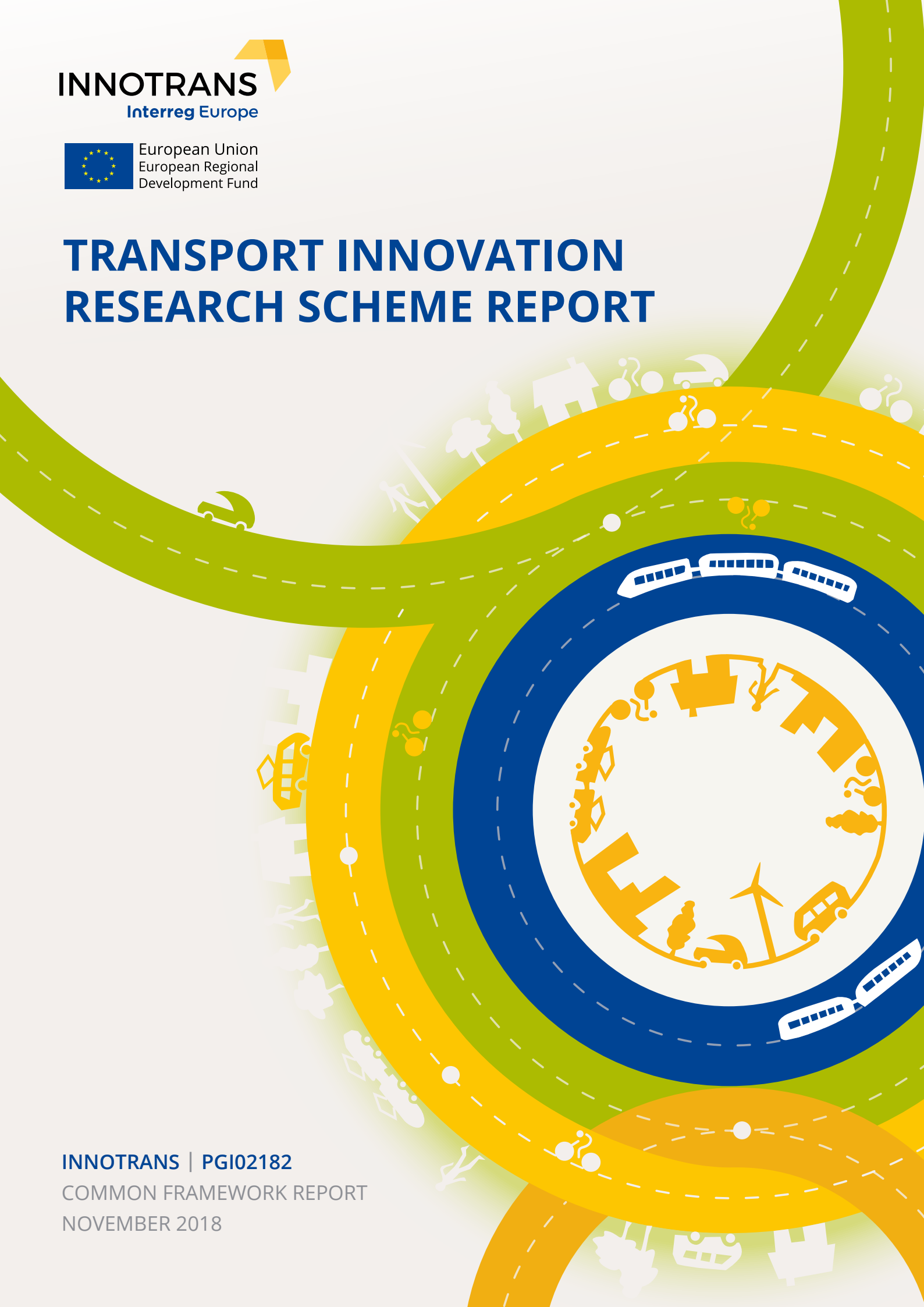


# TRANSPORT INNOVATION RESEARCH SCHEME REPORT

**INNOTRANS | PGI02182**

COMMON FRAMEWORK REPORT  
NOVEMBER 2018



# CONTENTS

<b>1. INTRODUCTION</b>	<b>  4</b>
<b>2. ANALYSIS OF THE REGIONS</b>	<b>  6</b>
2.1 Geography, Governance and general data	<b>  7</b>
2.2 Regional key innovation indicators	<b>  13</b>
2.3 Regional Economic Performance	<b>  14</b>
2.4 Transport in Regions	<b>  15</b>
<b>3. REGIONAL INNOVATION</b>	<b>  20</b>
3.1 General innovation outlook	<b>  21</b>
3.2 Regional innovation	<b>  22</b>
3.2 Transport specialization	<b>  32</b>
3.3 Research, Development and Innovation spending	<b>  34</b>
3.4 Transport Innovation Mechanisms	<b>  38</b>
3.5 Barriers and enabler/drivers of transport innovation	<b>  39</b>
3.5.1 Barriers	<b>  39</b>
3.5.2 Drivers	<b>  44</b>
3.6 Governance	<b>  47</b>
<b>4. SWOT ANALYSIS</b>	<b>  50</b>

The report reflects the author's views only and the Interreg Europe programme authorities are not liable for any use that may be made of the information contained therein.

## Lead partner contact details

Tessa Lukehurst  
Coventry University Enterprises Ltd.  
Puma Way, Coventry, CV1 2TT  
tlukehurst@cad.coventry.ac.uk  
[www.interregeurope.eu/innotrans](http://www.interregeurope.eu/innotrans)

# 1 INTRODUCTION



The role of the Framework Report is to reflect structural conditions and characteristics of the regions at the EU level and their impact on the transport sector dynamics. It is correlated to the outputs of the INNOTRANS project, which will map regional transport innovation capacity and identify the competitive advantage of the regions.



Transport innovation capacity should be linked to general methodologies used to measure innovation at Regional and Sectorial levels, such as EU Regional Innovation Scorecard or different other models populated with criteria and indicators and which are traditionally used to measure innovation.

Analysis of innovation will comprise indicators associated to different criteria, most often used being those related to:

- Infrastructure and framework conditions
- Industry
- Education and Research
- Governance

Each of the criteria described above is made of some indicators for the territories analysed and which offers a snapshot of the performance of the regions, showing internal environment Strengths and Weaknesses and external environment Opportunities and Threats. Regional analysis will contribute to the policy and operational recommendations formulated as an output of the project, which will be used to improve policy and operational planning of EU policies and other interventions in the area of transport.

This report will outline the transport innovation landscape within the four regions included in the project: West Midlands, South-East, Central Macedonia and Prague.

The PGI02182, INNOTRANS project is under implementation within the second call for proposals of the Interreg Europe Program (<http://www.interregeurope.eu/>), under the policy topic Research and Innovation.

The following five partners are involved in its implementation:

1. Coventry University Enterprises Limited (CUE), United Kingdom
2. Abruzzo Region, Italy
3. City of Prague, Czech Republic
4. South-East Regional Development Agency, Romania
5. Aristotle University of Thessaloniki, Greece.

INNOTRANS **main objective** is to improve the ERDF regional strategy for 2014-2020 for each region in addressing transport innovation. The project will provide the policy makers with the necessary evidence and a solid knowledge base to better channel funds for supporting transport innovation infrastructure and capacity improving projects.

# 2 ANALYSIS OF THE REGIONS



As the subjects of the study for the Framework report, the Regions involved reflect diverse territories and degrees of development. Partner regions performance is very different and provides a variety of experiences useful for improving policy interventions.



The first chapter describes the structural and framework conditions in the Regions analysed, focusing on: *geography and general data*, macroeconomic *indicators performance*, regional key indicators, economic indicators, transport indicators in the Regions.

The second chapter is about regional key indicators, economic indicators, transport indicators in the Regions, regional innovation, science and innovation indicators and regional structure, R&D and innovation transport expenditure, transport innovation mechanisms, barriers and enables/drivers of transport innovation, governance and stakeholders.

The last chapter comprises the SWOT analysis regarding the state of transport innovation at regional level in all Regions of the project.

The aim of the common report is to provide a general outlook on the state of innovation in the transport sector for the 5 regions included in the project. Some indicators are presented in centralized tables with the purpose of showing them in an easy to read manner. The report has a section on innovation mechanisms, defined as tools, procedures, policies, projects and products of innovation. In this section, each region has its own specific framework of innovation where the majority of the abovementioned typologies are represented.



## 2.1 GEOGRAPHY, GOVERNANCE AND GENERAL DATA

Regions compared are very different as territory and geography. One supplementary exception is the West Midlands, which is classified NUTS 1 in the NUTS nomenclature. The rest of Regions are NUTS 2 type of regions.

### Abruzzo

Abruzzo is a region of Southern Italy, with an area of 10,763 square km. Its western border lies 80 km east of Rome. The region is divided into the four provinces of L'Aquila, Teramo, Pescara, and Chieti. L'Aquila is both the capital city of the Abruzzo region and of the Province of L'Aquila and second largest city (pop. 73,000). Abruzzo borders the region of Marche to the north, Lazio to the west and southwest, Molise to the south-east, and the Adriatic Sea to the east.



Adriatic Sea to the east

Geographically, Abruzzo is divided into a mountainous area to the west, which includes the Gran Sasso e Monti della Laga National park, and a coastal area to the east with beaches on the Adriatic sea. Abruzzo is considered culturally, linguistically, historically, and economically a region of Southern Italy, although geographically it may also be considered central.

Abruzzo is known as „the greenest region in Europe“ as one third of its territory, the largest in Europe, is set aside as national parks and protected nature reserves: there are three national parks, one regional park, and 38 protected nature reserves.

With its 1.322.247,00 residents (data from ISTAT 2016), a total employment rate of 55,7% (15-64 year old)<sup>1</sup>, Abruzzo is one of the least populated Italian Administrative Regions. Abruzzo has been experiencing substantial socioeconomic stagnation since the early 1990s and is struggling to recover from devastating earthquakes that hit its capital city of L'Aquila and the surrounding area in 2009, 2016 and 2017.

The form of government of the Abruzzo Region is deeply influenced by the Constitution, which provides a set of detailed rules on regional governance and regulate the relationships between decision-making centres operating at the regional level. The Constitution set the compulsory bodies of the Regions in Regional Council (Consiglio Regionale), the executive body of the administration (hereinafter simply “Giunta”) and its President.

The region has exclusive competencies in policy making in scientific and technological research and support to innovation for industrial sectors, guided by national legislation. In Abruzzo, Regional Department of Economic Development, Labour, Education, Research and University Policies is the body responsible for the implementation of the innovation policies. The autonomy of the region in designing innovation policy is not correlated with proper funding resources. For the Smart Specialisation Strategy (S3), the Region has established a system of governance based on the two levels<sup>2</sup>:

- The first level relates to the programming, implementing and monitoring of the strategy. It is managed by a Board of Control, which is composed of the following actors: ERDF Managing Authority, the Department of Economic Development, Labour, Education, Research and University Policies, and the Department of Presidency and European relationships.
- The second level is updating strategy with the stakeholders engaged. This activity is carried out by the Regional Council for Research and Development

<sup>1</sup> Data from Smivez “Rapporto sull'economia del Mezzogiorno

<sup>2</sup> <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/abruzzo>

## Central Macedonia

The Region of Central Macedonia (RCM) is the largest of the 13 Greek regions in terms of area coverage and the second largest in terms of population size and economic activity (ROP, 2014). RCM comprises 17.5% of the country's population, i.e. 1,883,339 inhabitants in 2016<sup>3</sup>. The Region has a total area of about 18,810 km<sup>2</sup> of which 3,683 km<sup>2</sup> occupied by the prefecture of Thessaloniki, 3,968 km<sup>2</sup> by the prefecture of Serres, 1,516 km<sup>2</sup> by the prefecture of Pieria, 1,701 km<sup>2</sup> by the prefecture of Imathia, 1,581 km<sup>2</sup> by the prefecture of Kilkis, 2,506 km<sup>2</sup> by the prefecture of Pella and 2,918 km<sup>2</sup> by the prefecture of Halkidiki<sup>4</sup>.

RCM is located in a privileged geopolitical position in northern Greece combining a central location with border features. On the north it borders with Former Yugoslav Republic of Macedonia and Bulgaria, while within Greece borders on the east with the Region of Eastern Macedonia and Thrace, on the west with the Region of Western Macedonia, and on the southwest with the region of Thessaly. Key cities include namely Thessaloniki, Serres, Katerini, Veroia, Giannitsa, Kilkis, Naousa, Edessa.

RCM is characterized as a *less developed region* since it is lagging behind both the total country's and EU's performance; further deviation from the EU average is observed due to the prolonged recession in Greece (ROP, 2014).

The Region of Central Macedonia's key attributions relate to the programming and implementation of different policies but more important, the programming and implementation of RTDI policies. The Region is managing projects specific to region such as *transportation, ICT infrastructures, urban planning and environment, commerce, tourism and employment, natural resources, energy and industry*<sup>5</sup>. Another innovation related key responsibility of RCM is the design of the Innovation Smart Specialisation Strategy (RIS3).

## Prague

Prague is the largest city in the Czech Republic with a population of 1.296.829 inhabitants as of March 2018. It is the capital city of the Czech Republic and politically, economically and culturally the most important city in the country. Moreover, Prague is one of the most economically developed regions within the EU and also economically the best-performing region in Central and Eastern Europe, with a high potential for further economic growth.

From the government structure point of view, Prague has the same organisational structure as other regions in the Czech Republic. However, there is the significant difference, because Prague is not only a region but a city as well. This ambiguous status of Prague as both city and region is the only case in the Czech Republic.

As the capital city of the Czech Republic Prague is a seat of Parliament of Czech Republic and national government. Prague is self-governed by its city/regional government elected by inhabitants of the city. The regional government consequently elects the Mayor and the Council – the executive body of Prague. The Council establishes its initiative and advisory bodies (Secretariats in the case of Prague) which help to manage issues to the extent defined by the Czech law that are of interest to Prague and its citizens. Among such activities are e.g. education policy, social and housing policy, environment policy and so on. *Research and innovations* is primarily in competence of **national government** and is therefore a voluntary activity for regional/local self-governments as part of their own economic policy.

<sup>3</sup> Regional Innovation Monitor Plus, 2018

<sup>4</sup> Enterprise Greece, Mar 2018

<sup>5</sup> <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/organisation/region-kentriki-makedonia>



Charles' Bridge in Prague

Policy areas relevant for innovation accounted for a minor part of the budget in 2013. Most important activities reflected by the budget share include the development and maintaining of the transport system (40 %) associated with massive investment to the road infrastructure and development of public transportation. The second most important budget item (18 %) is "The city infrastructure", represented basically by investments in wastewater plant, sewer systems, footways, flood-control systems and other technical infrastructure (RIM Plus 2017).

High level of urbanisation, concentration of many functions and the proximity of key players in the capital makes Prague a distinct centre of development at a national level and places Prague above the other regions in nearly all of the structural indicators. For instance, it accounts for one-quarter of the Czech GDP.

## South East Development Region



Romania, Galati

South-East Region is located in the South-East of Romania and borders to the North with the North-East Region, to the West with the Central Region, to the Southwest with the South-Muntenia Region and the Bucharest-Ilfov Region, to the East with the Republic of Moldova, Ukraine and the Black Sea coast (194 km long on the mainland and 245 km of shore). Covering 35,762 km<sup>2</sup> or 15% of the country's total area, the region is the second largest of the 8 development regions of Romania.

The Region is the eastern border of the European Union. The length of the Romanian-Ukrainian-Moldavian border is 1,099.4 km. The Romanian-Moldavian border is entirely a river border (450 km) and the Romanian-Ukrainian border is: a part (273.8 km) land border, a part (343.9 km) river border and another part (31.7 km) maritime border.

The South-East Region comprises 6 counties: Braila, Buzau, Constanta, Galati, Tulcea, Vrancea. Constanta is the largest county, headquarters of the biggest Romanian maritime port located in Constanta municipality.

At the level of each county, local authority structures are county councils, local councils, municipal, town and communal councils. The localities are structured as follows: 11 municipalities, 24 towns and 355 communes with 1,447 villages. In the South-East Region there are 3 localities falling in the category of urban localities rank I: Constanta and the urban system formed by the municipalities of Braila and Galati. Constanta and Braila-Galati are the two-major urban centres of the South-East Region.

Since Romania has no official regional RDI policy, Sud-Est does not have a formal role in RDI policy-making. RDI policies are designed and coordinated by the Ministry of Research, which has a very limited role in regional RDI potential and exerts little territorial coordination of RDI. Romanian legislation is not providing administrative status for the regions; therefore South East Region is a development purpose region with NUTS 2 territorial status. South East is responsible for programming and managing regional funds. **South-East Regional Development Agency** is responsible for implementing the Regional Development Plan for 2014-2012 and acts as a key driver and developer of the Smart Specialization and RIS 3 strategies.

Out of 8 development regions in Romania, South-East Region ranks fourth in terms of regional GDP, the level recorded in 2014 being 2.3 times lower than the GDP of the Bucharest-Ilfov Region, the most developed of the eight regions of the country.

## West Midlands

The West Midlands is one of 12 regions of the UK. Situated centrally in England it covers an area of about 13,000km<sup>2</sup> and consists of several disparate areas. The West Midlands Combined Authority consists of seven metropolitan districts (Birmingham, Coventry, Dudley, Sandwell, Solihull, Walsall and Wolverhampton). These areas make up the region, together with four unitary authorities (Herefordshire, Shropshire, Stoke-on-Trent, and Telford and Wrekin) and three Counties (Staffordshire, Warwickshire and Worcestershire). It is the only UK region without access to the sea. Outside of the central major conurbation the region is largely fertile agricultural land with few hills or areas of uncultivable land. Very little of the region has an elevation over 200m. The population of the region was estimated at 5.8 million in 2016. Of these 2.9 million live in the West Midlands Combined Authority including 532,911 in Coventry. The combined authority covers an area of less than 1,000km<sup>2</sup> which means that 50% of the population lives on 7% of the land area. The majority of the region's heavy industry is located here.

The motorway circle of M6 and M42 around Birmingham is one of the busiest road networks in the UK and acts as a distribution node connecting motorway links to the South East and

## 2.2 REGIONAL KEY INNOVATION INDICATORS

Selected regional key indicators in the table below indicate key features of the regions and allow a better understanding of the general regional performance. It includes key indicators available at EU level.

Table 1. Key innovation indicators

Regions	West Midlands	Central Macedonia	South East Romania	Prague	Abruzzo
<b>Indicators</b>					
<b>GERD</b> (Gross Expenditure on Research and Development) or similar indicator showing spending for Innovation (Different Sources)	3,640 mil EUR (2014)	204.26 mil EUR (2013)	14.37 mil EUR (2015)	34,8% of total Czech intramural research spending, EUR (2014)	300 mil EUR (2015)
<b>Unemployment Rate</b> (Eurostat)	28,7% (2017)	22,9% (2017)	42,4% (2016)	21,8 (2015)	43,2% (2015)
<b>Motorways density</b> (km per square thousands km)	33	NA	2	89	57
<b>GDP</b> (purchasing power per inhabitant EURO)	25.700	15.400	14.500	53.100	24.600
<b>Human Resources in Science and Technology</b> (% of active population)	NA	36,6%	21,9%	60,2%	33,6%
<b>Employment in High Tech sectors</b> (% of total employment)	NA	2,4%	1,1%	9,2%	2,9%
<b>Population density</b> (inhabitants per square km)	445,4	99,6	73	2626,8	122,5
<b>Total population</b> (No)	5.772.082	1.883.339	2.469.801	1.267.449	1.326.513

Source: Statistics prepared by author from Eurostat, cut-off date 2016; where data was not available for 106, it was mentioned specifically, <https://ec.europa.eu/eurostat/cache/RCI/#?vis=nuts2.economy&lang=en>



National Express

London (M1), the South (M40), The South West (M5), the West (M56), the North West (M6) The North East (M69/M1) and the East (M6/A14) of the country. Birmingham's New Street Station is a central hub for the rail network and is the busiest rail station outside of London. This makes the area very attractive to transport businesses with many local warehousing and organisational hubs and makes transport one of the most important issues in the region. In the respect of Governance framework, UK has a centralized approach for innovation policy. The Department for Business, Energy & Industrial Strategy (BEIS) is in 2018 the government department responsible for innovation policies. UK has developed an entity, UK Research and Innovation (over 500 mil pounds budget per year) in charge with the innovation programmes. At local level is supported by the LEPs (Local Enterprise Partnerships), local or devolved authorities and other institutions. The UK governance model allows different institutions to be recipients and managers of innovation programs. Thus, West Midlands hosts one combined authority (CA): The West Midlands Combined Authority (WMCA), consisting of 18 local authorities and four Local Enterprise Partnerships (LEPs). As CA, the WMCA is a major local partner for the implementation of regional innovation measures and strategies<sup>6</sup>.

<sup>6</sup> <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/west-midlands>



## 2.3 REGIONAL ECONOMIC PERFORMANCE

Regions are very different also as economic performance. However, key economic indicators presented below reflect a diversity of situations. Economic dynamic of the regions is a key driver also for investments in Research and Development and especially for investments in innovation.

Table 2. Selected macroeconomic indicators

Regions	West Midlands	Central Macedonia	South East Romania	Prague	Abruzzo
<b>Indicators</b>					
GDP <i>Basic prices – mil EURO</i>	16.294,1	20.786	39.692,1	154.474,8	28.691
GDP <i>Purchasing power standard per inhabitant</i>	14.500	15.400	53.100	25.700	24.600
Gross Domestic Product <i>(purchasing power standard in % as EU average)</i>	88	53	50	182	84
Real Growth Rate <i>Regional Gross Value Added - % change of previous year</i>	NA	NA	0,8	1,8	-0,1

Source: Statistics prepared by author from EUROSTAT – cut-off year 2016

When compared with other regions of Mezzogiorno, in 2008-2016, the economic performance of **Abruzzo** continues to stand significantly above the Mezzogiorno average in term of activity rate, employment rate and GDP per capita. However, the economy of this region has been outperforming those in other regions of the Mezzogiorno.

In 2015, **Central Macedonia** accounted for 13.5% (€23,636m) of the national Gross Domestic Product (GDP), second only to Attiki (€84,368m) (Eurostat, 2017). Regional GDP values have been falling since 2008, although in later years (2014-2015) the negative trend has slowed down according to Regional Innovation Monitor Plus in 2018.

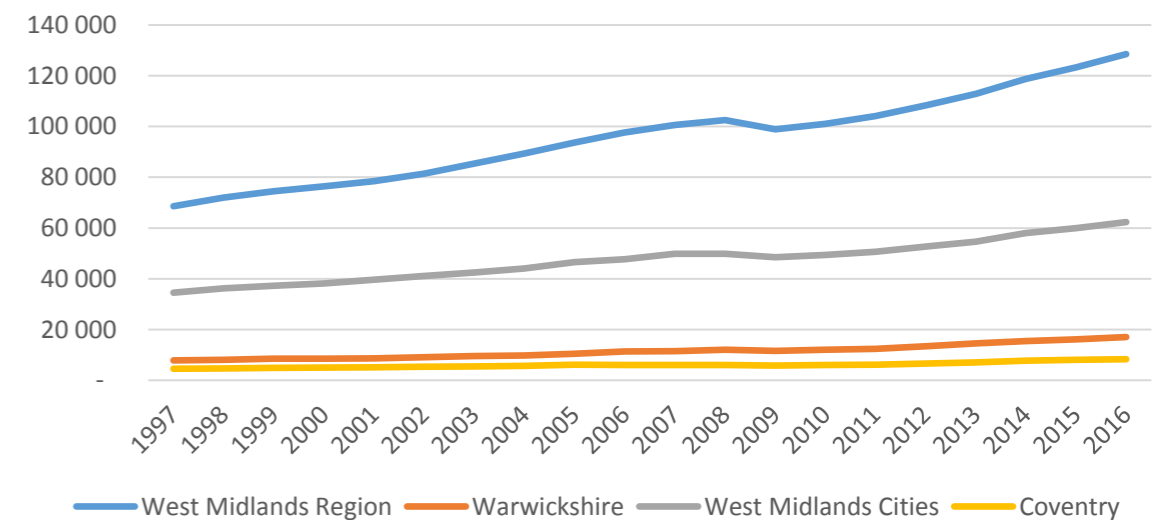
In 2015, the region accounted for 13.5% (€23,636m) of the national Gross Domestic Product (GDP), second only to Attiki (€84,368m) (Eurostat, 2017). Regional GDP values have been falling since 2008, although in later years (2014-2015) the negative trend has slowed down (Regional Innovation Monitor Plus, 2018). RCM is characterized as a less developed region since it is a bit behind of total country's and EU's performance; further deviation from the EU average is observed due to the prolonged recession in Greece (ROP, 2014).

**Prague** is the economic centre of the country and also a hub when it comes to economic relations in Czech Republic. Apart from all main authorities of the state administration, most financial institutions and foreign enterprises are based in Prague. All this has a significant effect on the regional economy. Approximately a quarter of the Czech Republic's GDP (24,6 % in 2014) is generated in Prague. GDP per capita in Prague reached 210 % of the Czech Republic's average. Presently, Prague exceeds average values for the entire EU-28 (GDP per capita in Prague was 68,9 % higher). Higher GDP (generally typical for a metropolis) is related to a higher level of wages, localisation of activities with a high added value and the concentration of central bodies of both the public and private sector.

At the level of the Romanian South-East Region, the Gross Domestic Product (GDP), expressed in millions of lei, was 75,239.3 million lei in 2014, which represents 11.26% of Romania's GDP and about 0.12% EU GDP 28. When comparing Romanian development regions, one can notice significant disparities. Out of 8 development regions in Romania, South-East Region ranks fourth in terms of regional GDP, the level recorded in 2014 being 2.3 times lower than the GDP of the Bucharest-Ilfov Region, the most developed of the eight regions of the country.

The West Midlands region historically underperforms, but has been able to show consistent growth over the past twenty years. Even in local terms Coventry has grown at a slower rate than the rest of the region overall<sup>7</sup>.

fig. 1 GVA Growth in the West Midlands Region



## 2.4 TRANSPORT IN REGIONS

Transport related indicators from the regions reflect the sectorial context in which they operate. Key infrastructure indicators are important incentives to develop innovative policies in transport sector. When a region is connected by multiple transport modes, chances for innovation are even bigger.

Table 3. Key transport indicators

Regions	West Midlands	Central Macedonia	South East Romania	Prague	Abruzzo
<b>Indicators</b>					
Motorways density <i>(km per square thousands km)</i>	33	NA	2	89	57
Rail <i>(km per thousand km)</i>		28	49w	475	
No of victims/ car accidents <i>(per 1 mil inhabitants)</i>	27	76	112	21	57

<sup>7</sup> Office of National Statistics 2108



Air transport total (freight and mail) – thousand tonnes	32	7	NA	71	Na
Air transport – passengers (thousands)	11639	5735	NA	12990	569
Population density (inhabitants per square km)	445,4	99,6	73	2626,8	122,5
Total population (No)	5.772.082	1.883.339	2.469.801	1.267.449	1.326.513
Gross Domestic Product (purchasing power standard in % as EU average)	88	53	50	182	84

Source: Eurostat data (2016) processed by Author

**Abruzzo** is geographically situated in a pivotal location in the middle of the Adriatic Corridor, a multi-modal transport network which re-establishes the role of the Adriatic Sea as a major cross-border region characterised by cultural exchanges and economic cooperation. Due to its rail/motorway/airport/sea port combination, Abruzzo has a central role in relations between the Tyrrhenian, the Adriatic and the Euro-Mediterranean (the Balkans and the Middle East). Within the framework of the TEN networks (Trans-European Networks), the Adriatic Corridor refers to the national transport system which is being developed from the mountain passes of north-east Italy (Brennero, Tarvisio, Villa Opicina) to Otranto and along the ridge of the Adriatic peninsula to the Ionian port of Taranto.



Abruzzo Region Palace

The international importance of this axis lies in its position between key routes through which Community transport policy can develop: with regards to the Mediterranean basin and the countries situated around the Black Sea basin, existing links between the Adriatic Sea, Greece and Turkish ports are important (source: [http://cordis.europa.eu/abruzzo/infra\\_en.html](http://cordis.europa.eu/abruzzo/infra_en.html)). Railway lines, ports, airport and motorways connect the Abruzzo region to the major Italian cities and to the national transport network. There are 2 airports (Abruzzo International Airport, L'Aquila-Preturo Airport), four main ports (Pescara, Ortona, Vasto, Giulianova), two main railways lines – Adriatic railway and Pescara-Rome railway, and the inland railways -, three highways A24 Rome - L'Aquila – Teramo, A 25 Teramo-Avezzano-Pescara,

A14 Bologna – Taranto; intermodal centres: Interporto of Abruzzo, Val Pescara freight terminal, Roseto lorry terminal, San Salvo lorry terminal, Goods sorting center for Marsica.

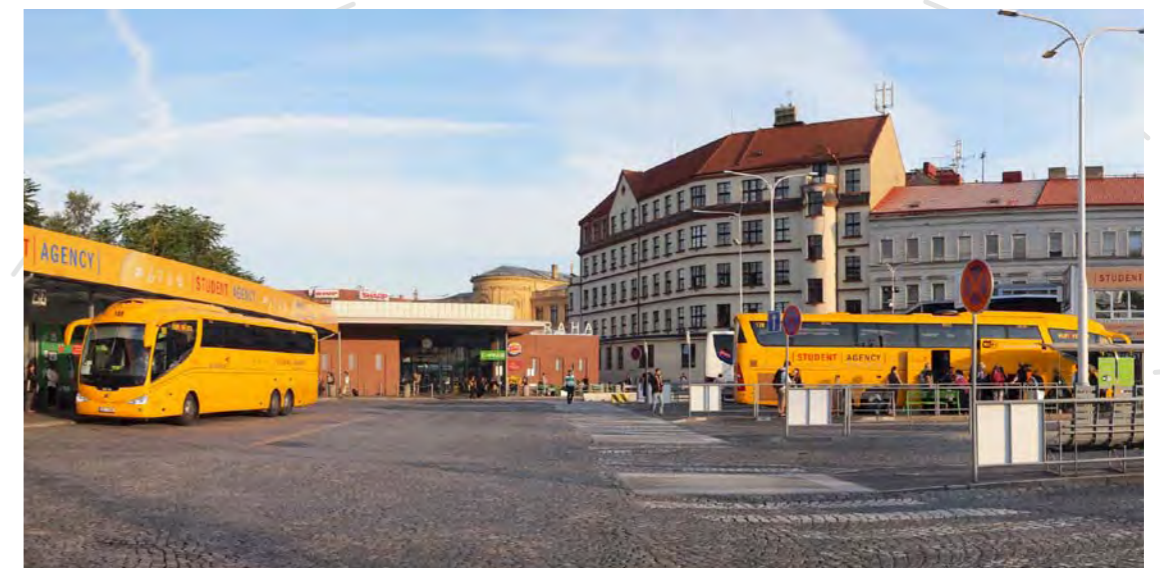
**Central Macedonia** networks comprise different infrastructures, while the key priority is improvement of TEN-T networks and the strengthening of the inter-regional network associated with the TEN-T (ROP, 2014). The available infrastructures include airports, a port of international importance, motorways and railway network, indicatively mentioning:

Thessaloniki International Airport “Makedonia” is one of the 14 regional airports that the Hellenic Republic’s Privatization Program (HRADF) has successfully concluded an international tender process in the granting of concession rights for its development and operation.

One of the most important motorways in Greece is the section of Egnatia Motorway that runs through Central Macedonia is 191 km long and extends from Polimyllos to Strimonas (Enterprise Greece, Mar 2018). The motorway has been constructed as a dual carriageway, separated by a central reserve, with two traffic lanes and a hard shoulder per direction. Its total width is 24.5 m., (or 22,0 m at certain adverse mountainous sections). The section Kleidi-Thessaloniki-Derveni, 45 km long, consists of 3 traffic lanes and a hard shoulder per carriageway. This section includes big bridges of a total (approximate) length of 7 km and tunnels of an (approximate) length of 18 km, as well as a great number of junctions and major structures (Enterprise Greece, Mar 2018).

Kastania bypass was constructed in Central Macedonia and involves the section of the Egnatia Motorway from Polymyllos to Veria, which has a total length of 26 km. The section includes twin-tube tunnels of a length 14 km (7 km per bore) and big bridges with high piers of a total length 2,8 km (1,4 km per bridge carriageway) (Enterprise Greece, Mar 2018). The railway network passes through the entire region of Central Macedonia.

For **Prague**, most important activities reflected by the budget share include the development and maintaining of the transport system (40 %) associated with massive investment to the road infrastructure and development of public transportation. The second most important budget item (18 %) is “The city infrastructure”, represented basically by investments in wastewater plant, sewer systems, footways, flood-control systems and other technical infrastructure (RIM Plus 2017).



Prague bus station

Prague has an integrated system of transport since 1992. It contains underground - metro, trams, city and suburban buses, railways, funicular to Petrin, ferries. 1 350 042 240 people used public transport in 2017 (1 261 243 240 in the City of Prague a 88 799 000 in the

Central Bohemia). The PID (Prague Integrated Transport) system offers the inhabitants of Prague and a large part of the Central Bohemian region can travel to one a travel document irrespective of the chosen means of public transport.

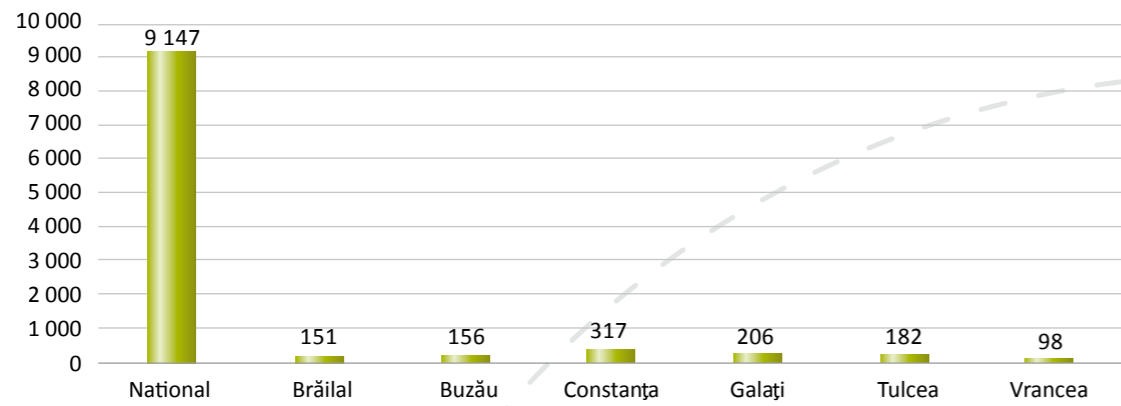
**Romanian South-East Region** is placed on the the global TEN-T network which includes in its case the airports from Constanța and Tulcea.

The region has a series of assets and good transport infrastructure and high-value natural environments are key ones. South East is connected to three pan-European transport corridors, is an important commercial node with 3 maritime ports: Constanta, Midia and Medgidia are commercial port, and Tomis is a touristic port. Also, there are three main fluvial-maritime ports - Tulcea, Braila, Galati - and three main fluvial ports - Murfatlar, Medgidia, Cernavoda.

The airport in Tulcea offers good means to provide national and international tourists access to Danube Delta, UNESCO heritage and the second biggest natural reservation in Europe. Similar, Constanta airport is used by NATO forces and is a commercial gate to Black Sea coast, the Danube Delta and its Biosphere Reserve.

The region plays an important role at the national level since it hosts two major intermodal terminals, Constanta and Galati. Constanta is the largest Romanian port and Galati is the biggest river port. There is not a direct highway connecting the region with the rest of country, but some national roads continue large European roads: E60 (France, Austria, Slovakia, Hungary, Constanta), E85 (Greece, Bulgaria, Buzau, Focsani), E87 (Turkey, Bulgaria, Constanta, Tulcea), E0 (Spain, France, Italy, Croatia, Serbia, Constanta), E581 (Galati-Tecuci).

Fig 2. No of new companies in transport in counties from South East region and National (National Institute of Statistics, 2017)



Source: INSSE, 2017

**West Midlands** is focusing its activities on advanced manufacturing and engineering which are recognised as the as a key driver of economic growth in the region. According to the regional ESIF strategy it represents 10% of all employment in the region. This is 57% greater than the overall average and 500% greater than the UK average for the automotive industry. The strategy therefore places AME at the front of every strategic priority in the region.

Transport in the region began a remarkable change in 2008 when Jaguar Land Rover was sold by Ford to the Tata Group. Their investment has begun a change in fortunes that has seen a tripling of value added in the region and which is leading a regional recovery in both transport innovation and manufacturing.

For the region, data shows that there has been a small shift away from public transport and an increase in the use of cars between 2011 and 2015. Compared to the average for the conurbation this is the reverse of the trend which has shown a small decline in the use of private transport and a mover towards rail.

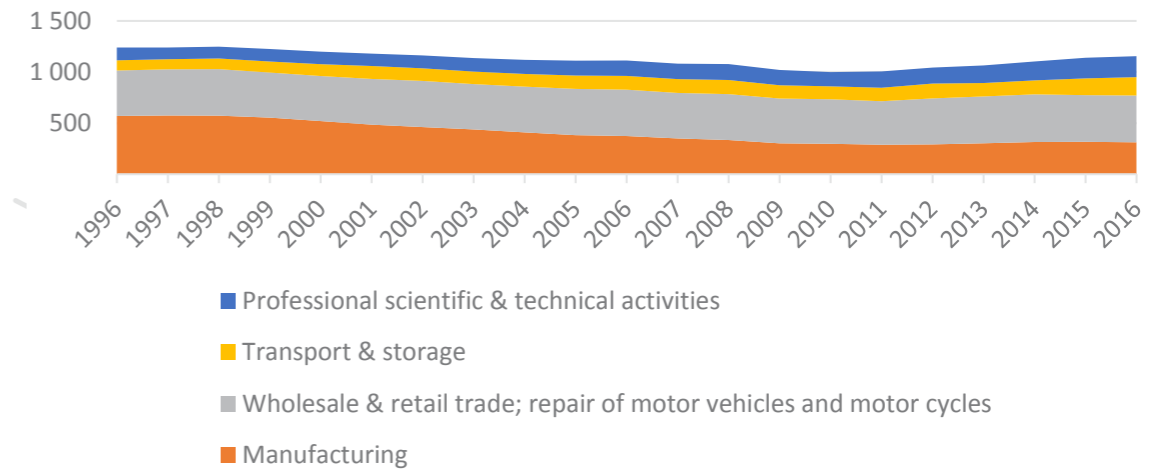
Table 4. Use of different transportation in West Midlands

All region	Mode			
	Bus	Rail	Metro	Car
2010/11	23%	12%	1%	64%
2012/13	22%	12%	1%	65%
2014/15	22%	15%	0%	63%
Average by Mode	22%	13%	1%	64%

It is possible that this shift in mode reflects the 2015 opening of a new and significantly improved major railway station and hub in the centre of Birmingham at New Street Station, the previous station having been unpopular with passenger numbers significantly in excess of those it was designed for.

Qualified human resources is important for the development of transport sector and West Midlands is relying on good assets from this point of view.

fig. 3 Transport Related Workforce Jobs by Industry - West Midlands



The ESIF policy goes on to identify that Intelligent Mobility, Niche Vehicles aerospace and transport equipment present a significant opportunity for Coventry and Warwickshire to become a leading centre in the UK, utilising local strengths in innovation. By 2025 the strategy projects that the sector will be worth £2.4 billion and 12% of the sub-region's output. It also predicts that the automotive sector will increase in importance with the location quotient rising from five to seven (employment in the sector 7 times more concentrated than the average).



# 3 REGIONAL INNOVATION



The Regional Innovation Scoreboard refines the analytical framework of the European Innovation Scoreboard to the extent possible in terms of data availability. It analyses and compares structural differences between regions.

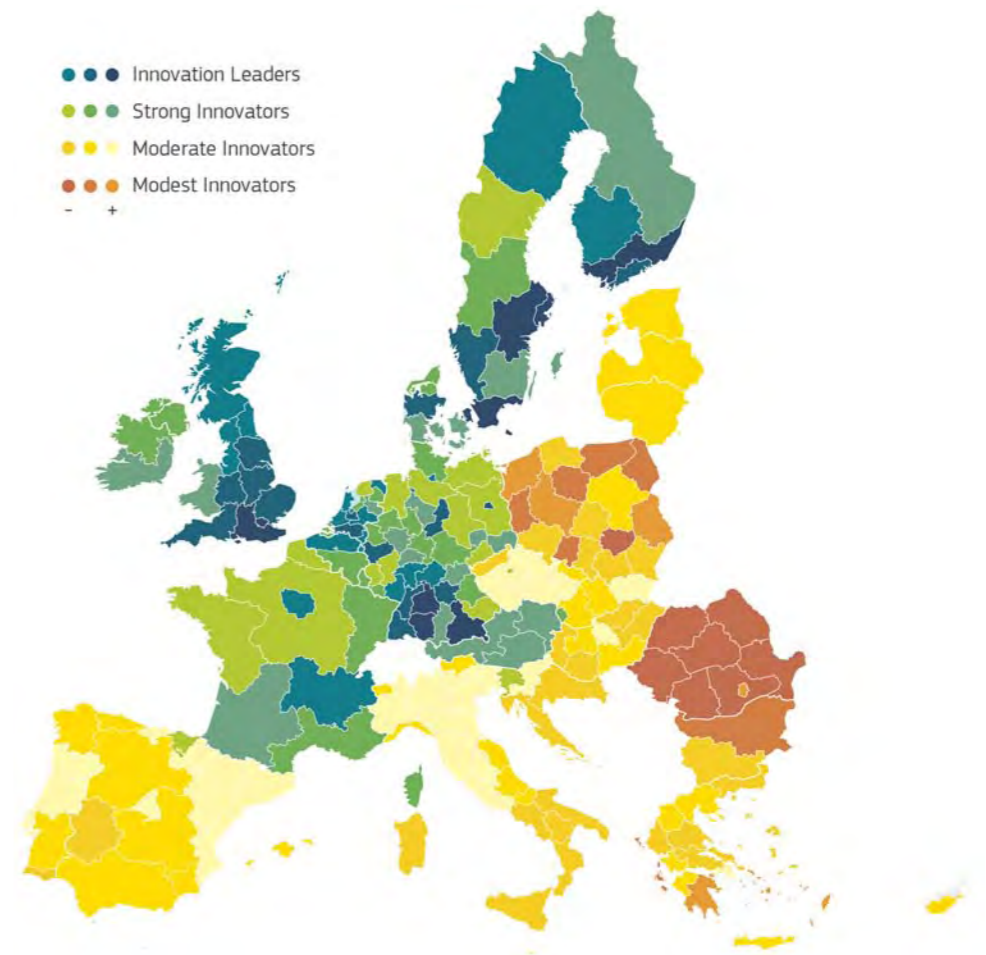


The 2017 Scoreboard confirms that Europe's most innovative regions are located in the most innovative countries: Stockholm in Sweden, followed by Hovedstaden (Copenhagen) in Denmark, and South East in the United Kingdom. Regional innovative hubs exist also in moderate innovator countries such as Prague in the Czech Republic or Bratislava in Slovakia.

## 3.1 GENERAL INNOVATION OUTLOOK

Regions under study were analyzed according to the Regional Innovation Scoreboard and national/regional/local plans and strategies affecting these regions. West Midlands is doing best being rated as Innovation Leader while the rest of the Regions are Strong, Moderate and Modest Innovators.

Fig 3: Regional Innovation Scoreboard 2017



source: [http://ec.europa.eu/growth/industry/innovation/facts-figures/regional\\_it](http://ec.europa.eu/growth/industry/innovation/facts-figures/regional_it)

## 3.2 REGIONAL INNOVATION

### Abruzzo

According to the Regional Innovation Scoreboard (RIS) 2017<sup>8</sup>, Abruzzo is ranked as a **moderate innovator**. Moderate innovators are those regions with a relative performance less than 10% below but more than 50% above that of the EU28.

The 2001 reform of the Italian Constitutional Law increased multi-level governance, granting to councils all the administrative functions that are not otherwise reserved to higher levels of governance. Regional administrations are now responsible for policy making in the area of scientific and technological research and support to innovation for industrial sectors but have to observe some fundamental principles set by national law. The two main instruments in support of regional innovation policy in Italy are the National Operational Programme (NOP) and the Operational Programme (OP).

Following the 2001 reform of the Constitutional Law, Italian regions started reorganizing their institutions to carry out new legislative tasks imposed by the reform. In the case of Abruzzo the principal authority in charge of innovation policy is the Abruzzo Region. The regional administration recently took important steps in changing the regional innovation governance system that are aimed at rationalizing policy development and implementation.

In Abruzzo, innovation performance has increased over time. The data below shows the normalised scores per indicator and relative results compared to the country and the EU. The table also shows the RII in 2017 compared to that of the country and the EU in 2017, the RII in 2017 compared to that of the EU in 2011, and performance change over time (Tab 1).

**Tab 1: Regional Innovation Scoreboard 2017**, source [http://ec.europa.eu/growth/industry/innovation/facts-figures/regional\\_it](http://ec.europa.eu/growth/industry/innovation/facts-figures/regional_it).

	Data	Normalised score	Relative to	
			IT	EU
Tertiary education	24.9	0.313	98	57
Lifelong learning	7.1	0.353	98	75
International scientific co-publications	783	0.363	95	87
Most-cited scientific publications	9.0	0.587	89	108
R&D expenditures public sector	0.6	0.492	98	90
R&D expenditures business sector	0.3	0.230	68	50
Non-R&D innovation expenditures	±	0.370	±	±

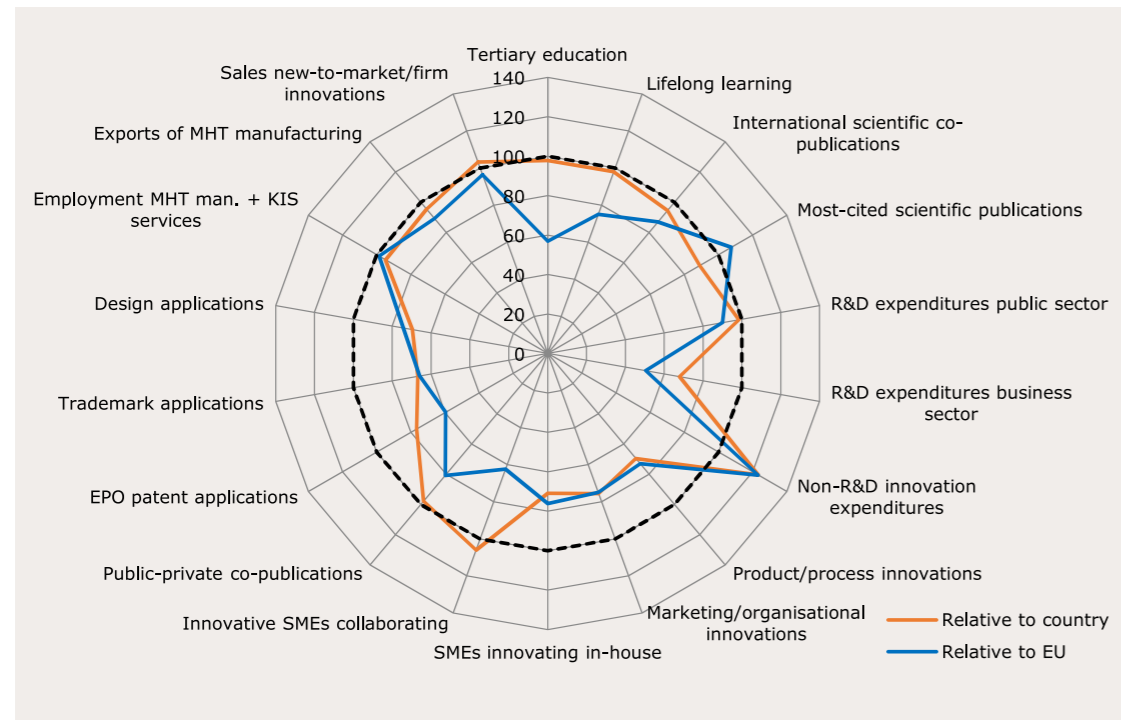
<sup>8</sup> The Regional Innovation Scoreboard is a regional extension of the European Innovation Scoreboard, assessing the innovation performance of European regions based on a limited number of indicators. The European Innovation Scoreboard provides a comparative analysis of innovation performance in EU countries, other European countries, and regional neighbours. It assesses relative strengths and weaknesses of national innovation systems and helps countries identify areas they need to address.

Product/process innovations	±	0.325	±	±
Marketing/ org. innovations	±	0.291	±	±
SMEs innovating in-house	±	0.347	±	±
Innovative SMEs collaborating	±	0.224	±	±
Public-private co-publications	66.8	0.240	98	81
EPO patent applications	1.62	0.233	77	60
Trademark applications	2.57	0.259	67	66
Design applications	0.62	0.387	70	74
Employment MHT manuf./KIS services	14.7	0.527	95	99
Exports of MHT manufacturing	48.0	0.564	95	89
Sales new-to-market/firm innovations	±	0.452	±	±
Average score	--	0.364	--	--
Country EIS-RIS correction factor	--	0.804	--	--
Regional Innovation Index 2017	--	0.293	--	--
RII 2017 (same year)	--	--	87.5	64.5
RII 2017 (cf. to EU 2011)	--	--	--	66.2
Regional Innovation Index 2011	--	0.287	--	--
RII 2011 (same year)	--	--	83.5	62.9
RII - change between 2011 and 2017	--	3.2	--	--

± Relative-to-EU scores are not shown as these would allow recalculating confidential regional CIS data.



The radar graph shows relative strengths compared to Italy (red line) and the EU (blue line), highlighting relative strengths (e.g. Non-R&D) and weaknesses (e.g. Business R&D expenditures).



Radar graph 2017, source [http://ec.europa.eu/growth/industry/innovation/facts-figures/regional\\_it](http://ec.europa.eu/growth/industry/innovation/facts-figures/regional_it).

The data shows data highlighting possible structural differences. For instance, the region is less urban, with slightly higher employment share in utilities & construction, lower share in services, and lower than average GDP per capita.

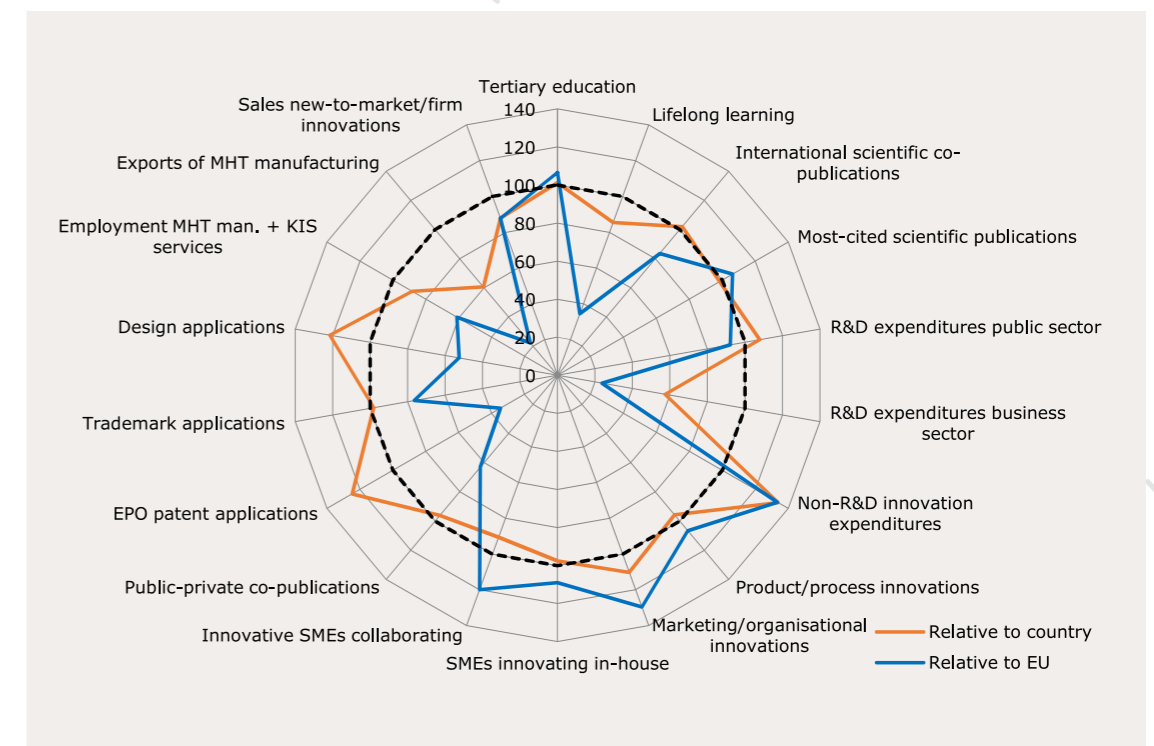


## Central Macedonia

According to the Regional Innovation Scoreboard 2017 (RIS 2017), RCM is ranked as „**moderate innovator**“, and innovation performance has increased over time.

The Regional Innovation Index (RII) in 2017 was 0.298 (normalised score), 98.1 relative to Greece (set equal to 100) and 65.6 relative to the EU (set equal to 100). The RII change between 2011 and 2017 was 2.4 (normalised score).

The RIS 2017 also provides an analysis of RCM's performance in each innovation indicator, allowing the identification of the region's relative strengths and weaknesses when compared to Greece and the EU.



Thus, the Region has its best performances in the following indicators: Tertiary education, Most-cited scientific publications, R&D expenditures public sector, Non-R&D innovation expenditures, SMEs performance, including SMEs innovating in-house, Innovative SMEs collaborating with others and SMEs introducing Product/process and Marketing/organisational innovations. Although the following indicators haven't performed so well when compared to the EU, they scored higher when compared to Greece: European Patent Office (EPO) patent applications and Design applications.

On the contrary, the region's worst performances both relative to Greece and the EU were in the indicators that follow: R&D expenditures business sector, Exports of medium-high/high-tech manufacturing.

Although innovation performance has been improved in the last decade, the region still lacks the resources, networks and measures needed for its having higher employment shares in manufacturing, and lower than average GDP per capita.





of smart specialization. The automotive industry is one of the most important branches for the Czech Republic in terms of research and development. Czech Republic takes the fifth place in the ranks of produced automobiles within the EU28 countries. More than 2000 researchers work in automotive, which is 11 % of researchers of all entrepreneur sector of Czech Republic.

In the field of automotive sector the emphasis is given to the innovations of the chassis systems leading to enhancement of safety and comfort as well. Innovations of driving units and fuels are supposed to improve the effectiveness and decrease of consumption of fossil fuels and emissions of harmful substances. Another field of support is electric and electronic accessories of cars, ecology and safety. In terms of ITS, mobility and infrastructure the focus is given to the cooperative systems for online sharing of information among the cars and others modes of transport, systems for optimisation of the usage network data, available charging sites for electronic and hybrid cars. Aerospace industry has 100-years tradition in Czech Republic, the biggest strength of this branch is the profession continuity and internalization. Moreover, the aircraft and motor production is a hi-tech industry. Aerospace industry deals with sustainable transport and providing its safety and security.

The emphasis is given to all the aspects of progressive technologies improving the construction elements of aircrafts, enhancing the durability of the chassis, communication technologies etc. In railway vehicle research and development is the main emphasis given to the advanced materials with higher durability, safety and environmentally saving materials. In advanced production technologies it is necessary to study the new products, emissions/energies and driving systems.

### South-East Romania

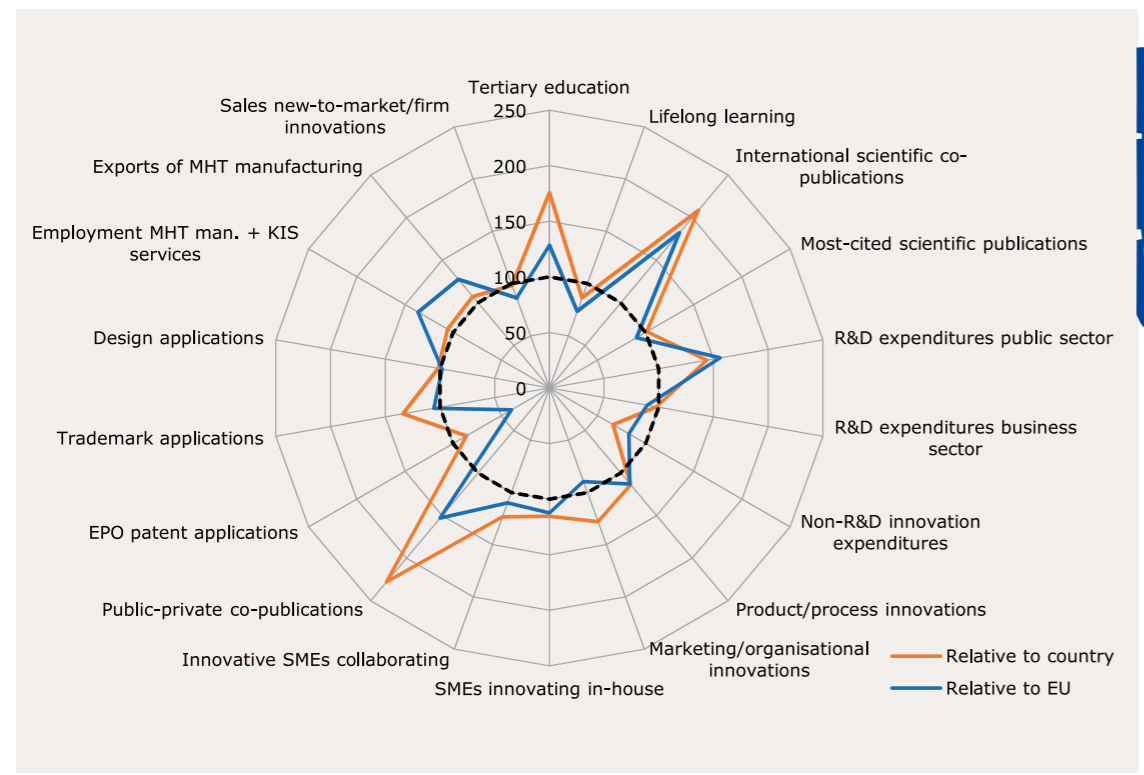
According to the Regional Innovation Scoreboard (RIS) 2017<sup>9</sup>, the Romanian South-East Region is ranked as a modest innovator (Fig 3). Modest Innovators are all regions with a relative performance below 50% of the EU average in 2017<sup>10</sup>. The radar graph shows relative strengths compared to Romania (red line) and the EU (blue line), highlighting relative strengths (e.g. non R&D innovation expenditures) and weaknesses (e.g. Public-Sector R&D expenditures).

<sup>9</sup> The Regional Innovation Scoreboard is a regional extension of the European Innovation Scoreboard, assessing the innovation performance of European regions based on a limited number of indicators. The European Innovation Scoreboard provides a comparative analysis of innovation performance in EU countries, other European countries, and regional neighbours. It assesses relative strengths and weaknesses of national innovation systems and helps countries identify areas they need to address.

<sup>10</sup> [https://ec.europa.eu/growth/industry/innovation/facts-figures/regional\\_en](https://ec.europa.eu/growth/industry/innovation/facts-figures/regional_en)

## Prague

Prague is a strong innovator, and innovation performance has decreased over time. Relative strengths compared to Czech Republic (red line) and the EU (blue line), highlight relative strengths (e.g. International scientific co-publications) and weaknesses (e.g. EPO patent applications).

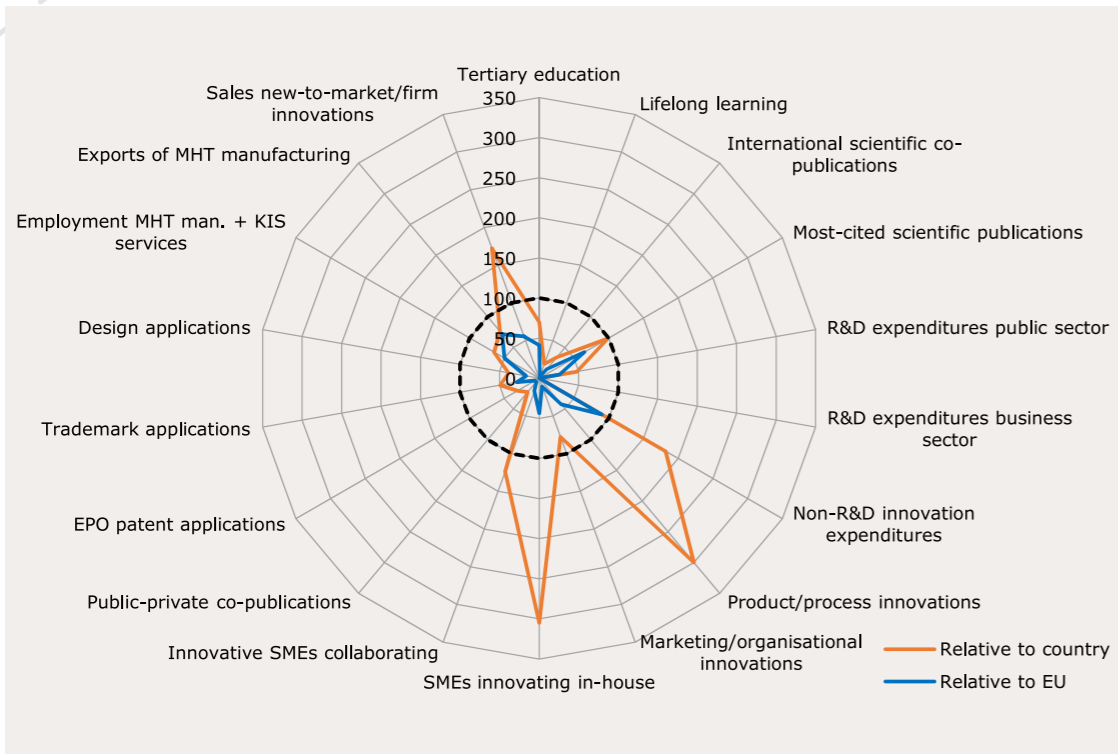


Possible structural differences refer to the fact that the region is highly densely populated area with higher employment share in services, lower share in manufacturing, and high GDP per capita.

Prague is the region with the highest economic performance in the Czech Republic. In recent years City of Prague started to pay much more attention to support the innovations. City of Prague supports research, entrepreneurial incubators and start-ups and closely cooperates with universities, Technology Agency of the Czech Republic and other progressive institutions.

As the result the city government also introduced projects supporting the innovation potential of the Prague city – first innovation vouchers and currently Prague vouchers designated to the start-ups and innovative SMEs doing business in Prague. Another important feature affecting the level of attention devoted to innovation and related topics is a high degree of investment in the technical infrastructure. City of Prague leads proof of concept project which comprises a set of activities to ensure that research results are shifted to commercial use. At the same time it is leader of the innovation partnerships project which allows public tenderers a new kind of cooperation with the private sector. These are cases where certain performance requested by the contracting authority is not yet available on the market and requires further research and development.

Based on The National Research and Innovation strategy for smart specialization of Czech Republic (The National RIS3 Strategy) three topics including innovations in transportation such as automotive, aerospace industry and railway vehicles were identified as the topics



Relative strengths compared to Romania (red line) and the EU (blue line), highlight relative strengths (e.g. Non-R&D innovation expenditures) and weaknesses (e.g. Public sector R&D expenditures). The region has higher employment shares in public administration, lower than average GDP per capita, but much higher than average GDP per capita growth.

A key strategy for developing innovative sectors is the Romanian Competitiveness Strategy. The last update covering the 2015-2020 period was drafted by the Ministry of Economy, Trade and Tourism, in consultation with the private sector and line Ministries. The strategy aims at correlating interventions dedicated to competitiveness, considering the national areas of excellence.

Analysis led to the identification of 10 economic sectors with competitive advantage that correlate with intelligent specialization areas mentioned in the National Strategy of Research, Development, and Innovation 2014 -2020. The economic sectors with competitive potential are: tourism and ecotourism, textiles and leather, wood and furniture, creative industries, **car and car components industry**, information and communication technology, food and beverage processing, health and pharmaceuticals, energy and environment management, bio-economy (agriculture, forestry, fisheries, and aquaculture), biopharmaceutical and biotechnology sectors.

In correlation with the SNC, according to the Smart Specialization Strategy of Romanian South-East Development Region, smart specialization areas identified for Region include also transport. Key smart specialization areas in the South-East Region, are:

- Construction and repair of ships; Shipping;
- Clothing industry;
- Agro-food and fisheries;
- Biotechnology;

- Agro-food biotechnologies;
- Environmental Biotechnologies;



**Eco-technologies:**

- Efficient and energy-efficient technologies;
- Equipment for the production of bio resources;

**Tourism:**

- Traditional tourism (coastal tourism, Danube Delta, mountain, etc.);
- Balneary tourism
- Niche tourism.

ICT, High Tech, Nanotechnologies and Advanced Materials.

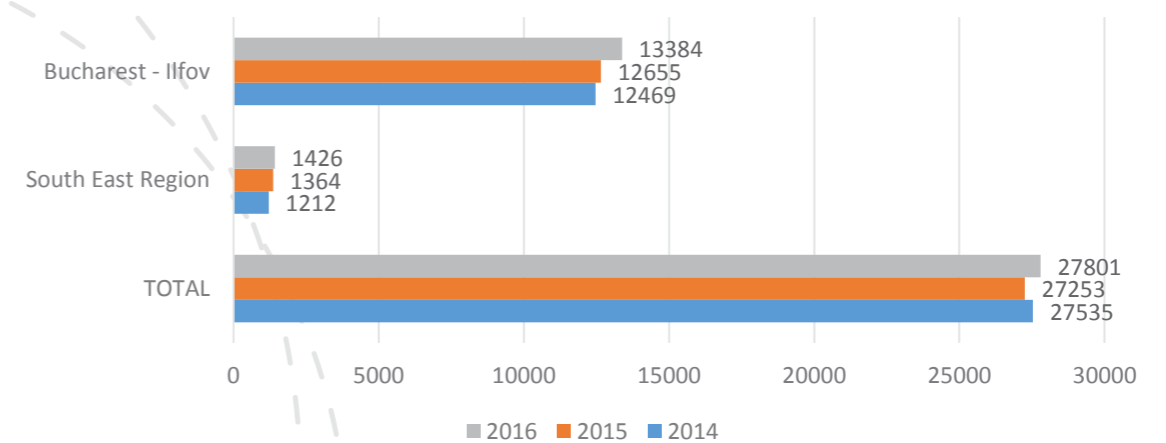


Lead actors in innovation policy in the Region are primarily the regional authorities - South-East Regional Development Agency (SERDA), Universities, local public authorities, Companies and Associations active at the regional level. South-East Regional Development Agency is responsible with drafting and monitoring the implementation of the Regional Innovation Strategies. Since 2007-2013 EU programming period, the Agency has been involved in preparing the innovation strategic planning at local level. In the context of the new programming period, SERDA has conducted the drafting process for the new Regional Innovation Strategy (2), the Smart Specialization Strategy and Regional Development Plan.

One important feature of the innovation framework is the existence of the qualified human resources in the field. The following graph shows the number of employed researchers at the level of the South-East Region, National and Bucharest-Ilfov. One can notice that at the level of South-East Region, the number of researchers is increasing slightly but not substantially to produce a big dynamic in the R&D area.



Fig 4. No of researchers (Total/Bucharest-Ilfov/South East)



Source: Romanian National Institute of Statistics, processed by Author

For instance, the region has higher employment shares in public administration, lower than average GDP per capita, but much higher than average GDP per capita growth.

Most of training on transport is delivered by the Constanta Maritime University. In 1990, the Institute of Civil Marjine (HG 113 / 06.02.1990, HG 102/1992) was re-established by de-

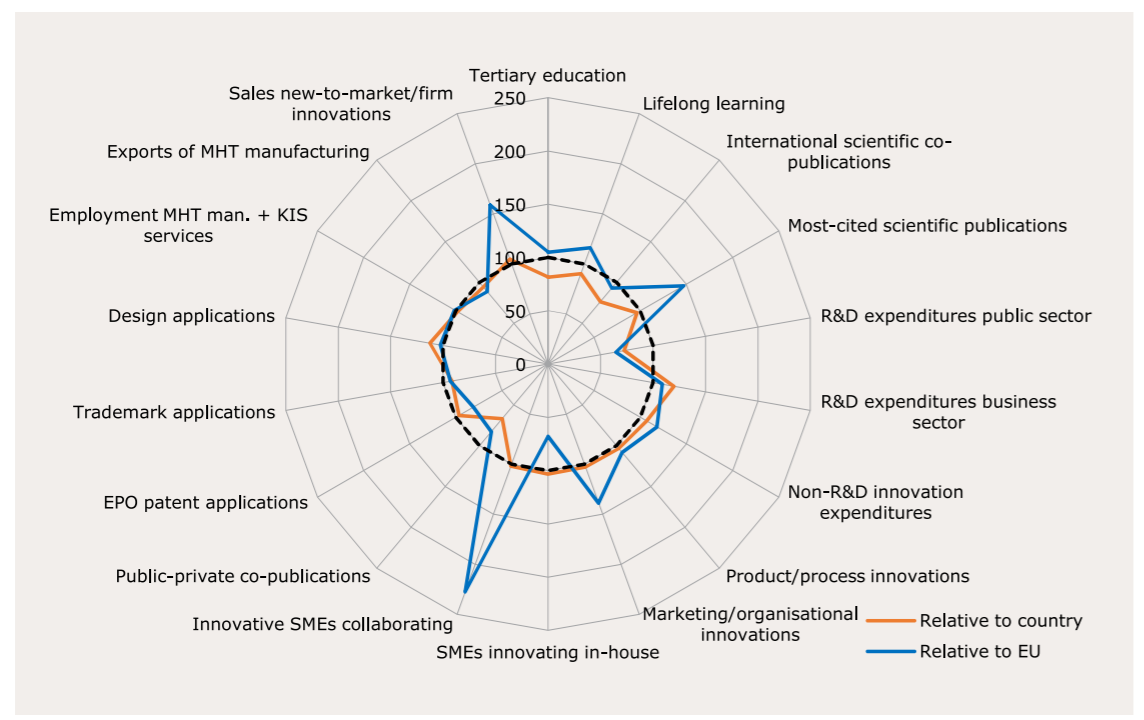
taching the Faculty of Navigation and the Faculty of Electro mechanics and passing them under the Ministry of Education. The institution changed its name to the Maritime University of Constanta by H.G. 85 / 08.02.2000.

The Constanta Maritime University's offer includes university courses in the fields of Maritime and Fluvial Navigation and Shipping and Economic Engineering in Transport and Masters in Engineering and Management in Terminal and Marine Operations, Engineering and Management in Maritime and Multimodal Transport, Transport Management and Logistics, Integrated transport systems management, Marine and port engineering and management, Maritime transport.

There are 12 (twelve) clusters in the South-East region that are specialized in various fields such as tourism, transport, shipbuilding, clothing, sustainable development, bio-economy, IT, alternative energy, health. In line with the areas of smart specialization identified, it is important to strengthen existing partner networks by increasing the number of co-operative projects implemented and by strengthening the management and communication capacity at the level of functional clusters.

### West Midlands

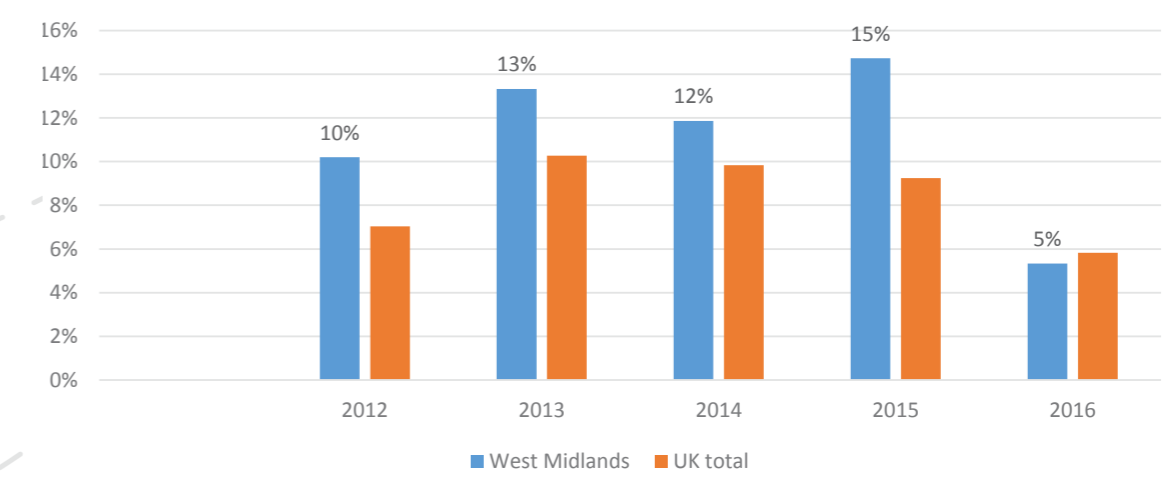
According to RIS 2017, West Midlands is a strong innovator, with innovation performance increasing significantly over time. For 2017, several relative strengths could be highlighted (e.g. Marketing & organizational innovations) and weaknesses (e.g. Public-sector R&D expenditures). The region is more densely populated, with higher than average employment share in manufacturing, and lower than average GDP per capita.



The Region does not have a specific RIS3 strategy but refers to the national one. The national policy is highly influenced by the central government view that regions and LEPs or Universities should be taking a position as leaders in some aspects of transport innovation – in particular Smart Mobility and driverless vehicles.



Fig 5. Annual Growth in RTD (%)



The national strategy states that UK has the potential to be a world leader in innovation. It also stresses UK RDTI needs to strengthen the ability to commercialize innovation but also defines the role of Government as an enabler through improving the interface between Universities, business and finance. It also recognizes that competition is an essential part of the drive to innovate and that multi-partner collaborations can provide synergies that are more than the sum of their parts.

This strategy has identified several key sectors. Of interest to innovation in transport are the identification of **Aerospace and Automotive** among **ten key Industrial Sector strategies**. In terms of relevance to the West Midlands region the Automotive sector is significantly more important as demonstrated in the Employment Location quotient charts below.

Universities are key drivers for West Midlands innovation capacity with three top 30 universities (Warwick, Birmingham, Coventry) and three more in the top 50, (Harper Adams, Keele and Aston). Two of these universities are in Coventry. Two others are close by in Birmingham. This creates a potentially powerful and influential research hub. Other Universities include Birmingham City, Stoke, and Worcester. Additionally, there are major centres of transport research at MIRA and the Manufacturing Technology Centre in Coventry. The region overlaps the northern half of the Motor Industry centre in the UK and several major automotive companies have research units in the area, including: Jaguar Land Rover, Tata Motors, Ricardo, ZF.

Advanced manufacturing and engineering are recognised as key driver of economic growth in the region. According to the regional ESIF strategy it represents 10% of all employment in the region. This is 57% greater than the overall average and 500% greater than the UK average for the automotive industry. The strategy therefore places AME at the front of every strategic priority in the region. In terms of transport the strategy specifically states: *“The Coventry and Warwickshire LEP area is a core part of the UK High Value Manufacturing Catapult through both WMG and the Manufacturing Technology Centre. The Catapult provides UK business with a gateway to access the best manufacturing talent and facilities in the country. It also acts as a conduit for funding from both the public and private sectors for projects and initiatives with due merit. In addition the focus on AME supports the Governments strategy for both the automotive and aerospace industries and linkage to the eight great technologies including; Advanced Materials, Robotics and Autonomous Systems and Energy Storage.”* (Coventry and Warwickshire LEP, 2016).





### 3.2 TRANSPORT SPECIALIZATION

According to the Regional Innovation Scoreboard, West Midlands and Prague are most dynamic innovators, being innovative leaders, while the rest of the regions included in this project are moderate innovators. However, regions have different results when analysed based on EU datasets and indicators.

Abruzzo Region is geographically situated in a pivotal location in the middle of the Adriatic Corridor, a multi-modal transport network which re-establishes the role of the Adriatic Sea as a major cross-border region characterized by cultural exchanges and economic cooperation.

Central Macedonia has a very good dynamic in terms of growth, especially considering the multimodality capacities of the region and the activity of the academic sector. A series of actors, including local authorities but also Universities and businesses are included in the implementation of the Strategy/transport plans for the regions. South East Romania has a good activity in improving public transportation, especially using ESIF. Public transportation as well as private investments in auto industry are a key feature, which is met also in the other Regions analysed.

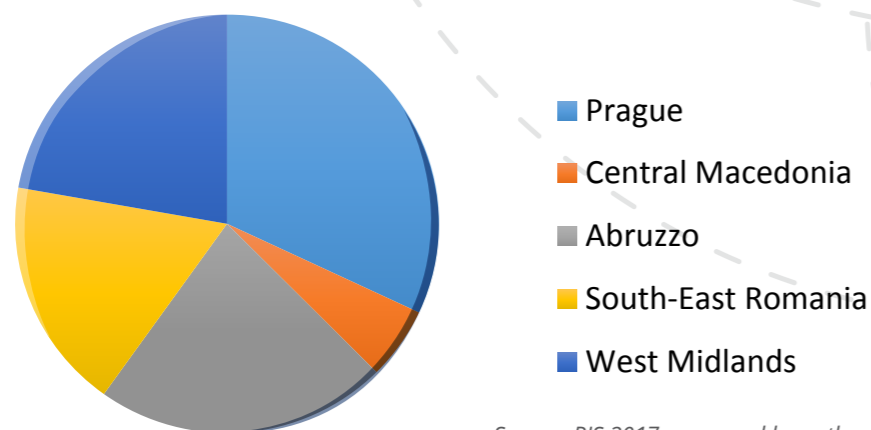
Human resources are very important to develop innovative technologies, including in the field of transport. Table below shows key elements regarding the quality of HR in the regions. Prague and West Midlands are best performers here.

Table 4. RDI indicators

	Population with tertiary education	Lifelong learning	Scientific co-publications	Most-cited publications
Prague	0,707	0,346	0,759	0,494
Central Makedonia	0,587	0,162	0,349	0,580
Abruzzo	0,313	0,353	0,363	0,587
South-East	0,227	0,011	0,060	0,355
West Midlands	0,578	0,546	0,388	0,802
Source	RIS, 2017			

Exports of medium and hightech manufacturing is of key importance for the Regions. Prague, West Midlands and South East Romanian Development Region are best performers in this area.

Fig 6. Exports medium and high tech manufacturing



Source: RIS 2017 processed by author from database

Other **key factors for innovation** are the European funding opportunities, important boosters for regional innovation, but also the bureaucracy, a major set-back.

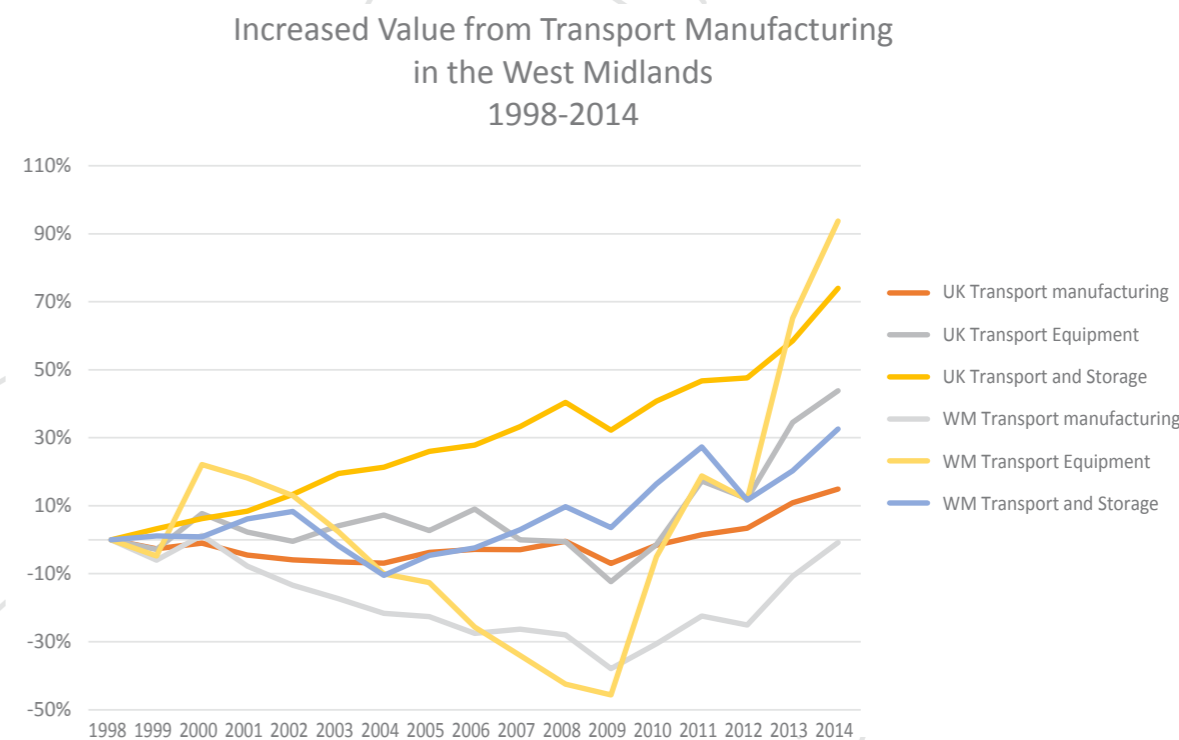
Given the geographical position of the regions included in the project, they have the potential to become major intermodal nodes. For example, West Midlands is the central nexus for Road and Rail communication throughout the UK, the same in the case of Prague, RCM and Abruzzo, the Romanian South-East Region hosts important maritime and fluvial ports.

Regions are potentially powerful and influential transport and innovation research hubs. All the regions have important and strong educational centres, also focusing on transport.

For different reasons, public transport still needs important investments. A second goal is to improve transport public policies in the Regions. For example, in the South-East Region local fleets are out-dated and there are not many alternatives regarding means of local transport that can be used. Also, the increase in the number of vehicles between 2002 and 2011, has recorded significant values in terms of cars and freight cars. Unfortunately, the number of passengers transported by public transport in urban environment is decreasing. Between 2000 and 2008, it decreased about 16% and in 2011 compared to 2000 with 33.31%. In Central Macedonia, public transport is currently limited to buses. In the West Midlands region between 2011 and 2015 there has been a small shift away from public transport and an increase in the use of cars.

The historical and geographical heritage influences the areas where innovation takes off. All the regions are important research centres. West Midlands plays an important role in automotive industries, and indicators increase Prague in chemical industry, automotive, ICT and financial intermediations. South-East region focuses on shipbuilding and education on transport.

Fig 7. Transport manufacturing dynamic



The economic crisis had a negative impact on the number of employees in innovative fields. For example, in RCM between 2000 and 2008 high-tech industries and knowledge-intensive services accounted for 1.7% of total employment and improved in 2016, reaching 1.9%.

still below the national (2.5%) and EU28(4%) averages. At the level of the South-East Region in 2011, 1,515 employees worked in the R&D sector, which represents a decrease of 198 employees compared to the values registered one year before. The R&D employees are mainly concentrated in the counties of Constanta (27,4/10,000 employees), Galati (25,2/10,000 civilian occupation) and Tulcea (22,0/10,000 civilian employees). At regional level, in 2011, researchers in 2011 accounted for 0.11% of the civilian population, below the national average of 0.30%. In 2010, the South-East Region was among the last in the European Union with 0.14 researchers per 100 employed people. West Midlands Region has been a centre of innovation in transport for decades. After a decrease in productivity and innovation due to a decline in the manufacturing base, particularly automotive, the region began a remarkable turnaround in 2008 when Jaguar Land Rover was sold by Ford to the Tata Group.

### 3.3 RESEARCH, DEVELOPMENT AND INNOVATION SPENDING

This subsection gathers available information on spending in transport sector. Data included is different due to the diversity of data sources.

#### Abruzzo

Almost half of all expenditure for R&D in Abruzzo (47.6%) is generated by the business sector, with an index score that places it amongst the regions of Southern Italy with the highest level of investment. In Abruzzo the collaboration between the Chamber of Commerce network and businesses is a real driving force for economic performance. Universities account for 38.8% of economic output and public authorities for 13.6% of the total (the contribution from non-profit organisations is still low).



*Abruzzo Tocco da Casauria*

The innovative capacity of the Abruzzo production system is better than it used to be: the current context as defined using the parameters of the European Innovation Scoreboard is more or less in line with what is found nationally.

#### Central Macedonia

The only sector where the R&D expenditure as a share of GDP is above the national average is that of the higher education, with higher education expenditure on R&D (HERD) accounting for 0.4% (€97.29m) of regional GDP (2013), compared to the national average of 0.3% (see 4.4 Transport innovation mechanisms) (Regional Innovation Monitor Plus, 2018). RCM (2011) is ranked 4th among the Greek Regions in terms of R&D expenditure



*Castle of Platamon Central Macedonia*

#### Prague

Almost one-third of all the organisations performing research and development are in Prague. Prague has almost a 50 % share of all the organisations performing R&D in the governmental sector and more than a 35 % share in the public university sector. To be more specific, 21 % of innovating companies, 75 % of institutes of the Academy of Sciences of the Czech Republic, 43 % of universities (public and private) and 30 % of other research institutes (including private companies) are based in Prague.

This fact also relates to other characteristics such as the employment rate in R&D and expenditure on R&D. Prague accounted for 41,5 % of the total R&D expenditure in 2014. Its value has increased in current prices by 172,4 % since 2000, while the growth in the whole of Czech Republic reached only 126 %. In purchasing power standard in constant prices, R&D expenditure allocated in Prague increased by 96,9 %. This growth significantly exceeded the growth rate of the Czech Republic (63,4 %) and the EU-28 (18,3 %). Support to research and development from the national budget was at the level of approximately 2,6 % of GDP in Prague (the Czech Republic 1,9 %, EU-28 2,3 %).



## South-East Region

Based on data inputs from Regional Development Plan of the South-East Region, in terms of innovation typology, in 2010, 43.89% of enterprises were product and process innovators, 40.72% were process-only innovators, while 10.86% introduced product-only innovations. Large innovative enterprises own the highest share: innovation can be found in 60% of the large firms, 45.70% of the medium-sized enterprises and falls to 33.7% for small enterprises. Sectorial analysis shows that between 2008-2010, at the level of the South-East Region, 36.30% of the industrial enterprises and 37.80% of the tertiary enterprises are innovative.

Research and development activity is not, however, the main source of innovation in innovative enterprises: only 8.58% of innovation spending in 2010 was R&D activity, while purchases of machinery, equipment and software accounted for 89.48%. The **share of R&D expenditure** is particularly low in large enterprises, the decrease being 25 times compared to 2008, reaching 3.12% in 2010 (from 122.503 thousand lei to 4.782 thousand lei), and a drastic decrease in expenditures on purchases of machinery and equipment (from 451,548 thousand lei to 145,912 thousand lei). In conclusion, there is a large number of research centers within the region, most of them located in Constanta, and being active in the sea-specific research (marine technology and marine ecology), but also in Galati focusing on technical specializations, especially naval architecture and metallurgy, and two research centers are located in Braila, within the Faculty of Engineering.

In 2012, there were 55 industrial parks established according to Government Ordinance no. 65/2001, with the subsequent amendments and completions regarding the establishment and operation of industrial parks. From these only 2 Industrial Parks operate in the South-East Region. Mangalia Business Incubator was opened departing from a project set up under the 2002-2012 Multiannual National Program for the Establishment and Development of Technology and Business Incubators funded by the Agency for the Implementation of Projects and Programs for SMEs implemented by the United Nations Development Program and supported by the City Hall of Mangalia.



*Khorugh from South East*

## West Midlands

Spending on research in the region has traditionally lagged the rest of the country. Since 2010 this has been changing, but it can be difficult to isolate – in 2016 the published headline data was combined with the East Midlands to preserve confidentiality. Until 2016 growth in spending was higher over the past five years than the rest of the country.

Department of Transport provides specific funding schemes for innovation which are advertised on a national basis and the region has been successful in gaining some of these funds. Additionally there is funding available both from the UK government Department for Trade and Industry through Innovate UK and from EU Structural Funds. This funding is directed at business support and is targeted at regional growth. Whilst almost all of the funding is generic for businesses, the size of the transport industry in the area means that some of it is used for transport innovation.

UK Autodrive is the largest government-backed trial of self-driving vehicles, receiving funding for the next three years. It is the key of three successful consortia, who have received funding from Innovate UK, under the Government's 'Introducing Driverless Cars' competition. The project started in November 2015 and will run for 3 years. The programme has recently been testing self-driving cars on the city streets in Coventry.



*Birmingham New Street at dusk*



## 3.4 TRANSPORT INNOVATION MECHANISMS



Junction crossing city

Most regions have rather defined mechanisms as key projects and methods in the area of innovative transport. West Midlands, Prague and Central Macedonia have presented a series of projects and initiatives related to the improvement of transport in the area. Most innovations projects are related to: **developing software application for public transport, improving parking, improving classic transport switching to using light rail**, amongst others.

Many Regions have initiated projects and measures in correlation with their attributions as providers as public services and the existence of RDI resources such as Universities, Companies, institutes and funding available.

Innovation in the regions analysed is related specially to process innovation and is most often **directly correlated to the presence and dynamics in the university and academic sector** in general in the region as well as the existence of **collaboration between universities and the business sector**.

Other Regions, such as South-East, Abruzzo and Central Macedonia have a greater focus on being the driver for innovation and a policy actor. They **conduct strategies on innovation in transport while financing key investment projects financed** under various sources such as ERDF - Regional Programs sponsored by the EU. Most of the Regions have the responsibility to finance Urban Transport .

Municipalities in the Regions have drafted **Urban Mobility Plans** which represents a key step in developing local policies for transport as public service. In Prague for example, a series of instruments such as Innovation Market web application, ESA Business Incubation Centre Prague (ESA-BIC Prague), Prague Startup Centre called Prague IoT Centre: IoT & SmartCity incubator. Smart Traffic includes topics such as:

- Electromobility and Smart Traffic
- Smartphone applications for drivers
- Transport optimization
- Availability of parking places

- Measuring the passage of cars
- Monitoring driver behaviour
- Others

Other regions have developed mechanisms for transport Innovation, such as:

- Specific research projects: Holistic Personal Public Eco-Mobility
- Strategies for urban mobility: Assist-mi (for people with disabilities), Apply parking
- Software developed to serve for transport as public service: Intelligent Variable Messaging System providing journey guidance for passengers
- Innovation of classic means of transportation such as West Midlands projects for Light Rail and Light Innovation

In Central Macedonia, a series of initiatives have been proposed and they concern:

- Telematic systems - bus operator of Thessaloniki
- Centres for Traffic Management
- Controlled parking systems
- Traffic flows monitoring
- E-ticketing, e-tolls, multimodal centres
- Technology Park and Innovation Zone (Tehnopolis, etc)

In South-East Region, a key mechanism is the public policy of financing urban mobility by using EU funds. A consistent budget is allocated to

## 3.5 BARRIERS AND ENABLER/DRIVERS OF TRANSPORT INNOVATION

### 3.5.1 Barriers

Barriers represent a threat identified by key stakeholders in the Regions and have most of the time an external source to the institutions. Barriers can be organized around some typologies and include: fiscal or regulatory constraints, competition constraints

General conclusions regarding barriers could be organized in some thematic areas:

#### **Lack of strong economic incentives for an ecological transport system**

Price tools aim to stimulate the purchase of green cars, the use of environmentally-friendly fuels and the reduction of vehicle use. Examples: fuel taxes, high parking rates, tax cuts for new vehicles using environmentally friendly technology (such as hydrogen, methane, electricity and hybrid technology).

#### **Lack of efficient urban transport**

One key step is to provide or continue funding for implementation of Sustainable Urban Mobility Plans for all cities with a population of more than 100,000 and even expand to associations/partnerships of cities aiming to organize transport in common.

#### **Reduced investment in road infrastructure**

Road infrastructure development should be done using appropriate transport infrastructure technologies, which will save fuel and reduce CO<sub>2</sub> emissions.

### Lack of communication and collaboration between stakeholders, public actors – businesses – Universities

Human Resources in Transport RDI are scarce and therefore well-prepared experts to improve the public-private and university dialogue are needed. Best collaboration shows up where the private environment is active and takes responsibilities in producing investment. Role of Universities is that of improving public policies in transport and create DEMAND for innovation.

### Policy focused on public transport

Focus on Public Transport and less on developing products/private transport businesses

### Limited access to finance

Banks and other financing is poor; ESIF has a very targeted strategy financing public transport – green – not so much

### Infrastructure barriers

Lack of infrastructures for smart and green fleets, access to build infrastructures in historical sites

### Policy barriers

Tax barriers, property of infrastructure related barriers

Specific barriers according to the Regional analysis are presented in the tables below. Often, barriers are similar from Region to region.

## Abruzzo

Barriers to transport innovation are generated to economic crisis and the lack of vision and planning a stable and long-term connection between transport and tourism, as the latter can be one of the most competitive sources of revenues for the region.

ICT platform for all services is missing and efforts are deployed randomly and are not based on a systematic vision.

There are small improvements in the private sector and the public sector is trying to set smart mobility as a priority also to improve management and reduce costs and efforts. For example, thanks to the real-time monitoring of traffic experiments, traffic congestion phenomena were reduced or avoided and this could be implemented by transport intermodality.

Touristic areas (e.g. winter sports such as ski and summer attractions such as touristic ports) need attention together with infrastructures such as railways, logistic infrastructures, airports and ports.

## Central Macedonia



Transport Authority of Thessaloniki, has limited capacities for facilitating an important intervention in the transport innovation promotion due to a combination of reasons.

There is not any widely adopted business 'culture' that favours the development of a well-structured marketing and sales strategy, which promotes, among others, an active and open participation in international events, exhibitions, etc.

The Region of Central Macedonia is not focusing and concentrating on few and carefully selected thematic areas that could support growth for all (rather than funding all sectors with limited source).

The cooperation of the academia with the industrial sector is usually not facilitated directly by establishing links with companies. On the contrary, it is usually implemented through programmes, such as the national research programme that promotes the co-operation of the academia with the industry and it is called 'Research-Innovate'.

Cooperation is not a mainstream way of working, as there is much fear and concern associated with it, although it could be a win-win choice that can reduce the operational costs.

There are some negative and discouraging facts that can hinder the potential of transport innovation promotion, such as (interview meeting 3):

- (i) the unwillingness of the companies to invest in Research and Development activities, spending own capital resources,
- (ii) the unawareness of the current status and future trends in the market dynamics by the academia actors,
- (iii) the very limited actual impact of several structures/agencies or intermediary services, which were launched in the last few years for the promotion of innovation (for example, the Technology Park, the Alexander's Zone of Innovation, etc.).

Current taxation system is considered by many as a main barrier to business initiatives, for this reasons many entrepreneurs choose to start a business in neighbouring countries. The tax rates and the limited access to the banking system could also comprise factors hindering innovation.

The bureaucracy and the absence of a culture favouring business initiatives in Greece comprise also main barriers towards innovation.

Weak participation in international fora which is in general rather important and crucial for attracting funding (as it was revealed through the example of LAT).

The absence of a Technology Park, like the example of Sophia Antipolis in France, which could allow businesses (e.g. spin-offs) to be located in the same space in order to be able to exchange easily knowledge and information.

The poor consideration of the intellectual property rights.

The industrial process is not promoted adequately, despite the fact that industry could play the role of a multiplier towards innovation generation.

In some cases due to the institutional framework of different laws that are in force and regulate the mobility and logistics field (such as urban logistics, traffic signals management, etc.), several distinct authorities are being involved in the decision taking, having overlapping competences.

Sometimes the communication between different Directions of an Authority or between the Authority and some other structures of it (e.g. a Metropolitan Development Agency) is lower than what it should be.



## West Midlands

Region's ESIF strategy highlights the difficulty of gaining investment for smaller businesses in the region, particularly in Coventry and Warwickshire.

The focus on a single major manufacturer and the Tier one and two suppliers that support them is potentially a barrier to development of alternatives and in case of business failure.

Apparent disconnect between the strategy and the implementation of funding under ESIF in that there are very few support projects which directly fund Transport Innovation.

The policy identifies market failures in three main areas

Technology or knowledge spillovers: the difficulty that SMEs have in funding research and development frequently means that common interest in the wider benefits of the results of the work is not realised.

Coordination and Network failures: the difficulty that small firms often encounter engaging in and managing collaboration

Imperfect and asymmetric information: a market failure that makes it difficult for innovative SMEs to find the investment they need to develop this innovation.

## Prague



Complicated legislation setting and other regulations that are not very pro-innovative. *Example: The taxi service Uber based on the idea of shared economy principle. The so far experience shows, that the case of Uber raised a wide discussion and kind of controversy between the Association of Czech taxi drivers and City of Prague as the business activities relating to the shared economy (e.g. Airbnb) are difficult to deal with in terms of Czech legislation.*

- Installation of electromobility infrastructure (charging sites and facilities) or very strict historic preservation of Prague's city centre subscribed on List of World Heritage Sites UNESCO.
- Low capacity of project management and administration. On the one hand there are sufficient financial allocations in the operation programmes, whereas on the other hand the number of finished and successful projects does not correspond with the disposable financial resources.
- The election cycle, because the personal changes of representatives complicates the stability and continuity of the priorities and projects
- Very fragmented ownership of the technical infrastructure and public spaces
- The need of a careful economic surveys when ratifying the important strategic documents
- The need of following the best practices from abroad
- Insufficient collaboration of public administration with the innovating companies
- Insufficient support of big companies
- Ineffective communication of the long-term development strategies of Prague.



Prague

## South-East Region

For the National level, according to ANRSC – National Public Utilities Regulation Authority – there are key obstacles in the field of local transportation:

The regulatory framework – law of local public transport – was introduced on the Government adoption agenda after many years of legal uncertainty. Still, the law is not yet in place.

Local authorities lack the framework to start modernizing the local network or to improve local transport system.

No history in the sector of running green fleets could affect the capacity of local authorities to justify impacts of buying it by using EU money.

According to the Regional Operational Program, main barriers for South-East Region transport sectors, are:

Reduced percentage of modernized roads – from 10,856 km of regional public roads, only 19.4% are modernized, the region having the lowest share in the country. The low value of the road density indicator for Tulcea is explained by the fact that the Danube Delta covers almost half the area of this county.

Poor road quality, poor lighting and street marking, and the situation of roads in rural areas is critical, with most rural localities lacking paved or asphalted roads.

Road bridges are in a precarious state.

Reduced density of electrified railways – the railway network had a total length of 10,948 km, out of which 1,750 km in the South-East Region out of which only 477 km, representing 27,2%, are electrified. Railroad density is 45.9 / 1000 km<sup>2</sup>.

## 3.5.2 Drivers

Drivers are generally strengths met by the Regions, opportunities that might be used in the future to improve the development of transport innovation. Drivers, similar to barriers, can be either policies and regulations, methodologies and methods, financing programs, product development or even business good practices.



General conclusions were generated from regional analyses:

### Demand for innovation

The UK example indicates that Universities and public authorities should design public policies in transport and create DEMAND for innovation.

### Stakeholders collaboration and role of the public authorities as key innovation drivers

Communication between stakeholders is a key success factor. Good examples from the Regions include: RIS3 strategies governance structures, role of the Regional Agencies or Management Authorities for Regional Operational Programs (South East, RCM, Abruzzo)

### Universities are another key driver for innovation in transport

Academic activity in the Regions part of the project is intense since key European universities work there. Coventry and Birmingham University are lead research institutions and produce RDI results such as patents that are part of the technological transfer projects. Prague also collaborates with the University of Prague.

### Resources and financing programs

#### EU support for Transport Innovation

Financing programs to stimulate collaborative research or investment in transport. Good practices could be met in all regions involved, from the Regional Funds allocated to transport and urban mobility (South East) to national programs (UK Autodrive) and public-private partnerships (RIM). In general, existence of ESIF financing focusing on innovation, transport.

### Innovative Projects

From the driverless programs to different software development to improve public transport accessibility, projects are a great feature of the Regions.

### Regulations/transport policy

Urban Mobility Plans, traffic management initiatives, infrastructure construction/modernization, greening urban fleets, considering investing in new transport modes

Tax relief when innovative investments or process innovation in transport are initiated by the private sectors

### Dynamic of private transport sector

South East (Yazaki), West Midlands (Tata Motors)

## Abruzzo

Transport policy exposes a complex dynamic, because all public entities are called to achieve goals for better services for the general public and the effort to put in action pilot projects with private companies or EU funded projects. The goals can be found in the Masterplan Abruzzo.

Other initiatives of collaboration include, among others, the 5G network implementation by University of L'Aquila which involves both the Municipality of L'Aquila and the Region for the surrounding areas, but also innovative projects such as PESOS (i.e. Pescara Sostenibile – Sustainable Pescara) that includes also incentives for public employees to use public transportation and for the reduction of carbon emissions. This last project gives a pivotal role to the City Mobility Manager and is also directed to introduce the Regional Mobility Manager, which, in the legal provision framework is envisioned but has not yet been selected in practice.

An entire project on intermodality has been developed by Department of Transport of Regione Abruzzo as a study within objective no. 3 “Regional Intermodality Planning” in 2017, with an administrative decision (Determina direttoriale no. DPE/27 of 3 august 2017) in the framework of activities 2017-2019, year 2017, approved by the Giunta with decision DGR no. 334 of 29.06.2017.

## Central Macedonia

The existence of a cluster or exhibition space could be helpful for the demonstration of new technologies to all interested parties, especially the various enterprises

There are few providers of transport innovation located in the Region of Central Macedonia that managed to create an international portfolio and client base, e.g. LINK, KENOTOM, BETA CAE and few AUTH's spin-off's. However, their examples are rather encouraging for the development of this sector and could attract similar big actors that would like to benefit from the same advantages that these competitors enjoy, mainly the availability of well-educated personnel that costs lower than in the central and northern Europe.

The existence of a Technology Park of 4th generation and the creation of Mega-projects and clusters in specialised fields related to transport and logistics could have a significant impact on the promotion of transport innovation.



West Midlands Poljce - View from Above 1

## West Midlands

The ESIF policy goes on to identify that **Intelligent Mobility, Niche Vehicles aerospace and transport equipment** present a significant opportunity for Coventry and Warwickshire to become a leading centre in the UK, utilising local strengths in innovation.

*By 2025 the strategy projects that the sector will be worth £2.4 billion and 12% of the sub-region's output. It also predicts that the automotive sector will increase in importance with the location quotient rising from five to seven (employment in the sector 7 times more concentrated than the average).*

Key policy proposes **specialist technology support programmes**, and demonstrator programmes around integrated transport systems, driverless vehicles, large data sets and automated vehicle control systems, all of which are very relevant to the sector.

**Programmes to stimulate collaborative research** and knowledge transfer are intended to stimulate commercialisation of innovation from both public and private sectors.

## Prague

Prague's region is natural centre of education and research with technically focused universities such as Czech Technical University covering a wide variety of technical disciplines.

Teams often co-work on the international projects, host significant international conferences and meetings, which enables to enter into partnership with the partners from abroad and spread and share their knowledge.

Relatively good amount of available subsidies and public fund

Cooperation between the private firms and research sector.

## South-East Region

Existence of a well known naval industry and a metallurgical industry in the Region

Financing available through the Urban Sustainable Urban Mobility Plan (PMUD) aiming to improving accessibility and good integration of the various modes of mobility and transport.

Regional policy is strategized with the RIS 3 strategies and the Smart Specialization Strategy, preconditions for EU funding in the transport sector.

PMUD includes the list of measures to improve mobility in the short, medium and long term.

The 2014-2020 Regional Operational Program - Urban Mobility Investment helping Romania to respond to the priority investments foreseen in the Romania - EU Partnership Agreement for 2014-2023 programming period.

## 3.6 GOVERNANCE

Governance is a key element in the process of improving public policies in the area of innovation and transport innovation. Partners have set up different mechanisms to negotiate and substantiate policies at regional level, including Innovation Strategies and Local Strategies, Innovation Committees for Innovation and so on. Public administration representatives, Universities, Research institutes, Transport Companies and other Business and NGOs are categories of stakeholders invited to participate and improve policies.

### Abruzzo

INNOTRANS stakeholders involved in the innovation chain: municipalities, clusters, public transport companies from all the transport field.

There is also a list of private generally family-owned companies that invest in research and innovation (e.g. D'Ambrosio Autotrasporti C.T.; D'Agostino Trasporti just to mention a couple) and they can be reached by the higher level stakeholders on the territory.

### Central Macedonia

The stakeholders are divided in three main categories, in particular:

1. **Business oriented stakeholders (namely, enterprises)**
2. **Governance (namely, Public Authorities/Policy Makers)**
3. **Academia (namely, University research teams and Research Units/Institutes)**

The three main categories of stakeholders could be further subdivided into smaller groups, such as:

1. **Business oriented stakeholders (namely, enterprises)**
  - a. operators of transport & logistics services
  - b. operators of transport infrastructure (e.g. systems, stations, axes, etc.)





Coventry City Council has been very involved in Transport Innovation, making the city a testbed for Autonomous Vehicles. As part of this process they have become actively involved in a wide range of projects.

### South-East Region

The most effective governance structure which is already set up at regional level, in a semi-formal way, is the partnership structure which has the role to draft and coordinate the implementation of the Regional Framework Document/South-East Intelligence Specialization Strategy for the 2014-2020 programming period. This structure works in the form of the Regional Innovation Consortium.

The Regional Innovation Consortium (CRI) is a consultative structure, without legal personality, coordinated by the South-East Regional Development Agency, made up of academics, research, innovative enterprises, public authorities and civil society, with a role in advising and RIS3 monitoring at the level of each development region, the endorsement of the regional framework document elaborated for the programming of the Axis 1. Technology Transfer Promotion, the Regional Operational Program (ROP) 2014-2020, the RIS3 Priority Portfolio Approval for each region, the analysis and prioritization of projects for innovation and technological transfer structures, according to Axis 1, ROP 2014-2020. Regional Innovation Consortium is made of 40 people.

- c. ICT providers (developers of software, producers of hardware)
- d. producers/manufacturers of vehicles
- e. other businesses

#### 2. Governance (namely, Public Authorities/Policy Makers)

- a. Authorities
- b. Chambers
- c. Federations of businesses
- d. Multipliers of Innovation & supporting agencies

#### 3. Academia (namely, university research teams and Research Units/Institutes)

- a. research on planning, management and organisation of passengers' transport systems
- b. research on planning, management and organisation of freight transport systems
- c. research on intelligent transport systems (ICT applied on transport sector)
- d. research on transport vehicles technologies
- e. research on transport infrastructure

## West Midlands

Most important stakeholders are Local Councils and LEPs who are the Managing Authorities for Innovation Funding. Additionally, the region has a new unitary Authority in the West Midlands Combined Authority, a new initiative designed to decentralize power from Central Government. This has brought 12 local authorities, including Coventry, and four LEPs together under a new mayor. Whilst this is still a new initiative and decision making is clouded – all authorities are represented but decisions still have to be accepted and implemented by each local authorities – it is important to note that Transport is a key devolved Priority. Transport for West Midlands (TfWM) has powers similar to Transport for London and is already taking responsibility for Public Transport in the region.



# 4 SWOT ANALYSIS



## Strengths

### Central Macedonia

Established cooperation of OSETh (Thessaloniki Transport Authority) with the academia sector of Thessaloniki (AUn, HIT/CERTH).

Experience of OSETh in the participating in transport related research and territorial co-operation projects at European level.

Geographical position of the Region of Central Macedonia that favours its evolvement to a transport and logistics hub between Europe and East. The port of Thessaloniki comprises the physical gate to the Balkan area and through it to the central Europe, encouraging the launching and development of logistics (transport, warehousing and forwarding) services and the implementation of innovative transport systems.

A barrier to the easy access of public funds (as in the case of the actors of the Region of Central Macedonia that are located far from policy making and decision taking capital centre) may encourage more the development of more economically sustainable research activities, which can be competitive at international level and can really boost innovation.

The actors of the transport innovation eco system were mapped in terms of smart urban mobility and also logistics, against 'industry's dynamics' in the horizontal axis, and against TRL in the vertical axis. It was found that in terms of the smart urban mobility, the actors have high industry dynamics & high TRL, while in terms of logistics the actors have high TRL & low industry dynamics (interview meeting 8).

Significant mass of regionally based public and higher education research and technology organisations (RIS3, 2012).

Relatively unique, in Greece, private sector initiatives to develop 'innovation infrastructure' (incubators, clusters) (RIS3, 2012).

Pilot region at EU level with long run history of planning and organising innovation policies, since 1994 Regional Technology Plan (RIS3, 2012).

Good degree of networking of regional institutions (RIS3, 2012).

### Prague

The most economically developed region in Czech Republic (the only better-than-average NUTS II region);

5th best public transport in the World;

25% of Czech GDP generated in Prague;

Central region of Czech Republic, the most important node of all modes of transport;

Centre of education (universities, Czech Academy of Sciences), research and international cooperation;

Relative high share of persons employed in services, science and technology;

Relative high share of qualified academics

Industrial tradition, good and available school system (Czech Technical University);

Perspective region for companies from abroad in terms of educated labour force and its price for value.

## South-East Region

The Region includes all major ports in Romania: Constanta, Galati, Braila, Mangalia

All cities over 100.000 inhabitants managed to draft and adopt the Urban Mobility Plans

Specialization on shipbuilding

Existence of companies producing auto components

Good share of high tech products to export

Transport market is growing positively correlated with economic growth and GDP increase. Demand on the transport market (increase of 55% between 2010-2012 while GDP rose with 54%) is high

Romania has a good track history in automotive high tech sector (presence in Romania of Continental, Siemens, etc)

Quality of RDI (Technical Universities, such as Babes Bolyai University, Technical University from Cluj, Bucharest Polytechnic University, Galati Lower Danube University in Galati)

## West Midlands

Vehicle manufacturing centre with a the leading national brand centred in the region

Strong presence of volume premium brands and niche vehicle makers

1500 automotive suppliers, including 17 Tier1, well developed 2nd/3rd Tiers

Jaguar Land Rover is a leader for adoption of new technology

A strong tradition and culture of manufacturing and, therefore, much tacit as well as formal knowledge/skill

A high quality engineering services sector well integrated with the major global players

Good development facilities at Jaguar Land Rover, MIRA, RAPRA, ZF and others

Expertise in body manufacture, including use of lightweight materials

Emerging capability in new higher-value-added technologies especially autonomous vehicles

Flexibility of labour markets compared to other EU Member States

A strongly supportive public sector

Local cluster of expertise in IT skills as centre of games industry in UK

## Abruzzo

Central position in Adriatic-Ionian area in geographic longitude profile



## Weaknesses

### Central Macedonia

Limited capacities of the Thessaloniki Transport Authority (responsibilities overlapping; bus transport system controlled by the state; recent adoption of a new legal & organisational form). Public Transport modes are currently limited to buses.

Although there are some very good examples of transport/logistics services & technology providers, it is noticed that some of them are not much active and open in the frame of international activities, e.g. research, exhibitions, etc.

There is not any widely adopted business 'culture' that favours the development of a well-structured marketing and sales strategy, which promotes, among others, an active and open participation in international events, exhibitions, etc.

The Region of Central Macedonia is not focusing and concentrating on few and carefully selected thematic areas that could support growth for all (rather than funding all sectors with limited sources).

The cooperation of the academia with the industrial sector is usually not facilitated directly by establishing links with companies. On the contrary, it is usually implemented through programmes, such as the national research programme that promotes the cooperation of academia with the industry and it is called 'Research-Innovate'. A Centre of Excellence on Transport would be something useful and is currently missing. Such a Centre could promote the cooperation between academia and businesses, and could provide space for the demonstration of technological systems to be developed.

Cooperation is not a mainstream way of working, as there is much fear and concern associated with it, although it could be a win-win choice that can reduce the operational costs.

There are some negative and discouraging facts that can hinder the potential of transport innovation promotion, such as:

- the unwillingness of the companies to invest in Research and Development activities, spending own capital resources,
- the unawareness of the current status and future trends in the market dynamics by the academia actors,
- the very limited actual impact of several structures/agencies or intermediary services, which were launched in the last few years for the promotion of innovation (for example, the Technology Park, the Alexander's Zone of Innovation, etc.).

Companies are usually searching for technology solutions through consultants who are not always real experts in the field.

The bureaucracy, the taxing system and the absence of a culture favouring business initiatives in Greece comprise the main barriers towards innovation.

The low participation in international fora which is in general rather important and crucial for attracting funding.

The absence of a Technology Park, like the example of Sophia Antipolis in France, which could allow businesses (e.g. spin-offs) to be located in the same space in order to be able to exchange easily knowledge and information.

Poor standardisation in the logistics field.



Most of the actors of the transport innovation eco-system are providing design/planning for innovation, as well as soft initiatives (for example, promotion of software development, support for the creation of start-ups). However, the industrial process is not promoted adequately, despite the fact that industry could play the role of a multiplier towards innovation generation.

In some cases due to the institutional framework of different laws that are in force and regulate the mobility and logistics field (such as urban logistics, traffic signals management, etc.), several distinct authorities are being involved in the decision making, having overlapping competences and responsibilities, increasing this way the complexity towards the overcoming of problems.

Sometimes the communication between different Directions of an Authority or between the Authority and some other structures of it (e.g. a Metropolitan Development Agency) is lower than what it should be.

Limited funding available (RCM, 2015).

High rates of unemployment (in total, women, young people, long-term unemployment) (RCM, 2015).

Difficulties in coordination and leveraging international best practices.

Research activity is concentrated in University laboratories, and it is fragmented among numerous small units without any specific clear industrial goal or connection (RIS3, 2012).

Innovation potential is highly concentrated spatially with a metropolitan, peri-urban and rural divide (RIS3, 2012).

Limited self-financing capacity of regional SMEs for innovation activities (RIS3, 2012).

Fragmentation of innovation support activities and lack of co-ordination at regional and local levels (RIS3, 2012)

## Prague

Limited experience with innovation procurement and other instruments (PPI, pre-commercial public procurement, innovation partnership etc.);

Slowly developing smart city concept;

Complicated legislation setting and regulations, that is not positively affecting the innovation implementation;

Strict regulation of the possible claimants in EU funding, especially Operation Programme Prague – Growth Pole 2014-2020;

Lack of territorial integration between Prague region and surrounding Central Bohemian region;

Difficult status of Prague as a municipality, a region and NUTS II region at the same time.

## South-East Region

Reduced percentage of modernized roads – from 10,856 km of regional public roads, only 19.4% are modernized, the region having the lowest share in the country.

Prevalence of car transport while rail transport is reduced due to the degradation of the Romanian railway system.

High cost of net engine technologies, although Romania has a good track history in automotive high tech sector

Lack of integration between transport modes and region

Insufficient accessibility of the system of public transport for industrial areas

Lack of proper connectivity of industrial platforms and ports with national road network

Lack of urban mobility means – (bike-sharing) – or intermodal centers (bus and park-and-ride)

Lack of an integrated ticketing system

No digital information system

Lack of Traffic Management Centers

Not very developed urban logistics policy

Inadequate pedestrian infrastructure

Lack of strong economic incentives for an ecological transport system.

Lack of efficient urban transport.

The current state of the rail system

Reduced investment in road infrastructure

Very weak investment in the bicycle transport

## West Midlands

Lack of indigenous OEMS and major Tier 1s (with the exception of Jaguar Landrover) and lack of local design or purchasing authority in most major companies

Concentration on low value components, where firms struggle to compete on costs, and less involvement in high value areas.

Lack of UK electronics or communications

Industry to support developments in high value vehicle technologies

Move to low cost sourcing due to high resource costs

Productivity and competitiveness below global standards in many plants

Skills base below national standards and

Significantly below the international standards in Japan and Germany

Inadequate investment in new product development and the necessary plant & equipment

Low adoption rates of international quality

Standards ISO/TS 16949

Suffering a negative image through high profile closures and sell offs

Continued concerns about quality and costs – relatively high costs of labour



## Abruzzo

Geography in geographic latitude profile

### Opportunities

#### Central Macedonia

Respecting and following the rules of the European Regulation 1370/2007, especially in case that the bus operator of Thessaloniki will be privatised. The implementation of the European Regulation 1370/2007 and the recent privatisation of TRAINOSE (rail operator) will boost competition among KTEL and rail, mainly in the route 'Athens – Thessaloniki'.

The introduction of new transport modes, such as the METRO, the sea-boat service, etc. (good cooperation, and complementary planning are prerequisites for the successful inclusion of the new modes in the transport system of Thessaloniki).

Big customers of a company may promote some innovation activity by asking from their services provider to incorporate certain state-of-the-art business approaches or systems.

It is considered that certain fields of expertise have a greater potential for development and progress within the close future time horizon, in particular: green logistics; agro-food logistic; city logistics; routing of vehicles; network design/intermodality; autonomous, robotic vehicles being used in industrial spaces, for the handling of products/goods (interview meeting 3). In the freight transport sector, the main improvements could be related to the informatics systems and the organisational models. Incorporation of 5G, Galileo and LORA technologies in the telecommunication capabilities of the technology systems may be crucial for the future in short-term. Concerning the prospects on the usage of alternative fuels, LNG (Liquefied natural gas) is considered that will have much potential for usage in the road transport sector in the future. Other main trends in mobility and logistics that will drive the sector are: the on-demand services, the customization and the cooperative schemes and services (e.g. MaaS related to mobility and/or logistics, behaviour, etc.).

The Region should fund the sectors related to food (big number of enterprises, perishable material) and metals - the two main exporting products of the region - that can result to a good rate of return, spreading the benefits to a wider spectrum of actors.

The establishment of direct and informal/formal relations between the companies/businesses can really work for their benefit and be very effective.

The Research Committee of AUTH could better and more support the several research groups working under its umbrella, by implementing some horizontal actions, such as marketing actions on behalf of all research groups.

The existence of a cluster or exhibition space could be helpful for the demonstration of new technologies to all interested parties, especially the various enterprises.

Many university graduates of the Region of Central Macedonia have migrated in north and central Europe for working as experts and scientists. If being attracted again back to their homeland, their professional experiences could lead to the launching of innovative businesses in several sectors, among which transport field, as in the case of LAT example.

The enhancement of researchers' mobility, the exploitation of the Greeks that gained experiences abroad, and the encouragement of involvement in international fora and activities could help in innovation promotion.

The identification of the main market trends that will drive innovation during the next decades could be a fundamental prerequisite for the innovation promotion.

The development of research infrastructure close to the KEDEK facilities (KEDEK is a newly established AUTH's 'Centre of Interdisciplinary Research and Innovation') that is planned and will be done in synergy with the RIS strategy of the Region of Central Macedonia.

The Thess INTEC initiative that is steered by the Thessaloniki's Technological Park.

The cooperation of the companies/businesses with the academia sector could produce interesting results in relation to the promotion of transport innovation. This is also indicated by the example of LINK, in the case of which, its founder recruited its first employees from a pool of University students that was delivering lectures to.

A Centre of Excellence on Transport would be something useful and is currently missing. Such a Centre could promote the cooperation between academia and businesses, and could provide space for the demonstration of technological systems to be developed.

There are few providers of transport innovation located in the Region of Central Macedonia that managed to create an international portfolio and client base, e.g. LINK, KENOTOM, BETA CAE and few AUTH's spin-off's. However, their examples are rather encouraging for the development of this sector and could attract similar big actors that would like to benefit from the same advantages that these competitors enjoy, mainly the availability of well-educated personnel that costs lower than in the central and northern Europe.

The recent privatisation of the Port of Thessaloniki could trigger the development of the private logistics services and could accelerate the modernisation of the port infrastructure, systems and equipment. OLTh s.a. participates in the network of the Terminal Link (one of the partners of the three-member consortium) that includes 28 ports in total worldwide, which it could benefit from. In addition, it intends to proceed with investments that will be related to: the development of a Port Community System; the adoption of a new terminal operating system; the monitoring of special KPIs (e.g. per commodity); the exploitation of the Internet of Things; the decision taking supporting technologies, etc.

The Region of Central Macedonia could support the port community, by promoting the establishment of: a truck appointment system (that will allow the development of a traffic assignment model); a monitoring system for air pollution; an evaluation frame for measuring the impact of containers handling and arrivals on the traffic in the whole Region.

The Technology Park of Thessaloniki intends to be evolved in a 4th generation Tech Park in the frame of the initiative, called 'Thess-INTEC' and it promotes some Mega Projects towards this direction, among which, two of them are related to transport, in particular, the 'Future Mobility' project and the 'Competence Centre for Logistics' (that will try to co-locate industry and academia actors). Other mega projects are related for example to artificial intelligence, energy, etc. It was mentioned that the 4th generation Technology Parks are associated with an Act that encourages the inclusion of businesses.

The HIT/CERTH participates, as a partner, in a project proposal in the frame of the mobility related KIC (Knowledge and Innovation Communities). KICs are funding huge research infrastructure, promoting the cooperation of the industry with the academia sector. If this project proposal will be granted, HIT/CERTH intends to support several actions (of the Thess-INTEC initiative), as well as the establishment of cooperative ITS for the mobility and circulation management in the Region of Central Macedonia.

Transfer of international experiences and best practices (RCM, 2015).

Growing pressure to export may help to drive business innovation and an increased openness of the production system (RIS3, 2012).

Potential to promote Thessaloniki as an 'Open city': Metropolitan character, connections with the Greek and Balkan hinterland and the Black Sea region (RIS3, 2012).



## Prague

Setting up the priorities in transport innovation;

More intensive collaboration of academic and private sector for better and more effective technology transfer;

Innovations and improvements in public transport vehicles resulting in higher preference of public transport and decline of private vehicle traffic;

Considering the current transport problems and increasing demand for new and alternative solutions;

Current preparation of Prague SUMP.

## South East Region

Funding opportunities – ESIF funds – for public authorities and especially the Regional Operational Program

Naval industry dynamic

Finance bicycle trails and bicycle tracks, bicycle parking facilities, pedestrian tracks and streets in pedestrian areas

Attracting new Foreign Direct Investment in the region – equipment and machinery

Use Large Infrastructure Operational Program financing to modernize – TEN-T network

Regional Operational Program – infrastructure connecting TEN-T network, especially at regional level

EU Territorial Cooperation Programs – cross border investment opportunities (mainly roads)

Danube Strategy – 4 out of 6 eligible from South-East Regional Development Agency.

BERD loans to develop street infrastructure

## West Midlands

New markets for the premium and niche vehicles manufactured in the region – e.g., China and India

Faster connection to other parts of the UK through HS2

Development of the engineering services sector, given by the outsourcing of key design and development activities by OEMs and the major suppliers

Potential for a lead role in specific technology growth areas (e.g. low carbon)

Exploiting the business opportunities created by legislative pressure (e.g. End of Life Directive, Targets for Low Emissions, ITS)

Exploiting regional technology expertise to attract inward investors

Working with the emerging economies vehicle industries to show the benefits of the West Midlands for access to markets

Partnerships with public bodies to focus on the skills needs of the engineering industry

Diversification of the supply chain to other sectors, therefore gaining new business practices, perspectives and innovation

## Abruzzo

TSG2 Italian coordination (together with National Coordinator and Friuli Venezia Giulia Region)

### Threats

#### Central Macedonia

Overlapping of some roles and responsibilities among various Authorities that is related to some risks of policy implementation (Interview meeting 1).

The role of individuals/persons in key positions is crucial as they can become the catalysts or the barriers of change (interview meeting 3).

The brain-drain trend, namely the migration of high level educated people.

Absence of an integrated monitoring and evaluation system of relevant actions that could provide feedback for the planning (RCM, 2015).

Relocation of productive industries (based on labour) to neighbouring countries and regions and absence of the capability to restructure the productive base of the sector towards the production of services and products of added value (RCM, 2015).

Ageing and subsequently difficulty in making the insurance system sustainable (RCM, 2015).

Social challenges: difficulty of individuals in paying debts, unemployment increase, extreme poverty increase (RCM, 2015).

Further erosion of employment in sectors based on low-wage competition (RIS3, 2012).

Bureaucratic nature public initiatives to support innovation and entrepreneurship (RIS3, 2012).

Unclear and changing institutional framework (taxation, management of research results, etc.) (RIS3, 2012).

Significant reduction of financial capacity because of the economic crisis (RIS3, 2012).

## Prague

General scepticism, mistrust and lack of interest to the European Union funding and subsidies;;

Discouraging of the private sector stakeholders from the investment and development of innovative solutions;

Lack of interest of public authorities in the innovation processes and their massive development;

Low pressure of private enterprises and universities to cooperate and market the solution via public authorities.



### South-East Region

Bureaucracy

Frequent changes of national public policies

Lack of continuity of state aid schemes to support investments

Lack of public financial resources to develop integrated investments

### West Midlands

Uncertainty over the future following the referendum and governments decision to leave Europe

Shrinkage of the supply chain as global competitors increase their capabilities

The movement of the production of vehicles and components to low (wage) cost countries. This applies to labour intensive processes but also to high technology manufacture. It has potential to accelerate if the UK leaves the EEA

Increasing gap in productivity/GVA and high UK labour costs

High investment costs associated with new technologies (e.g. low carbon technologies) combined with financial difficulties through over supply of product and high operating overheads

Cost down pressures leading to suppliers exiting the market

Failure to address the skills gap at all levels

The growth of European and global supply

Adverse exchange rates

### Abruzzo

Global trends in transport industry and slow catch-up capacity at a large scale (mostly SMEs are pioneer innovators)





INNOTRANS PARTNERS



[www.interregeurope.eu/innotrans](http://www.interregeurope.eu/innotrans)

