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Work Package 7: Develop sustainable transition plans for selected sectors using case studies

Action 5: Quantitative analysis of tourism mobility in the Atlantic Arc

P. González, J. Virto and J. Fernández-Macho   Version 1.3: April 2021

Maritime, Ocean Sector and Ecosystem Sustainability: Fostering Blue Growth in Atlantic Industries

Work Package 7: Develop sustainable transition plans for selected sectors using case studies

Action 5: Quantitative analysis of tourism mobility in the Atlantic Arc

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Final Report

Abstract: The main objective of MOSES project Work Package 7 Action 5 (WP7_Act5: Quantitative analysis of tourism mobility in the Atlantic Arc) is to develop an indicator system to perform a quantitative analysis of several features of tourism mobility (demand, supply, amenities and connectivity) and to detect trans-regional clusters. To do this, WP7_Act5 has constructed a database and developed an indicator system that allows not only to assess the relative size and the characteristics of the coastal tourism sector in the Atlantic Arc at NUTS3 level, but to detect trans-regional clusters based on the similarities present in the data. The assessment of coastal destinations provides information on the specific characteristics of the most popular destinations in the Atlantic Arc, and identifies the regions whose economies are most dependent on tourism and those that suffer the most from the pressure of tourism. The detection of tourist trans-regional clusters in the Atlantic Arc has been conducted using cluster and principal component analysis.

This report summarises the main components of WP7_Act5 and analyses the results.

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Preface

The European Union (EU) is a major tourist destination representing 40% and 31% of worldwide total international arrivals and receipts, respectively. Tourism contributes 10.3% to the EU GDP and 11.7% to total employment and plays an important role in many EU Member State economies. Therefore, the goal of EU policy is to maintain Europe's standing as a leading tourist destination while maximizing the industry's contribution to growth and employment.

As part of the EU's Blue Growth strategy, the coastal and maritime tourism sector has been identified as an area with special potential to foster a smart, sustainable and inclusive Europe. This sector has now become the largest single maritime economic activity, representing 62% of the jobs and 41% of the GVA in the EU Blue Economy in 2018. However, activities such as cruises and resorts along with an increasing demand have environmental and social consequences on natural resources and local communities. A healthy environment is fundamental to any form of 'blue' tourism. Sustainable coastal and maritime tourism policies must acknowledge the impacts of tourism activities on the coastal territories and their interactions with the maritime ecosystems.

The outbreak of COVID-19 has put the tourism industry under unprecedented pressure with airplanes on the ground; hotels closed, and travel restrictions. From January-October 2020, the volume of international tourism has fallen by 68% in Europe, but the true extent of the economic impact remains to be seen. Public administrations will need to take a strategic approach to support tourism accompanied by measures that help reduce its environmental impact. In this framework, the recently revised Atlantic Action Plan (AAP) contributes to the recovery efforts in the blue economy focusing on key sectors. Concerning coastal tourism, the AAP points out the necessity to develop new forms of sustainable maritime and coastal tourism following the guiding principles of circular economy, zero pollution, energy efficiency and biodiversity preservation. Some recommendations to help the transition toward a more sustainable coastal and maritime tourism include, among others:

- To measure and monitor the impacts of maritime and coastal tourism, promoting quantitative assessment tools to evaluate the carrying capacity of destinations.

- To promote collaboration mechanisms at all political, geographic and sectoral level, and to foster technical cooperation within and between coastal regions, in particular, those with similar challenges and issues.

- To support integrated maritime and coastal planning by implementing transversal spatial and environmental planning instruments.

In summary, a better knowledge of the coastal tourism sector at the local level and cross-border coordination as part of an Atlantic area strategy can contribute to reaching the sustainability objectives.

Action 5 of MOSES project Work Package 7 Action 5 (Wp7_Act5: Quantitative analysis of tourism mobility in the Atlantic Arc) has as its main objectives to develop an indicator system to perform a quantitative analysis of several features of tourism mobility (demand, supply, amenities and connectivity) and to detect trans-regional clusters. The responsible partner for Wp7_Act5 is the Institute for Public Economics, University of the Basque Country (UPV/EHU).

The indicator system and database we have developed allows not only to assess the relative size and the characteristics of the coastal tourism sector in the Atlantic Arc at NUTS3 level, but to detect trans-regional clusters based on the similarities present in the data.

The assessment of coastal destinations provides information on the specific characteristics of the most popular destinations in the Atlantic Arc, and identifies the regions whose economies are most dependent on tourism and those that suffer the most from the pressure of tourism.

The detection of tourist trans-regional clusters in the Atlantic Arc has been conducted using cluster and principal component analysis. Concerning the discussion on the appropriateness of clusters at the national level versus a trans-national approach, we have found that data strongly support nation-driven coastal clusters. The only exception is the group formed by the Canary Islands, Algarve and Madeira. These destinations have in common that they are mass tourism, sun and beach destinations, with a high concentration of hotels and resorts, and a high dependence on tourism of their economies. The analysis of the detected clusters also provides information on the different char-

acteristics of tourist destinations, pointing to three main tourism specializations in the Atlantic Arc: "sun and sand" tourism; more rural tourism, mainly using campsites; and mainly urban tourism.

The report is organized as follows. Sections 1 and 2 describe the relevance of the tourism sector for the EU and, specifically for the Atlantic Arc. The indicator system designed for this study is explained in section 3 and its information is used to characterize and assess the tourism sector in the coastal destinations. Finally, section 4 is dedicated to the detection and analysis of trans-regional clusters.

1   Tourism as a regional development factor

Over the past decades, tourism has become a key driver of socio-economic progress through the generation of jobs, income, production, and infrastructure development for many destinations around the world. It is also considered the main instrument for regional development. According to the World Travel and Tourism Council (WTTC) the tourism industry accounts for 10.4% of the world GDP and 10% of employment in 2018. In addition, tourism is the largest and fastest-growing sector in the world. As a result of higher income, increased leisure time, and low cost of travel, the movement of tourists has increased over the years all over the world. Moreover, almost every country has increased its investment in the tourism industry to increase the number of tourists. The 2009 global economic crisis significantly affected international tourism, causing a decline in international arrivals (4%) and international tourism revenues (5%) [12]. However, the sector recovered soon and from 2010-19, both arrivals and revenues have been increasing at rates above 4% on average, confirming tourism as a leading and resilient economic sector.

Europe is a major tourist destination, welcoming half of the world's international tourist arrivals. Within Europe, the European Union (EU) accounts for the bulk of the region's tourism [9], representing in 2017 40% and 31% of worldwide total international arrivals and receipts, respectively. Furthermore, five out of the top ten destinations in the world, both in international arrivals and receipts, are located in the European Union (France, Spain, Italy, Germany and United Kingdom). Tourism plays an important role in many EU Member State economies, with wide-ranging impact on economic growth, employment and social development. In 2018, the tourism sector directly contributed 3.9% to EU GDP and 5.1% to total employment. When its close links with other economic sectors are taken into account, the tourism sector's figures increase significantly (10.3% of GDP and 11.7% of total employment, e.g. 27.3 million workers [13]).

EU policy aims to maintain Europe's standing as a leading tourist destination while maximising the industry's contribution to growth and employment. Since 2001, the EU Commission has published several communications setting out policy guidelines in relation to the sustainable management of destinations to ensure the long-term competitiveness of tourism [1, 2]. The Lisbon Treaty acknowledged in 2009

the importance of tourism, giving the EU legal support to respond to the many challenges and opportunities facing the tourism sector, " the EU shall complement the action of the Member States in the tourism sector, in particular by promoting the competitiveness of Union undertakings in that sector" (art. 195). The inclusion of tourism in the Lisbon Treaty obliged the EU Commission to respond by adopting a new political framework in June 2010 regarding tourism [4]. Thus, a number of European or multinational initiatives were proposed to encourage a coordinated approach to promote tourism development and to increase the competitiveness of tourism and its capacity for sustainable growth.

The extraordinary beauty, cultural wealth and great diversity of EU's coastal areas have made them the preferred destination for many holidaymakers. In 2018, just over half (51.7 %) of the EU's tourist accommodation establishments were located in coastal areas, the sector employed over 3.2 million people and generated a total of 183 billion euros in Gross Value Added. The EU Commission presented in 2014 a new strategy to promote sustainable growth and competitiveness in coastal and maritime tourism [7]. The Commission identified 14 actions to help the sector working jointly with Member States, regional and local authorities and the industry in their implementation. Among them, the Commission proposes to develop an online guide to the main funding opportunities available for the sector and to support the development of trans-national and interregional partnerships, networks, clusters and smart specialisation strategies in coastal and maritime tourism.

As part of the EU's Blue Growth strategy [10], the coastal and maritime tourism sector has been identified as an area with special potential to foster a smart, sustainable and inclusive Europe. This sector has now become the largest single maritime economic activity. Overall, coastal tourism accounted for 62% of the jobs, 41% of the GVA and 34% of the profits in the EU Blue Economy in 2018 [11]. However, while maritime and coastal tourism is a vital economic activity for a wide range of EU coastal regions, activities such as cruises and resorts along with an increasing demand have environmental and social consequences on natural resources and local communities. In addition, oceans and coastlines are increasingly coveted spaces as strategic resources for states and businesses as they sustain a large part of the world population and global economy. Hence, coastal and maritime tourism, as part of the blue economy, is facing emerging sustainability challenges at the local and global levels that should be addressed [22].

A healthy environment is fundamental to any form of 'blue' tourism. Sustainable coastal and maritime tourism policies must acknowledge the impacts of tourism activities on the coastal territories and their interactions with the maritime ecosystems. Tonazzini et al. [22] propose some recommendations to help the transition toward sustainable coastal and maritime tourism that include, among others:

1. Promotion of policy coherence, stakeholders collaboration and cooperation mechanisms to ensure coherent, integrated and consistent policies at all political, geographic and sectoral level, and to foster policy dialogue and technical cooperation within and between marine regions, through the sharing of knowledge, expertise, and resources from different marine regions, in particular, those with similar challenges and issues.

2. Support integrated maritime and coastal planning through an ecosystem-based approach by implementing transversal spatial and environmental planning instruments.

3. Development of comprehensive monitoring, evaluation and statistics schemes by measuring and monitoring the impacts of maritime and coastal tourism to natural ecosystems, promoting quantitative instruments and assessment tools to evaluate the carrying capacity of destinations or territories.

Public administrations will need to take a strategic approach to investments in enabling infrastructures to support tourism. This needs to be accompanied by measures that help to reduce the environmental impact of coastal tourism. In line with the above recommendations, cross-border coordination as part of a sea-basin strategy can contribute to the development of high-value tourism areas.

The great variety of Europe's coastal tourism means that most growth generating initiatives will inevitably be developed on a local or regional scale. Each of Europe's sea-basins presents different challenges and opportunities, requiring tailor-made approaches. In this framework, MOSES is an EU Interreg Atlantic Area funded Project[1] whose objective is to examine the Blue Growth path for sustainable development of the major sectors operating in the Atlantic space as envisaged by the Atlantic Plan. As mentioned above, the EU listed coastal and maritime tourism as a focus area for delivering sustainable growth and jobs in the blue economy. The challenge is to address demand

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[1]MOSES is a three year EU Interreg Atlantic Area funded Project, involving eight partners across five member states, France, Ireland, Portugal, Spain and United Kingdom.

volatility, changes in the Atlantic tourism behaviour and promoting strategic trans-regional partnerships. However, effective policies can only rely on sound evidence. One condition, among others, for enabling successful blue growth is the availability of better data, analysis and knowledge about the sea and the use we make of it [18]. This is the target of this MOSES case study focusing on the tourism sector.

The MOSES project team at the University of the Basque Country (UPV/EHU) developed an extensive quantitative analysis of the tourism sector in the Atlantic Arc using a system of indicators on tourism flows, tourism supply, natural and cultural amenities, infrastructures and accessibility. The main objectives of this study are to assess Atlantic tourism destinations at the NUTS3 level based on the constructed database, to detect trans-regional clusters based on the similarities present in the indicator system and to identify the main factors that characterize tourism mobility. The results obtained provide a broad range of information on the tourism sector that will give insights about the Atlantic Arc tourist destinations useful for policy makers.

2   Tourism in the Atlantic Arc: main trends

According to the INTERREG ATLANTIC AREA PROGRAMME 2014-2020, the Atlantic Area covers the western part of Europe bordering the Atlantic Ocean. It comprises 36 regions from the western part of the UK, Ireland, Portugal, the northern and south-westernmost part of Spain, and western France (Table 1). The INTERREG Atlantic Area Programme 2014-2020 covers an expanded area compared to the previous Programme (2007-2013) due to the inclusion of new regions: Canary Islands (Spain), the Autonomous Regions of the Azores and Madeira (Portugal). The participation of the three insular regions will contribute to a more cohesive Atlantic Region, increase its natural and cultural heritage and enhance its comparative advantage related to its maritime perspective (www.atlanticarea.eu/page/3).

Country	NUTS2 Region
France	Haute-Normandie, Basse Normandie, Pays-de-la Loire, Bretagne, Poitou-Charentes, Aquitaine
Ireland	Border, Midland and Western, Southern and Eastern
Portugal	Norte, Algarve, Centro, Lisboa, Alentejo, Azores, Madeira
Spain	Asturias, Cantabria, Navarra, País Vasco, Andalucía (Huelva, Cádiz and Sevilla), Islas Canarias
United Kingdom	Cumbria, Cheshire, Greater Manchester, Lancashire, Merseyside, Gloucestershire, Wiltshire and Bristol/Bath area, Dorset and Somerset, Cornwall and Isles of Scilly, Devon, West Wales and The Valleys, East Wales, South Western Scotland, Highlands and Islands, Northern Ireland.

Table 1. Atlantic Area NUTS2 regions (NUTS2016 classification).

The Atlantic Area is defined at the NUTS2 level; therefore, it includes the whole of Ireland and Portugal, and 6 out 27 French NUTS2 regions, 6 out 17 Spanish regions and 15 out of 41 UK regions (Table 1). With an area of 549372 km^2 and a population of 64.32 million people, the Atlantic Area represents 12.3% of the area and 12.5% population of the EU-28.

The European Commission adopted an Atlantic maritime strategy in 2011, in response to repeated calls from stakeholders for more ambi-

tious, open and effective cooperation in the Atlantic Ocean area. The Atlantic Action Plan (APP) was adopted in 2013 to help create sustainable and inclusive growth in coastal areas of the five Atlantic Member States and their regions [5]. The APP identifies a number of priority areas that can promote innovation, contribute to the protection and improvement of the Atlantic's marine and coastal environment, improve connectivity and create synergies for a socially inclusive and sustainable model of regional development. Priority 4 highlights how maritime and coastal tourism can contribute to sustainable regional development by the diversification of its products and the development of niche markets.

With marine assets consisting of a coastline stretching over 20,000 km, the EU Atlantic Arc maritime and coastal tourism sector has the potential to be a key driver of growth in what are often rural areas with limited other opportunities for economic development. Figures from OECD tourism statistics suggest that across the Atlantic Arc tourism accounts for 2.4 million jobs and the international receipts[2] contribute approximately 84 million euros to the balance of payments.

Figure 1 shows the evolution in the last decade of the main macroeconomic indicators that measure the contribution of tourism to the Atlantic Arc economy by country[3]. Data for Portugal and Ireland correspond to the whole country. However, data for France, Spain and United Kingdom correspond only to the part of each country that belongs to the Atlantic Arc[4]. Analysing the graphs we may draw the following conclusions.

- It may be observed that the contribution of tourism to GDP and employment follows a positive trend in this period, except in the UK.

- Spain is the country where tourism contributes the most to both GDP and employment, and it is also the country that shows the highest rates of growth. However, this contribution is not homogeneous at the regional level. The range of variation in the weight of tourism in the Spanish regions goes from 35% of GDP and 40.4%

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[2]World Tourism Organization defines international tourism receipts as expenditure of international inbound visitors including their payments to national carriers for international transport. They also include any other payments or payments afterward made for goods and services received in the destination country.

[3]Data source: UNWTO. No data were available for the tourism contribution to GDP in Ireland.

[4]The Atlantic Arc share of each country (France, Spain and the United Kingdom) has been estimated taking into account the share of Atlantic tourism in each country (% of overnight stays) and the Atlantic share in the total GDP and employment of each country. These data come from Eurostat Regional Statistics.

of employment in the Canary Islands to 6% of the GDP and 10% of employment in the Basque Country.

- The United Kingdom ranks last in terms of the contribution of tourism to its economy. We also observe a slightly downward trend in the UK macroeconomic indicators, particularly in employment.

- While the weight of tourism in GDP is higher in France than in Portugal, the opposite is true for employment, implying that the sector is more labour-intensive in Portugal.

- The weight of the international receipts on the GDP has increased in this last decade, except in Ireland. The evolution of Spain and Portugal is very similar in this period and spectacular: the rise of the contribution of the expenditure of foreign tourism has gone from 6% in 2010 to more than 10% in 2018. This result suggests that the capacity of these two countries to attract foreign tourism has increased strongly in recent years. As a matter of fact, the number of foreign tourists increased by 36% from 2010 to 2018 in Spain and 100% in Portugal.

Tourism demand in the Atlantic Arc[5] remained quite stable at the beginning of the XXI century until the financial crisis of 2008 where it decreased slightly (see Figure 2). However, the sector recovered soon and from 2009 onwards, tourism demand has followed a steady upward trend with rates of growth over 5% from 2012 to 2017. We observe some differences in the evolution of resident and non-resident tourism. The recovery of the sector after the crisis was due to non-resident tourism that started increasing rapidly in 2009. From 2009 to 2017 foreign tourism demand increased by 82%. Domestic tourism began its recovery in 2012 with rates of growth lower that the ones observed for foreign tourism. From 2011 to 2019 resident tourism increased by 36%. The share of the Atlantic Arc in the total tourism demand for EU-28 has been quite stable, although it increased almost one point from 2011 to 2017. Note that the Atlantic tourism share in the EU28 is higher in the case of domestic tourism.

Tourism was expected to continue to grow in 2020, but the outbreak of COVID-19 has put the tourism industry under unprecedented pressure with airplanes on the ground, hotels closed, and travel restrictions. From January-October 2020, the volume of international tourism has fallen by 72% in the world and 68% in Europe [16], but the true extent of the economic impact remains to be seen. Coastal and maritime tourism is the Blue economy sector which is suffering most from

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[5]Data Source: Eurostat Regional Statistics. Overnight stays for EU28 were only available from 2014 onwards.
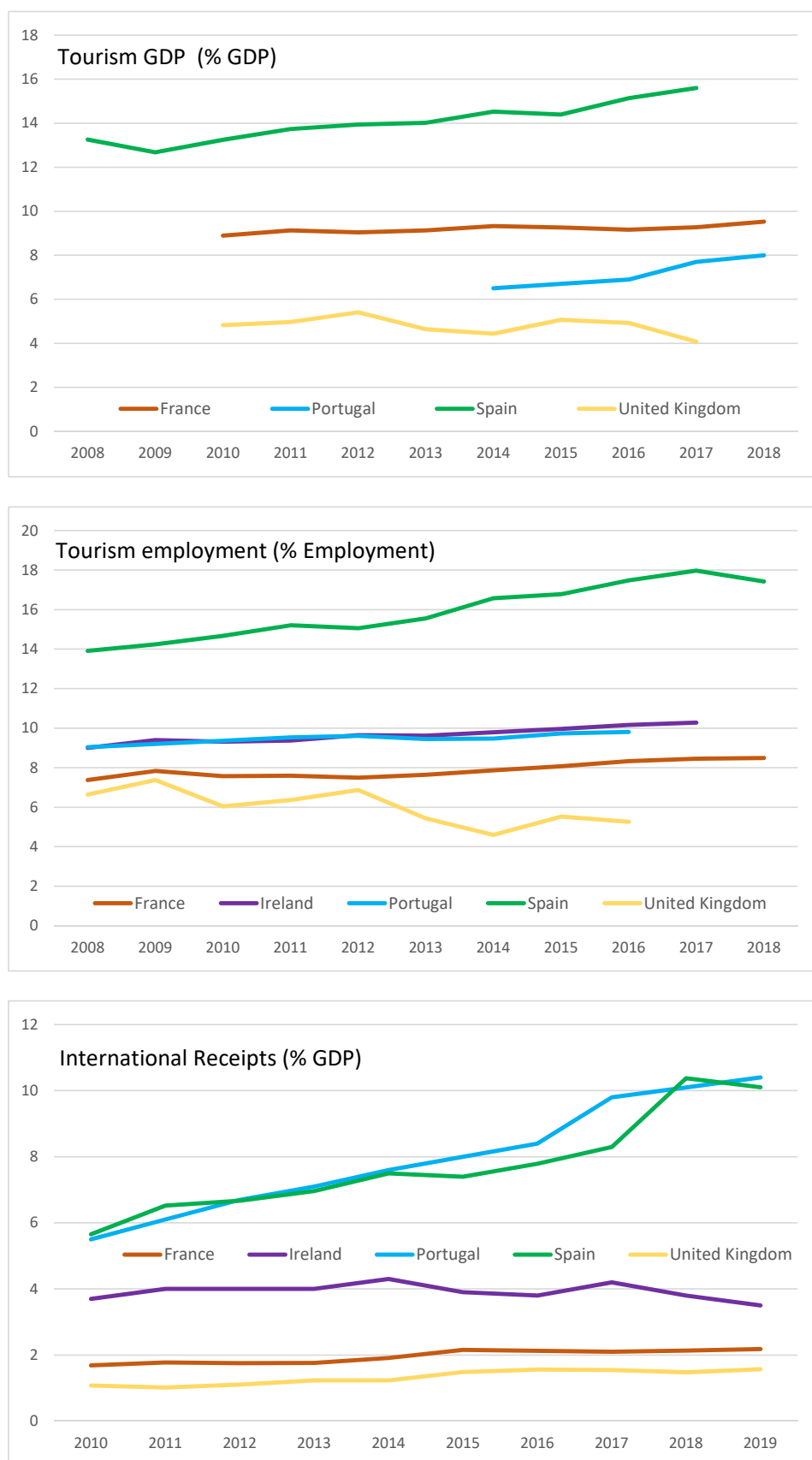
Figure 1. Contribution of tourism: Macroeconomic indicators.
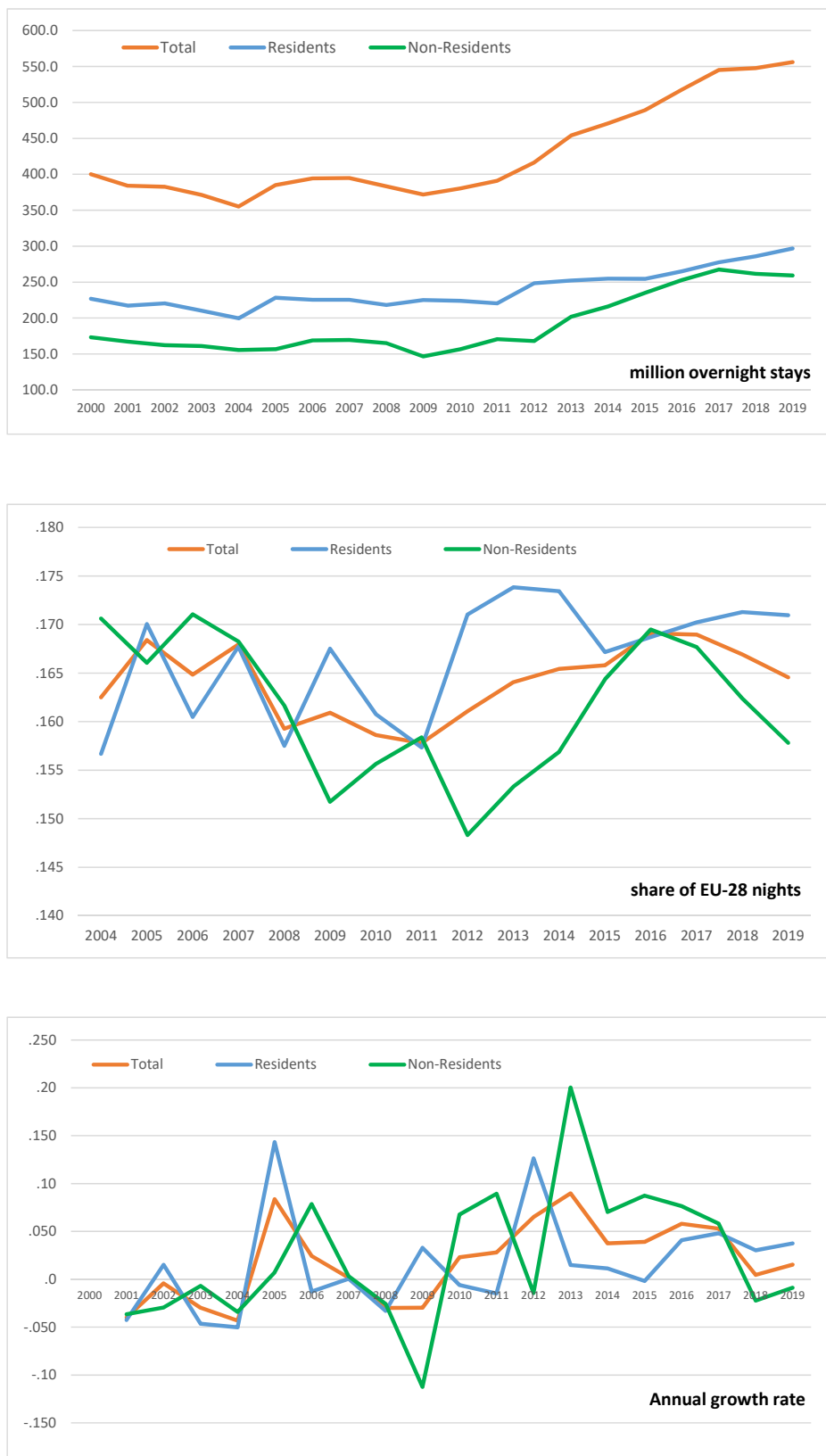
Figure 2. Tourism demand: Residents and Non-residents.

the COVID-19 crisis. To help repair the economic and social damage brought by the pandemic, the European Commission has put forward its proposal for a major recovery plan on 27 May 2020. This needs to be accompanied by measures that help reduce the environmental impact of coastal tourism, protecting and restoring Europe's land and marine natural capital, in line with the strategic approach for a sustainable blue and green economy [14]. In this line of work, the recently revised Atlantic Action Plan [15] contributes to the recovery efforts in the blue economy focusing on key sectors that combine sustainable transformation with a high job creation potential in Atlantic coastal communities. In Pillar 4, Goal 6 "Stronger coastal resilience" of this plan, one of the points is to develop new forms of sustainable maritime and coastal tourism following the guiding principles of circular economy, zero pollution, energy efficiency and biodiversity preservation. A better knowledge of the sector at the local level and cross-border coordination as part of a sea-basin strategy can contribute to reaching these objectives.

3 Assessment of Coastal Tourism destinations in the Atlantic Arc

Both coastal and maritime tourism are considered among the oldest and largest segments of the tourism industry. To assess and analyse the coastal tourism destinations it is necessary to establish a good definition of these sectors. Coastal and maritime tourism can be defined as tourism for which the proximity of the sea is a condition. Following ECORYS [6]:

- **Coastal tourism** covers beach-based tourism and recreational activities (e.g. swimming, surfing, sunbathing), and non-beach related land-based tourism in the coastal area (all activities that in the coastal area for which proximity to the sea is a condition, such as coastal walks and wildlife watching), as well as the supplies and manufacturing industries associated to these activities.

- **Maritime tourism** covers predominantly water-based tourism, rather than land-based (e.g. activities such as sailing, yachting and cruising and other nautical sports, often carried out in coastal waters). It also includes the operation of land facilities, manufacturing of equipment, and services necessary for this segment of tourism.

For the purpose of this study, coastal tourism is always going to refer to both of them.

Given the substantial contribution of the tourism industry to the local economy and labour market in coastal areas, tourism statistics are of high relevance in the framework of the EU's integrated maritime policy [3]. According to Eurostat, coastal regions are defined as standards statistical regions (NUTS3 level), which have at least half of their population within 50 km of the coast. Following the NUTS2016 classification, there are a total of 99 NUTS3 coastal regions in the Atlantic Area: 14 in France, 7 in Ireland, 13 in Portugal, 16 in Spain, and 49 in the United Kingdom (see appendix I). These NUTS3 regions are the objective of our analysis, i.e, the coastal destinations in the Atlantic Arc.

3.1   Tourism Indicator System

In this section we describe the system of indicators designed to characterize coastal tourism, i.e., to identify the unique characteristics and assets of each coastal destination. Even if tourism could be considered a demand-side phenomenon, it affects the supply-side and we need to account for both approaches in order to measure tourism properly. Tourism facilities such as the number of bed places are essential to understand tourism, but visitors base their decision on more elements when they are choosing a destination. For example, amenities are part of the decision making because travellers have diverse expectations and motivations. Besides, tourism activities use these amenities as part of their production. Attractions have magnetic pulling power, and without attractions, tourism would not exist. Finally, airport infrastructures play an important role in the heart of the regions in which they are located, and certainly in the tourism sector. The 1997 deregulation of air transport in Europe led to major changes in the way people travel, with the inception of low cost and an increase in destinations in European air services, and new tourist destinations which lead to an increase in tourism demand [17]. To conclude, tourism is a multidimensional phenomenon and in order to achieve a complete characterization of the sector, we must account for both the demand and supply sides, the amenities and the degree of connectivity.

The indicator system designed for this study is classified into four main groups or vectors: demand, supply, amenities and connectivity. The indicators are selected so that we are able to capture the main characteristics of the tourism sector with the limitations imposed by the availability of data at the NUTS3 level (see appendix II).

The **demand** side of tourism is measured by the tourist flows:

- Tourist arrivals that at least did one overnight stay at tourist accommodation establishments. The total number of arrivals is split by origin[6] and type of accommodation.[7]

- Overnights spent at tourist accommodation establishments, including indicators on overnights by origin, type of accommodation, and geographical characteristics of destination (urban, rural, coastal).[8]

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[6]Domestic and foreign tourism. Domestic tourism comprises the activities of residents of a given country travelling to and staying in their own country.

[7]Tourism accommodation establishments are defined according to the activity classification: Hotels and similar accommodation (NACE 55.1), holiday and other short-stay accommodation (NACE 55.2) and camping grounds, recreational vehicle park and trailer parks (NACE 55.3).

[8]The geographical characteristics of the destination, close to the coast or degree of urbanization are based on the local area units or municipalities (LAU-2) where

Arrivals and overnight stays are key indicators that inform about the tourism attractiveness of each region. They complement each other since arrivals measure the total number of trips to a region, and overnight stays measure the length of stay of those trips. However, overnights better reflect the impact of tourism on the destination than tourism arrivals [19].

Tourism **supply** indicators collect information on the characteristics of accommodation supply and other tourism-related sectors:

- Bed places by type of accommodation, and geographical characteristics of destination (urban, rural, coastal).

- Accommodation establishments by type of accommodation. This indicator compliments the bed places information indicating the size of the tourism industry.

- Employment and local units for several tourism activities, such as retail trade, transport, accommodation and food services. These indicators are useful to measure the dependence of the regional economy on tourism.

Concerning the **amenities** vector, we have considered indicators able to capture the intangible concept of tourism attractiveness. Different aspects of travel destinations (nature, cultural values, and the practice of certain leisure activities or sports) attract people. We have collected information on the following indicators:

- Natural amenities, such as the length of the coastline, the dimension of the coastal area, the number of bathing places, considering their water quality and the number of blue flags awards obtained,

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the accommodation establishments are located [8]. Coastal areas and non-coastal areas are classified according to the distance of the municipality to the sea. If a municipality borders the sea, it is by default coastal (and part of a coastal region); if a municipality is not bordering the sea but has 50% of its surface within a distance of 10km from the sea, it is also considered coastal; all other municipalities are non-coastal. Urban or rural areas are classified based on a combination of criteria of geographical contiguity, population density and a minimum population threshold applied to 1 km^2 population grid cells. The three categories to be used for the classification type of locality referring to the degree of urbanisation are:

- densely populated areas or urban areas: at least 50% of the population lives in high-density clusters

- intermediate areas or small urban areas: less than 50% of the population lives in rural grid cells and less than 50% lives in high-density clusters

- thinly populated areas or rural areas: more than 50% of the population lives in rural grid cells.

the Sites of Community Importance (Natura 2000), and the land covered by forests.

The length of the coast and the quality of bathing places captures the potential of attractive beach holidays and water sports. In addition, the coast contains areas of special landscapes with exceptional scenery, which encourage hiking or relaxation in the countryside. In the case of natural areas, Sites of Community Importance are natural areas with high natural and cultural value and declared of general interest. They can be objective of enjoyment for the citizens and constitute a tourist attraction. In this line, we also include the land covered by forests.

- Social and Historical amenities: the number of World Heritage Sites classified by UNESCO. These places could be a good proxy of cultural destinations, which are one of the factors for attracting domestic and international tourism.

- Other attractions such as sports, amusement and cultural activities. The indicators included in this group are the land used for arts, entertainment or recreation activities since investments in amusements and sports attractions were associated with a higher level of tourism employment, and the number of shops and restaurants, which captures some of the most common activities done by tourists, shopping and eating out.

The degree of **connectivity** of a region is measured only through maritime and air traffic using the following indicators:

- Maritime traffic. We have indicators on the number of ports, distinguishing between big and small ports, and total passengers and cruise passengers by port.

- Air traffic. Tourism is the most important contributor to the increase in air traffic. We include indicators on the total air passengers carried and the number of airports distinguishing between big and small airports.

The main data source is Eurostat, although some specific sources have been used for indicators such as Blue Flags or World Heritage Sites (see appendix III). Data has been collected for the year 2017.

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3.2   Characterization of the Atlantic Arc destinations

In this section, we analyse the main characteristics of coastal destinations in the Atlantic Arc with respect to the different aspects of tourism: the demand and supply sides, amenities and connectivity.

3.2.1   Tourism demand

Both the number of arrivals and overnight stays are key indicators within tourism statistics. There were over 132 million arrivals and 473 million nights spent in tourist accommodation establishments in the coastal destinations of the Atlantic Arc in 2017.

Maps 3 and 4 show the regional breakdown of the total number of arrivals and overnight stays. As can be observed, Lisboa is the destination with the most arrivals (7.2 million) followed by the "sun and sand destinations" Tenerife and Algarve (around 4.5 million each). On the other hand, Tenerife and Gran Canaria are the regions with the most nights spent in tourist accommodations (more than 30 million each). This difference in the distribution of arrivals and overnight stays reflects the different length of stay. The average length of stay in the coastal destinations of the Atlantic Arc is 3.6 nights. However, it reaches 7.5 nights in the Canary Islands and falls to 2.5 nights in Lisboa or 3 nights in other urban destinations such as Dublin or Liverpool.

We could also observe in Maps 3 and 4 that arrivals, and even more overnight stays, are concentrated in a relatively small number of regions, the blue and yellow shaded areas. Thus, only 6 regions, Gran Canaria, Tenerife, Lanzarote, and Fuerteventura in Spain, and Algarve and Lisboa in Portugal, account for 30% of the nights. If we add Cádiz in Spain, Gironde, Vendee, Charente and Landes in France, Dublin in Ireland, and Cornwall and Devon in the UK, the result is that this set of 14 regions account for 50% of the total overnight stays.

It should also be noted the high share of the islands in the total tourism demand: the seven Canary Islands, Madeira, and Azores account for one quarter of the total overnight stays. Particularly, 23% of the total nights are spent in the four big Canary Islands (Gran Canaria, Tenerife, Lanzarote, and Fuerteventura) and Madeira.

Concerning the origin of tourists, domestic arrivals were 45 million (34% of the total) and non-resident arrivals were over 87 million in 2017. On the other hand, domestic tourists spent 232.4 million nights in tourist accommodations (49% of the total), while non-residents'
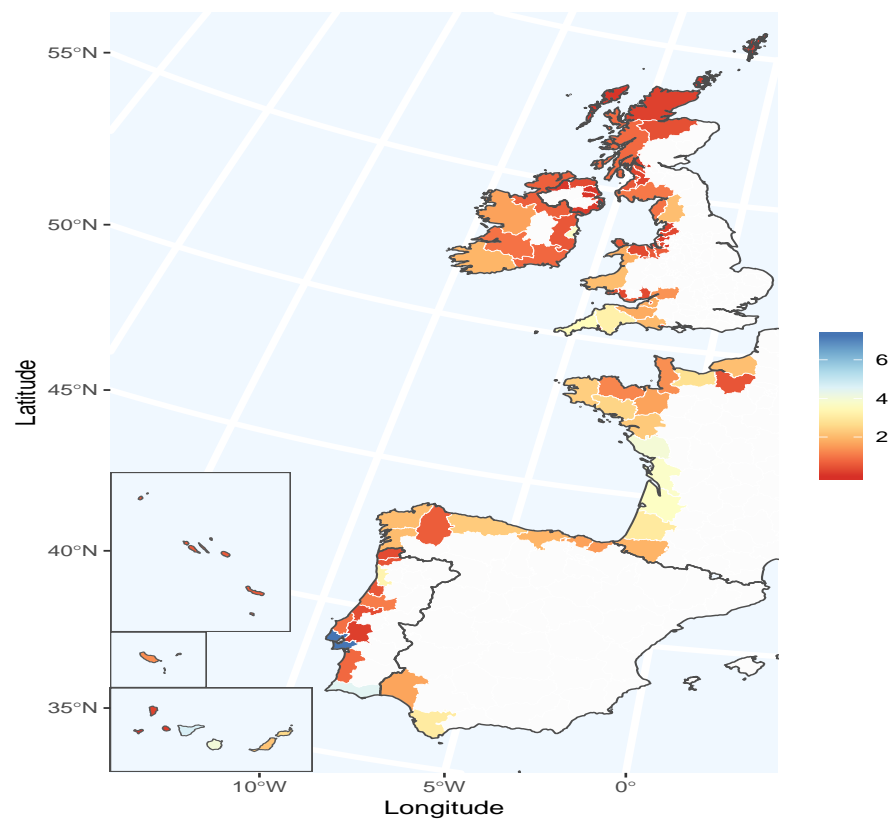
Figure 3. Total arrivals by NUTS3 regions (millions).
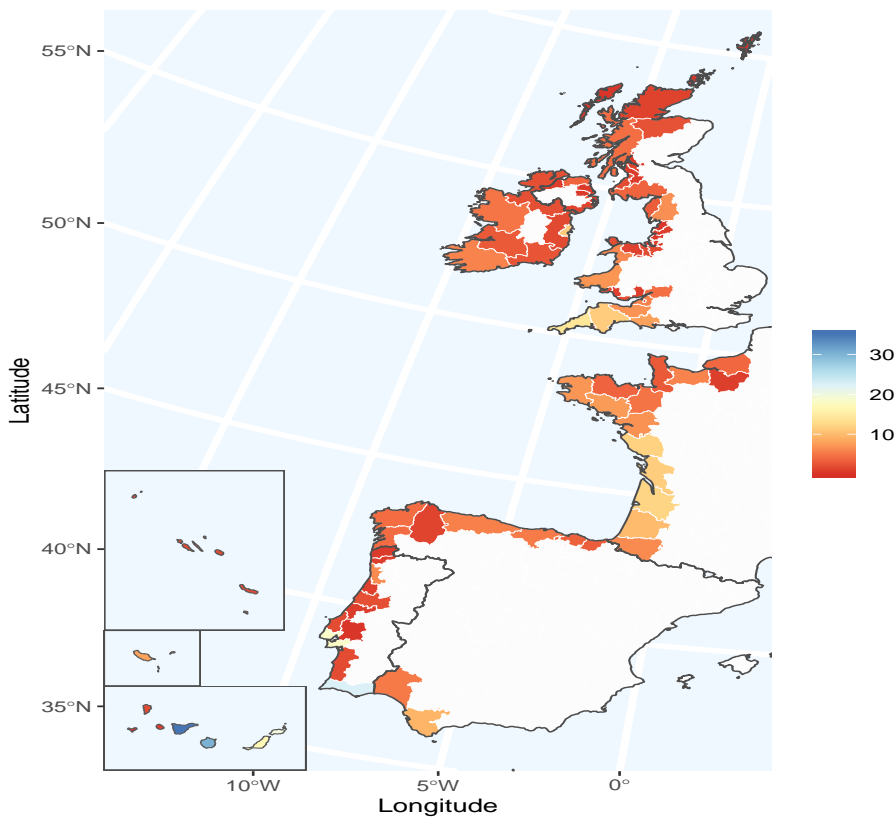
Figure 4. Total overnight stays by NUTS3 regions (millions).

nights were almost 241 million. The difference in the share of residents and non-residents in arrivals and overnight stays reflects again the difference in the length of stay: 5.2 nights for domestic tourists and 2.8 days for non-residents tourists.
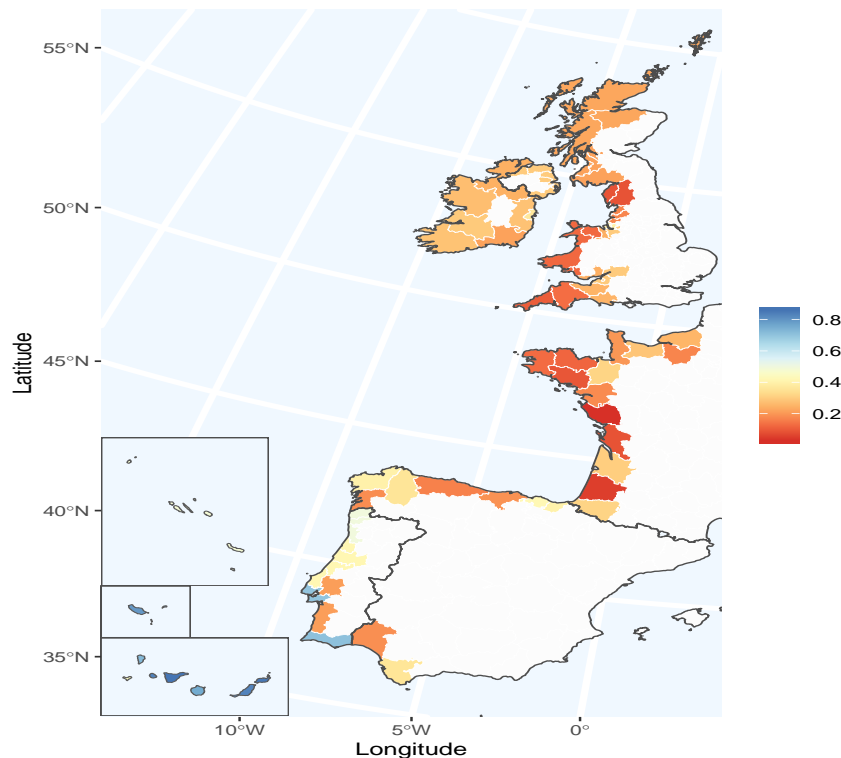
Figure 5. Non-resident overnight stays by NUTS3 regions (% of total nights).

Map 5 allows analyses of the relative share of non-residents in the total number of overnight stays in tourist accommodation establishments by NUTS3 regions. Only 31 regions have a share of non-residents overnight stays above 50%, while the other 68 regions are principally destinations for national travellers. This result suggest that foreign tourists have a relatively restricted range of destinations. The highest shares for non-residents in the total number of tourist nights spent (dark blue and yellow in the map) were recorded in the Canary Islands and Madeira: non-residents accounted for more than 90% of the total nights in Fuerteventura and Lanzarote, and more than 86% in Tenerife, Madeira and Gran Canaria. By contrast, the regions with less international appeal (red and orange in the map) are those with higher rates of domestic tourism. More than 2/3 of the regions have a share of domestic tourism above the average in the Atlantic Arc (51%). It should be noted that all the French regions are in this group with domestic tourism shares over 60%. Furthermore, the highest shares for non-residents in the total number of tourist nights spent were recorded in French regions Vendee (96%), Landes (95%) and Charente-Maritime (91%).

Most popular tourist destinations in the Atlantic Arc

The top 20 tourist regions in terms of total overnight stays are shown in Figure 6. These 20 regions together accounted for 54.3% of the total number of overnight stays in the Atlantic Arc in 2017. The Spanish island region of Tenerife had the highest number of overnights stays among any of the NUTS3 regions in the Atlantic Arc (35 million nights), while two other Canary Islands also featured among the top five destinations (Gran Canaria and Lanzarote). Two Portuguese regions, the very touristic Algarve, and the capital Lisboa completed the top five destinations. Aside from two more large holiday destinations in Spain (Fuerteventura and Cádiz) and one in Portugal (Madeira), the top 20 regions also include, Dublin in Ireland, Cornwall, Devon, Dorset, Somerset and South West Wales in UK and six regions in France, Gironde, Vendee, Charente M., Landes, Morbihan and Finistere.
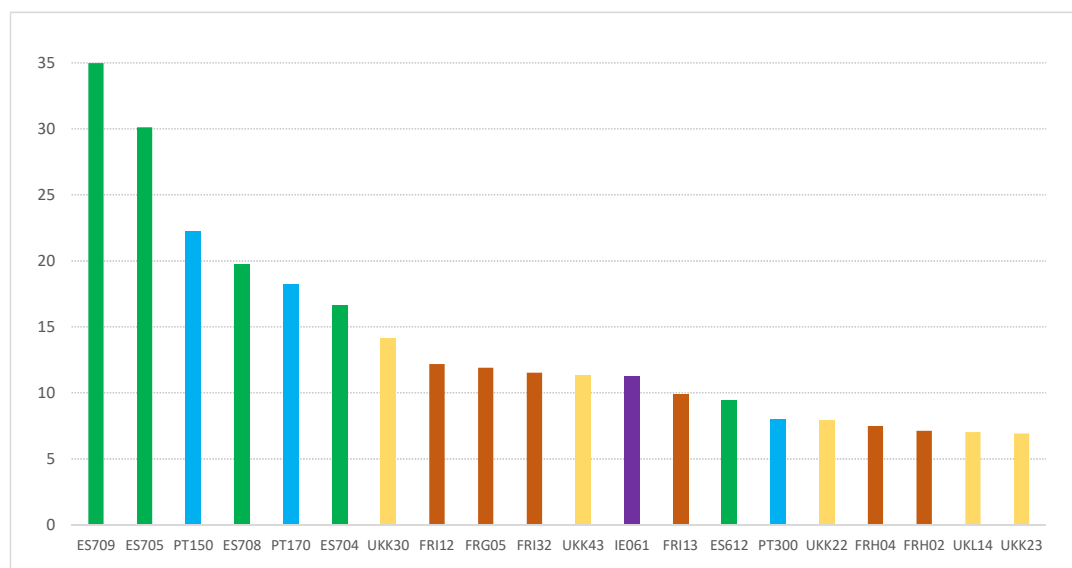
Figure 6. Total overnight stays (millions). Top 20 destinations.

Figure 7 shows the top twenty destinations for domestic and foreign tourism. The top 20 destinations for non-residents account for 74% of foreign tourism while the top 20 destinations for residents only account for 55% of domestic tourism. We conclude again that foreign tourism is much more concentrated in a few destinations than domestic tourism.

We observe that foreign tourism prefer "sun and sand" destinations as the big Canary Islands (Tenerife, Gran Canaria, Lanzarote and Fuerteventura), Algarve and Madeira; and capital cities such as Lisboa and Dublin. Given that these regions are among the most pop-
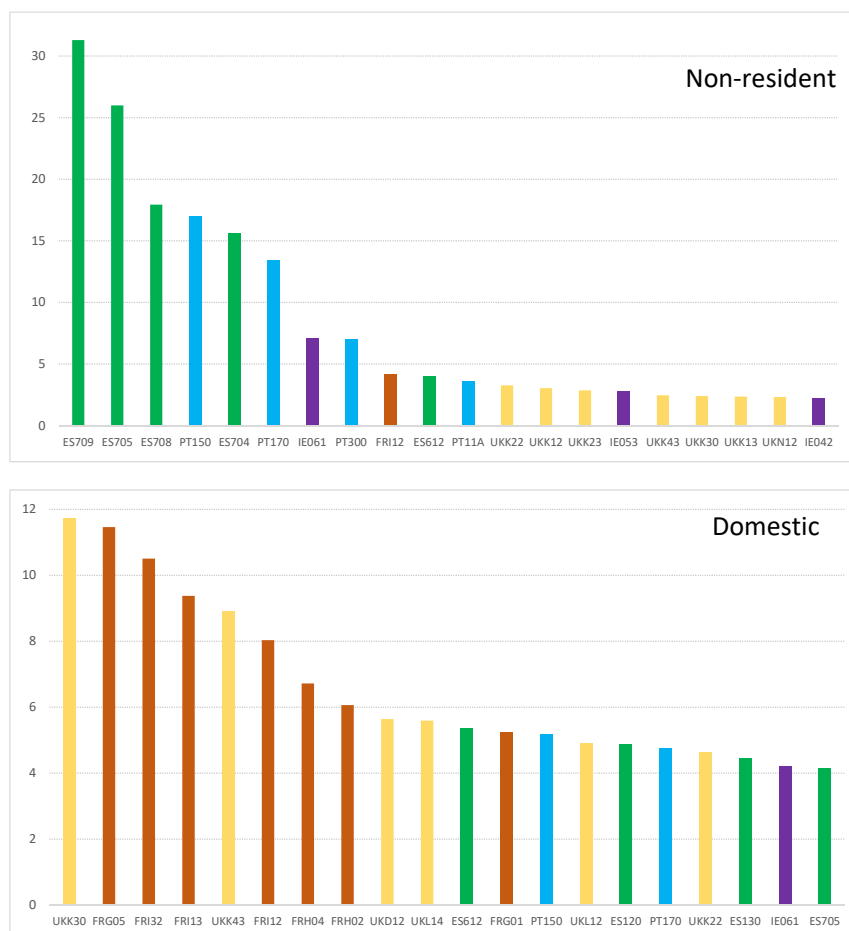
Figure 7. Overnight stays by origin (millions). Top 20 destinations.

ular destinations and their percentage of non-residents is over 75%
(Dublin 63%), we can consider them as destinations with *high interna-
tional appeal*. Note also the high concentration of foreign tourism in
the Atlantic Arc islands: 42% of all the non-resident overnight stays
are spent in the four big Canary Islands (Tenerife, Gran Canaria, Lan-
zarote and Fuerteventura) and Madeira.

By contrast, domestic tourism is concentrated in France and the UK,
with some Spanish regions such as Cádiz, Asturias and Cantabria.
Cornwall is the region with the most domestic tourism: A total of 1.4
million nights were spent there by residents in 2017. In this group of
top 20 domestic destinations, we should distinguish between regions
with:

- High volume of tourism and a high domestic tourism share, such
  as the French regions of Vendee, Landes, Charente M., Morbihan
  and Finistere, all of them among the 20 twenty most popular des-
  tinations and with more than 85% domestic tourism; and the UK
  regions of Cornwall, Devon (including Torbay and Plymouth), and

South West Wales, with more than 80% domestic share. These regions are considered destinations with *high domestic appeal*.

- A medium-high volume of tourism and a high domestic share, such as Loyre Atlantique, East Cumbria, Gwynedd, Asturias and Cantabria. These regions are among the 30 most popular destinations.

- High volume of tourism and a low domestic share: Algarve, Lisboa, Dorset, Dublin, Gran Canaria and Cádiz.

The distribution of tourism demand by type of accommodation establishments in the 20 most popular destinations is shown in Figure 8. Hotels and similar accommodation (hereafter referred to as hotels) accounted in 2017 for more than 60% of the total number of nights spent in tourist accommodation establishments in 9 out of these 20 destinations: the Spanish Canary Islands (Tenerife, Gran Canaria, Lanzarote and Fuerteventura) and Cádiz; Algarve, Lisboa and Madeira in Portugal; and Dublin. The highest proportion of nights spent in hotels is in Madeira (95%) followed by Algarve, Lisboa, Cádiz, and Dublin, all of them with a share of nights in hotels over 80%. By contrast, five regions among the top 20 (all of them French) report that at least half of its total number of nights were spent in camping grounds, recreational vehicle parks and trailer parks (hereafter referred to as campsites): Vendee (70%), Landes, Charente-Maritime, Morbihan, Finistere. These five French regions accounted for 35% of all nights spent in campsites across the Atlantic Arc in 2017. We have found a high degree of correlation (over 90%) between the destinations where most nights are spent in hotels and those preferred by foreign tourists, and, on the other hand, between domestic destinations and nights spent in campsites.

With a change in the legal basis for the collection of tourism statistics, a new set of information became available: regional statistics collected according to whether 0 not tourist accommodation establishments are in coastal municipalities, or densely or thinly populated areas.

As expected, the pull of the coastal municipalities, i.e. those that are either bordering the sea or have 50% of its surface within a distance of 10 km from the sea, is very important in the Atlantic Arc NUTS3 destinations, accounting on average for 82% of the overnight stays in the Atlantic Arc. As a matter of fact, there are only a few destinations with less than 40% of their nights spent in coastal municipalities. Some of them because they have a relatively short coastline, such as Lezeria do Tejo, Eure, or Cavado, and others because they have major inland
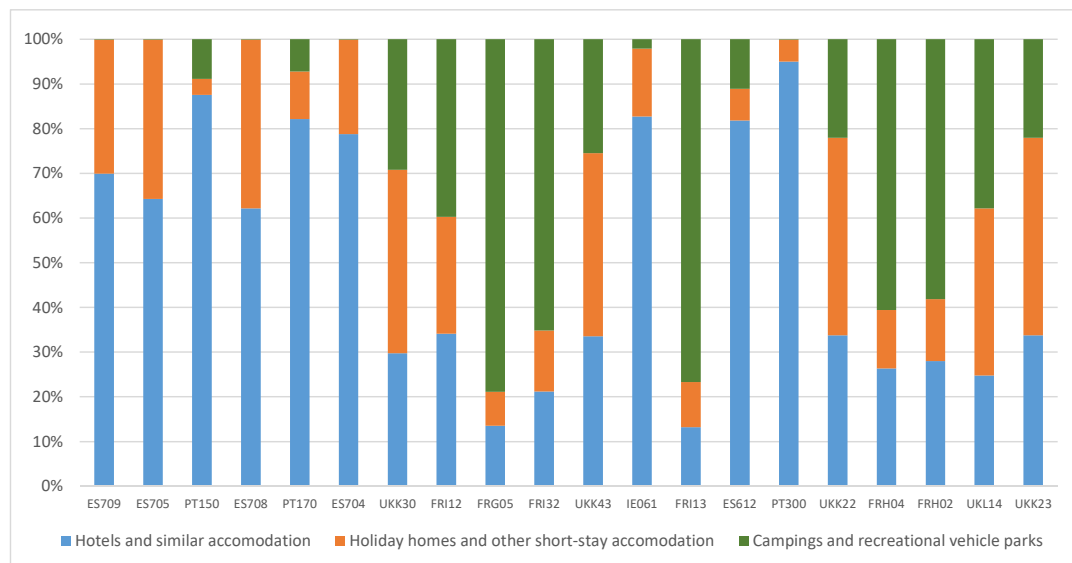
Figure 8. Overnight stays by type of accommodation. Top 20 destinations.

cities, such as Merseyside (Liverpool), Coimbra or Seine-Maritime (Rouen).

The most popular destinations for densely populated areas, which is usually called urban tourism, include capital regions (Belfast, Lisboa and Dublin), regions with relatively large cities such as Porto, Merseyside (Liverpool), Derry, Bizkaia, Bristol or Bath, and some very popular tourist destinations like Cádiz, Huelva or Madeira. By contrast, there were four regions in Portugal (Lezeria, Alentejo, Oste, Leiria), and Cornwall in the UK where urban tourism failed to account for any of the nights. Moreover, urban tourism does not reach 5% in Algarve and Cumbria and is below 10% in the Canary Islands. On the other hand, tourism in thinly populated areas, the so-called rural tourism, accounts for only 28% of the total overnight stays in the Atlantic Arc. However, it is very popular in some UK regions, such as Cumbria, West Wales and the Valleys, and Highland and the Islands, where more than 80% of the nights are spent in rural areas. Some other regions have at least 50% of their nights in rural tourist accommodations: Asturias and Cantabria in Spain, Alentejo Litoral y Letizia do Tejo in Portugal, and Bretagne, Aquitanie and Charente M. in France.

Table 2 summarizes the results on tourism demand in the Atlantic Arc by country and origin of tourists. It also shows the most popular destinations in each country. Note that Spain has the highest share of total overnight stays in the Atlantic Arc, followed by the UK. This result is due to the fact that Spain receives more than 45% of non-residents tourists. So, in general Spain, particularly the Canary Islands are a magnet for foreign tourism. By contrast, two countries monopolise

Total		Residents		Non-Residents	
Most popular regions	Nights (000)	Most popular regions	Nights (000)	Most popular regions	Nights (000)
France	**95980** (20.3%)		**77993** (32.4%)		**17857** (7.7%)
Gironde	12182	Vendee	11459	Gironde	4147
Vendee	11903	Charente M.	10508	Pyrenees A.	2259
Charente M	11533	Landes	9378	Calvados	1857
Ireland	**31249** (6.6%)		**15089** (6.3%)		**16160** (6.9%)
Dublin	11258	Dublin	4916	Dublin	7062
South West	5880	South West	3082	South West	2797
Western	4933	Western	2669	Western	2264
Portugal	**66536** (14%)		**20346** (8.5%)		**46190** (19.9%)
Algarve	22210	Algarve	5181	Algarve	17029
Lisboa	18226	Lisboa	4754	Lisboa	13471
Madeira	7951	Porto	2783	Madeira	7051
Spain	**146495** (31%)		**41179** (17.1%)		**105316** (45.3%)
Tenerife	34987	Cádiz	5366	Tenerife	31299
Gran Canaria	30125	Asturias	4877	Gran Canaria	25991
Lanzarote	19715	Cantabria	4455	Lanzarote	17939
UK	**132893** (28.1%)		**85998** (35.7%)		**46896** (20.2%)
Cornwall	14140	Cornwall	11740	Dorset	3267
Devon	11357	Devon	8896	Bath	3045
Dorset	7897	East Cumbria	5640	Somerset	2865
Atlantic Arc	**473024** (100%)		**240605** (100%)		**232419** (100%)
Tenerife	34987	Cornwall	11740	Tenerife	31299
Gran Canaria	30125	Vendee	11459	Gran Canaria	25991
Algarve	22210	Charente M.	10508	Lanzarote	17939

Table 2. Most popular tourist NUTS3 destinations, 2017.

domestic tourism: UK and France. Therefore, we may distinguish between Spain and Portugal where most of the tourism is non-resident (72% and 69.5%, respectively) and France and the UK with the majority of tourists that are residents (81.3% and 65%, respectively). In Ireland, tourism demand is split almost fifty-fifty between residents and non-residents.

Tourism Demand Impacts

In a broad sense, uncontrolled tourism poses a number of threats to both natural areas and cities. Increasing numbers of tourists in urban areas can result in added congestion, higher pollution levels and potential damage to historical buildings; while in rural and coastal areas may lead to soil erosion, increased waste, discharges to the sea, the

loss of natural habitats and pressure on endangered species. Two indicators are usually used to measure this kind of impacts:

- Tourism intensity: number of overnight stays in relation to the resident population. This indicator shows the social intensity of tourism demand. It is linked to the social dimension of the region and it gives information on the pressure that tourism exerts on the local population.

- Tourism density: total number of overnight stays in relation to the area of the region in km^2. It is a measure of the relationship between the total overnight stays and the area available to accommodate tourists. It shows the geographical density of tourism demand. This indicator is linked to the spatial dimension of the region and it gives information on the pressure that tourism exerts on the territory, the local environment and resources.

  In regions with high tourism density, further growth should be controlled to avoid exceeding social carrying capacity. On the contrary, in some rural regions with low tourism density, future growth is possible, though specific territorial and environmental assessments should be done beforehand.

To conclude, both indicators measure one aspect of the economic significance of tourism in a region different from the information given by the absolute number of overnight stays and more related to sustainability. Tourism Intensity is the most common measure of tourism "socio-cultural" impact and Tourism Density is an indicator of tourism impact on the territory.

Tourism pressures are quite heterogeneous across the five countries of the Atlantic Arc as can be observed in Table 3. Spain is the only country where tourism intensity and density are above the average of the Atlantic Arc. By contrast, Ireland is the country with the smallest values for these two indicators, i.e., the country where the degree of tourism pressure is the lowest. Note that the difference between countries is larger in the case of the pressure on the territory, where the Spanish average of nights per km^2 is more than four times the Irish one. We can also observe in Table 3 that the range of variability of the pressure indicators is considerable within each country. The highest variability in tourism intensity is found in Spain, which shows some large figures for two of the Canary Islands, Fuerteventura and Lanzarote. However, the highest variability in tourism density is found in the UK, probably due to the very small area of some of the British NUTS3 regions, such as Blackpool, Torbay or Liverpool, among others.

Tourism Intensity (Nights/1000 inhabitants)					
COUNTRY	Average	Lowest		Highest	
France	8170	Eure	1669	Landes	24389
Ireland	6963	Mid-East	2408	Western	10930
Portugal	8418	Letizia	1808	Algarve	50309
Spain	14974	Bizkaia	2967	Fuerteventura	144263
UK	9789	Warrington	1339	Gwynedd	50038
Atlantic Arc	9959	Warrington	1339	Fuerteventura	144263

Tourism Density (Nights/km^2)					
COUNTRY	Average	Lowest		Highest	
France	967	Eure	167	Vendee	1757
Ireland	494	Border	184	Dublin	12158
Portugal	1802	Letizia	101	Madeira	9914
Spain	2173	Lugo	136	Lanzarote	23304
UK	1264	Caithness	94	Blackpool	124303
Atlantic Arc	1271	Caithness	94	Blackpool	124303

Table 3. Tourism impacts by country.

Map 9 shows the regional distribution of tourism intensity. There were 33 regions with intensities of at least 10000 nights per 1000 residents, i.e., above the Atlantic Arc average. The regions with the highest intensity, shaded blue and yellow in the map, are two of the big Canary Islands (Fuerteventura and Lanzarote with more than 130,000 nights per 1000 residents), Wales, the south of Portugal and the Scottish region of Lochaber, Skye-Lochalsh, Arran-Cumbrae and Argyll-Bute (hereafter, Lochaber).
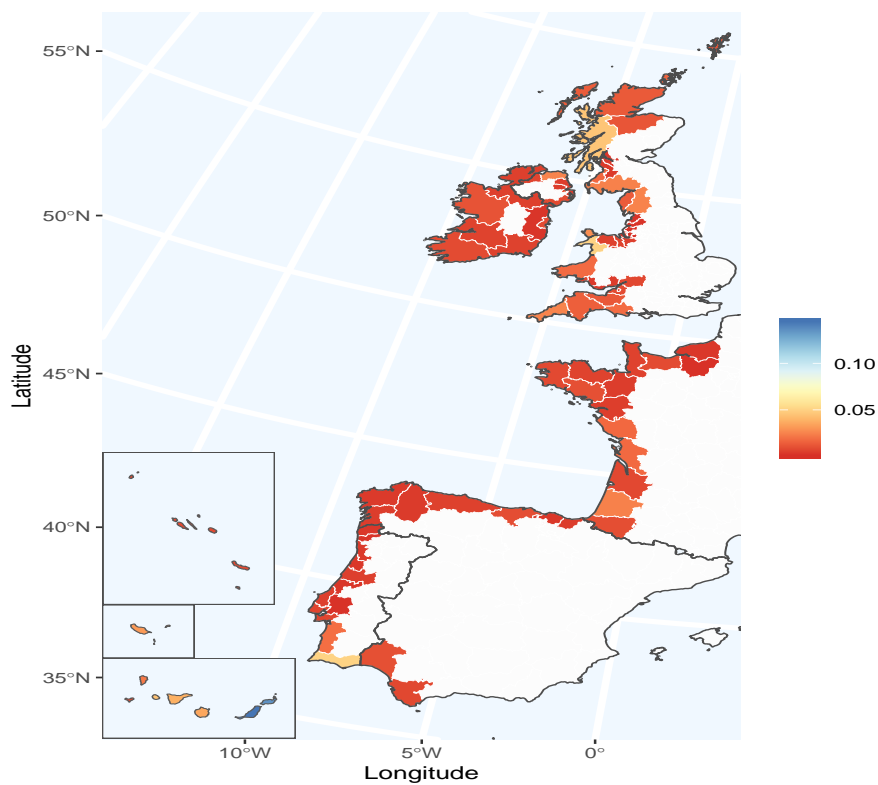
MOSES

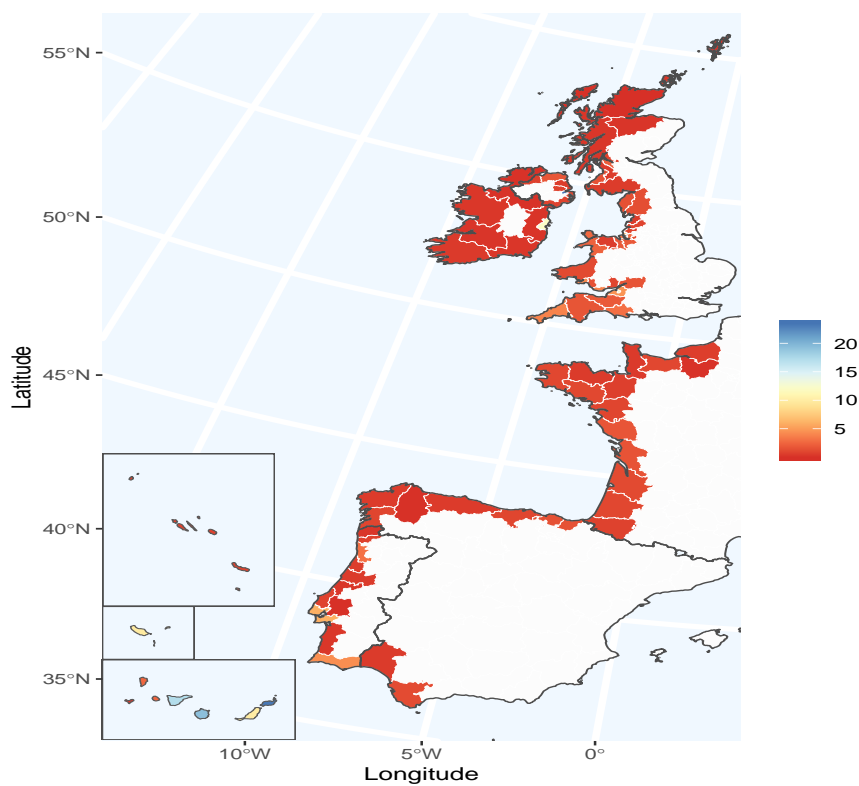**Figure 9. Tourism Intensity by NUTS3 destinations.**

Figure 10. Tourism density by NUTS3 destinations.

Analysing Figure 11, we may conclude that the highest tourism intensity rates were concentrated in the islands: all the Canary Islands but Hierro, Madeira and Isle of Anglesey are among the top 20. We find as

well in this group some the most popular tourist destinations such as Algarve, Cornwall, Landes, and East Cumbria. Lastly, we have the two smallest regions in the Atlantic Arc, Blackpool and Torbay, and some regions with a very low population density such as the Scottish regions of Lochaber (density 6.9) and Dumfries-Galloway (density 23.2), Alentejo Litoral in Portugal (density 17.8), and Gwynedd in Wales (density, 48.5). In these regions population density is particularly low compared to the average density in the Atlantic Arc that is 127.7 inhabitants per km^2.
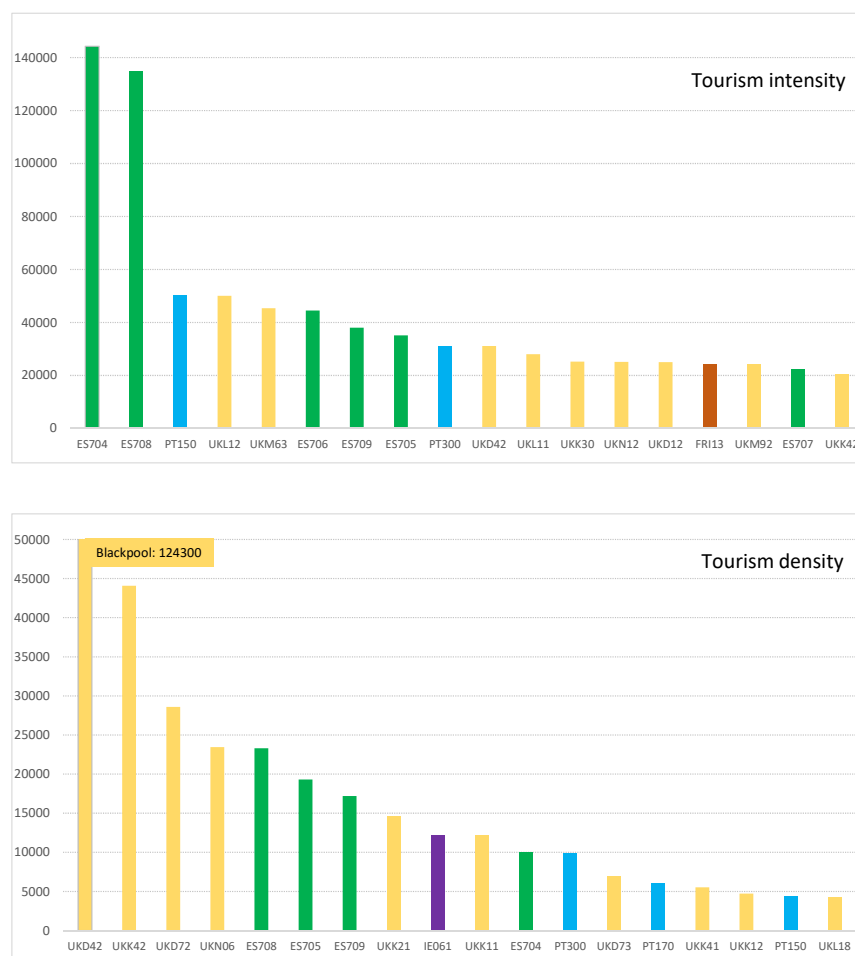
Figure 11. Tourism impacts. Top 20 destinations.

The regional distribution of tourism density is shown in Map 10. The regions with the highest tourism density are Blackpool and Torbay (the two smallest regions in the Atlantic Arc) with 124,300 and 44,100 nights per km^2, respectively, followed by Liverpool. These three regions have such extreme values that we have removed them from the map to be able to examine the differences between the rest of the regions. The regions shown as blue and yellow in the map are Dublin, Lisboa and the Canary Islands and Madeira.

There were 44 regions with densities of at least 1300 nights per km^2, that is, above the Atlantic Arc average that is 1271 overnight stays per km^2. Figure 11 shows the top twenty regions with the highest densities. Twelve of these regions recorded tourism densities of at least 10000 overnights stays per km^2:

- Blackpool and two other very small and popular regions in the south of the UK, Torbay and Bournemouth.

- Urban regions (some of them also very small) such as Liverpool, Belfast, Dublin, and Bristol.

- The most popular tourist islands: the four big canary islands (Lanzarote, Gran Canaria, Tenerife, and Fuerteventura) and Madeira.

One more destination in the south of the UK, Plymouth, two of the most popular destinations, Algarve and Cornwall, and five urban regions, Sefton, Lisboa, Bath, Swansea and Cardiff, complete the list of the top twenty destinations with the most pressure on the territory.

3.2.2 Tourism industry

The tourism industry is analysed in this section from two points of view: firstly, the characteristics of the accommodation sector, and secondly, the weight of the employment in the tourism sector on the total regional employment.

Accommodation capacity

There were over 67,000 tourist accommodation establishments in the Atlantic Arc in 2017 with a total of almost 4.7 million bed places, which means an average of 69 bed places per establishment. Half of these establishments were holiday homes and other short-stay accommodations (hereafter holiday homes) with 0.85 million bed places (25 bed places per establishment). Hotels accounted for 41% of the tourist establishments offering almost 1.7 million bed places (60 bed places per hotel), and campsites represented only 9% of the establishments with an average of 394 places per establishment. These figures imply that the size of the tourism industry in a region is going to depend strongly on the type of establishment prevailing in that region.

Figure 12 shows the distribution of the accommodation establishments in the twenty most popular destinations of the Atlantic Arc. We observe that hotels represented more than 50% of the establishments in

Dublin (85%), Algarve, Cádiz, Gironde, Lisboa and Madeira; holiday
homes prevailed in Gran Canaria (92%), Lanzarote, Tenerife, Cornwall,
Devon and South West Wales; and campsites accounted for more than
half of the establishments in the French regions of Vendee, Charente-
Maritime and Landes, and for more than 40% in Bretagne.

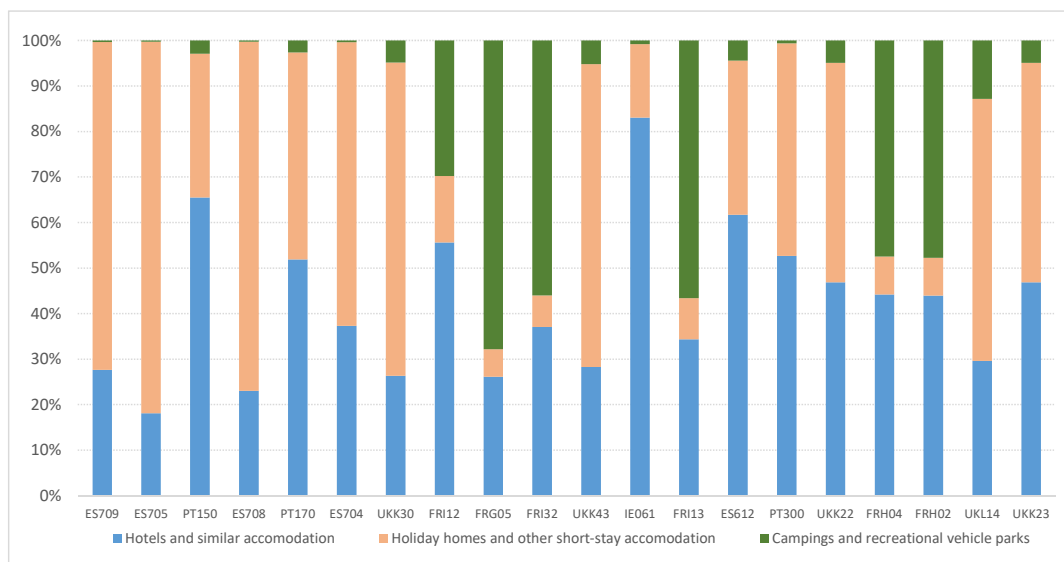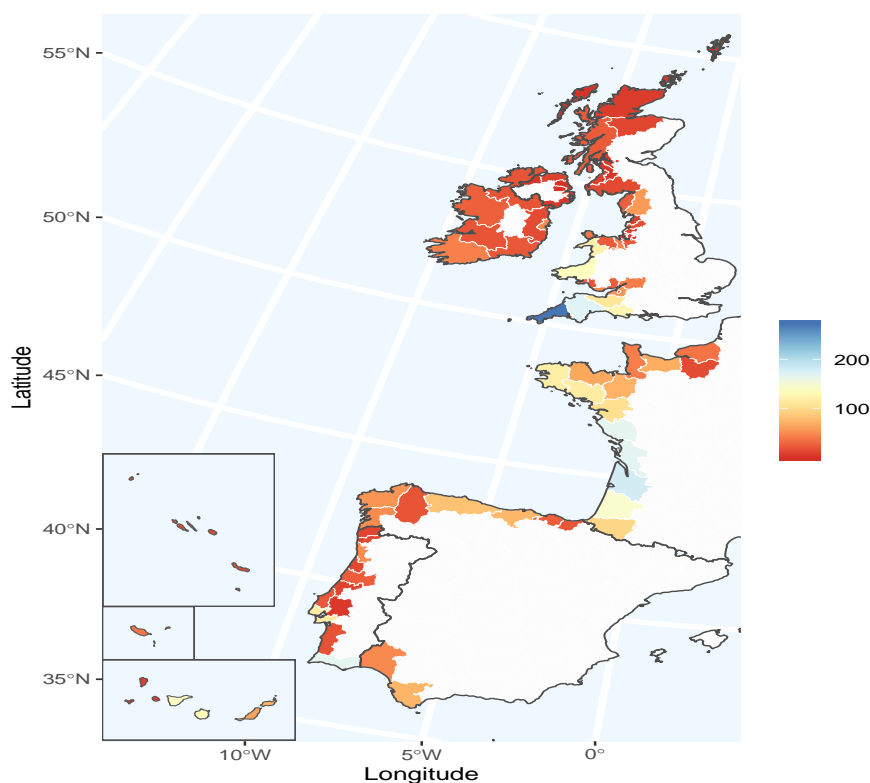**Figure 12. Establishments by type of accommodation.**

Figure 13. Total bed places by NUTS3 regions (thousands).

The main indicator for accommodation supply is the number of bed
places. Map 13 show the regional breakdown of the bed places in

all type of tourism accommodations. The destinations in blue represent those with more bed places available in 2017 followed by those in yellow and orange. Some of the regions with a high number of bed places are, unsurprisingly, some of the most popular tourism destinations, such as Cornwall and Devon, Algarve, the Canary Islands, and Poitou-Charente. The highest number of bed places was recorded in Cornwall with more than 272 thousand bed places, followed by Gironde in France with almost 180 thousand. However, we also find regions such as Asturias, Blackpool or Dorset with a very small tourism industry size and/or a very short length of stay (no more than 3 nights).

The three graphs in Figure 14 show the differences between the destinations with respect to the type of accommodation offered to tourists. Bed places in hotels are very important in the "sun and sand" destinations (Canary Islands, Algarve, Madeira, Cádiz) and urban destinations such as Lisboa, Dublin, and Porto. Cornwall is the region that offers the most bed places in holiday homes. We should also mention the position in this type of accommodation of some French regions as Gironde, and Pyrenees-A. and the Spanish region of Cantabria. Campsites are a very common type of accommodation in France: 11 out of 14 regions are among those with the largest number of places in these establishments. Then we find some UK regions such as Cornwall and Devon, South West Wales and Gwynedd in Wales, Dorset and Somerset.

The total number of bed places is of interest in relation to the capacity of different regions to respond to tourism demand. But the tourist industry is interested in the net occupancy rates. These may be measured in relation to the number of rooms or the number of bed places; room rates are often considered the preferred measure insofar as the turnover of a double room is often the same regardless the room is occupied by one or two people. Both bedroom and bed places occupancy rates are shown in Figure 15 for the NUTS2 coastal regions in the Atlantic Arc.

The occupancy of hotels and similar establishments may vary according to the characteristics of each region. Urban regions are more likely to be characterised by large numbers of visitors who tend to stay for a relatively short period, with tourist trips to cities often spread throughout the year. Visitors to these regions may also be travelling for professional reasons, in which case demand for rooms will probably be spread throughout the working week, supplemented by private trips during weekends and holiday periods. By contrast, the average length of stays is substantially longer in more traditional holiday regions
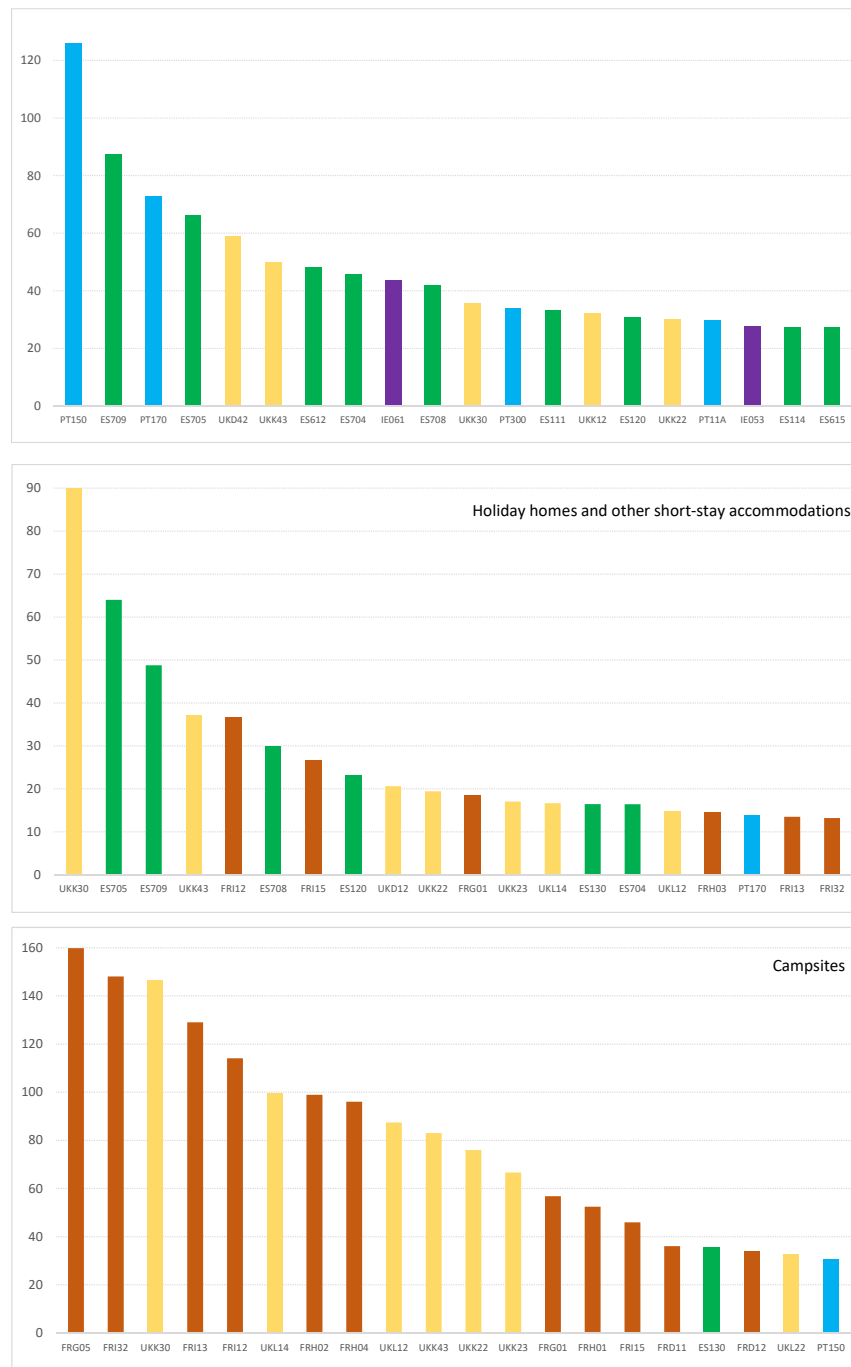
Figure 14. Bed places by type of tourist accommodation establishments (thousands).

which are visited chiefly for recreational purposes. The highest net occupancy rate was reached in the Canary Islands, where 85.4% of the bedrooms were occupied in 2017. Three more regions have an occupancy rate of at least 70%: Eastern and Midland (including Dublin) 79%, Madeira, 75.3% and Lisboa, 70%. Note that in the case of Canary Islands, Madeira and Azores some hotels in these destinations may close during the off-season, while others seek to keep their occupancy rates high through special offers, which may, for example, encourage pensioners (typically from northern Europe) to spend longer periods on vacation during the winter months. At the bottom of the range,

Figure 15. Occupation rate by NUTS2 regions.

there are five regions with an occupancy rate lower than 50%: Devon (48.6%) and Lancashire (38.7%) in UK, Asturias (44.8%) and Galicia (42.8%) in Spain, and Centro (41,7%) and Alentejo (39,2%) in Portugal.

Tourism pressures both on the population and on the territory can be measured as well using the number of bed places by residents (intensity) or by km^2 (density). We would like to highlight some results obtained with these two indicators (see Figure 16). There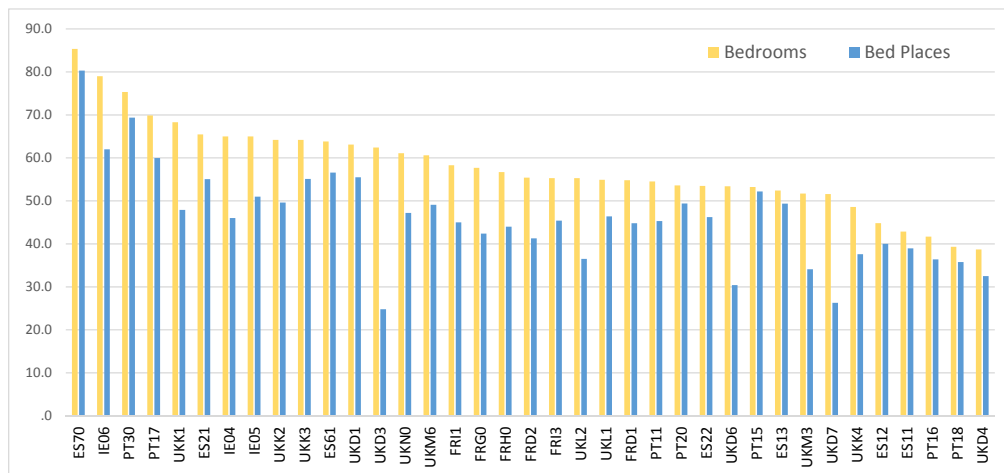 are some regions like Devon, Dorset, Somerset, and South West Wales in the UK, Charente M. and Vendee in France, and Alentejo Litoral where the number of beds per 1000 inhabitants is among the 20 highest, while the number of overnight stays per 1000 inhabitants was not. This implies that if the accommodation bed places in these regions were used to full capacity the tourism pressure would increase. The same happens with the regions of Dorset, Cornwall, Anglesey or Cardiff where the pressure on the territory of the tourism supply is higher than that of tourism demand.

Employment in the tourism sector

Tourism is a social, cultural and economic phenomenon, which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes. In tourism statistics, the term activities represent the actions and behaviours of people in preparation for and during a trip in their capacity as consumers. The list of tourism characteristic activities is: Accommodation for visitors, Food and beverage serving activities, Railway passenger transport, Road passenger transport, Water passenger transport, Air passenger transport, Transport equipment rental, Travel agencies and other reservation services activities, Cultural activities, Sports and
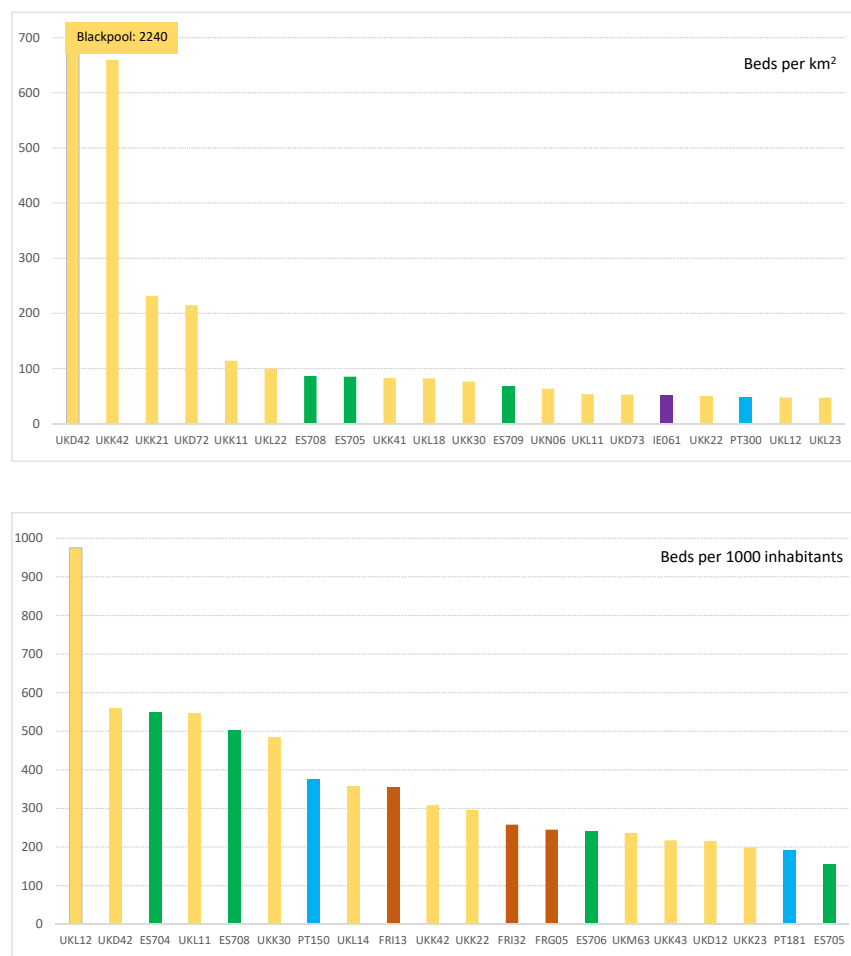
Figure 16. Bed places per km^2 and 1000 residents (thousands).

recreational activities, Retail trade of country-specific tourism charac-
teristic goods, Other country-specific tourism characteristic activities.
It is not easy to find regional data for macroeconomic indicators such
as GVA or employment for all these activities, some of them very spe-
cific. We can analyse some results for the activities corresponding to
the following NACE chapters and divisions:

G : Wholesale and retail trade, and specifically, for division G47,
     which corresponds to Retail trade, except for motor vehicles and
     motorcycles.

H : Transport.

I : Accommodation and Food Services, split into Accommodation
     (I55) and Food Services (I56).

The data show that in 2017 the sum of the three chapters, G, H and I,
accounts for 27% of the total employment in the Atlantic Arc coastal
destinations: Trade amounts to 15.5%, Transport to 4%, and Accom-
modation and Food services to 7.5%. Concerning the divisions, Retail

Trade employs 9.5% of the workers, Accommodation services 2%, and Food Services 5.5%.

Figure 17. Employment share of Trade, Transport, Accommodation and Food Services sectors (%).

Figure 18. Employment share of the Accommodation and Food services sector (%).

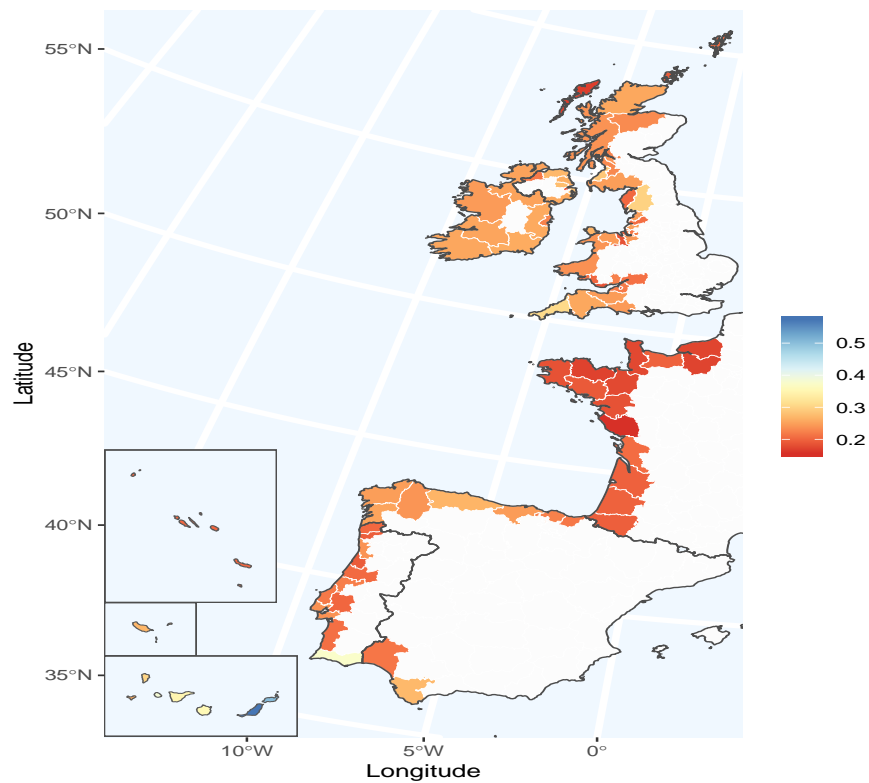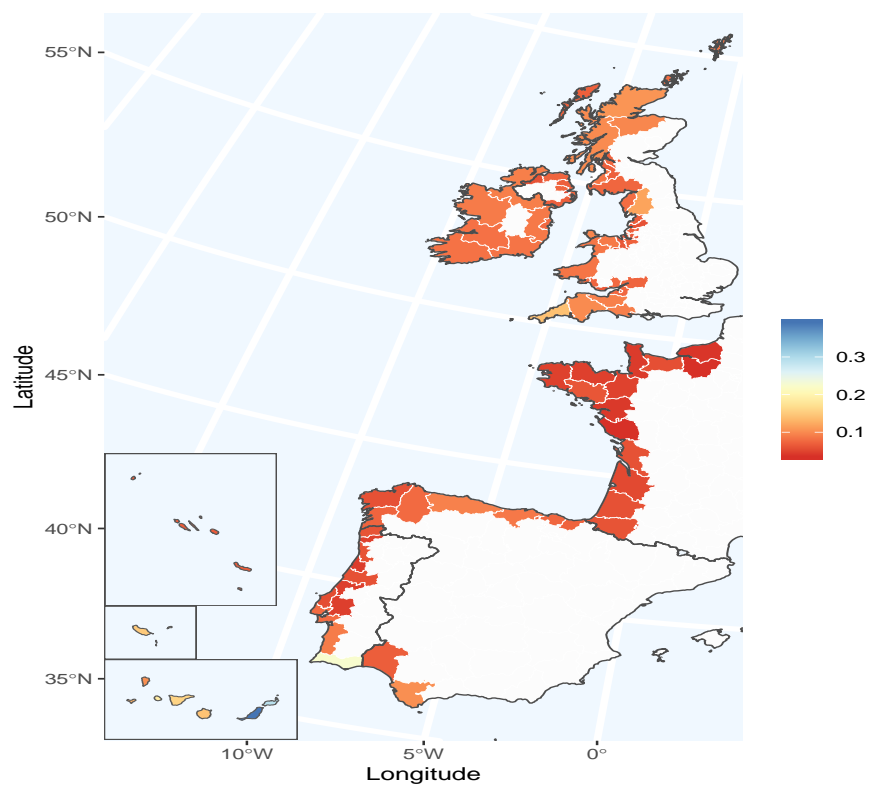The regional breakdown of the share of Trade, Transport and Accommodation and Food services sectors in the total employment are shown in Map 17. Destinations shaded in blue and yellow are the most dependent on tourism-related sectors. The following regions stand out: Fuerteventura with almost 60% of the employment in these three sectors and Lanzarote with 50%. With at least 30% of employment-related to tourism are: La Palma, Cornwall, Tenerife, Gran Canaria, Algarve, and La Gomera. At the bottom range we find all the French regions (but Charente M.) that have less than 20% employment in tourism and Eilean Siar (Western Isles) with 17%.

Analysing the dependence on tourism by country we find that the group of the twenty most dependent regions consists of all the Canary Islands, Cádiz and Asturias in Spain, Algarve and Madeira in Portugal, and Cornwall, Isle Anglesey, East Cumbria, Torbay, South Ayrshire in Scotland, and some of the Northern Ireland destinations (Ards and North Down, Antrim and Newtownabbey, Causeway Coast and Glens, and Mid and East Antrim) in the UK. Note that no Irish or French regions are included.

Map 18 shows the dependence of the Atlantic Area regional destinations in terms of employment in the sector typically considered tourism, Accommodation and Food and Beverage services. The results are not so different from the ones obtained for the G-I sectors. Fuerteventura (39%), Lanzarote (29%), Algarve, La Gomera, and Tenerife are still the most dependent regions with more than 15% of employment, followed by Madeira, Gran Canaria and Cornwall with more than 14%. The least dependent regions are all the French regions and the Portuguese regions in the North, Centre and Alentejo (except Porto) along with Belfast.

It would be interesting to analyse the Accommodation and the Food and Beverage services sectors separately, since the Food and Service subsector is not fully tourism. We observed some differences in the results for the two sectors.

The range of variability of the percentage of the total employment in the Food services sector goes from 20% in Fuerteventura to 3% in Vendee. Almost 2/3 of the Atlantic destinations have more than 5% of their employment in this sector. Figure 19 shows the top twenty destinations in this indicator. It may be observed that half of them are Spanish (all the Canary Islands, Cádiz, Cantabria, Asturias, Lugo and Bizkaia), plus Algarve, Madeira and Alentejo Litoral in Portugal and Cornwall, Torbay, Devon, Anglesey, East Cumbria, Somerset and
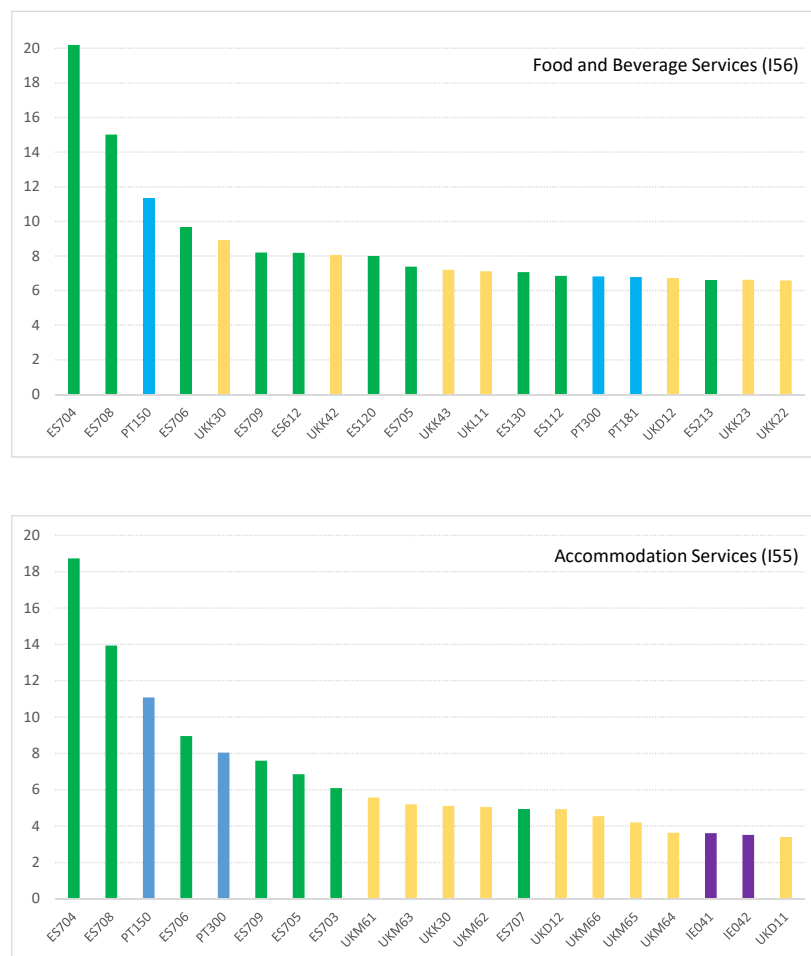
Figure 19. Employment share of Accommodation and Food services (%). Top 20 regions

Dorset in the UK. Again, there are no French or Irish regions in this group.

The range of variability of the percentage of the total employment in the Accommodation sector goes from 19% in Fuerteventura to 0.4% in Eure and Seine-Maritime. The most dependent destinations in this sector are all the Canary Islands, Algarve, and Madeira (see Figure 19). For all of them, more than 6% of the employment is in this sector compared to the 2% average in the Atlantic Arc. The group of the twenty most dependent regions is completed with Cornwall, East and West Cumbria and the Highlands and Islands in the UK, and the Border and Western destinations in Ireland. Note that there are no French regions in this group. Employment in accommodation does not reach even 1% in Belfast, Merseyside, Galicia, the Basque Country, Aveiro and Cavado, and Vendee, Seine-Maritime, and Eure in France.

Bed Places		Employment Accommodation		Employment Food	
Largest supply regions	Bed Places	Most dependent regions	Share (%)	Most dependent regions	Share (%)
France	**1388119** (29.7%)		**1%**		**3.8%**
Charente M.	179160	Morbihan	1.43%	Pyrenees A.	4.76%
Pyrenees A.	166305	Calvados	1.4%	Morbihan	4.7%
Landes	165243	Pyrenees A.	1.24%	Charente M.	4.59%
Ireland	**194380** (4.2%)		**2.7%**		**5.5%**
Dublin	48468	Border	3.62%	Mid-East	6.09%
South West	44221	Western	3.52%	South East	5.70%
Western	26368	South-East	2.77%	South West	5.61%
Portugal	**501366** (10.7%)		**2.2%**		**5.5%**
Algarve	165622	Algarve	11.08%	Algarve	11.33%
Lisboa	115807	Madeira	8.04%	Madeira	6.81%
Porto	50369	Azores	2.93%	Alentejo L.	6.78%
Spain	**870803** (18.6%)		**2.6%**		**7.2%**
Tenerife	138331	Fuerteventura	20.2%	Fuerteventura	18.7%
Gran Canaria	132858	Lanzarote	15%	Lanzarote	13.9%
Asturias	81923	La Gomera	9.7%	La Gomera	9%
UK	**1722017** (36.8%)		**2.1%**		**5.8%**
Cornwall	272203	Caithness	5.57%	Cornwall	8.93%
Devon	170022	Lochaber	5.20%	Torbay	8.04%
South West Wales	137134	Cornwall	5.11%	Devon	7.20%
Atlantic Arc	**4676685** (100%)		**2%**		**5.5%**
Cornwall	272203	Fuerteventura	20.2%	Fuerteventura	18.7%
Charente M.	179160	Lanzarote	15%	Lanzarote	13.9%
Devon	170022	Algarve	11.08%	Algarve	11.33%

Table 4. Most tourism-dependent NUTS3 destinations, 2017.

Table 4 summarizes the results on tourism supply in the Atlantic Arc by country. It also shows the destinations in each country with the largest values in each indicator: number of bed places, and shares of employment in the Accommodation and Food and Beverage sectors. Note that while Spain was the leader in tourism demand, UK has the highest share of total bed places in the Atlantic Arc, followed by France. Both together accumulate 66.5% of the total tourism supply in the area.

Concerning the share of total employment in tourism, we observed that Spain is the most dependent country in the Atlantic Arc with 9.8% of the employment in Accommodation and Food sectors, followed by Ireland with 8.2%. Spain is also the country where the two regions most dependent on tourism are located: Fuerteventura and Lanzarote. Note that in Fuerteventura almost 40% of total employment is related to these two sectors and in Lanzarote 28.9%. These results give an idea of the degree of specialization of the economy in these islands, and in general, in the Canary Islands, and Algarve.

3.2.3 Amenities

We have information on several indicators corresponding to different aspects of the attractiveness of a destination: quality of the bathing places, Sites of Community Importance (Natura 2000), World Heritage sites, land covered by forest or recreational activities, number of shops, restaurants.

Maps 20 and 21 show the regional breakdown of two out of the six indicators related to the quality of the bathing places: the number of blue flags awards and the number of bathing places with an excellent quality of water.

There are 39 regions without any blue flag. The majority of them do not have any bathing places (UK) or have a very short coastline, as is the case of Lezeira and Eure. Algarve was the region with the highest number of blue flags (92) in the Atlantic Arc in 2017. In the group of the top twenty are the Spanish regions of Pontevedra, A Coruña, Cádiz and Gran Canaria, the Portuguese regions of Algarve, Porto, Azores, Alentejo, Oeste, Coimbra, Lisboa, Madeira; the French regions of Gironde, Loire-A, Finistere, Vendee, Charente M.; the Irish regions of Western and South West; and South West Wales in the UK.

Concerning the water quality of the bathing places, we will focus on the places with excellent quality. First of all, we should mention that Finistere with 267 places is the region with the most bathing places in
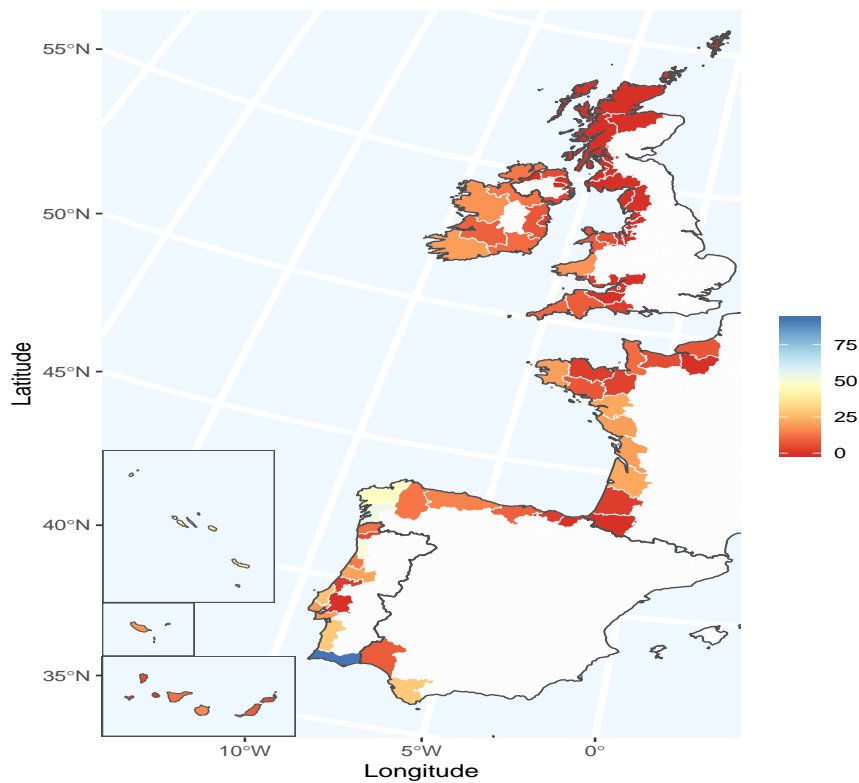
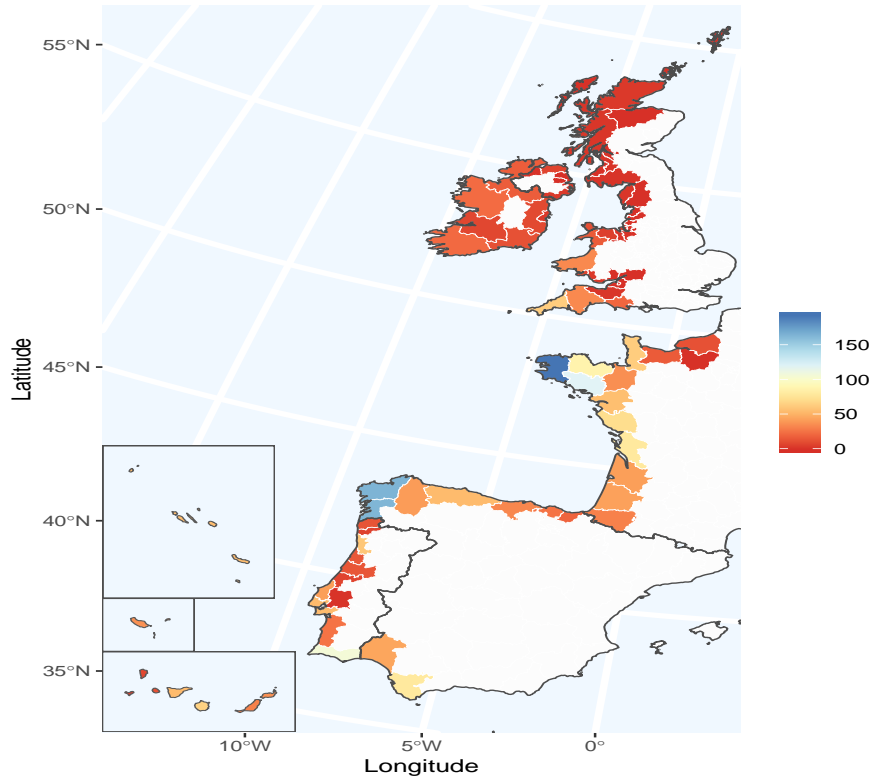**Figure 20. Blue Flag Awards by NUTS3 regions.**

Figure 21. Number of excellent bathing places by NUTS3 regions.

the Atlantic Arc, followed by some Spanish regions (A Coruña, Pontevedra, and Cádiz), some French regions (Morbihan, Côtes d'Armor, Manche, Charente-M., Vendee, Loire-A.), Algarve, and Corwall. The

group the top 20 regions with the largest number of bathing places does not contain any Irish destination and only the region of Cornwall in the UK.

As expected the list of regions with the largest number of excellent bathing places shows similar results. Finistere is the top region with 192 excellent bathing places followed by A Coruña, Pontevedra, Morbihan, and Algarve. We should mention again that the group the top 20 regions with excellent bathing places does not contain any Irish destination and only the region of Cornwall in the UK. At the bottom of the list we find Eure and Lezeria, two regions with a very small coastline and 38 British regions, some of them without any bathing places. It is also interesting to note that even though the Canary Islands are not at the top of the list of regions with the highest number of bathing places, it is the region with the best water quality in the sense that over 93% of their bathing places have an excellent water quality.
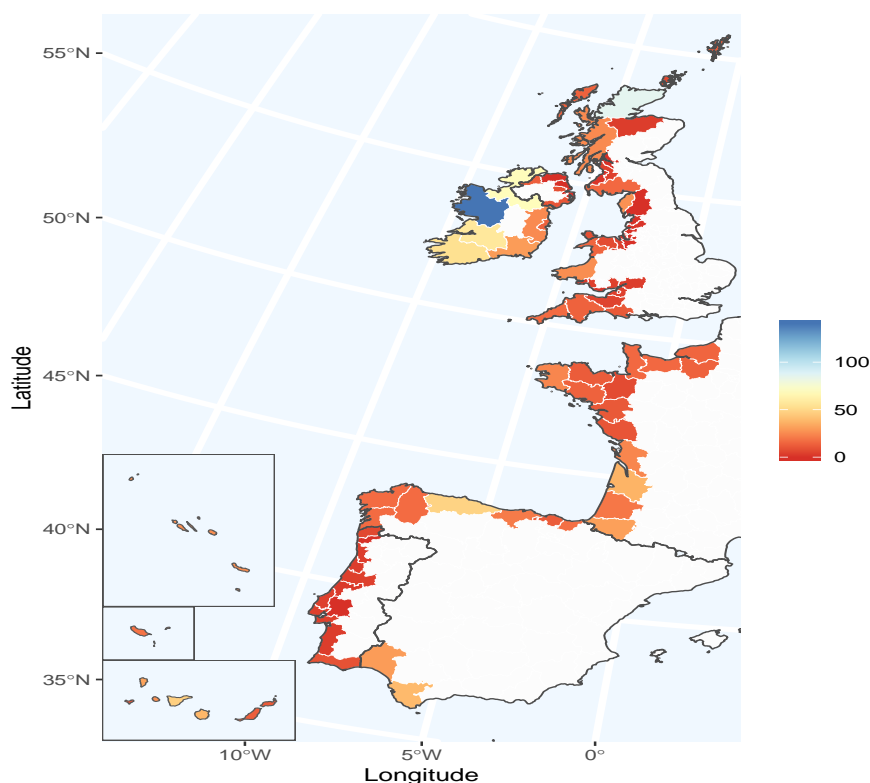
Figure 22. Total Sites of Community Importance (Natura 2000) by NUTS3 regions.

Map 22 show the regional distribution of the total number of Sites of Community Importance-Natura 2000 (hereafter referred to as protected areas), both marine and terrestrial. The Atlantic Arc had in 2017 a total of 1473 protected areas covering a total surface area of 9,056,082 km^2. More than a quarter of these protected areas (27%) are marine sites, with a surface area of 4,309,549 (48% of the total surface protected).

Figure 23. Number of retail trade Locals by NUTS3 regions.

As can be observed in map 22, the destinations with the largest number of protected areas are the Irish regions of Western, Border, Mid West, South West and Mid East and Caithness in the Highlands. As a matter of fact, Ireland accounts for 26% of the total number of protected areas. Other regions ranked in the top twenty for this indicator are the Spanish destinations of Asturias, Huelva and Canary Islands; the French regions of Gironde, Pyrenees A.; the Azores in Portugal, and West Cumbria, South 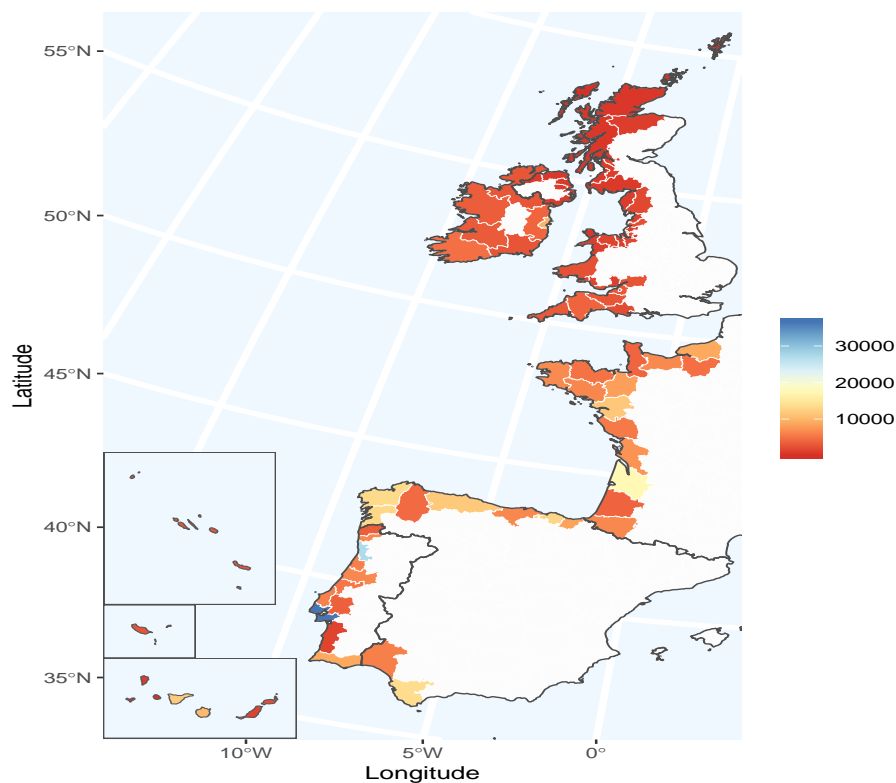West Wales and Lochaber in the UK. The ranking of the regions changes substantially if we order them by surface area. Thus, the data show that the top five regions are Madeira, Charente M., Caithness, Huelva and Western IE, which cover 31% of the total surface area.

Ireland is also the country where marine protected areas are concentrated: 150 out of the 395 marine protected areas in the Atlantic Arc are Irish. Other regions of interest with respect to this indicator are the Azores, Finistere, Manche, Cádiz, A Coruña, and Dublin. However, the largest marine protected surface area is in Madeira, followed by Charente M., Finistere, South West Wales and Cote d'Armor. These five regions account for 47% of the total marine protected surface area. We should mention as well other regions where more than 80% of their protected area is marine, such as Bristol, Ille-et-Vilaine, Manche, and Cornwall.

To end up with the natural attractions, according to Eurostat LUCAS statistics, 73893 km^2 of the land in the Atlantic Arc was covered by forests in 2015. The forest area is concentrated in a small number of regions: the first five regions with the largest forest area cover 27% of the total, and the first 10 regions, 42% of the total. The top ten regions are mostly located in Spain (Lugo, Asturias, A Coruña, Huelva, Pontevedra and Cantabria), France (Gironde, Landes and Pyrenees-A.), and only Coimbra in Portugal.

With respect to the cultural attractiveness of the Atlantic Arc destinations, we use only one indicator, the number of World Heritage Sites. There is a total of 51 World Heritage Sites in our area of study (the majority of them cultural) located in only 39 NUTS3 regions. The distribution of these sites by country is as follows. There are 15 sites in Spain located in 8 regions, 9 sites in France distributed among 7 regions, 9 sites in 7 Portuguese regions, two sites in two Irish regions and a total of 16 sites in the UK located in 15 regions. We must highlight the regions of Gironde and A Coruña with three World Heritage Sites and the Spanish regions of Lugo, Asturias, Cantabria, Bizkaia, and Tenerife; Lisboa and Azores in Portugal; and Devon in the UK, with two sites each.

Finally, we are going to analyse briefly three indicators related to the recreational and entertainment supply of the destinations: land used for recreational activities, and the number of restaurants and shops. Concerning the land used for recreational activities, the top twenty regions account for 51% of the total recreation land in the Atlantic Arc. These destinations are located in UK (Dumfries-Galloway, East Cumbria, Devon, Somerset, and Lochaber), South of Ireland and Mid-East; and France (Gironde, Cotes-d'Armor, Landes, Morbihan, Ille-et-Vilaine, Finistere, Loire-A., Vendee, Seine M., Pyrenees-A., and Eure).

Table 5 shows the distribution by country of the locals of divisions G47 (retail trade, hereafter shops) and I56 (Food and beverage services, hereafter restaurants). As can be observed Spain and Portugal are the countries that concentrate the supply of shops and restaurants: Both together account for 54% of the shops and 56% of the restaurants.

Map 23 shows the regional distribution of the shops in the Atlantic Arc. The top twenty regions with the largest number of shops accumulate 58% of the total. Given the country distribution observed in Table 5, it is not surprising that no British destination can be found in this group, and that Dublin is the only Irish region. The first two positions are occupied by Lisboa and Porto with more than 27 thousand shops, and the third one is Gironde with far fewer shops (17 thousand). The

COUNTRY	Shops		Restaurants	
	Number	Percentage	Number	Percentage
France	102446	24%	46144	19.9%
Ireland	30133	7%	18954	8.2%
Portugal	116007	27.1%	65145	28%
Spain	115871	27%	65681	28.3%
UK	64378	15%	36432	15.7%
Atlantic Arc	428835	100%	232356	100%

Table 5. Distribution of shops and restaurants by country.

following six positions are occupied by the Spanish regions of Cádiz, A Coruña, Pontevedra, Bizkaia, Tenerife, and Asturias.

Concerning restaurants, data show that the top five destinations (Lisboa, Porto, A Coruña, Cádiz and Tenerife) concentrate over a quarter of the total number of locals. We may conclude again that it is not surprising that no British destination can be found in the group of the twenty regions with the largest number of restaurants, and that Dublin is the only Irish region. In addition to the five regions mentioned above, other regions in the group of the top twenty are Asturias, Pontevedra, the Basque Country, Gran Canaria and Cantabria in Spain, Algarve and Oeste in Portugal, and Gironde, Loire-A., Seine-M. and Bretagne in France.

3.2.4 Connectivity

The degree of connectivity in the Atlantic Arc destinations is analysed by means of air and maritime traffic. The regional distribution of these two indicators is shown in Maps 24 and 25.

We can see a lot of regions in red in Map 24, meaning that there is no air traffic. As a matter of fact, there are no airports in 47 destinations and only 19 regions received more than 2 million passengers in 2017. To conclude, the air traffic in the Atlantic Arc is very concentrated in a few destinations:

- The top two destinations (shade dark blue in the map), Dublin and Lisboa, monopolise 30% of the total traffic.

- Adding Tenerife, Gran Canarias and Porto, we reach 50.6% of the air traffic.

- Adding Algarve, Bristol, Lanzarote, Gironde, Fuerteventura, Antrim (Belfast) and Loire A., 76.3%.

- Adding Bizkaia, Liverpool, A Coruña and Madeira, we reach 85.3%.
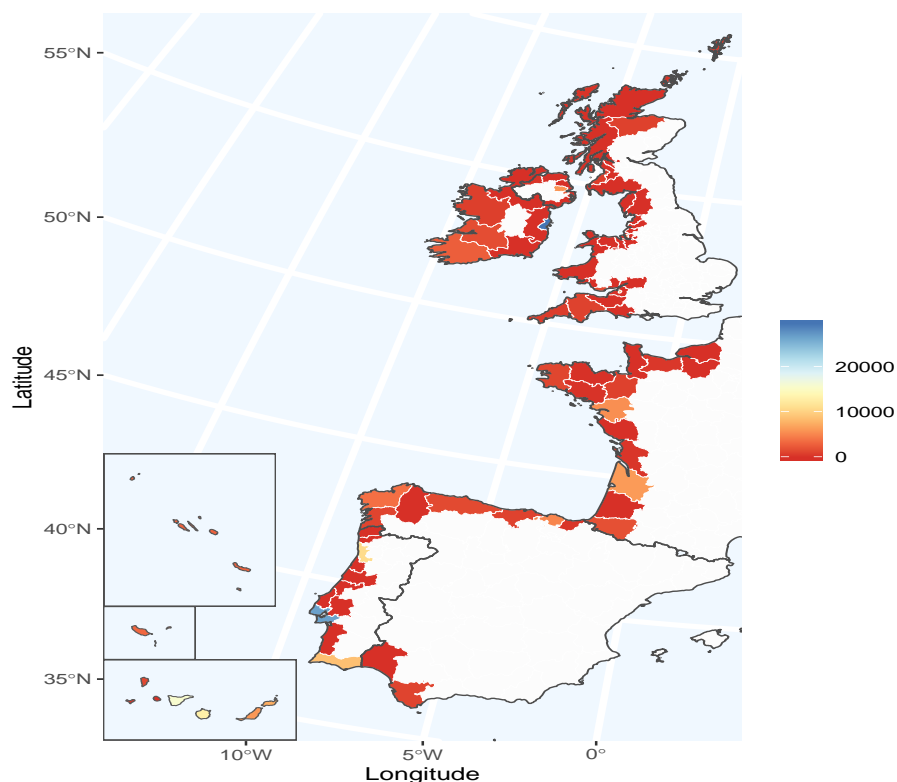
Figure 24. Air Passengers by NUTS3 regions (thousands).

We obtain similar results for maritime traffic. There is no traffic in 67 destinations and only 7 regions received more than 1 million passengers in 2017. To conclude, the maritime traffic in the Atlantic Area is very concentrated in a few destinations:

- Only the port of Algeciras in Cádiz represents 20% of the total passengers.

- The top two destinations (shaded dark blue in the map), Cádiz and Tenerife, monopolise 38% of the total maritime passenger traffic.

- Adding Isle of Anglesey and Dublin, we reach 51.6% of the maritime traffic.
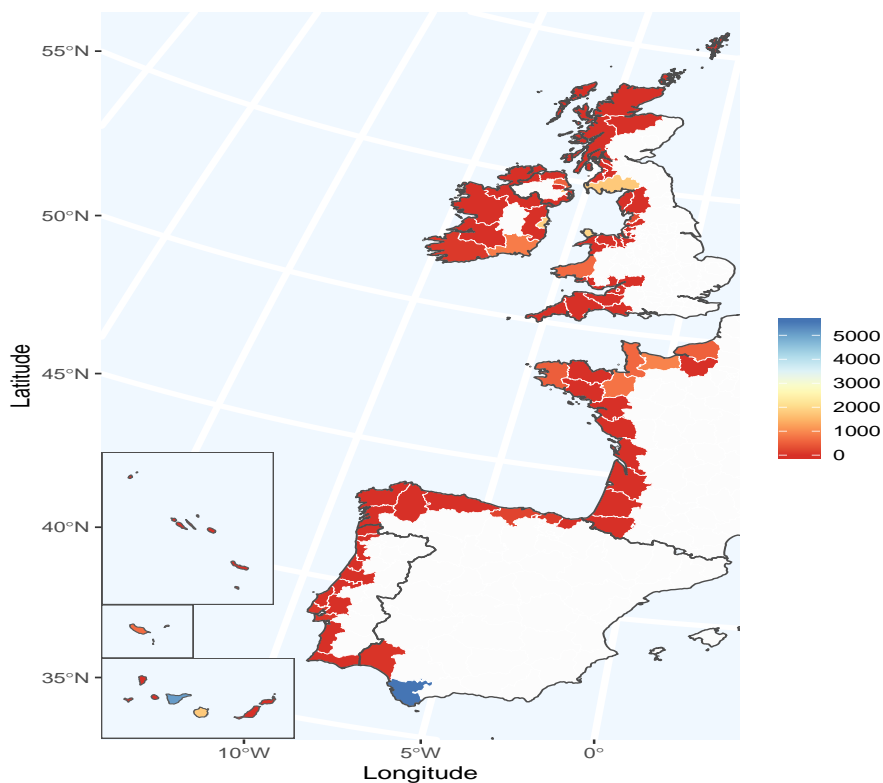
Figure 25. Port Passengers by NUTS3 regions (thousands)

- Adding Gran Canaria, Dumfries-Galloway, Belfast, Calvados, and South-East (IE), we reach 76%.

- Adding Ille-et-Vilaine, Sefton, Madeira, and South West Wales we reach 86.2%.

- Adding Manche, Mid and East Antrim, Seine-Maritime, Finistere, Plymouth, Bournemouth and Poole, Lancaster and Wyre, Cantabria, Bizkaia, and South-West (IE), we have almost 100%.
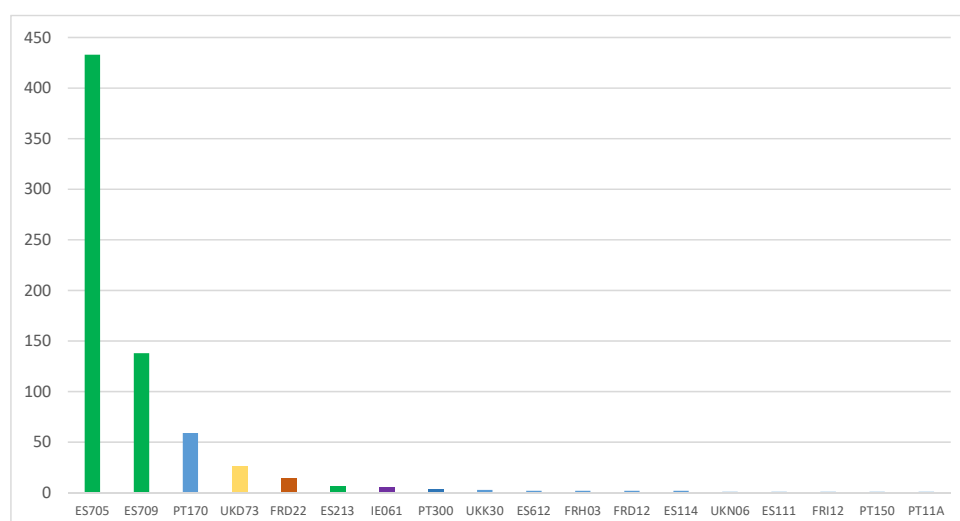
Figure 26. Cruise passengers by NUTS3 regions(thousands).

Cruising is a form of tourism in itself and an important sector for coastal regions and islands to attract. The European cruise market is one of the largest cruise markets in the world, ranking only behind North America for passenger numbers. According to Eurostat, in 2017, the number of passengers starting a sea cruise in the European Union (EU) reached 7.0 million, surpassing the previous peak of 6.9 million in 2012.

There is a small number of destinations in the Atlantic Arc that contribute to this type of tourist activity. All of them are represented in Figure 26. We may observe that cruise activity is concentrated in a very few destinations: Tenerife and Gran Canaria in Spain with 81.5% of the total cruise passengers, followed by Lisboa with 8%, Sefton, 4% and Seine M., 2%, and Bizkaia and Dublin that do not reach 1%.

4 Detection of tourist trans-regional clusters in the Atlantic Arc

The database constructed allows us not only to assess the relative size and the characteristics of the coastal tourism sector in the Atlantic Arc, but to discuss the appropriateness of a strategy of forming clusters at the national level *versus* a trans-national approach. Therefore, we considered it worth investigating whether the data indicates some degree of regional homogeneity that could be associated with the clusters.

In order to identify potential areas of regional homogeneity across the European Atlantic Arc, as reflected in regional similarities in indicators in the database, the method of cluster analysis [20] was chosen. Cluster analysis is a statistical technique that aims to form groups of similar entities, comparable to what is done in factor analysis but without specifying a particular statistical model or making any assumptions about the underlying distribution of the data. The most commonly used methods for this analysis are hierarchical and k-means clustering. k-Means clustering can be used if the number of clusters is pre-specified, but hierarchical clustering is the preferred choice for a small dataset, as it makes it easy to examine solutions with increasing numbers of clusters. For the analysis presented here, an agglomerative hierarchical clustering approach using Ward's method was adopted [23].

The creation and evolution of regional clusters might be the result of a process of polarization. For example, one of the possible consequences of European economic integration may be clustering effects leading to polarization processes, and these need not respect national borders. It can be argued that, during such polarization, neighbouring regions tend to share similar outcomes due to spatially related changes in socio-economic variables. To take these "neighbour effects" into account, a cross-regional and trans-national dimension should be added to European maritime policies. It is of interest to find evidence supporting or rejecting the hypotheses of nation-driven maritime clusters vs. cluster spillover across national boundaries in the case of coastal tourism.

The set of indicators used is classified as follows: demand (21 indicators), supply (18 indicators), amenities (17 indicators) and connectivity (6 indicators). [9] The demand indicators are split into three categories:

- Tourism flows, i.e., arrivals and overnight stays. Since not only the volume but the characteristics of arrivals/overnights are different by region, we include indicators that measure the share of international, coastal, rural, urban and campsite tourism.

- Tourism pressures, i.e., tourism density (arrivals/nights per km^2) and tourism intensity (arrivals/overnights per 1000 residents). In addition to the general indicators, we include some others that distinguish between tourism pressures due to international or domestic tourism, and in different geographical destinations (coastal, rural or urban).

- Efficiency. We include four indicators in this area, the occupation rate of the bed places and the length of stay, distinguishing between international and domestic tourism since both types of tourism usually show significant differences in this type of indicators.

The supply indicators are classified into four categories:

- Tourism industry capacity (bed places per km^2). It shows the capacity of the tourism industry and the geographical density of tourism supply. In addition to the general indicator tourism capacity indicator, we include four indicators more that measure tourism capacity in coastal, rural or urban locations and in campsites.

- Tourism industry intensity. It is measured as the ratio of bed places over resident population. This indicator shows the social intensity of tourism supply. We also consider the tourism industry intensity for coastal areas. Another indicator included in this area is the size of the tourism industry.

- Share of tourism in regional employment. This indicator measures the share of some tourism sectors (retail trade, transport, accommodation and food services) in the regional economy. It is a measure of the specialization of the region in the tourism sector or of the dependence of the regional economy on tourism.

- The density of some tourism services such as restaurants, hotels and shops.

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[9] The full list of indicators and their description may be found in appendix II.

The amenities indicators cover a number of areas such as the coastal qualities of the region (coastline and coastal area), Sites of Community Importance (Natura 2000), land covered by forests, the quality of the water in the bathing places and the number of blue flag awards, and the intensity of some attractions, such as World Heritage sites, shops, restaurants or land used for arts, entertainment and recreation activities. Lastly, the connectivity indicators are mainly related to air and port traffic.

To detect tourist trans-regional clusters in the Atlantic Arc, agglomerative hierarchical cluster analysis was conducted for the 99 NUTS 3 coastal European regions that belong to the Atlantic Arc using the 62 indicators included in the system (see Appendix II).

The rest of the chapter is organized as follows. The first section presents the clusters obtained for each vector, i.e., demand, supply, amenities and connectivity. In the second section the whole set of 62 indicators is studies jointly in order to get the global clusters, which take into account all the different aspects of tourism. Finally, a summary of the main findings is shown in the third section.

4.1   Identifying clusters by vector

In this section, we are going to present and explain the clusters obtained for each of the four areas of interest in the tourism sector: demand and supply sides, amenities and connectivity.

4.1.1   Tourism demand

Map 27 show the seven trans-regional clusters identified in the Atlantic Arc using the 22 indicators of tourism demand. The composition of each cluster is as follows.

- Cluster 1. Peninsular Spain, Ireland, France (except Vendee, Landes and Charente M.), Portugal (except Algarve, Madeira, Alentejo), Scotland (except Lochaber), English regions (except Cornwall, East Cumbria, and Devon), Scotland (except Lochaber) and Wales (except Gwynedd, Anglesey and South West Wales).

- Clusters 2. Algarve and the small Canary Islands (La Gomera, La Palma, Hierro), Madeira and Devon.

- Cluster 3. Fuerteventura and Lanzarote.

- Cluster 4. Gran Canaria and Tenerife.

- Cluster 5. Vendee, Landes and Charente M. in France, Alentejo in Portugal, and East Cumbria and Cornwall in England, Gwynedd, Anglesey and South West Wales in Wales, and Lochaber in the Highlands.

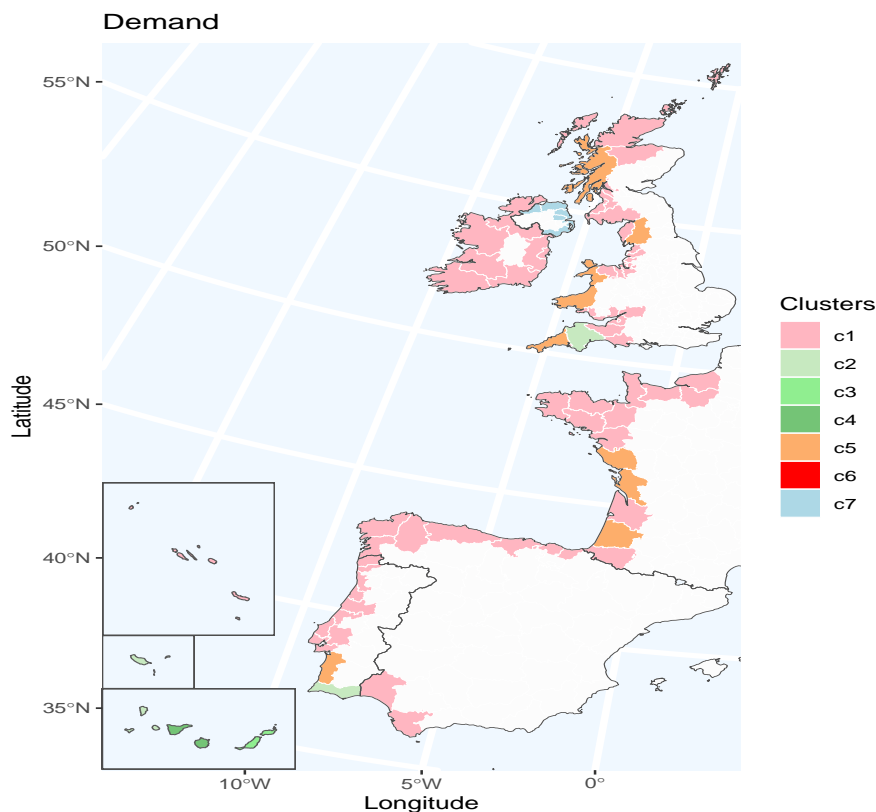- Cluster 6. Blackpool.

- Cluster 7. Northern Island.

Figure 27. Big Clusters: Demand vector.

We observe that the specific characteristics of Blackpool, a very important tourist resort with the smallest area in all the Atlantic Arc, are not similar to any other region. As a result, Blackpool is a one-element cluster. Another very specific cluster consists of the Northern Ireland regions.

We use the four first principal components that explain 70% of the variability in the 22 demand indicators to get some insights about the main factors that have influenced the generation of the clusters (see appendix IV).

The first component distinguishes between international and mostly coastal tourism with high intensities and densities versus domestic and rural tourism, i.e., Clusters 2, 3 and 4 versus Cluster 5. Note that Clusters 2, 3 and 4 together consist of the most popular regions for
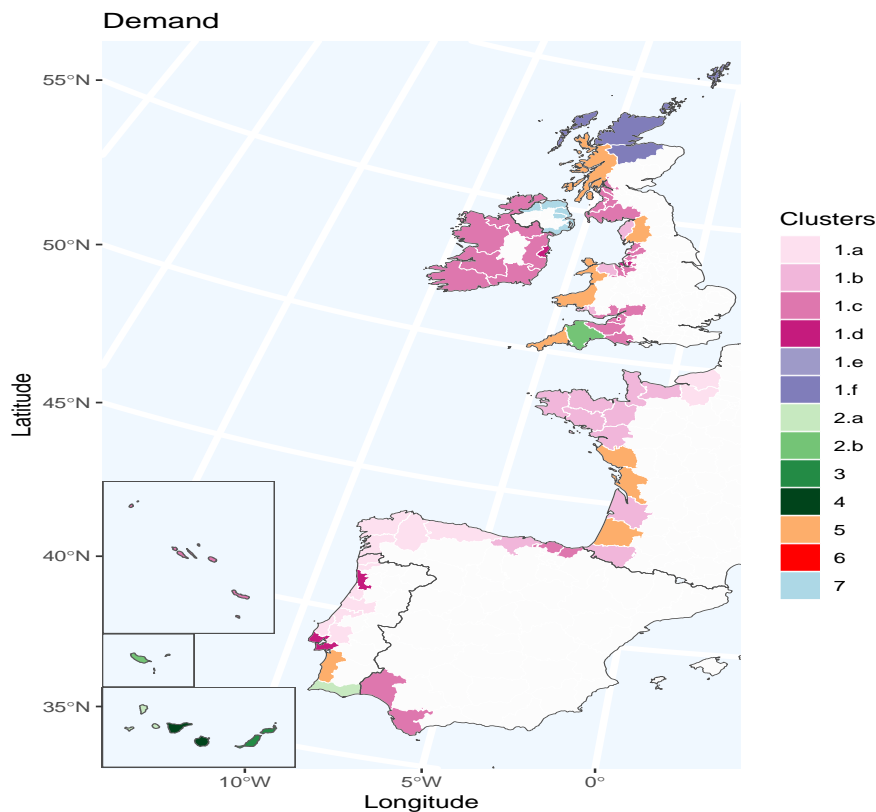
Figure 28. Small Clusters: Demand vector

foreign and coastal tourism such as the Canary Islands, Madeira, and Algarve and Devon, while cluster 5 contains the regions with the highest proportion of domestic and rural tourism, but with some intensity of tourism such as Cornwall, Vendee, Landes and Charente M. in France, or Lochaber in Scotland. The distinction between Clusters 2, 3 and 4 comes from other factors, such as the degree of tourism pressure, which is the highest in clusters 3 and 4, the importance of cruise tourism (cluster 4) and the high share of nights spent in hotel accommodations in regions like Madeira or Algarve.

Cluster 1 includes a large number of regions, those with less tourism pressure. In order to better analyse the composition of this cluster, it can be split into several sub-clusters as follows (see Map 28).

- Cluster 1.a: Asturias, Galicia, Haute Normandie, the North and Centre of Portugal (except Porto).

- Cluster 1.b: Cantabria in Spain, Basse Normandie, Bretagne, Loire-A., Pyrenees-At., and Gironde in France, West Cumbria, Plymouth, and East Wales (except Flintshire-Wrexham) in the UK.

- Cluster 1.c: Basque Country and Andalucía in Spain, Ireland (except Dublin), the Azores in Portugal, Lancashire (except Blackpool),

Cheshire, Gloucestershire, Wiltshire and Bath, Dorset and Somer-
set (except Bournemouth), East Wales, West Central and Southern
Scotland.

- Cluster 1.d: Dublin, Lisboa, Porto, Merseyside, Bristol and Bournemouth.

- Cluster 1.e: Torbay.

- Cluster 1.f: Highlands (except Lochaber).

We may detect some clear drivers in these subclusters. Note, for in-
stance, that cluster 1.d. is determined by urban tourism, while cluster
1.f is characterized by rural tourism of low density.

4.1.2   Tourism supply

Map 29 shows the five big trans-regional clusters detected, while Map
30 show the results obtained with a larger number of clusters. The
composition of the clusters identified in the Atlantic Arc using the 18
indicators of tourism supply is as follows.
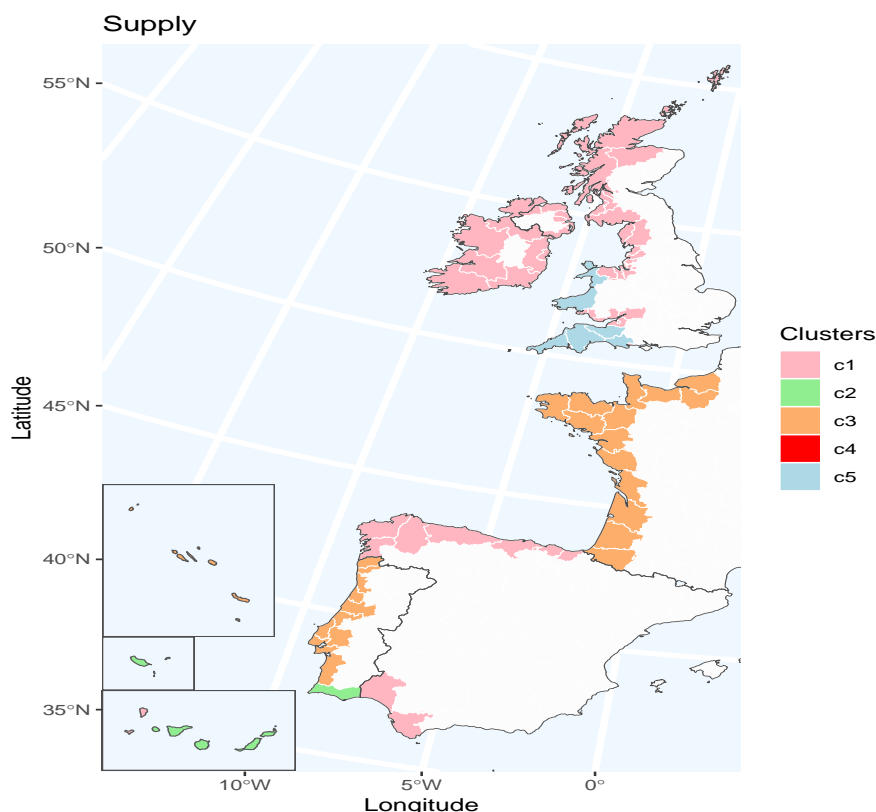

Figure 29. Big Clusters: Supply vector.

- Cluster 1: Peninsular Spain, La Palma and Hierro, Ireland, North-
  ern Ireland, Scotland, England (except Dorset, Somerset, Torbay
  and Devon) and Wales (except Anglesey, Gwynedd and South West
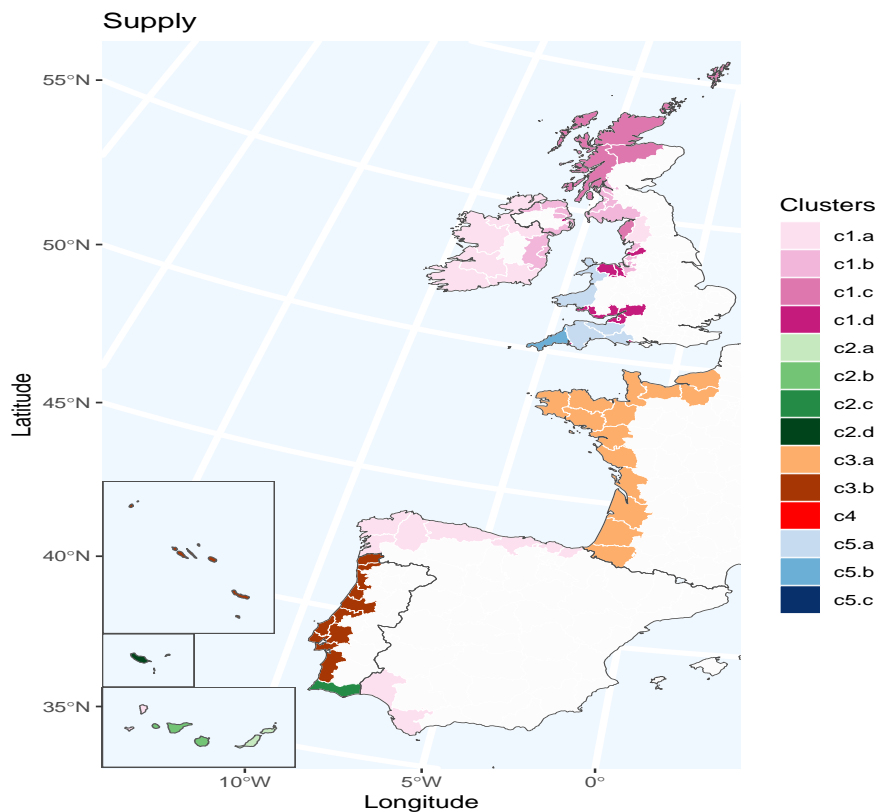 Wales).

Figure 30. Small Clusters: Supply vector

- Cluster 1.a: Peninsular Spain, La Palma and Hierro, Ireland (except Dublin and Mid-East) and East Cumbria.

- Cluster 1.b: Dublin and Mideast in Ireland and Northern Ireland (except Belfast), West Central and Southern Scotland, Lancashire, Cheshire, Merseyside (except Blackpool and Mid Lancashire).

- Cluster 1.c: West Cumbria and Highlands and Islands.

- Cluster 1.d: Mid Lancashire and Gloucestershire, Wiltshire and Bristol/Bath area, Bournemouth, Plymouth, and Wales (except Anglesey, Gwynedd and South West Wales), and Belfast.

• Cluster 2: Gran Canaria, Tenerife, Fuerteventura, Lanzarote, La Gomera, Algarve and Madeira.

- Cluster 2.a: Fuerteventura, Lanzarote.

- Cluster 2.b: Gran Canaria, Tenerife, La Gomera.

- Cluster 2.c: Algarve.

- Cluster 2.d: Madeira.

• Cluster 3: France and Portugal (except Algarve and Madeira).

- Cluster 3.a: France.

- Cluster 3.b: Portugal (except Algarve and Madeira).

- Cluster 4: Blackpool.

- Cluster 5: Cornwall, Dorset and Somerset and Devon (except Plymouth and Bournemouth) and Wales (Gwynedd, South West Wales and Anglesey).

  - Cluster 5.12: Dorset and Somerset and Devon (except Torbay, Plymouth and Bournemouth) and Wales (Gwynedd, South West Wales and Swansea).

  - Cluster 5.13: Cornwall.

  - Cluster 5.14: Torbay.

We observe again that the specific characteristics of Blackpool, a very important tourist resort with the smallest area in all the Atlantic Arc, are not similar to any other region. As a result, Blackpool is a one-element cluster.

The four first principal components explain 75% of the variability in the 18 supply indicators, and they help get some insights about the main factors that have influenced the generation of the supply clusters. The *size* effect represented by the first principal component (see appendix IV) is the main factor that determines the supply clusters. We find that regions in clusters 2, 4 and 5 (in this order) present very high values on this component. The second principal component opposes cluster 3 to the mass tourism regions of Madeira, Algarve and Canary Islands (cluster 2).

4.1.3 Tourism amenities

We have identified eight clusters with respect to the degree of attractiveness of the locations in terms of amenities (see Map 31).

The composition of the clusters is as follows.

- Cluster 1: North of Spain, peninsular Portugal, and Aquitaine.

- Cluster 2: the Canary Islands and Andalucía.

- Cluster 3: Basse Normandie, Bretagne and Poitou-Charentes in France.

- Cluster 4: Haute Normandie, Dublin, Cumbria, Lancashire, Cheshire, Gloucestershire, Wiltshire and Bath, Somerset, West Central and
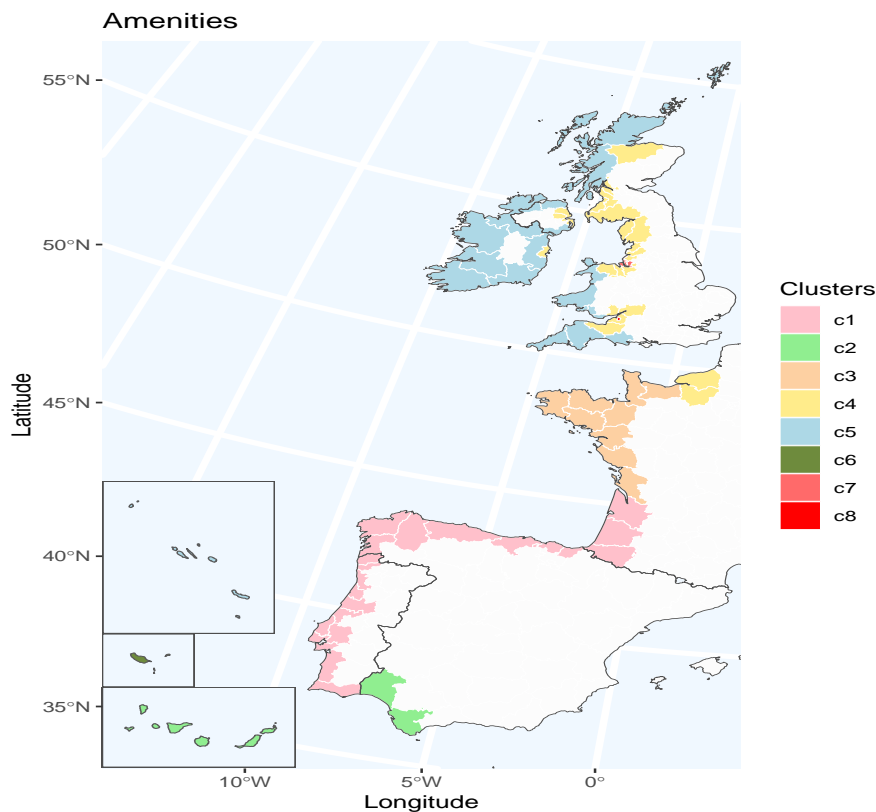
Figure 31. Clusters: Amenities vector

Southern Scotland and Inverness, Flintshire-Wrexham, Monmouthshire-Newport and Conwy-Denbighshire in Wales, and Northern Ireland (except Newry, Derry and Causeway Coast).

- Cluster 5: Azores, Ireland (except Dublin), Cornwall and Devon, Bournemouth and Dorset, Bristol, Plymouth and Torbay, Wales (except Monmouthshire-Newport, Flintshire-Wrexham and Conwy-Denbighshire), Highlands and Islands (except Inverness) and Newry, Derry and Causeway Coast in Northern Ireland.

- Cluster 6: Madeira.

- Cluster 7: Merseyside.

- Cluster 8: Bristol.

We observe that we detect two one-element clusters, Madeira and Bristol, and another very specific cluster, the Merseyside NUTS3 regions.

The first four principal components explain 62% of the variability of the amenities indicators (see their representation in appendix IV). The first principal component opposes the "good" amenities (excellent bathing places, blue flags, forests and tourist resources) to the "bad" amenities (poor bathing water quality, small coastal area, and recreational land). It is related to clusters 1, 2, 3 and 6 (in this order) on the

"good" side, and Merseyside and Bristol on the opposite one. The second principal component opposes the regions with larger protected areas (Madeira, Bristol and Canary Islands) to the rest of the regions, mainly Merseyside.

4.1.4 Connectivity

Map 32 shows the 6 clusters we have detected using the 6 connectivity indicators available on air and maritime traffic.
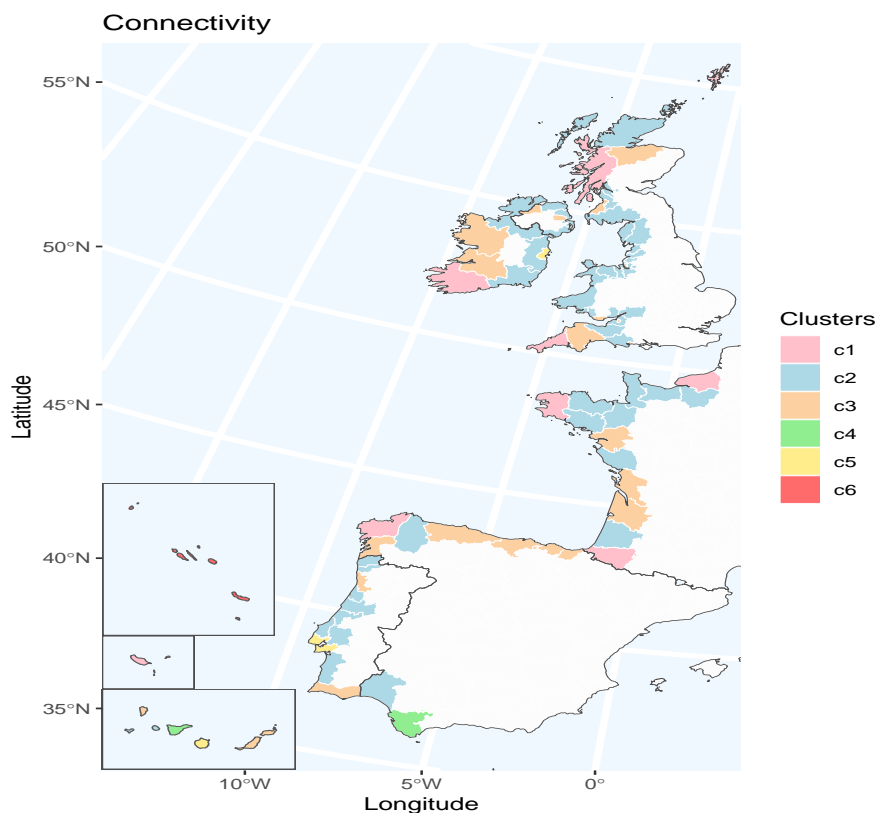

Figure 32. Clusters: Connectivity vector

The composition of the clusters is as follows.

- Cluster 1: A Coruña, Seine-Maritime, Finistere, and Pyrenees Atlantiques, South-West (IE), Madeira, Cornwall, Lochaber and the Shetland Islands.

- Cluster 2: Destinations with an almost null connectivity level: Lugo and Huelva, Hierro y La Gomera in Spain; peninsular Portugal (except cities Porto and Lisboa, and Algarve); Normandie (except Seine-Maritime), Bretagne (except Finistere), Vendee, and Landes in France; Border, Mid-East and South-East in Ireland; West Central and Southern Scotland (except S. Ayrshire), Cumbria, Lancashire, Cheshire and Merseyside (except Liverpool), Wales (except Cardiff), Gloucestershire, Wiltshire and Bath, Dorset, Somerset and Torbay in the UK.

- Cluster 3: North of Spain (except A Coruña), Lanzarote, Fuerteventura, and La Palma, Loire, Gironde, Charente M. in France, Western and Mid-West in Ireland, Algarve and Porto in Portugal, Liverpool, Bristol, Bournemouth, Devon, Cardiff, South Ayrshire, Inverness, Derry, and Antrim-Newtownabbey in the UK.

- Cluster 4: Cádiz and Tenerife

- Cluster 5: Gran Canaria, Dublin, Lisboa.

- Cluster 6: Azores

Given the information provided by the four principal components that explain 90%, the main factor that determines the creation of the clusters, is the *size* effect. Thus, we have cluster 4, 5, 6 and 1 versus clusters 3 and cluster 2 with almost zero connectivity. Another interesting aspect that characterizes the clusters is the combination of a high volume of traffic and few structures, that separates clusters 4 and 5 from cluster 6 (Azores). The third factor of interest is the opposition air traffic/port traffic. In this aspect, cluster 1 is more related to maritime traffic and cluster 3 to air traffic.

4.2 Tourism clusters in the Atlantic Arc

The joint analysis of the 62 tourism indicators available allows the identification of five large trans-regional clusters shown in Map 33. In addition to this, the information provided in Map 34, with a more disaggregated level of clustering, allows a more detailed analysis.

The composition of the clusters is as follows.

- Cluster 1: Peninsular Spain, Ireland (except Dublin) and Portugal (except Algarve and Madeira)

  - Cluster 1.a: Peninsular Spain, Ireland (except Dublin) and Porto, Lisboa and Azores in Portugal.

  - Cluster 1.b: Alentejo and the Norte and Centro of Portugal (except Porto)

- Cluster 2: Canary Islands, Algarve and Madeira

  - Cluster 2.a: La Gomera, La Palma and Hierro

  - Cluster 2.b: Fuerteventura, Lanzarote and Algarve

  - Cluster 2.c: Gran Canaria and Tenerife

  - Cluster 2.d: Madeira

- Cluster 3: France, East Cumbria, Cornwall, Anglesey, Gwynedd and South West Wales.

  – Cluster 3.a: France
  – Cluster 3.b: East Cumbria, Cornwall, Anglesey, Gwynedd and South West Wales

- Cluster 4: Dublin, UK (except Blackpool, East Cumbria, Cornwall, Anglesey, Gwynedd and South West Wales)

  – Cluster 4.a: Dublin, Bristol
  – Cluster 4.b: West Cumbria, Highlands and Islands
  – Cluster 4.c: UK: Western Central and Southern Scotland, Lancashire and Cheshire (except Blackpool), East Wales and Conwy-Denbighshire Bridgend-Neath Port Talbot and Swansea, Devon, Dorset and Somerset and Gloucestershire, Wiltshire and Bristol/Bath area (except Bristol).
  – Cluster 4.d: Merseyside
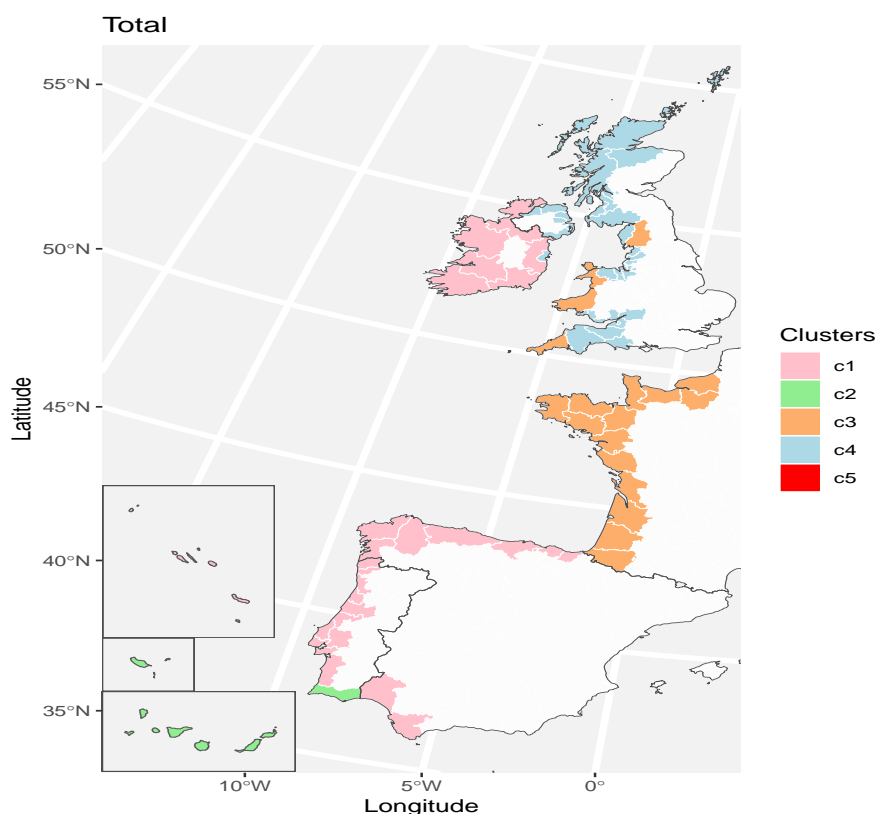 – Cluster 4.e: Northern Island

- Cluster 5: Blackpool

Figure 33. Big Trans-regional Tourism Clusters

In order to get some insights into the relationship between the regions in the clusters and the multiple variables used in the analysis, the
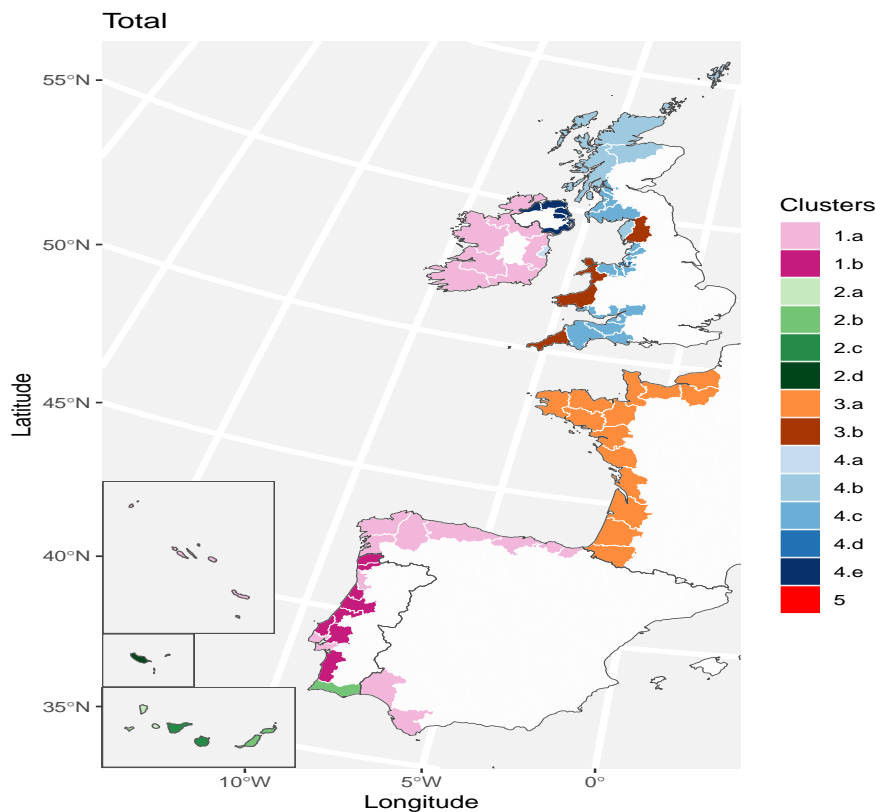
Figure 34. Small Trans-regional Tourism Clusters.

first two principal components can be used. Figure 35 displays the Atlantic destinations together with the indicators making up the two main principal components. We may observe that the regions lie on a parabola across the resulting principal plane, a distribution often called the horseshoe (or Guttman) effect. This appears when there is a strong scale dependence that is reflected in more than one factor [21], and the result is that, instead of two linear principal components, there is a single underlying non-linear factor defined by the way the regions are distributed along the parabola. In particular, regions that are most different lie at opposite ends of the parabola, in this case, Canary Islands (cluster 2) and Blackpool (cluster 5) with the rest of the regions in intermediate positions.

Figure 35 also displays the variables that are well represented by the first two principal components, and hence appear near the unit circle. Broadly, four large groups can be identified. The first is formed by variables with positive values on both principal axes (first quadrant of the plot): variables that represent international tourism mostly in coastal localities with a high degree of tourism pressure and a high percentage of employment in tourism-related sectors. Canary Islands, Madeira, and Algarve (cluster 2) and Wales and Cornwall (cluster 3.b) lie very close to these variables, indicating that they have values greater than the means. A second group is composed of variables with
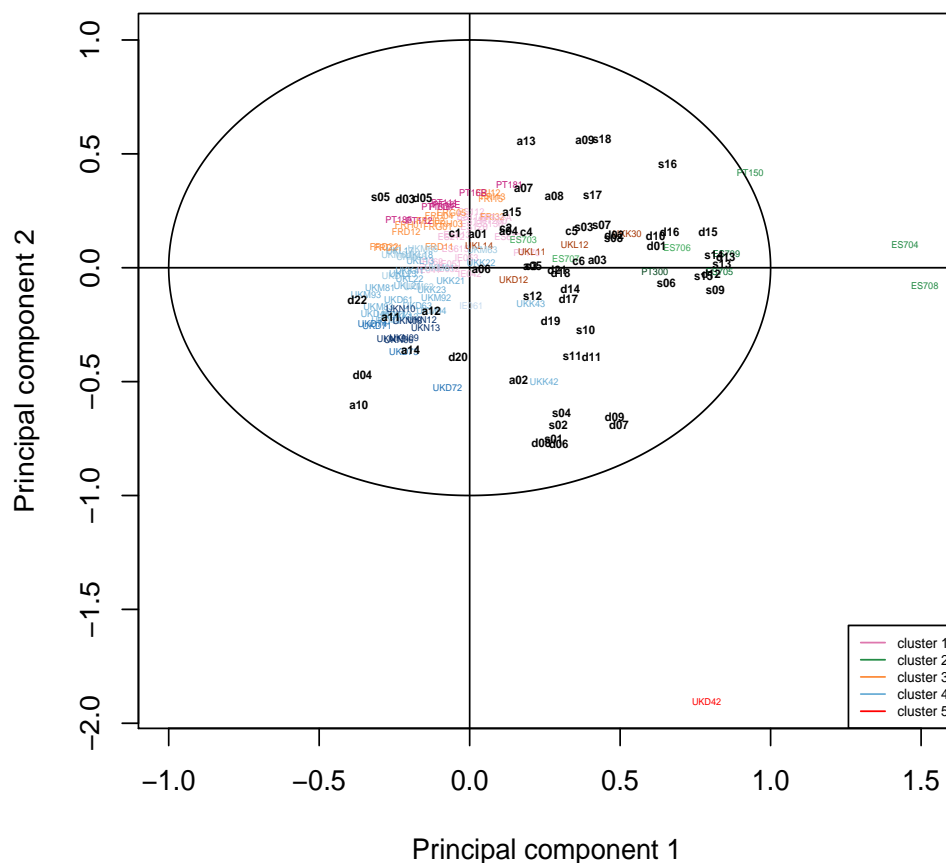
Figure 35. Principal Components 1 and 2.

negative values in the first principal axis and positive values in the second one (second quadrant of the plot). These variables are related to tourism in thinly populated areas and in campsites. In this case, the French regions (cluster 3.a.) and the Portuguese (except Porto, Lisboa, Algarve and the islands (Madeira and Azores)) lie close to these variables, indicating that they have values greater than the means. By contrast, the regions in the first quadrant of the plot have values below the means. The third group contains variables with negative values on both principal axes (third quadrant of the plot): indicators related to urban tourism with a high occupation rate (probably because there is little supply) and with bathing places with a poor water quality. The regions in clusters 4.c. and 4.e. and some of cluster 4.d. have high values of these variables. Finally, the fourth group of variables are projected in the fourth quadrant of the plot (positive values on the first axis and negative values on the second one. These indicators are related to high tourism demand density and high percentages of coastal

and urban tourism, which may be found in Blackpool (cluster 5) and some regions of cluster 4.c. (Torbay and Devon).

The analysis of the the first two principal components provides information on the different characteristics of tourist destinations, pointing to different tourism specializations in the Atlantic Arc. A "sun and sand" tourism in the first group, more rural tourism, mainly using campsites in the second group, and highly urban and dense tourism in the fourth group. The third group would consists of the regions with the least tourist appeal.

4.3   Summary

Table 6 summarizes the main findings of this study concerning the analysis of trans-regional clustering in the Atlantic Arc. The first column shows the regions that make up each cluster or grouping, while the second column shows the country they belong to. Columns 3 to 7 display the results obtained using cluster analysis for the whole set of data (column 3) and each of the four vectors considered in this study (columns 4 to 7). Finally, the last column assigns a group number to each set of "similar" regions.

We first set out to test the hypotheses of nation-driven maritime clusters vs. cluster spillover across national boundaries in the case of coastal tourism. As a result of our analysis, mostly nation-driven maritime and coastal clusters were found to be strongly supported by the data, as can be seen in Table 6. A quick analysis of this table leads to the conclusion that we can detect eight big groupings of regions in the Atlantic Arc, most of them nation-oriented. The only exception is the group formed by the Canary Islands, Algarve and Madeira. These destinations have in common that they are mass tourism, sun and beach destinations, with a high concentration of hotels and resorts, and a high dependence on tourism of their economies.

A global analysis of all the results obtained, summarised in table 6, allows for a detailed characterisation of the five trans-regional tourist clusters that we have detected in the Atlantic Area.

Cluster 1: Groupings 1 to 5. It is formed by the Spanish and Portuguese peninsular regions, except for Algarve, and the Irish regions, except for Dublin. In general, it is characterised by a medium

Cluster	C	Total	Supply	Demand	Amenities	Connect	Grouping
ES.North	ES	1a	1	1	1	3	1
ES.Andalucía	ES	1a	1	1	2	2+4	2
IE (-Dublin)	IE	1a	1	1	5	2+3	3
PT.Porto.Lisboa.Azores	PT	1a	3	1	1+5		4
PT.Peninsule (-cities-Algarve)	PT	1b	3	1	1	2	5
ES.Canary Islands	ES	2abc	1+2	234	2	3	6-7-8-9
PT.Algarve	PT	2b	2	2	1	3	7
PT.Madeira	PT	2d	2	2	6	1	10
FR. North	FR	3a	3	1	4		11
FR. Centre	FR	3a	3	1	3	2	12
FR. Aquitaine(-Landes)	FR	3a	3	1	1		13
FR. South (-Aquitaine+Landes)	FR	3a	3	5	3	2	14
Wales.C + Cornwall + E.Cumbria	UK	3b	5	5	5	2	15
IE. Dublin + UK. Bristol		4a	1	1			16
Scotland.North + W.Cumbria	UK	4b	1	1	5	2	17
Scotland.CS + Lancashire + Cheshire	UK	4c	1	1	4	2	18
Wales-C+SW - Devon - Cornwall - Somerset + Plymouth	UK	4c	1	1	4+5	2	19
UK.Devon, Somerset, Gloucestershire - Plymouth	UK	4c	5	1	5	2	20
UK. Merseyside	UK	4d	1	1	7	2	21
UKN. Northern Ireland	UK	4e	1	7	4+5	2	22
UK. Blackpool	UK	5	4	6	4	2	23

Table 6. Trans-regional clusters in the Atlantic Arc. A summary.

or high degree of connectivity, with good amenities and a medium intensity and density of demand and tourist supply. There is one exception, cluster 1.b (Portuguese regions without the cities Porto and Lisboa) which have below-average demand and supply intensity and density and low connectivity. There is also an important urban tourism component in the regions of the Basque Country in Spain, in Porto and Lisboa and to a lesser extent in the regions of Ireland.

Cluster 2: Groupings 6 to 10. It is made up of the Madeira and Canary Islands and the Algarve. It is characterized by very high con-

nectivity (except for the smallest islands), good amenities with many Natura 2000 sites, very high intensity and density of demand and large tourist accommodation supply. In addition to this, the weight of the tourist sector in the economy is very high, especially in the Canary Islands.

Cluster 3: Groupings 11 to 15. It includes all the French regions and the British regions of East Cumbria, Cornwall and West-Center Wales (Gwynedd, Anglesey and South West Wales). The common feature in this cluster is the high weight of rural and campsite tourism. Analyzing the French regions, we may observe that going down from north to south, the amenities improve from medium quality to good, the intensity and density of demand gradually move from low to high, and something similar happens with tourist supply, which is very low in the north and becomes medium-high in the southern regions. The British regions in cluster 3.b are characterized by a supply of medium quality amenities with a good number of Natura 2000 sites, high demand intensity and density values and an above-average level of accommodation places, especially in Cornwall, which has a significant rural and campsite supply.

Cluster 4: Groupings 16 to 22.

> **Grupos 17, 18, 21 y 22:** It is made up of virtually all the regions in the North West of England (except East Cumbria, Mid Lancashire and Blackpool) along with Scotland y North Ireland. These regions are characterised by low connectivity, poor amenities, low or very low intensity and density of tourism demand and low tourism supply. However, the weight of tourism employment in these regional economies is above average.

> **Grouping 16:** The cities of Dublin and Bristol have medium intensity and density of tourism demand with an urban accent and a low-medium tourism supply. In addition to that, the quality of their amenities is quite low, while they are very well connected.

> **Groupings 19 and 20:** It is made up of Wales (except West-Center Wales) and the South West of England. The main features of these regions are medium intensity and density of tourism demand, a low tourist supply that grows as you go south. The quality of the amenities offered is quite good.

Cluster 5: Grouping 23. Blackpool. This is a region with not many similarities with the rest. It is a one-element cluster in the demand

and supply vectors. This region is characterized by very high intensity and density of tourism demand with a strong urban accent and a large tourism supply. However, the weight of tourist employment in the regional economy is much lower than average. In addition to this, Blackpool shows low-quality amenities and a low degree of connectivity.

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Appendix I: Atlantic Arc: NUST3 regions

Country	NUTS3 Region		Country	NUTS3 Region	
France	FRD11	Calvados	United Kingdom	UKD11	West Cumbria
	FRD12	Manche		UKD12	East Cumbria
	FRD21	Eure		UKD42	Blackpool
	FRD22	Seine-Maritime		UKD44	Lancaster and Wyre
	FRG01	Loire-Atlantique		UKD45	Mid Lancashire
	FRG05	Vendee		UKD47	Chorley and West Lancashire
	FRH01	Cotes-d'Armor		UKD61	Warrington
	FRH02	Finistere		UKD63	Cheshire West and Chester
	FRH03	Ille-et-Vilaine		UKD71	East Merseyside
	FRH04	Morbihan		UKD72	Liverpool
	FRI32	Charente-Maritime		UKD73	Sefton
	FRI12	Gironde		UKD74	Wirral
	FRI13	Landes		UKK11	Bristol
	FRI15	Pyrenees-Atlantiques		UKK12	Bath and North East Somerset, North Somerset and South Gloucestershire
Ireland	IE041	Border		UKK13	Gloucestershire
	IE042	Western		UKK21	Bournemouth and Poole
	IE051	Mid-West		UKK22	Dorset CC
	IE052	South-East		UKK23	Somerset
	IE053	South-West		UKK30	Cornwall and Isles of Scilly
	IE061	Dublin		UKK41	Plymouth
	IE062	Mid-East		UKK42	Torbay
Portugal	PT111	Alto Minho		UKK43	Devon CC
	PT112	Cavado		UKL11	Isle of Anglesey
	PT11A	Porto		UKL12	Gwynedd
	PT150	Algarve		UKL13	Conwy and Denbighshire
	PT16B	Oeste		UKL14	South West Wales
	PT16D	Regiao de Aveiro		UKL17	Bridgend and Neath Port Talbot
	PT16E	Regiao de Coimbra		UKL18	Swansea
	PT16F	Regiao de Leiria		UKL21	Monmouthshire and Newport
	PT170	Lisboa		UKL22	Cardiff and Vale of Glamorgan
	PT181	Alentejo Litoral		UKL23	Flintshire and Wrexham
	PT185	Leziria do Tejo		UKM61	Caithness, Sutherland and Ross, Cromarty
	PT200	Azores		UKM62	Inverness, Nairn and Moray, Badenoch, Strathspey
	PT300	Madeira		UKM63	Lochaber, Skye, Lochalsh, Arran, Cumbrae and Argyll, Bute
Spain	ES111	A Coruña		UKM64	Eilean Siar (Western Isles)
	ES112	Lugo		UKM65	Orkney Islands
	ES114	Pontevedra		UKM66	Shetland Islands
	ES120	Asturias		UKM81	East Dunbartonshire, West East Dunbartonshire, West Dunbartonshire and Helensburgh, Lomond
	ES130	Cantabria			
	ES212	Gipuzkoa		UKM83	Inverclyde, East Renfrewshire and Renfrewshire
	ES213	Bizkaia		UKM92	Dumfries, Galloway
	ES612	Cadiz		UKM93	East Ayrshire and North Ayrshire mainland
	ES615	Huelva		UKM94	South Ayrshire
	ES703	El Hierro		UKN06	Belfast
	ES704	Fuerteventura		UKN08	Newry, Mourne and Down
	ES705	Gran Canaria		UKN09	Ards and North Down
	ES706	La Gomera		UKN10	Derry City and Strabane
	ES707	La Palma		UKN12	Causeway Coast and Glens
	ES708	Lanzarote		UKN13	Antrim and Newtownabbey
	ES709	Tenerife		UKN15	Mid and East Antrim

Appendix II: Tourism Indicator System

D1. International Tourism Rate	Non-residents arrivals over Total arrivals (%)
D2. Coastal Tourism Rate	Coastal overnight stays over Total nights (%)
D3. Rural Tourism Rate	Overnight stays in thinly populated areas over Total nights (%)
D4. Urban Tourism Rate	Overnight stays in densely populated areas over Total nights (%)
D5. Campsite Tourism Rate	Overnight stays in campsites over Total nights (%)
D6. Total Tourism Density	Total Arrivals per km^2
D7. International Tourism Density	Non-residents arrivals per km^2
D8. Domestic Tourism Density	Residents arrivals per km^2
D9. Coastal Tourism Density	Coastal overnight stays per km^2 of coastal area
D10. Rural Tourism Density	Overnight stays in thinly populated areas per km^2 of total thinly populated area
D11. Urban Tourism Density	Overnight stays in densely populated areas per km^2 of total densely populated area
D12. Total Tourism Intensity	Total Arrivals per 1000 inhabitants
D13. International Tourism Intensity	Non-residents Arrivals per 1000 inhabitants
D14. Domestic Tourism Intensity	Residents arrivals per 1000 inhabitants
D15. Coastal Tourism Intensity	Coastal overnight stays per 1000 inhabitants
D16. Rural Tourism Intensity	Overnight stays in thinly populated areas per 1000 inhabitants
D17. Urban Tourism Intensity	Overnight stays in densely populated areas per 1000 inhabitants
D18. Cruise traffic	Cruise passengers per inhabitant
D19. Length of stay	Total overnight stays over total arrivals
D20. International Length of stay	Non-resident overnight stays over non-resident arrivals
D21. Domestic Length of stay	Resident overnight stays over resident arrivals
D22. Occupation rate	Daily overnight stays over Bed places available

Table B1. Indicator System: Demand.

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S1. Tourism Industry Capacity	Total Bed places per km^2
S2. Coastal Capacity Rate	Coastal Bed places per km^2 of coastal area
S3. Rural Capacity Rate	Bed places in thinly populated areas per km^2 of total thinly populated area
S4. Urban Capacity Rate	Bed places in densely populated areas per km^2 of total densely populated area
S5. Camping Capacity Rate	Bed places in campsites per km^2
S6. Tourism Industry Intensity	Total Bed places per 1000 inhabitants
S7. Coastal Tourism Industry Intensity	Coastal Bed places per 1000 inhabitants in the coast
S8. Tourism Industry Size	Total Bed places per 1000 inhabitants over Total accommodation establishments
S9. Employment G-I	Share of employment in sectors G-I over total employment
S10. Employment G	Share of employment in sector G over total employment
S11. Employment G47	Share of employment in division G47 over total employment
S12. Employment H	Share of employment in sector H over total employment
S13. Employment I	Share of employment in sector I over total employment
S14. Employment I55	Share of employment in sector I55 over total employment
S15. Employment I56	Share of employment in sector I56 over total employment
S16. Tourism Services: Restaurants	Number of locals in sector I56 over Population
S17. Tourism Services: Hotels	Number of locals in sector I55 over Population
S18. Tourism Services: Shops	Number of locals in sector G47 over Population

Table B2. Indicator System: Supply.

A1. Length of coast	Length of coast (km)
A2. Coastal Area	Area of the coastal municipalities over total area

A3. Sites of Community Importance	Number of SCI per km^2
A4. Marine SCI	Number of Marine SCI per length of coast
A5. SCI Area	Area of the SCI per km^2
A6. Marine SCI Area	Area of the Marine SCI per length of coast

A7. Blue Flags Awards	Number of Blue Flag awards per length of coast
A8. Bathing places	Number of Bathing places per length of coast
A9. Excellent Bathing places	Bathing places with excellent quality of water (%)
A10. Good Bathing places	Bathing places with good quality of water (%)
A11. Sufficient Bathing places	Bathing places with sufficient quality of water (%)
A12. Poor Bathing places	Bathing places with poor quality of water (%)

A13. Land covered by forest	Land covered by Forest per km^2
A14. Land for ars, enterteinment, recreation	Land covered by recreational activities per km^2

A15. World Heritage Sites	Total number of World Heritage Sites
A16. Restaurants	Number of locals in sector I56 over Population
A17. Shops	Number of locals in sector G47 over Population

C1. Ports	Total number of ports
C2. Main Ports	Number of big ports ($\geq$ 200,000 passengers)
C3. Port Traffic	Total number of passengers in all ports

C4. Airports	Total number of airports
C5. Main Airports	Number of big airports ($\geq$ 200,000 passengers)
C6. Airport Traffic	Total number of passengers in all airports

Table B3. Indicator System: Amenities and Connectivity

MOSES

Appendix III: Data Sources

Most of the data on the tourist indicators comes from Eurostat statistics as shown in the table below. Note that some data are available at NUTS3 regions, which is the geographical scale chosen for this study, while others are available at different geographical scales, higher (NUTS2 regions) or smaller (airport, port, sites, ...). Moreover, any missing data at any level for year 2017 has been imputed using information from previous years.

Source		Variables	Level
Eurostat	Regional Tourism Statistics	Arrivals, Overnights, Beds, Establishments	NUTS2
	Regional Structural Business Statistics	Local units, Employment	NUTS2
	Regional Business Demography	Enterprises, Employment	NUTS3
	Transport	Air passengers	Main airport
	Transport	Maritime passengers, Cruise passengers	Port
	Land Use and Cover Area frame Survey	Land use forests and arts, entertainment and recreation	NUTS2
	European database on Natura 2000 sites and the Official Journal of the European Union	SIC	Sites
	Bathing Water Directive: Status of bathing water (European Environment Agency)	Bathing places (excellent, good, ...)	Bathing places
	Regional Demographic Statistics	Area, Population	NUTS3
	Regional Economic Accounts (Branch and Household Accounts)	GVA, Employment, GDP *per capita*	NUTS3
Others	World Heritage sites website	Sites	Sites
	Country websites on blue Flags	Number of flags	NUTS3
	Country Statistics Offices (CSO)	Arrivals, overnights, beds, establishments	NUTS3

Regulation (EU) 692/2011 foresees the collection of regional tourism statistics at the NUTS 2 level; tourism statistics are therefore no longer collected for regions at the NUTS 3 level (from 2012 onwards). Therefore, it has been necessary to apply some disaggregation methods to construct the database at NUTS3 level for year 2017. To estimate NUTS3 level indicators from NUTS2 level indicators we have used tourism data on overnights (for demand) and bed places (for supply) from the following Country Statistical Offices:

- Spain. Instituto Nacional de Estadistica (INE), EUSTAT, Instituto Galego de Estadistica, Instituto de Estadistica y Cartografia de Andalucia, Instituto Canario de Estadistica.

- Ireland. Central Statistical Office.

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- France. Institute National de la statistique et des etudes economiques (INSEE).

- Portugal. Instituto Nacional de Estatistica (Statistics Portugal). Estatisticas do Turismo, 2017.

- UK. Northen Ireland Statistics and Research Agency.

If the data is collected at a smaller geographical level, the data for the NUTS3 regions have been computed by aggregation.

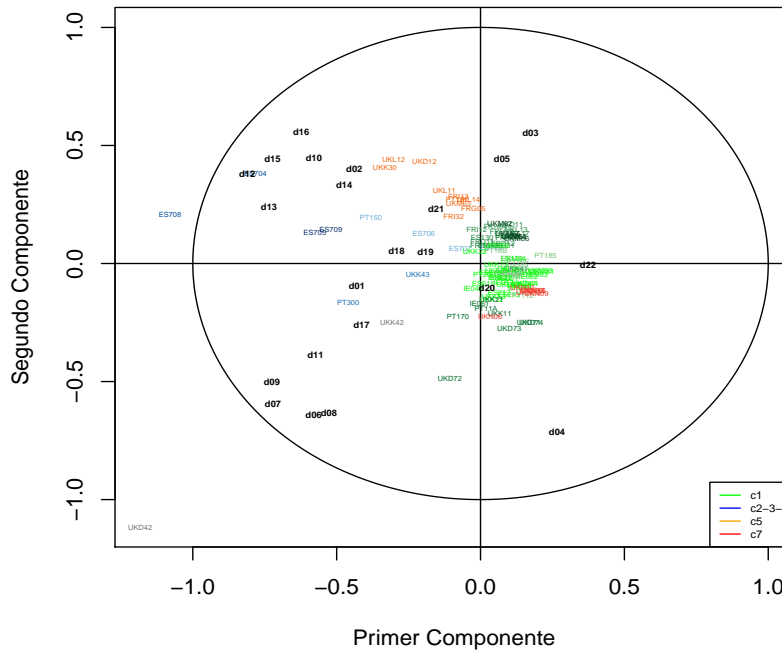# Appendix IV: Principal Componets

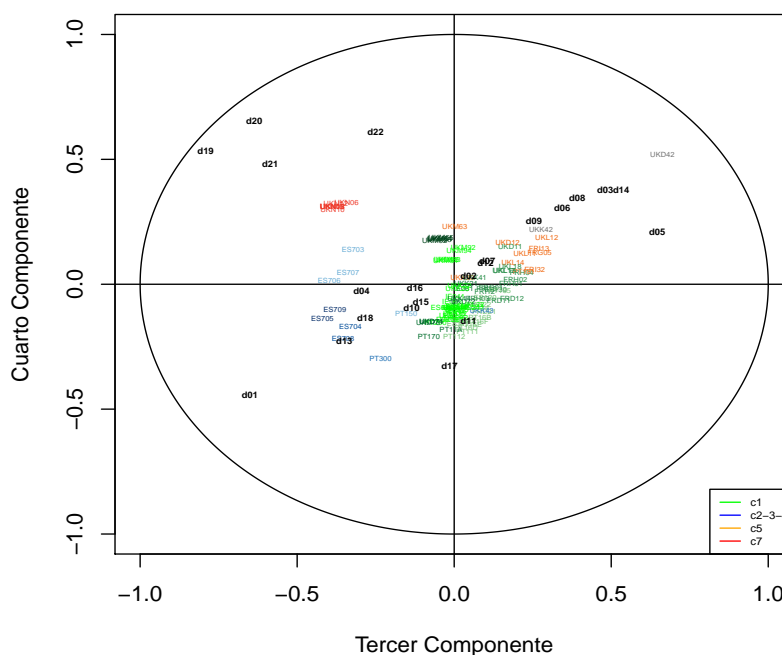## Principal Components Planes

Figure D1. Demand: Principal Components 1 and 2.

Figure D2. Demand: Principal Components 3 and 4.
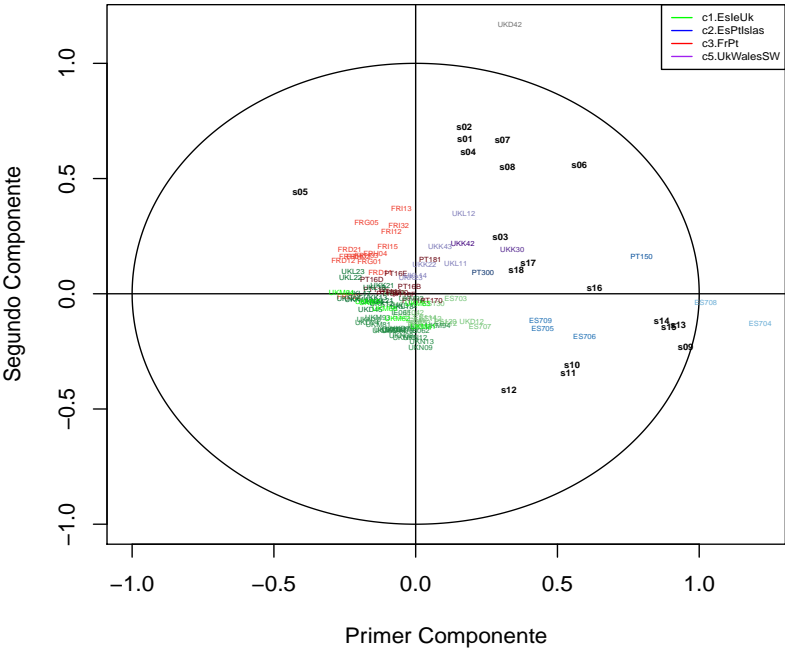
Figure D3. Supply: Principal Components 1 and 2.
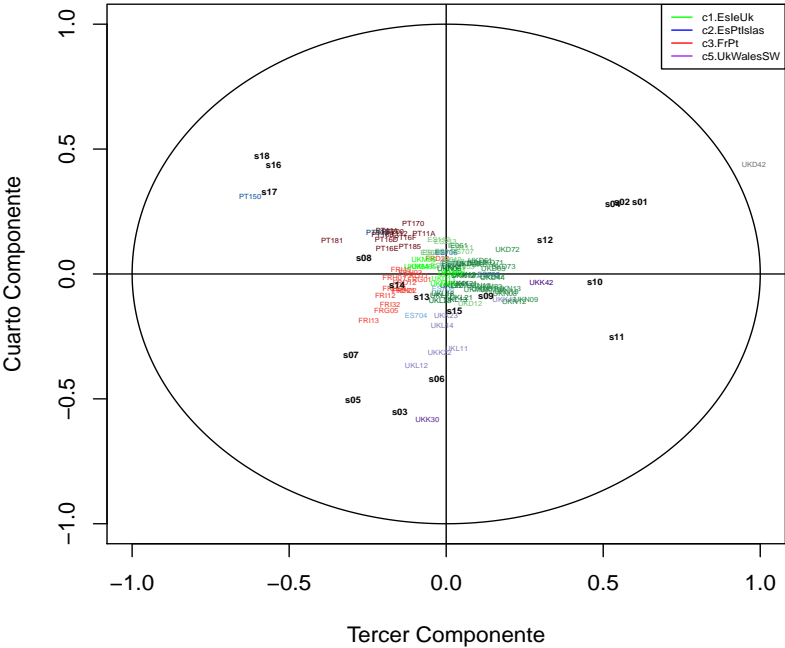
Figure D4. Supply: Principal Components 3 and 4.
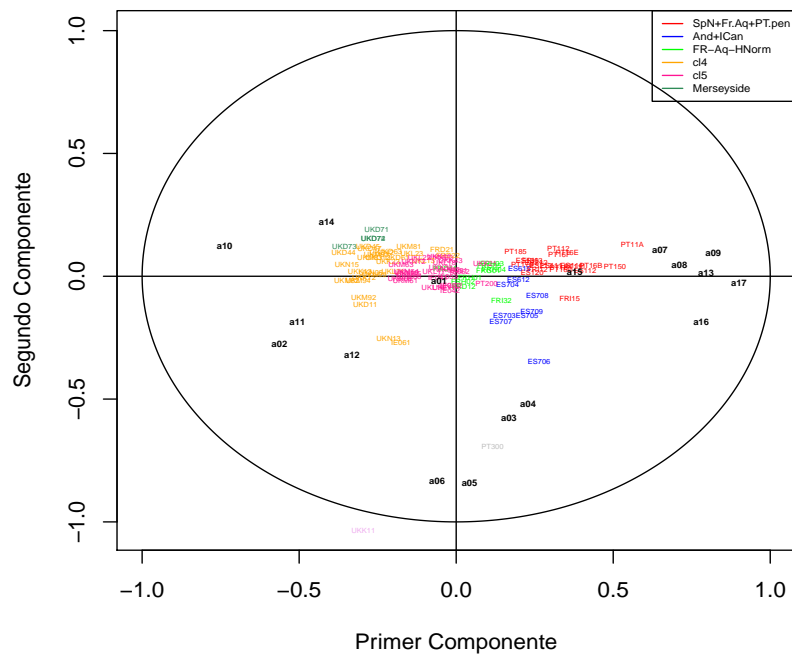
Figure D5. Amenities: Principal Components 1 and 2.
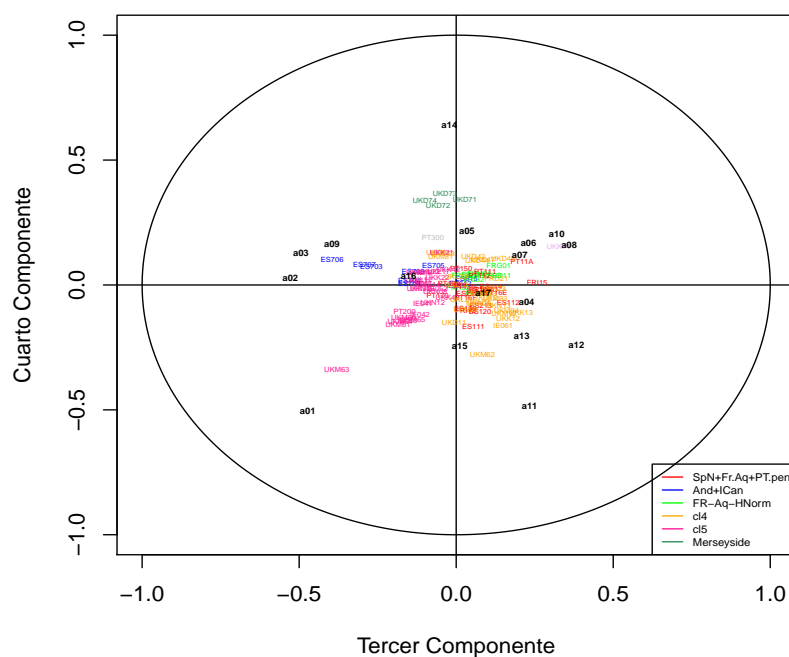
Figure D6. Amenities: Principal Components 3 and 4.
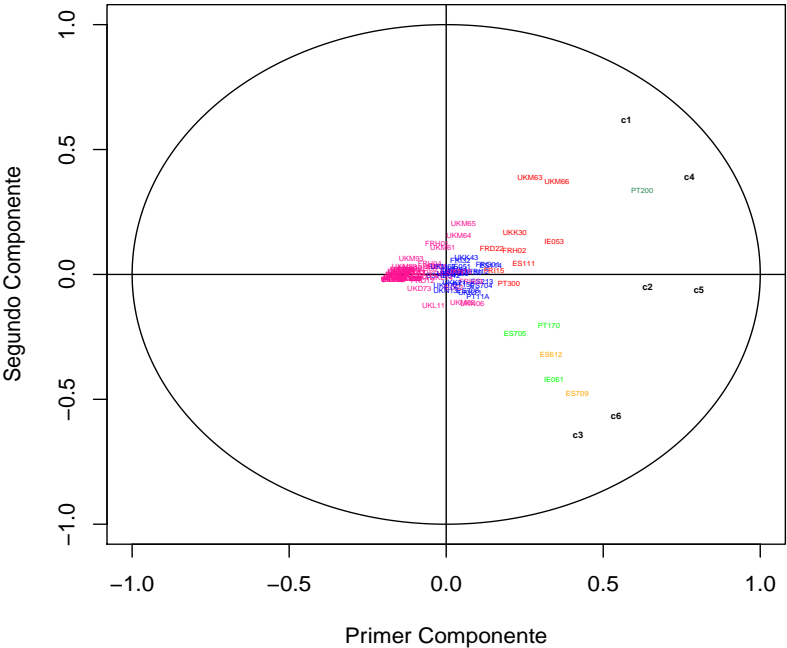
Figure D7. Connectivity: Principal Components 1 and 2.
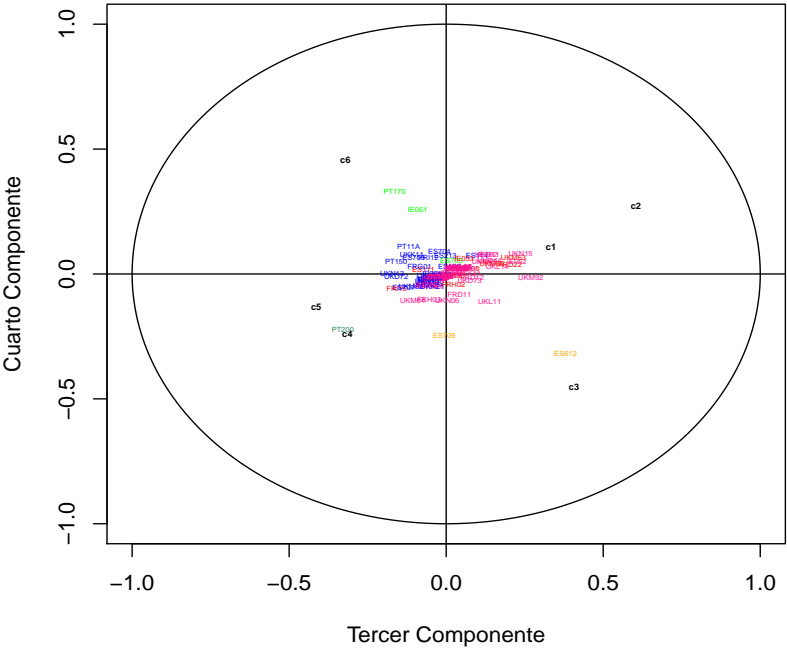
Figure D8. Connectivity: Principal Components 3 and 4.
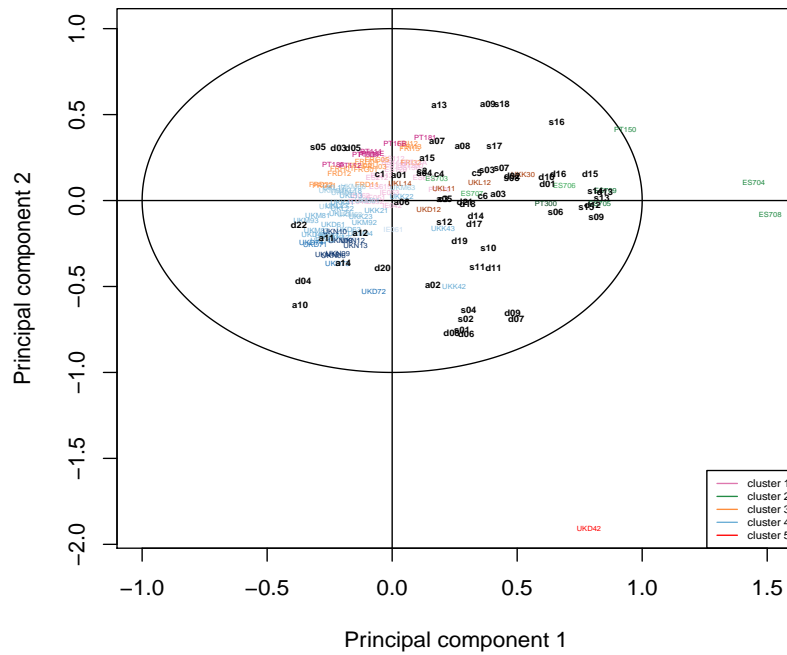
Figure D9. Connectivity: Principal Components 1 and 2.
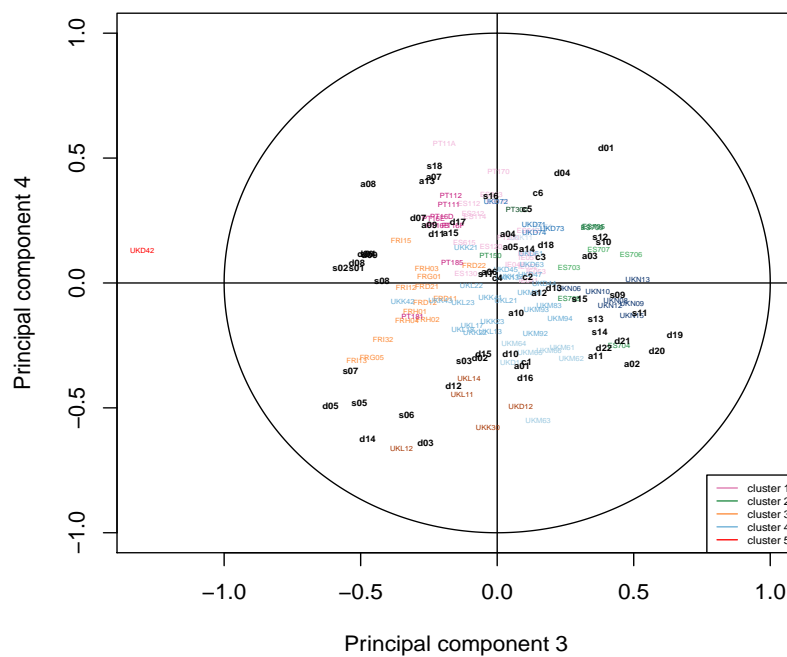
Figure D10. Connectivity: Principal Components 3 and 4.

Hierarchical clustering: Dendograms
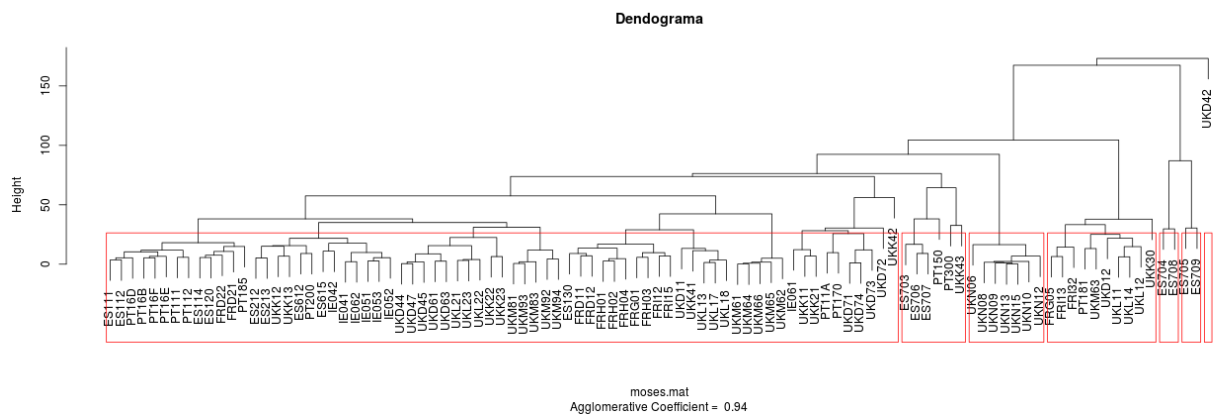
Figure D11. Demand: Dendogram (seven clusters).
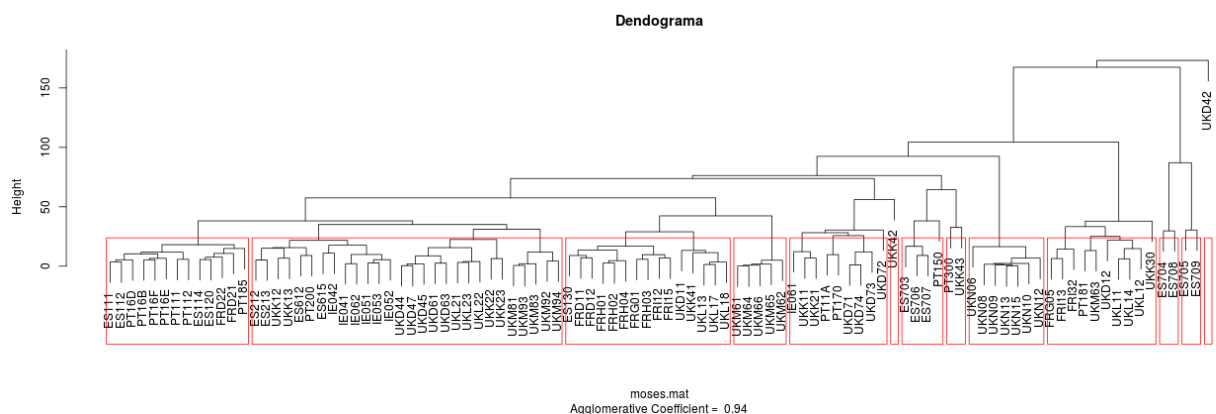
Figure D12. Demand: Dendogram (thirteen clusters).
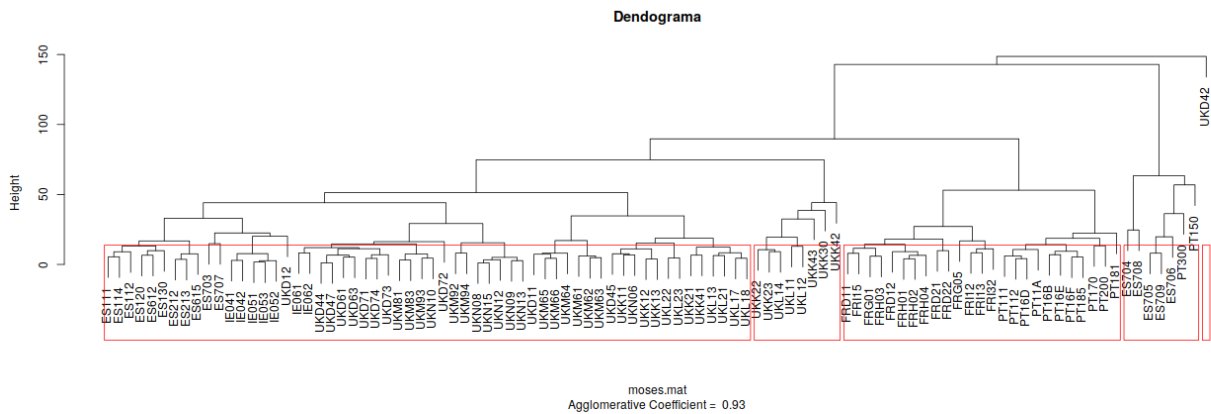
Figure D13. Supply: Dendogram (five clusters).
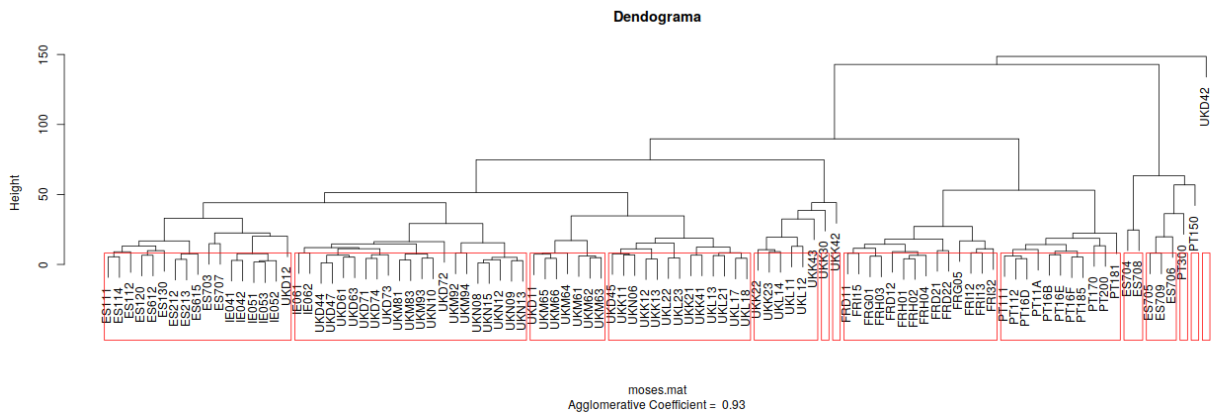
Figure D14. Supply: Dendogram (fourteen clusters).
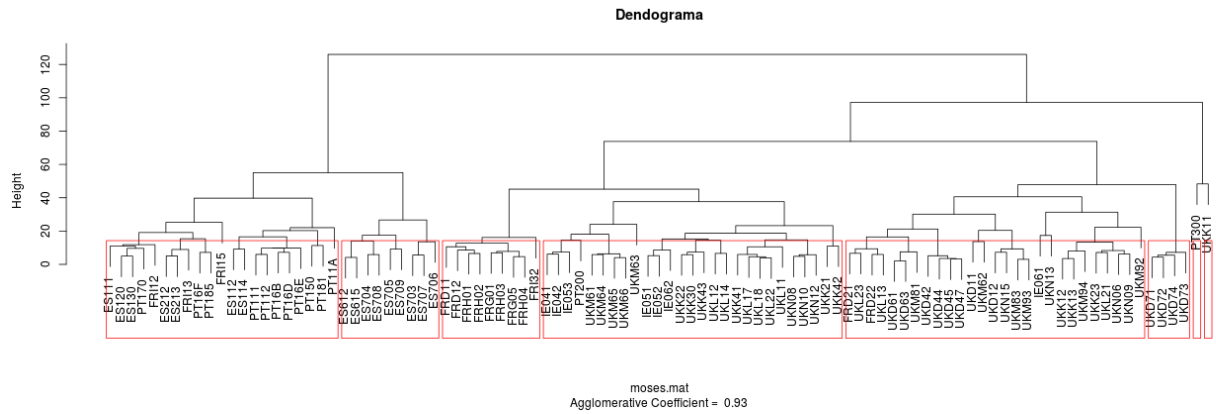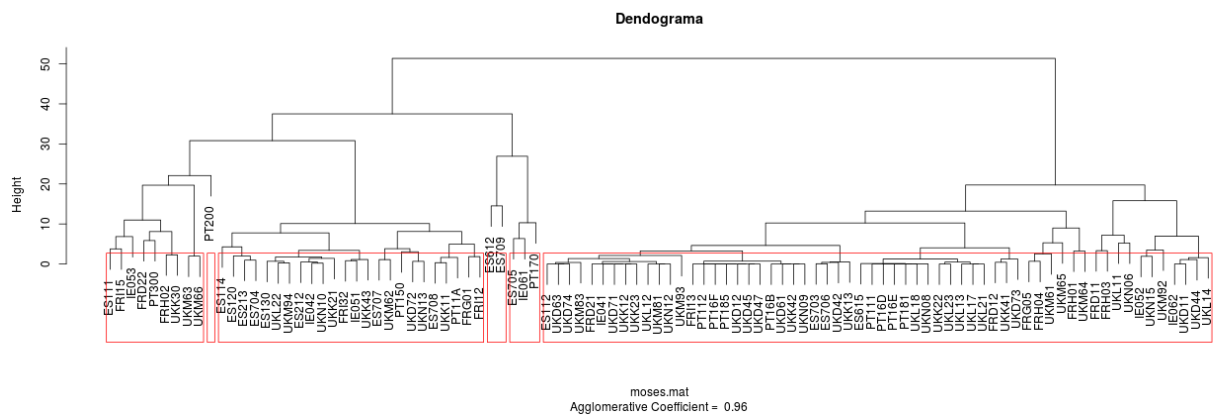
Figure D15. Amenities: Dendogram.

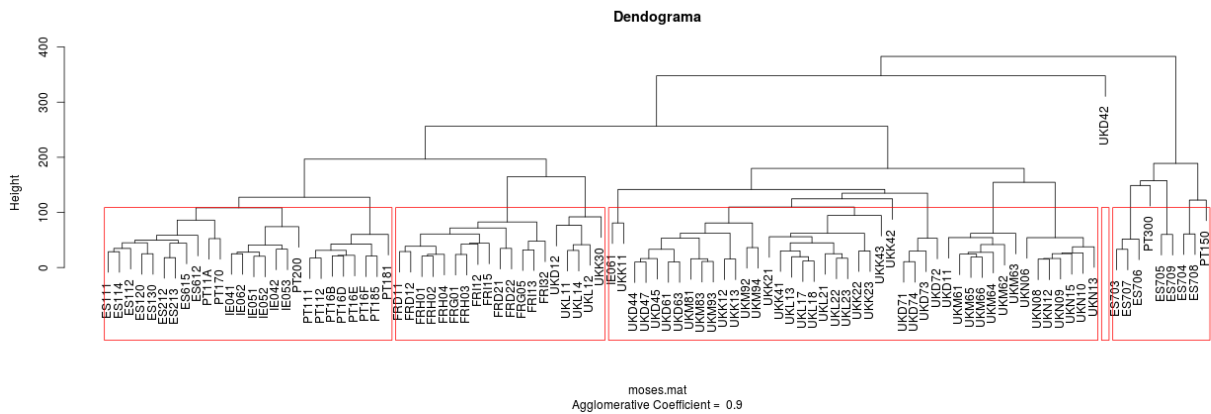**Figure D16. Connectivity: Dendogram.**
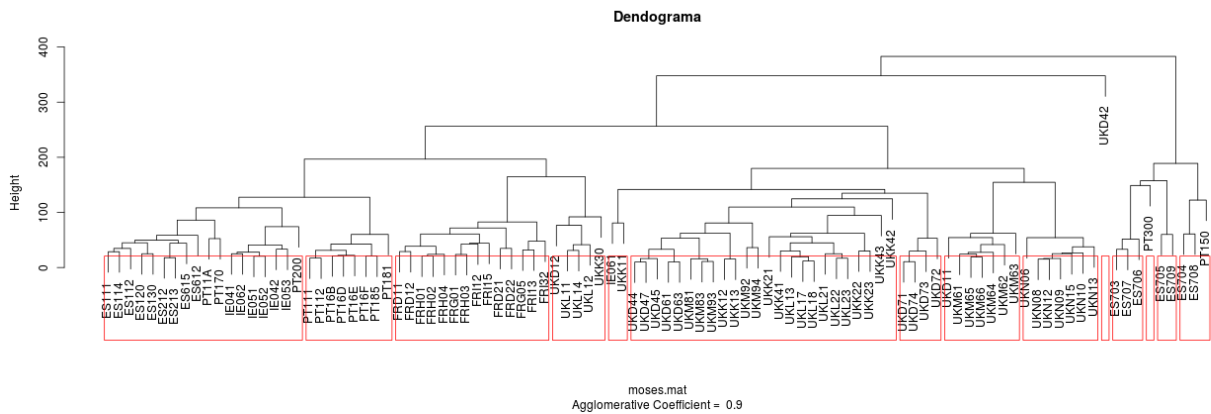
Figure D17. Tourism sector: Dendogram (five clusters).

Figure D18. Tourism sector: Dendogram (fourteen clusters).