig. 11.3.6 – Private mobility (*) per municipality. Veneto – Year 1991-2001-2011



(*) Percentage ratio between the residing population who commute daily for work or study reasons and use a private or motorised transport (car or motor vehicle) and the residing population who commute daily for work or study reasons.
Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data

safety are primary factors. However, these are not the only two aspects of interests in the framework of a detailed analysis. The cooperation agreement between FCA and Google, signed on May 2nd 2016, confirms that the research on vehicles equipped with driver assistance systems or self-driving vehicles is not limited to the scientific field, but is getting more and more focused on the industrial world. Most probably, the future of vehicle manufacturing will depend on this trend. The possible change, which could accompany the introduction of this technology, could spark a revolution in road mobility. The effects could be enormous including minimizing of road accidents linked to bad driving habits or carelessness. It is clear that the majority of road accidents lie much more on bad driving habits, than on the lack of infrastructure.



71.2% of accidents are due to bad driving

From the 2014 Istat data for Italy, it emerged

that 71.2% of reported road accidents can be attributed either to alleged circumstances linked to road users and their driving habits, while 20.8% depend on simultaneous inconveniences whilst travelling, which may include the behavioural factor. Nowadays we do not know if such a complex system is sustainable, since it would need an upgrade of the infrastructure. However, this cannot be excluded, according to certain economic estimate of the social costs connected to the road accidents. The social costs of road accidents represent an estimate of the financial damage suffered by the community due to a road accident. The estimate aims at quantifying the various expenses borne by the community following the consequences caused by road acci-

dents, e.g. the loss of production capability due to a death or an injury, non-pecuniary data related to the loss, direct health care costs, general costs for damages to things, administrative, judiciary and other costs. In Italy, the parameters are established by the Minister for Infrastructure and Transport.

The economic lever in this case, essential in scenarios that necessitate important investment, could be identified considering the public interest connected to the private interest. This can be seen from the fact that road accidents account for around a quarter violent deaths in Europe and the economic estimate of social costs connected to the phenomenon in Veneto, just in 2014, amounted to around 1.5 billion euros, whilst in Italia the figure surpassed 17.6 billion.

Law N. 41 of March 23rd 2016 aimed to modify the Italian criminal code making vehicular homicide a criminal offence together with road traffic injuries, both to be punished as a result of negligence. Hopefully, this could make a short-term impact on the situation and serve as a deterrent to prevent bad habits and to mitigate this phenomenon.



Road accidents: figures

In 2014, the phenomenon had a slower

decrease. According to the data, in Italy a decline of accidents of 2.5% was reported (absolute value 177,031). The number of injured people in the same year was 251,147, showing a decrease of 2.7% from 2013, whilst deaths only fell by 0.6% for a total of 3,381. These decreases are lower than the decreases shown between 2013 and 2012, especially concerning deaths which have decreased of 10% in this period. These very low values in the decrease of de-

Tab.11.4.1 - Road accidents with personal injuries, deaths and injured people. Italy, Veneto and provinces – Year 2013:2014

	Incidents			Deaths			Injuries		
	2014	2013	% Var.	2014	2013	% Var.	2014	2013	% Var.
Belluno	490	474	3.4	21	15	40.0	734	676	8.6
Padova	3,038	2,888	5.2	51	60	-15.0	4,095	3,889	5.3
Rovigo	590	598	-1.3	18	13	38.5	843	841	0.2
Treviso	2,195	2,365	-7.2	53	48	10.4	3,155	3,463	-8.9
Venezia	2,389	2,322	2.9	59	51	15.7	3,503	3,222	8.7
Verona	3,026	2,857	5.9	73	59	23.7	4,108	3,851	6.7
Vicenza	2,230	2,290	-2.6	50	53	-5.7	3,074	3,039	1.2
Veneto	13,958	13,794	1.2	325	299	8.7	19,512	18,981	2.8
Italy	177,031	181,660	-2.5	3,381	3,401	-0.6	251,147	258,093	-2.7

Source: Regione Veneto Processing - Sistema Statistico Regionale Section on Istat data

aths may be observed also on the European level were a decrease of -0.5% for the EU28 was reported. Hopefully, this is a transitional situation, even if the data from the oldest and most populated countries of the Union, those who first introduced policies in order to minimize road death, indicate that there could be certain structure limits within the current road mobility model.

In fact countries such as France, the UK and Germany are in counter-trend with increases in road deaths in 2013 (3.5%, 2-1% and 0.8% respectively) whilst road deaths fell by 1.1% in Spain. The variation indicators of the reported data over 2013 for 2014 in Veneto report a counter-trend compared to Italian national data.

325 deaths due to accidents in Veneto in 2014

The absolute values indicate that in 2014 there were 13,958 accidents that caused 19,512 injuries and 325 deaths. Compared to the previous year the percentages indicate an increase of 1.2% of incidents, +2.8% injured people and +8.7% deaths. An increase in the number of deaths needs to be assessed taking into account the 20.5% decrease reported in 2013 compared to 2012, where deaths on the roads of Veneto dropped below 300 for the first time. We can expect, however that in Italy and thus also in Veneto that in the coming years this phenomenon would decrease, also due to the deterring factors which could be enforced by the recent law on "vehicle homicide". The analysis of the provincial data for Veneto shows percentage improvements - only for certain provinces and only for certain variables. It highlights a percentage reduction of incidents in 2014 compared to 2013 in the provinces of Treviso (-7.2%), in Vicenza (-2.6), and in Rovigo (-1.3%); per-

centage decreases of injuries only in Treviso (-8.9%); percentage decrease of deaths in Padua (-15.0%) and in Vicenza (-5.7%).

Concerning the implementation of the III and IV European Road Safety Action Programme, which aim at reducing the numbers of fatalities by half (for the decades 2001-2010 and 2011-2020 respectively), Veneto is ranked at the national average level.

A decrease of 53.1% of road deaths since 2001

The decrease of fatalities from 2001 to 2014 was 53.1% in Veneto compared to 52.4% for Italy as a whole. In the first four years of activation of the IV Programme the road accident victims were reduced by 17.9% in Veneto, a reduction almost identical to that of Italy's; 17.8%.

Deaths have fallen by 53.1% since 2001. There was a 53.1% decrease in number of deaths in Veneto from 2011 to 2014, as compared to 52.4% nationally. In the first four years of implementation of the 4th Road Safety Action Programme, victims of road traffic accidents decreased in number by 17.9%, almost exactly the same as the national figure of - 17.8%.

Analysing the rate of accidents in Veneto based on the characteristics of the road on which the accident occurs, 2014 data shows that the majority of accidents occur in urban areas, with 9,881 accidents, which caused 152 deaths and 12,968 injuries, representing 70.8% of all accidents, with a mortality rate⁶ of 1.5 deaths every 100 accidents. The highest mortality rate, however, is found outside of towns and cities, where, between highways and roads outside

⁶ Rate of mortality = (number of deaths) / (number of accidents) x 100

Tab.11.4.2 - Percentage composition of the accidents per location and characteristic of the road. Veneto and provinces – Year 2014

	Within residential area							Outside of residential area (*)						
	Crossroads	Roundabout	Junction	Straight	In Bend	Bend	Other(**)	Crossroads	Roundabout	Junction	Straight	In Bend	Bend	Other(**)
Belluno	19.8	5.4	12.8	48.2	11.3	2.3	100.0	15.1	2.2	9.8	39.1	30.7	3.1	100.0
Padova	15.0	7.8	20.9	47.0	7.4	1.8	100.0	9.9	3.1	22.3	47.9	14.7	2.0	100.0
Rovigo	16.8	4.9	26.0	43.1	9.0	0.3	100.0	10.4	4.1	16.2	47.3	21.6	0.5	100.0
Treviso	19.5	4.7	24.4	43.2	7.7	0.6	100.0	11.5	5.8	25.6	38.9	17.5	0.8	100.0
Venezia	19.0	5.5	22.6	44.0	7.4	1.6	100.0	9.1	4.7	19.3	51.6	12.0	3.3	100.0
Verona	9.3	4.5	36.6	41.5	7.2	0.9	100.0	9.7	6.8	19.3	40.2	22.2	1.8	100.0
Vicenza	15.0	9.4	24.9	41.7	8.1	0.8	100.0	8.8	4.4	21.0	42.9	21.2	1.7	100.0
Veneto	15.2	6.4	25.8	43.7	7.7	1.2	100.0	10.3	4.8	20.4	44.4	18.3	1.9	100.0

(*) Escluse autostrade

(**) Include passaggio a livello, dosso, pendenza e galleria

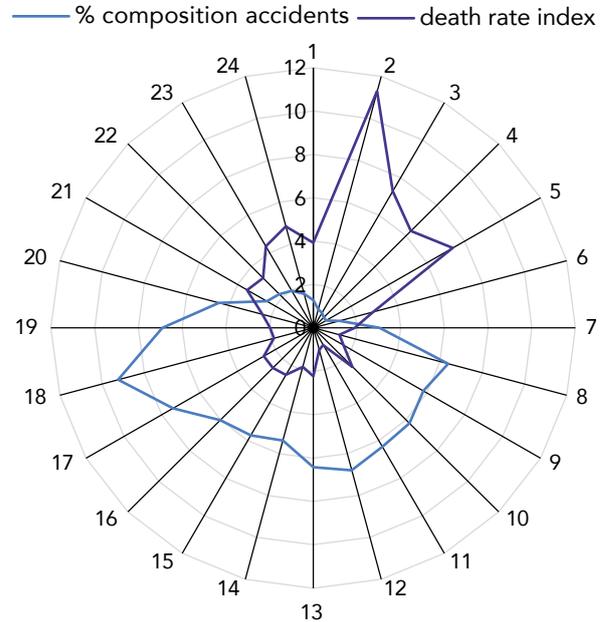
Fonte: Elaborazioni Regione Veneto - Sezione Sistema Statistico Regionale su dati Istat

of built up areas, there were 4,079 deaths in 2014, with a mortality rate of 4.2.

The detailed characteristics of the road on which an accident takes place are interesting to observe from a territorial point of view. If we exclude accidents on highways, which, due to the different structure of the road, are made up of around 85% of accidents on straight sections and the remainder on bends, the situation on urban and extra-urban roads provides more interesting details. The majority of accidents occur on straight roads and road intersections for urban and non-urban contexts, with 43.7% and 44.1% and 25.8% and 20.4% respectively. The third most common accident is different for the two types of road. On urban roads, accidents are more common close to junctions, with 15.2% of the total, whilst, on extra-urban roads, the third most likely accident is on a bend, with 18.3% of all accidents. In addition, it is interesting to note how the province of Belluno, due to the mainly mountainous territory, most accidents occur on bends in the road, with big differences in relation to the other provinces, especially on rural roads. Indeed, 30.7% of accidents occurred on bends outside of the urban centre of the province, a good 8.5 percentage points above the value calculated for the province of Verona, in second place with 22.2% of accidents on bends in roads outside of urban areas. As far as the mortality rate is concerned, the greatest deviation from the mean in detailed characteristics of Veneto roads is found in accidents occurring on bends in urban roads, whose rate of 3 deaths every 100 accidents is double that of the 1.5 deaths of aggregated data, bringing the gravity of accidents occurring in these circumstances in line with the lowest indices of accidents recorded on rural roads.

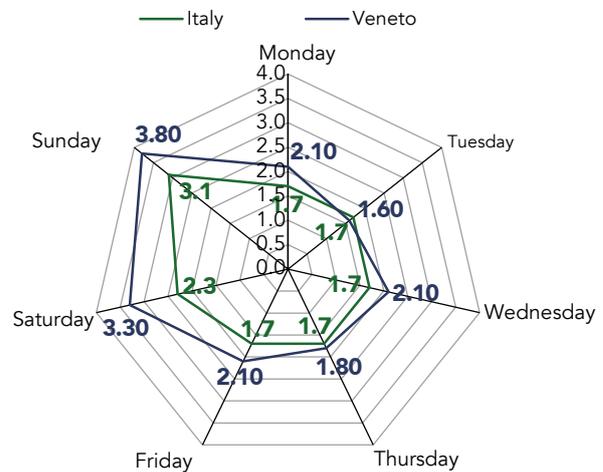
The majority of road accidents with injuries in Veneto are distributed over the hours from 8 am to 7 pm. Indeed, 10,978 of a total of 13,958 occur during the daytime hours of business traffic and commuting to/from work or travel to/from school. The peak of 1,291 accidents (9.2% of the total) occurred at around 6 pm, during the evening rush hour. However, during this time range, the mortality rate index never exceeded 2.6 deaths for every 100 accidents, going above the rate of 2 per 100 accidents between 10 am and 3 pm and between 3 pm and 5 pm. During the evening and especially at night, despite there being a lower number of accidents, there is a high mortality rate with extremes of 10 deaths per 100 accidents at around 2 am, maintaining values of over 5 right up to 5 am.

Fig. 11.4.1 – Percentage composition of road accidents and mortality rate index (*) according to time of day. Veneto – Year 2014



Source: Veneto Region Data Processing, Regional Statistical System Section on ISTAT data

Fig. 11.4.2 – Mortality rate index (*) according to day of the week. Veneto and Italy – Year 2014

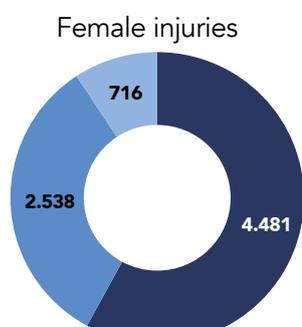
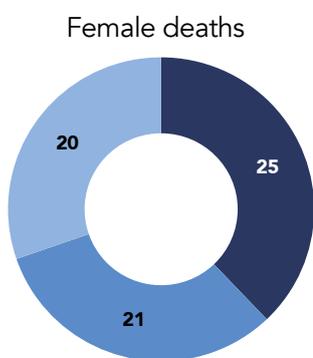
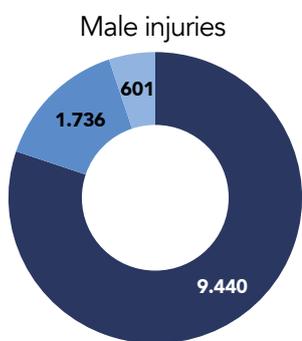
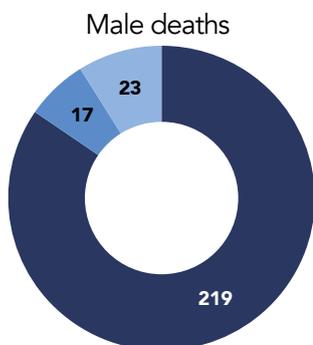


(*) Mortality rate index = number of deaths / number of accidents x 100
Source: Veneto Region Data Processing, Regional Statistical System Section on ISTAT data

The mortality rate index calculated on different days of the week highlights the fact that accidents on Veneto roads, in general more serious than those on a national level, show a clear divergence between

Fig. 11.4.3 – Deaths and injuries in road accidents according to category of user and gender. Veneto – Year 2014

■ Driver ■ Passenger ■ Pedestrian



Source: Veneto Region Data Processing, Regional Statistical System Section on ISTAT data

weekdays and Saturday and Sunday, on which 1 and 1.7 more people lost their lives than they did on a national level.

The most serious accidents, between moving vehicles, were caused by head-on and frontal-lateral collisions, with a mortality rate in Veneto in 2014 of 5.1 and 2.0 respectively. However, if we consider isolated vehicles, the worst outcomes were recorded for Veneto in 2014 for collision with a train (4.7), sudden braking (4.0), fall from a vehicle (3.7) and impact with an accidental obstacle (2.8). Particular attention must be devoted to vulnerable road users, especially pedestrians and motorcyclists. Indeed, the mortality rate index in Veneto for accidents involving these two user categories in 2014 was 3.5 and 4.3 respectively, over 1 death more, per 10 accidents, than the general regional index.

The gender data, per user category, highlights a clear preponderance of men, as compared to women, among drivers suffering injury or death. A total of 12,036 male drivers were harmed in accidents, including 259 deaths, whilst female drivers harmed numbered 7,801, with 66 deaths as a result of the accident. Over 84% of men who died were driving a vehicle, against fewer than 38% of women. The remainder of female deaths due to road accidents in Veneto was divided equally between pedestrians and vehicle passengers.

This data highlights a gender danger rate index⁷ that is clearly higher among men than women, with a difference of 1.4 points. This index, in the identification of the number of deaths for every 100 people harmed in road accidents, has a general value of 1.6 in Veneto in 2014. However, when calculated according to gender, the danger rate index shows a value of 2.2 for men and 0.8 for women. If considered in terms of user category, excluding passengers for whom the index differential between men and women is insignificant – 1.0 and 0.8 respectively, the differences between genders of drivers and pedestrians are consistent: 2.3 and 0.6 for the former and 3.7 and 2.7 for the latter.

Road accident rate based on kilometric localisation on Veneto roads

Road accident rate based on kilometric localisation on Veneto roads

Using data of the kilometric localisation of road accidents for the period 2011-2014,

⁷ Danger rate index = (number of deaths) / (number of deaths + number of injured) x 100

it was possible to draw up rankings of the main roads with the highest accident rate per kilometre in Veneto.

It was decided to use only stretches of road longer than 25 km and with a total of more than 100 localised accidents in the four years under consideration. According to number of accidents per kilometre, the rankings were topped by Strada Statale 13 "Pontebbana" (SS013), with 2.47 accidents per kilometre per year and, in second place, SS307 "del Santo", with 2.41 accidents per kilometre. In third place, SS516 "Piovese", with 2.39 accidental per

kilometre per year. However, in terms of mortality rate index, the top three roads in Veneto for worst accident outcome were SS12 "dell'Abetone e del Brennero", SS247 "Riviera" and SS203 "Agordina", with 7.11, 6.49 and 6.29 deaths every 100 accidents respectively. It is to be noted that many of the roads that rate highly in terms of mortality rate index are indeed roads that cross mountainous territory, excluding SS247 "Riviera", SS1 "Alemagna", SS309 Romea and SS10 "Padana Inferiore".

Tab.11.4.3 - Stretch in kilometres, average annual number of accidents per kilometre and death rate index for stretches of main road longer than 25 km and with more than 100 recorded accidents. Years 2011:2014

Road name	Length of stretch in km	Average annual accidents per km	Death rate index (*)
SS 013 - Pontebbana	63.3	2.47	2.08
SS 307 - del Santo	26.4	2.41	0.78
SS 516 - Piovese	26.5	2.39	1.98
SS 245 - Castellana	50.1	2.13	3.75
SS 515 - Noalese	39.1	1.86	2.75
SS 309 - Romea	70.9	1.85	4.18
SS 011 - Padana Superiore	154.0	1.65	3.15
SS 248 - Schiavonesca Marosticana	80.1	1.56	3.60
SS 053 - Postumia	116.6	1.49	2.73
SS 047 - della Valsugana	73.0	1.49	3.23
SS 249 - Gardesana Orientale	69.0	1.39	2.87
SS 016 - Adriatica	69.5	1.37	3.40
SS 348 - Feltrina	53.8	1.37	4.08
SS 014 - della Venezia Giulia	79.2	1.31	3.61
SS 010 - Padana Inferiore	66.8	1.10	4.10
SS 046 - del Pasubio	45.0	1.01	3.31
SS 050 - del Grappa e del Passo Rolle	61.1	1.00	4.90
SS 349 - di Val d'Assa e Pedemontana Costo	63.4	0.86	5.07
SS 247 - Riviera	46.4	0.83	6.49
SS 434 - Transpolesana	82.9	0.78	2.72
SS 246 - di Recoaro	42.6	0.77	0.76
SS 500 - di Lonigo	34.3	0.77	3.81
SS 499 - Rodigina	45.0	0.75	2.96
SS 203 - Agordina	60.8	0.72	6.29
SS 051 - di Alemagna	118.2	0.68	5.90
SS 012 - dell'Abetone e del Brennero	80.4	0.61	7.11
SS 251 - della Val di Zoldo e Val Cellina	154.9	0.21	2.34

(*) Death rate index = number of deaths / number of accidents x 100

Source: Veneto Region Data Processing, Regional Statistical System Section on ACI (Italian Automobile Society)-ISTAT data