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TRANSNATIONAL OBSERVATION:

South Europe at the Crossroads: Investments in Road, Rail, Air and Seaborne Transport for the Future

South Europe at the Crossroads: Investments in Road, Rail, Air and Seaborne Transport for the Future

Over the last decade, there has been considerable investment in transport in southern European regions. **Bulgaria, Cyprus, Croatia, Italy, Greece, Malta, Portugal, Romania and Spain** have all received European funding and loans to increase and improve access to markets and public services. Citizens and businesses alike have benefitted. Some notable investments have been made. From **2007** – **2013**, the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) spent 23% of its transport budget on improvements in Greece, Spain, Italy and Portugal (the Southern Convergence Regions) – a total of **18.7 billion EUR**. This amounted to nearly a third of the resources available from the two funds for these regions. From **2007** – **2017**, over **50 billion EUR** worth of loans have been made available by the European Investment Bank (EIB) to support the transport and infrastructure investments in the Southern EU regions. This represents 38% of the total lending capacity of the EIB for transport investments across Europe for the period. From **2014** – **2020**, **21.5 billion EUR** of ERDF and CF funding has been allocated for the 9 Southern Member States under the broader theme of "Network Infrastructures in Transport and Energy".

What effect have these investments had? Has there been an impact on Gross Domestic Product (GDP)? Which regions and modes of transport need further attention in southern Europe? Are we able to recognise network deficiencies effectively, make the most of the infrastructure assets we have and prevent negative spill-over effects? It seems essential to monitor the transport dynamics over time to help guide decision-making for the future and to minimise the risk of unbalanced investments.

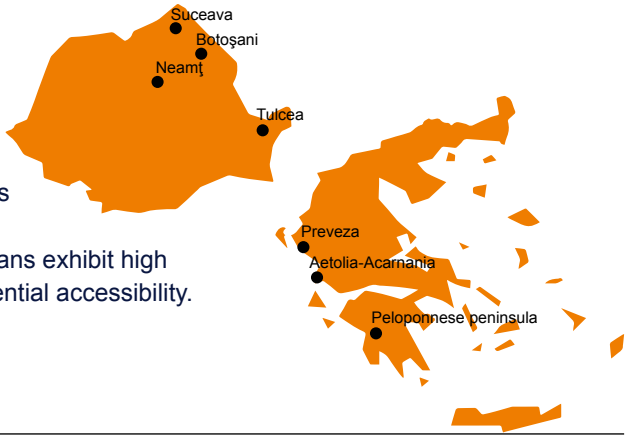
Measuring accessibility

Understanding accessibility and coming up with meaningful measurements, however, is challenging. Statistical agencies don't provide accessibility indicators and there is no way to collect them; they can only be generated by accessibility models. The European Territorial Observatory Network (ESPON) has been designing accessibility models to support transport investment policies for over a decade. As such, ESPON has become the main source for comparative accessibility indicators for European regions, supporting a number of strategic decision-making processes on all levels – European, national, regional and local.

This transnational observation paper aims to provide snapshots across transport systems, with particular focus on challenge zones for both passengers and freight transport in Southern Europe. It examines road, rail, air and sea transport and brings together several ways of measuring accessibility applied by ESPON researchers: potential accessibility (how easily people in one region can reach people, markets and services in another region); hinterland accessibility (how many people can reach a certain port within a certain time) and empirical data (transport volume in ports). The paper presents accessibility scenarios for road, rail and air in 2030 and for sea transport in 2050.

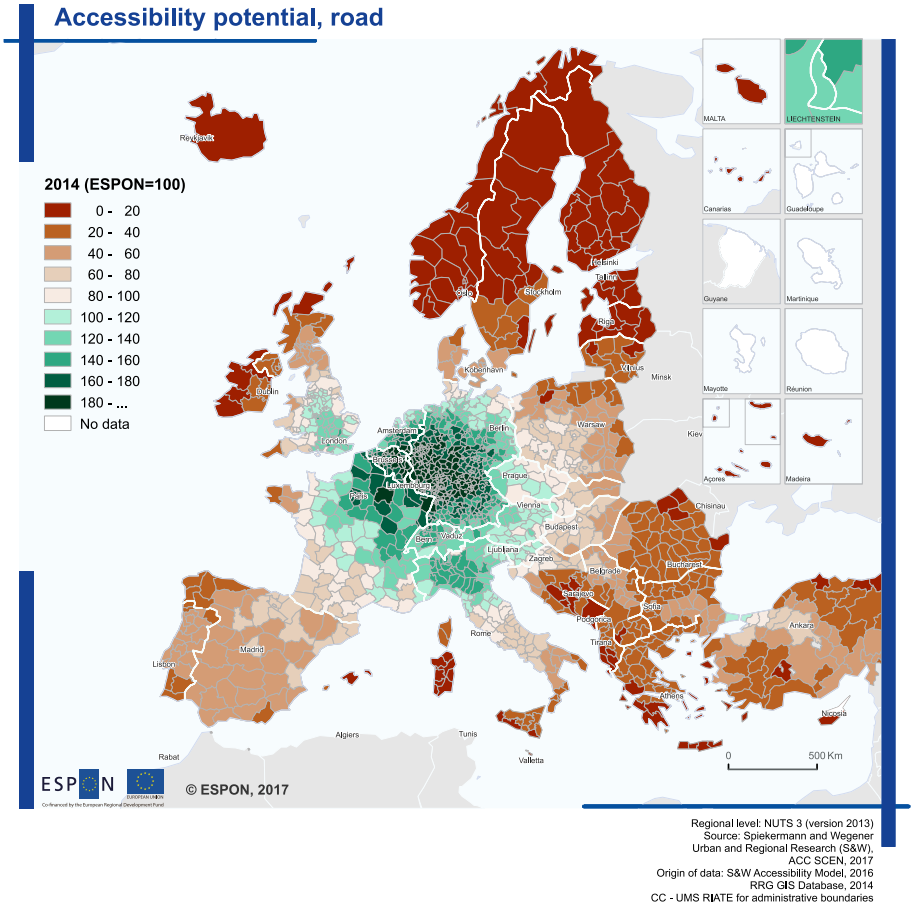
POTENTIAL ACCESSIBILITY BY ROAD

The areas with lowest potential accessibility by road are: the Romanian counties Botoșani, Neamț, Suceava and Tulcea; the Greek regions of Aetolia-Acarnania and Preveza and the Peloponnese peninsula. Portugal and the Balkans exhibit high relative growth but low absolute growth in potential accessibility.



The potential accessibility by road is in line with the core-periphery pattern in Europe (Figure 1). The core with the highest potential accessibility by road in Europe lies around Germany, north-eastern France, the Netherlands and Belgium. This is more than twice the European average in some areas.

Figure 1
Potential accessibility by road (the weighted European average for population is set to 100).



Accessibility by road decreases with movement away from the European core. There is less than 20 per cent potential accessibility by road (as compared with the European average) in the Mediterranean islands, the counties Botoșani, Neamț, Suceava and Tulcea (RO NUTS 3), the regions of Aetolia-Acarnania, Preveza (EL NUTS 3) and the Peloponnese peninsula (EL NUTS 2).

Moving slightly closer to the European core, a number of areas, particularly in south-eastern Europe, follow the spatial pattern with potential accessibility of between 20 and 40 per cent of the European average. These areas include: the regions of Galicia, Asturias (ES NUTS 2), Almería (ES NUTS 3), Alto Minho, Cávado, Alto Tâmega, Terras de Trás-os-Montes, Médio Tejo, Alentejo Litoral, Baixo Alentejo and Algarve (PT NUTS 3); the provinces of Bari, Lecce, Crotone, Catanzaro, Vibo Valentia, Reggio Calabria (IT NUTS 3); the counties of Šibenik-Knin and Split-Dalmatia (HR NUTS 3); large parts of Bulgaria and Romania, as well as Greece.

Northern Italy is slightly out of synch with this pattern. The combination of well-developed road infrastructure and a high population concentration has led to potential accessibility by road in this area that accounts for 50 per cent above the European average.

Broadly speaking, there are two regional groups apparent in terms of relative development of potential accessibility by road between 2001 and 2014. The first has only moderate growth of up to 20 per cent and the other has substantial relative accessibility increases of more than 100 per cent in some areas. By way of example, low relative growth occurred in a corridor from England to Italy, putting it firmly in the first

group. Here, accessibility was already high in 2001, and upgrades to the motorway network had only a low relative impact on accessibility. Spain, Portugal, Western Romania, Croatia and Greece, however, fall into the second group with the highest relative growth due to new infrastructure projects.

The effect of population

Population dynamics, in addition to transport network developments, influence these changes in accessibility. This is certainly the case in most regions in Spain, Portugal and Greece where changes and improvements to the road transport network are further affected (though to a lesser degree) by an increasing population (network driven development).

In contrast, Italy's growth in potential accessibility is primarily affected by increases in population with improvements in the road network having a lesser effect (population driven development).

Bulgaria, Romania and parts of Greece are characterised by positive changes to the road network which compensate for negative population trends. Overall, these regions have higher accessibility levels in 2014 than they did in 2001, despite a significant decline in the population over the period. This change is caused by major improvements of the road infrastructure (network driven development).

POTENTIAL ACCESSIBILITY BY RAIL.

Areas with lower potential accessibility by road generally benefit from higher accessibility by rail thanks to high-speed rail corridors. Northern Italy offers notable potential accessibility by rail above the European average; this is in spite of the fact that local railway services have deteriorated. The lowest rail accessibility values are for the Spanish province of Almería, the Balkans and Eastern Romania. The western coastal regions of Peloponnese show the most extreme accessibility decline.

The spatial pattern demonstrating potential accessibility by rail bears a strong resemblance to the pattern for potential accessibility by road, with regions in the European core having the highest values (Figure 2). However, high accessibility is less evenly distributed here as regions with top accessibility are forming corridors along high-speed rail links from France towards the Atlantic and via Lyon to the Mediterranean regions. These corridors result in high accessibility by rail in regions that are typically outside the scope of high potential accessibility by road.

Northern Italy has potential accessibility by rail that is above the European average, just as it does for potential accessibility by road (Figure 1). The railway network in this region is concentrated around the Milan node, though most of the municipalities in the area are reasonably close to railway links with the exception of the mountainous areas. Historically, the railways in Northern Italy were built to connect major cities with one other, as well as connecting medium-sized centres with the main poles (particularly Milan and Turin). Overall, Italy has slightly less railway than it did 50 years ago since some lines were abandoned in the mid-1960s. Over the last decade, the Italian railways have been prioritising investment in the high-speed network. This has had a knock-on effect on infrastructure and rolling stock for local services which have faced underinvestment.

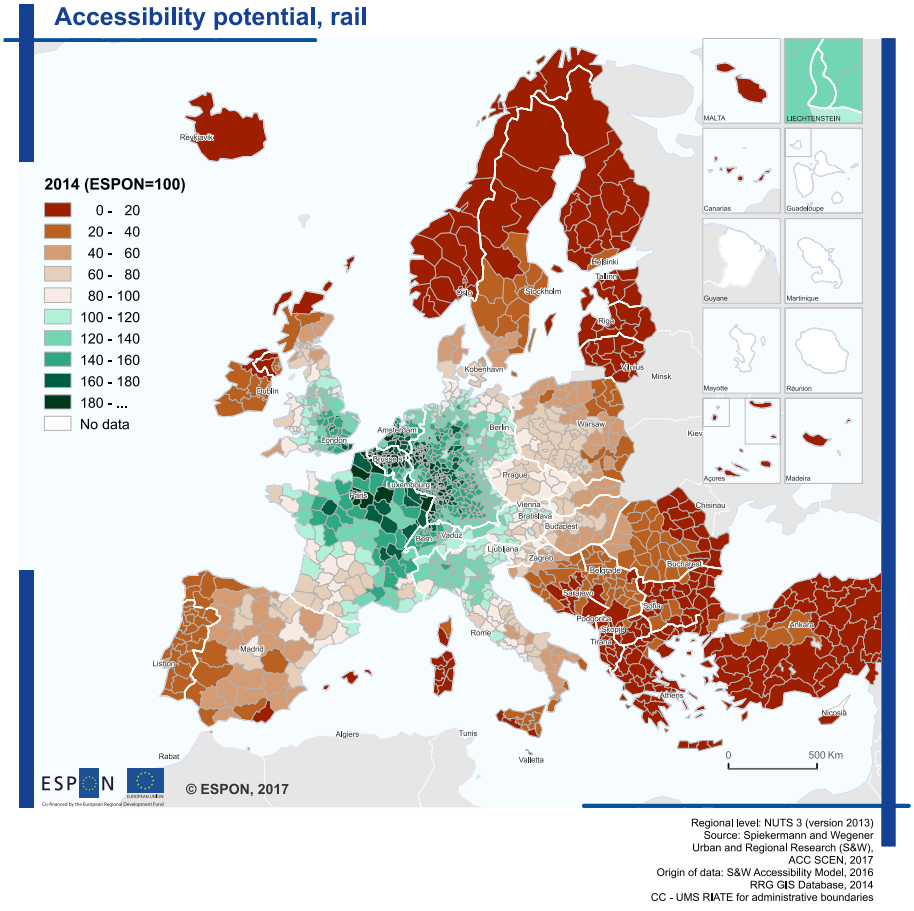
Very much in the spirit of the Trans-European Transport Network (TEN-T) developments, there has been considerable investment in the high-speed network in Spain. In spite of this, most Spanish regions have

lower than European average potential accessibility by rail, with the exception of Madrid and the provinces of Zaragoza, Tarragona and Gipuzkoa.

Poor potential accessibility by rail, accounting for only up to 40 per cent of the European average, is found in Portugal along with the provinces of Cuenca, Huelva, Cádiz and Granada (ES NUTS 3), Galicia, Extremadura and the Principality of Asturias (ES NUTS 2), Crotone, Reggio Calabria and Lecce (IT NUTS 3), Pernik, Blagoevgrad, Plovdiv and Pazardzhik (BG NUTS 3), Sofia City (BG NUTS 3), the 1st, 3rd and 4th Romanian macro-regions as well as the regions of Pieria, Thessaloniki and Kilkis (EL NUTS 3). The lowest potential accessibility values are for the 2nd Romanian macro-region as well as large parts of Bulgaria and Greece. A more holistic view, through comparison of the accessibility developments by road and rail over recent years, reveals that road infrastructure development has been prioritised in these regions.

It is apparent that the highest relative gains in accessibility by rail occurred in many regions that have clearly below average absolute values, such as Spain, Portugal and southern Italy. Additionally, the highest gains in Southern Europe were in northern Italy and parts of Spain. The absolute growth in large parts of south-eastern Europe was rather low and some regions in Romania even experienced a decrease in accessibility. The spatial pattern of changes is different for absolute changes in accessibility by rail. Unlike the infrastructure-population development patterns that determine potential accessibility by road, rail accessibility in Southern Europe has experienced an overall decline. The improvements to the network in the eastern parts of Romania, along the borders with Moldova and Ukraine, have not affected the overall values due to the negative population trends. In contrast, there were positive population trends in the Peloponnese and Crete (EL) which mask negative network changes in these areas. The most dramatic accessibility decline can be seen in western coastal regions of the Peloponnese due to abandoned rail links and negative population trends, mainly caused by emigration.

Figure 2
Potential accessibility by rail (the weighted European average for population is set to 100).



POTENTIAL ACCESSIBILITY BY AIR.

The lowest European values for air accessibility are in the rural areas of Spain, Portugal, Greece, Romania and Bulgaria. Whilst regional airports fill the accessibility gaps in rural areas at times, they are prone to rapid market decline. For example, traffic in Girona airport (Catalonia region, Spain) increased by 650% between 2000 and 2005, up to 5 million passengers, and then dropped to 3 million passengers when Ryanair opened a permanent base in Barcelona. Losses in accessibility by air have also been experienced by Extremadura, Castile and León (ES NUTS 2) as well as parts of north-eastern and eastern Spain, the Italian NUTS 2 regions of Abruzzo and Umbria and the Greek NUTS 3 regions of Boeotia and Laconia experienced.

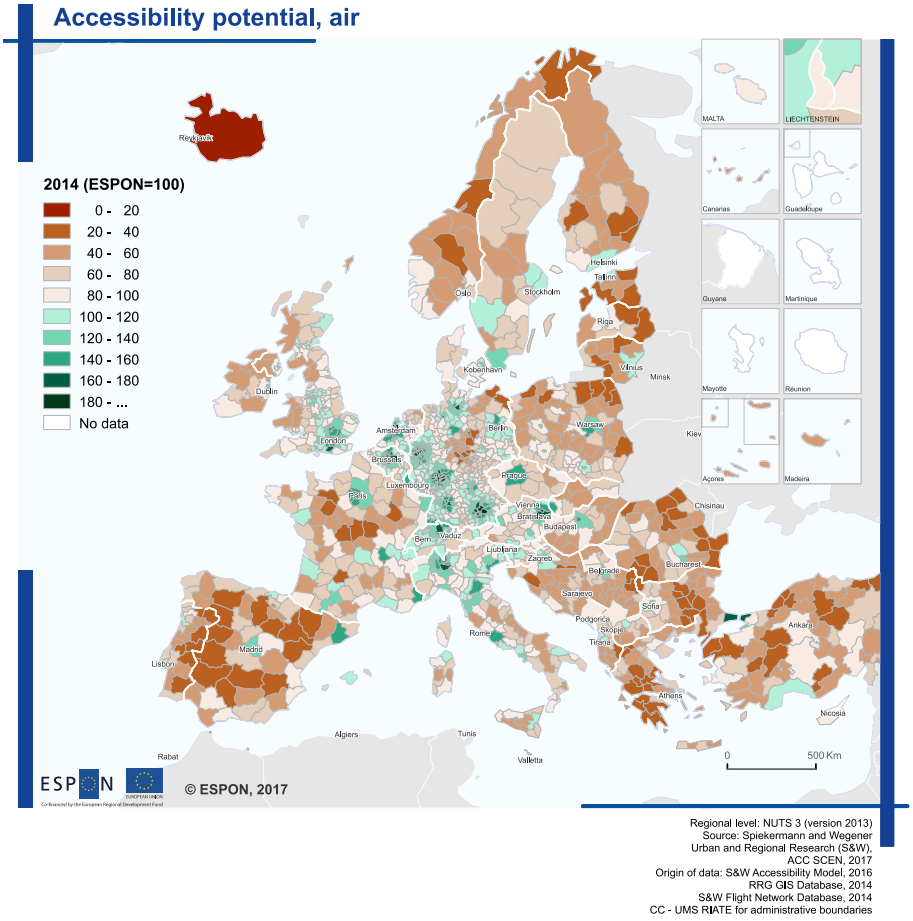
The patterns of potential accessibility by air are different to those of road and rail; they form a mosaic with regions of high, medium and low accessibility side by side (Figure 3). Naturally, the major airport regions and their close surroundings attain the highest accessibility values. This also applies to countries that have typically lower accessibility levels in other modes of transport. In southern Europe, the regions with the highest accessibility by air are located around the airports of Madrid and Barcelona as well as in northern Italy. In principle, all capital regions in southern Europe benefit from the global connectivity arising from their airports. This results in above-average potential accessibility. However, the extension of benefits arising from an airport in an area seems to be rather limited.

The highest relative growth rates have been in the Balkans; these developments have been -influenced by regional airports that have benefitted from new air services, resulting in relative growth rates of more than 50 per cent in some cases. The lowest relative growth rates in accessibility by air are in areas around major international airports or between major airports.

There have been losses in accessibility by air caused by the reduction of flight services in Extremadura, Castile and León (ES NUTS 2) as well as parts of north-eastern and eastern Spain, the Italian NUTS 2 regions of Abruzzo and Umbria and the Greek NUTS 3 regions of Boeotia and Laconia.

High absolute growth has occurred in regions that exhibit high relative growth as well. In particular, regions in south-western Europe have benefitted from new regional airports and the introduction of new flight connections.

Figure 3
Potential accessibility by air (the weighted European average for population is set to 100).



ACCESSIBILITY BY SEA.

Southern Italy and Greece have lost passenger traffic between 2005 and 2015. Within the same period, there have been decreases in container volume in the Mediterranean ports of Barcelona and Tarragona, the Atlantic port of Bilbao as well as the Black Sea port of Constanţa. Continental hinterland accessibility is at its lowest for southern Europe in the Atlantic ports of Avilés and Gijón and the Black Sea ports of Varna and Constanța with its satellite ports of Midia and Mangalia; in these areas, fewer than 2.5 million people are reachable by road within 4 hours.

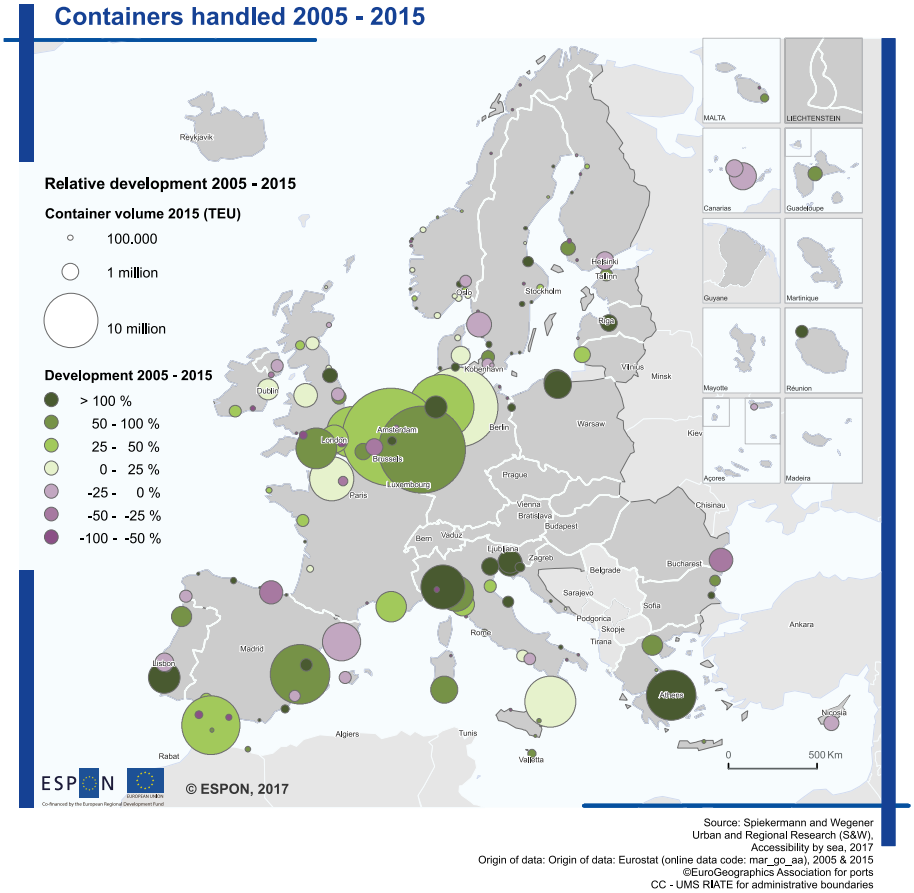
While seaborne passenger transport is particularly intensive in the eastern Mediterranean Sea, passenger services by sea are almost completely missing along the Atlantic coast. In the western part of the Mediterranean Sea, there are only a few ports that cater to substantial numbers of maritime passengers. Moving eastwards, the density of passenger ports increases, in particular along the Italian, Croatian and

Greek coasts and amongst the islands. In spite of this, some Italian and Greek ports had lost passenger traffic by 2015 when compared with 2005. The total passenger volume on Malta, however, has substantially increased in the same period because of the demand for both domestic and cross-border ferry services.

The development of maritime freight volumes between 2005 and 2015 is very heterogeneous; there are growing and shrinking ports all across southern Europe. This is due to the diverse specialisation of individual ports, their development paths during the global economic crisis, competition strategies and restructuring processes. An examination of the gross weight of goods and container volumes handled between 2005 and 2015 in Europe does reveal a more distinguishable south-north pattern, however, with significant gains in the North Sea (Figure 4).

With 75% of freight traffic passing through Gibraltar to the northern ports of Rotterdam, Antwerp and Hamburg, the Mediterranean Sea can be classified as a passing zone. Though there are large container ports in the Mediterranean region, their performance is limited by less dense motorway and freight village networks in their hinterland, and poorer rail connections to the ports when compared with the North Sea facilities. For European exporters, accessibility to European intercontinental ports is more critical than connections from Europe to overseas ports. The natural correlation between container volumes and hinterland accessibility is well illustrated by the Black Sea port of Constanţa, where container volumes had declined by 2015 in comparison with 2005 due to poor hinterland accessibility.

Figure 4
Relative development of container volumes 2005 – 2015.



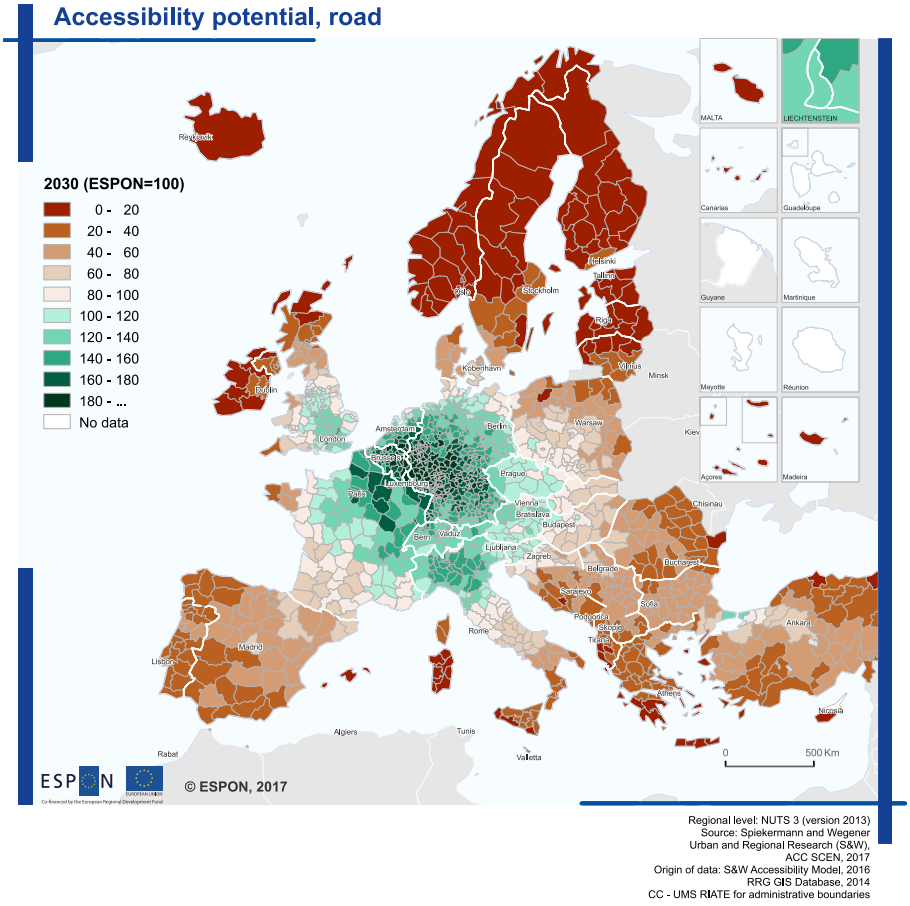
POTENTIAL ACCESSIBILITY BY ROAD: PROSPECTS AND SCENARIOS 2030.

Large parts of Portugal and Spain are expected to face a decline in potential accessibility by road by 2030, with the exceptions of Alentejo Litoral (PT) and the Cantabria autonomous community (ES). The lowest road accessibility values in southern Europe are expected in the Peloponnese peninsula and the Mediterranean islands by this date, although, in relative terms, the islands will see improvements, albeit at a modest rate. Cyprus is expected to lead the way with up to 20 per cent improved potential accessibility as compared with 2014. Additionally, the highest relative gains can be expected in Centru and Vest as well as some counties in the Nord-Vest and Sud-Muntenia development regions of Romania, the municipalities in the north-western, northern-central and south-western planning regions of Bulgaria as well as the NUTS-3 region of Elis in Western Greece

The potential accessibility scenario 2030 reflects the TEN-T plans for road infrastructure. Yet, despite major anticipated improvements, the current differences between north and south are expected to remain, with the exception of accessibility in northern Italy, which is currently much above the European average. Accessibility by road will persist in decreasing towards regions outside the European core and lowest accessibility by road in southern Europe will remain in the southern parts of the Peloponnese peninsula and on the Mediterranean islands; in these areas, potential accessibility by road will still be less than one fifth of the European average. Many regions in Spain and Portugal, as well as most regions in south-eastern Europe, currently have potential accessibility of ca. 50 per cent of the European average or less. As is the case today, urban areas will have the highest potential accessibility and rural areas will have the lowest. In south-western Europe, the rural average will reach only 60 per cent of the European average.

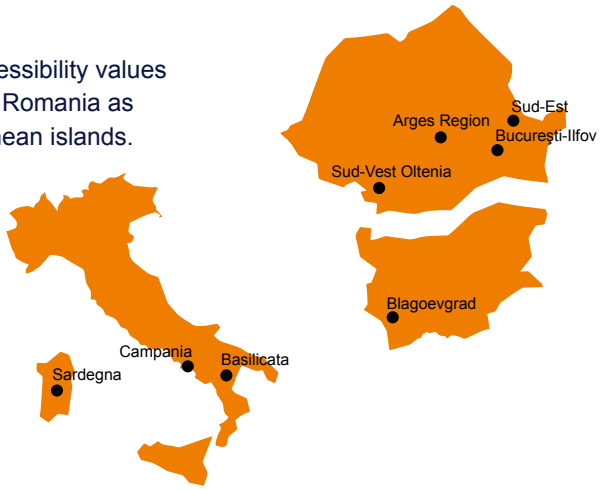
The examination of the relative changes between 2014 and 2030 reveals that there are no big changes anticipated in areas with the highest accessibility but that there will be improvements in areas with lower than average accessibility (Figure 5). The investments in road infrastructure will be particularly notable in: the Romanian counties of Timis, Caras-Severin, Arad, Bihor, Hunedoara, Alba, Sibiu, Arges, Brasov, Prahova, Covasna, Vrancea, Salaj, Cluj, Mures; the Bulgarian provinces of Pleven, Lovech, Ruse, Veliko Tarnovo, Gabrovo, Sofia and Sofia city, Pernik, Kyustendil, Blagoevgrad, Pazardzhik and; the Greek Prefecture of Elis. Significant declines in population will lead to a modest growth of accessibility by road in southern Italy and a decline in accessibility in large parts of Spain and Portugal.

Figure 5
Relative changes in road potential accessibility 2014-2030



POTENTIAL ACCESSIBILITY BY RAIL: PROSPECTS AND SCENARIOS 2030.

According to projections, the lowest potential accessibility values will remain in the eastern regions of Bulgaria and Romania as well as western Greece along with the Mediterranean islands. A very modest relative change is expected for the Romanian county of Arges between 2014 and 2030. Relative changes below 20% are projected for most of the Romanian regions in Sud-Vest Oltenia, București-Ilfov and Sud-Est, the Bulgarian province of Blagoevgrad, the Italian regions of Basilicata and Campania as well as Sardegna.



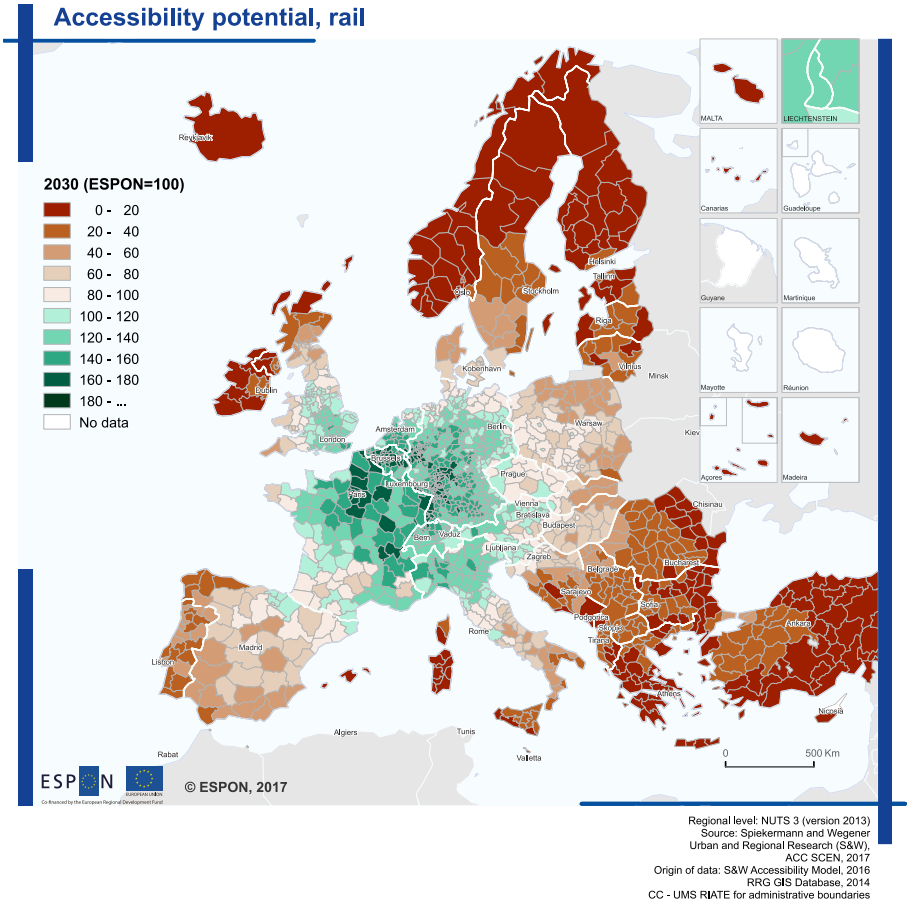
In 2030, disparities between high and low rail accessibility areas are expected to be less pronounced, and the area of above-average accessibility is likely to extend further beyond the European core.

High-speed rail network investments are expected to raise the areas of Bilbao and Barcelona in Spain and Rome in Italy to above-average accessibility. In contrast, it is expected that clearly below-average

accessibility by rail will be found in south-eastern Europe with the lowest values likely in the eastern regions of Bulgaria and Romania as well as large parts of Greece. Unsurprisingly, low accessibility by rail will also remain a typical characteristic of islands in the future.

Potential accessibility by rail is expected to experience a relative increase which is much higher than that for roads (Figure 6). New high-speed rail lines, but also the upgrade of existing rail infrastructure to high-quality conventional lines, will lead to the highest relative gains in the Balkans as well as in Spain and Portugal. Particularly high relative changes will occur in the Spanish provinces of Badajoz, Cantabria and Almeria; they are expected to exceed 100 per cent by 2030. With the exception of Zadar and Sibenik-Knin, Croatia is also expected to register significant relative changes. The most significant impact in Italy is anticipated in the NUTS 3 regions of Bolzano-Bozen, Trento, Imperia, Savona and Asti, with potential accessibility gains of up to 50 per cent.

Figure 6
Relative changes in rail potential accessibility 2014-2030

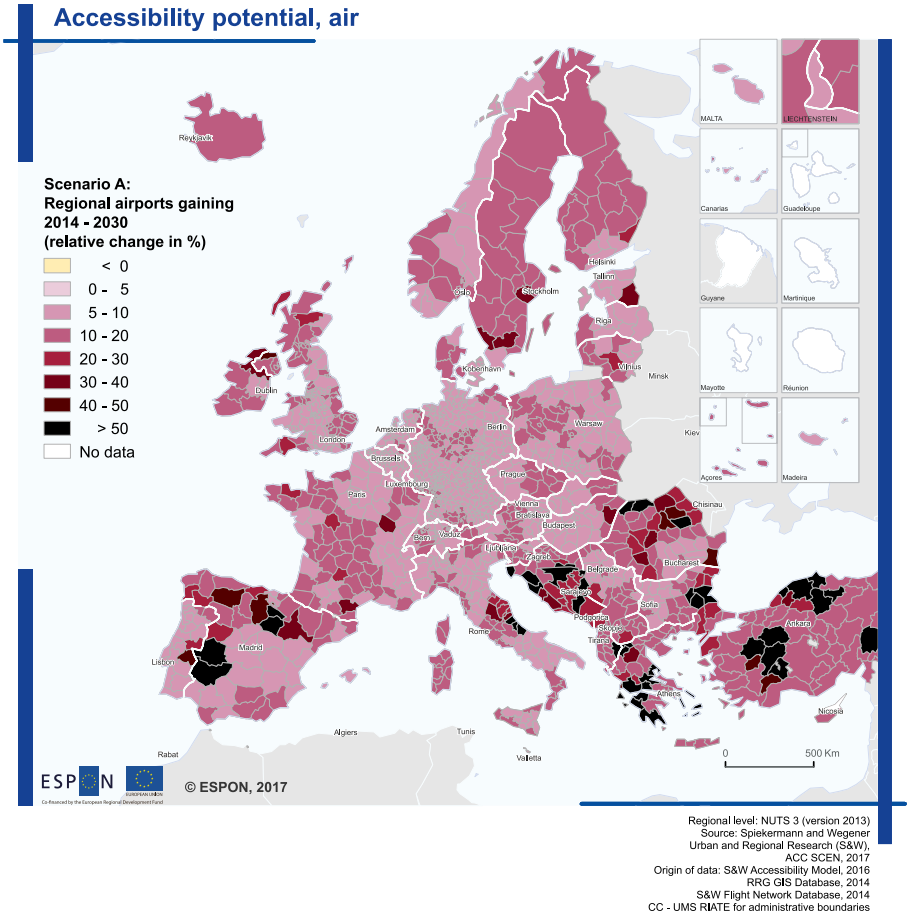


ACCESSIBILITY BY AIR: PROSPECTS AND SCENARIOS 2030.

Whilst regional airports are likely to gain in importance by 2030, a number of rural areas will still experience only a rather modest relative change of less than 10 per cent in potential accessibility by air. These areas include large parts of Portugal, many areas in southern and eastern Spain, the Italian regions of Piemonte, Lombardia, Veneto, Emilia-Romagna, Toscana in the north and Molise, Campania, Puglia, Basilicata and Sicily in the south as well as south-eastern Romania.

The significant impact of regional airports will be rather sporadic. There are expected to be only a few big winners, which have more than 50 per cent relative change between 2014 and 2030. These are likely to be: the Spanish provinces of Badajoz, Caceres, Soria and La Rioja (ES); the Italian provinces of Teramo, Pescara and Chieti (IT); the Croatian counties of Istarska županija, Ličko-senjska županija, Zadarska županija, Bjelovarsko-bilogorska županija, Bjelovarsko-bilogorska županija and Brodsko-posavska županija (HR); the Romanian counties of Maramureş, Satu Mare and Bacău (RO); the Bulgarian Oblasts of Burgas, Sliven and Yambol (BG) and the Greek regions of Andros, Thira, Kea, Milos, Mykonos, Naxos, Paros, Syros, Tinos Magnisia, Sporades, Zakynthos, Ithaki, Kefallinia, Aitoloakarnania, Achaia, Ileia, Fthiotida, Fokida, Lakonia and Messinia (EL). Relatively-speaking, there is also likely to be a notable impact in Alto Alentejo (PT), Zaragoza, Burgos and Léon (ES), Perugia (IT), Šibensko-kninska županija and Splitsko-dalmatinska županija (HR) and Harghita, Sibiu, Neamţ, Suceava and Gorj (RO).

Figure 7
Relative changes in air potential accessibility 2014-2030



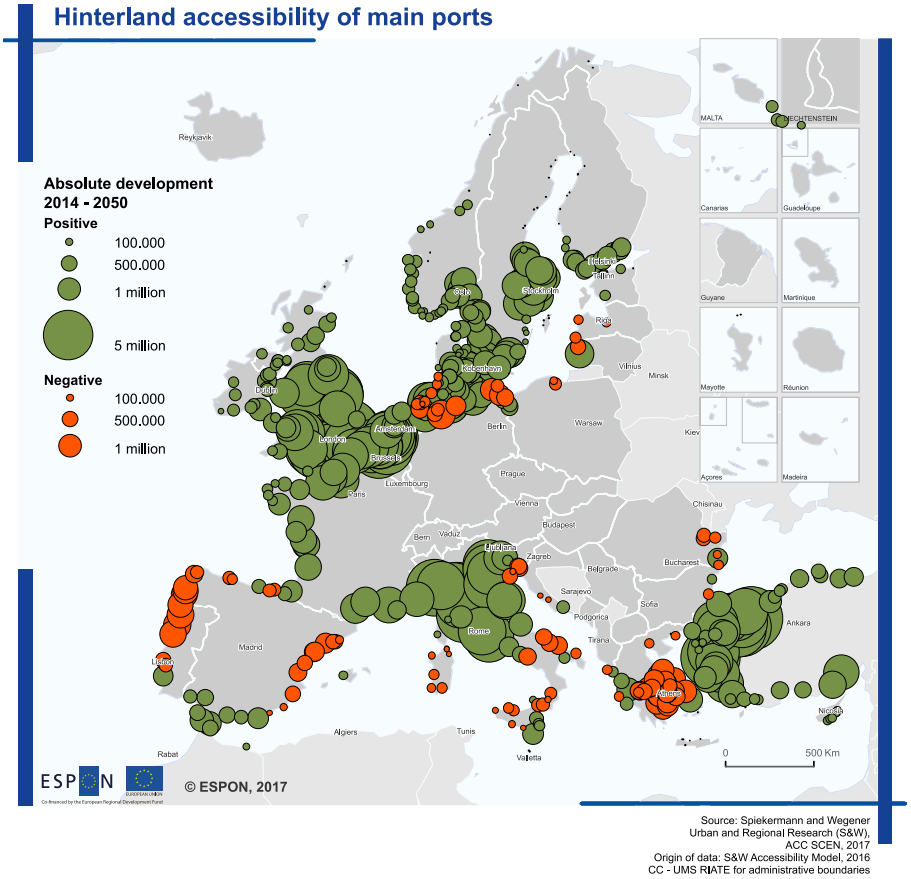
ACCESSIBILITY BY SEA: PROSPECTS AND SCENARIOS 2050.

An overwhelming majority of European ports will experience increases in hinterland accessibility due to further advancements in the TEN-T network; however, ports in Portugal, eastern Spain, some regions in Italy and Greece can expect a decreasing hinterland market area.

The Action Plan for the EU Strategy for the Adriatic-Ionian region states that “the North Adriatic ports could secure 6.0m TEU containers/year of traffic by 2030 (or 11.3% of the EU market); this would represent traffic growth of almost 350% over 20 years, provided good railway access is provided for the hinterland”. Judging by the hinterland accessibility projections for 2050 (Figure 8), it is likely that prospects in the North Adriatic will materialise due to their more competitive positioning. At the same time, evidence suggests that investments in port-land interconnections can have a very significant short-term effect; however, in the long-term, a number of other territorial patterns need to be taken into account. Hinterland accessibility, for example, is important; it has been one of the key priorities for the port of Valencia for several years now, and contributed to the port lifting 4.6 million TEU (Twenty Foot Equivalent) in 2015 – a leap of almost 5 per cent compared with 2014. Long-term projections, however, indicate that the port of Valencia can anticipate a negative absolute change by 2050; it is likely that it will reach 500,000 people fewer within four hours from the port in comparison with 2014. The indicators used in Figure 8 suggest that, despite substantial infrastructure investments, ports rely on a number of other socio-economic variables, most notably population and the size of hinterland markets.

Figure 8

Absolute development of hinterland accessibility of main ports 2014 – 2050. For each port, the accessibility model calculates the travel time to all NUTS-3 regions in Europe and then sums up the population that is reachable within a maximum travel time of four hours. The scenario takes account the planned trans-European road network developments as well as the population changes over time.



Conclusions

The anticipated development of the TEN-T network will yield significant accessibility improvements for the southern regions of Europe. However, modest growth or even negative development projections for potential accessibility in some regions indicate that infrastructure development is not the only priority in terms of development. Regions and macro-regions in southern Europe need to better understand the causality between infrastructure, population and market potential. Improvements in the transport network do not automatically lead to improvements in economic performance. Romania, for instance, has had major improvements in road infrastructure but also a sharp decline in population – a decrease by 14.9 per cent over the last decade (Eurostat 2017). These changes are reflected in both the comparably poor potential accessibility values as well as the below-average GDP per capita.

The projections of modest and even negative relative change take into account expected shrinkages in the population in many regions of southern Europe and this, in turn, will have negative repercussions for potential accessibility. The most severe population decline is likely to be found in Bulgaria, particularly in the north-west as well as in the provinces of Gabrovo, Ruse, Kyustendil, Smolyan and Yambol, with a shrinking rate of over 20 per cent by 2030. The demographic pattern in a number of other southern regions is similar. Between 10 and 20 per cent shrinkage is expected in: the Spanish provinces of Castilla y León, Comunidad Valenciana, Huesca, Lugo and Ourense, Cuenca and Teruel; large parts of Portugal as well as Dytiki Ellada, Thessalia and Ionia Nisia (EL); the Romanian macro-regions of Sud-Est, Sud-Vest Oltenia and Vest and larger areas of Jadranska Hrvatska and Kontinentalna Hrvatska (HR). Southern Italy will register up to 10 per cent shrinkage in the regions of Molise, Campania, Puglia, Basilicata, Calabria, Sicilia (except Caltanissetta), Trapani, Ragusa and Sardegna (except Olbia-Tempio). These regions need to balance infrastructure investments with their socio-economic and competitiveness strategies, in order to reduce the risk of malinvestments and to make sure that the development choices they make do not have a high cost in terms of lost secondary opportunities.

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