ASOCIACIÓN DE INGENIEROS DE CAMINOS, CANALES Y PUERTOS Y DE LA INGENIERÍA CIVIL

INFRASTRUCTURE REPORT CARD OF SPAIN

AIRPORTS REPORT 2023

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INDEX

ANNEXES

Acknowledgments

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1. Purpose and scope

The purpose of this report is to assess the infrastructure of Airports in Spain, following the methodology established by the Spanish Association of Civil Engineers (Asociación de Ingenieros de Caminos, Canales y Puertos y de la Ingeniería Civil, also **Asociación Caminos**). For its elaboration, support has been provided by institutions and organizations linked to Airports, as well as the expertise of engineers, technicians, and experts who have collaborated with Asociación Caminos.

This document is part of a broader study that analyzes the state of six sectors of public works in Spain: Railways, Highways, Ports, Airports, the complete Water cycle, and Urban and Metropolitan Public Transportation. The methodology includes an objective evaluation, based on the analysis of quantitative indicators from both Spain and other selected countries in our economic environment, referenced to the most representative data of each sector in an international context. It also includes a qualitative evaluation of public works in Spain, based on the opinions of a selected group of experts for each sector.

The report is complemented with several annexes:

- **Annex 1: List of tables.** Complete list of the report's tables.
- **Annex 2: List of figures.** Complete list of the report's figures.
- **Annex 3: Acronyms.**
- **Annex 4: Bibliography and references.** Details the bibliography used and the databases and publicly available documents considered and consulted in this report.
- **Annex 5: Indicators from major international organizations.** Includes detailed information about the evaluations, indices, and indicators from the main organizations that assess infrastructures.
    - "Report Card for America´s infrastructure." American Society of Civil Engineers (ASCE)
    - "The Global Competitiveness Report (GCI)". World Economic Forum (WEF)
    - "The Global Adaptation Index (ND-Gain Indicators)". University of Notre Dame (EE.UU.)
    - "Transport in the European Union". European Commission.
- **Annex 6: Indicators from the main Spanish organizations,** which includes information about the indicators from the main Spanish organizations:
    - Ministry of Transport, Mobility, and Urban Agenda (Ministerio de Transportes, Movilidad y Agenda Urbana)
    - Ministry for Ecological Transition and Demographic Challenge (Ministerio para la transición ecológica y el Reto Demográfico)
- **Annex 7: Basic data and details of the indicators used for the quantitative evaluation.**

2. Description of the Airport Infrastructure in Spain

The Public Business Entity AENA established the commercial company "Aena Aeropuertos, S.A." in 2011 for the management of airport activity and to hold the ownership of air navigation services in the public entity. In 2014, the organizational and human resource segregation between the two entities was completed after the Council of Ministers announced the entry of private capital into AENA, S.A., up to 49% of its capital. Additionally, the state commercial company "AENA Aeropuertos, S.A." changed its name to “AENA S.M.A., S.A.”, while the public business entity "Aeropuertos Españoles y Navegación Aérea" changed its name to ENAIRE. This way, both companies operate independently.

The aeronautical policy regarding civil aviation is directed by the Ministry of Transport, Mobility, and Urban Agenda through the General Directorate of Civil Aviation, within the competencies of the General State Administration. On the other hand, the State Agency for Air Safety (AESA) is the entity responsible, among other functions, for the exercise of the inspection and sanctioning powers regarding civil aviation.

The general reference framework for Aena Group's planning consists of the Strategic Plan, the Air Sector Development Plan (PDSA), and the Infrastructure and Transport Plan (PITVI) of the Ministry of Transport, Mobility, and Urban Agenda. The specific reference framework includes the Multi-Year Action Program, the Strategic Plan, and the Operational Plan of Aena, S.A. In this regard, the New Management Model of the System constitutes the new legal framework for the modernization of the Spanish airport system and includes the separation of airport management functions from air navigation functions.

Investments in the conservation, improvement, and expansion of air transport infrastructure are carried out through AENA and ENAIRE, both dependent on the Ministry of Transport, Mobility, and Urban Agenda.

AENA is a state-owned commercial company that manages 46 airports and 2 heliports in Spain (connecting 90 countries and 370 destinations). Through its subsidiary Aena Internacional, it also participates in the management of 17 airports in various countries in Europe and America (12 in Mexico, 2 in Colombia, 2 in Jamaica, and 1 in the United Kingdom), with 6 additional airports in Brazil added by the end of 2022. Among the airports managed by AENA is London Luton Airport (51% ownership). AENA is the world's leading airport operator by passenger volume, with nearly 275 million passengers in 2019.

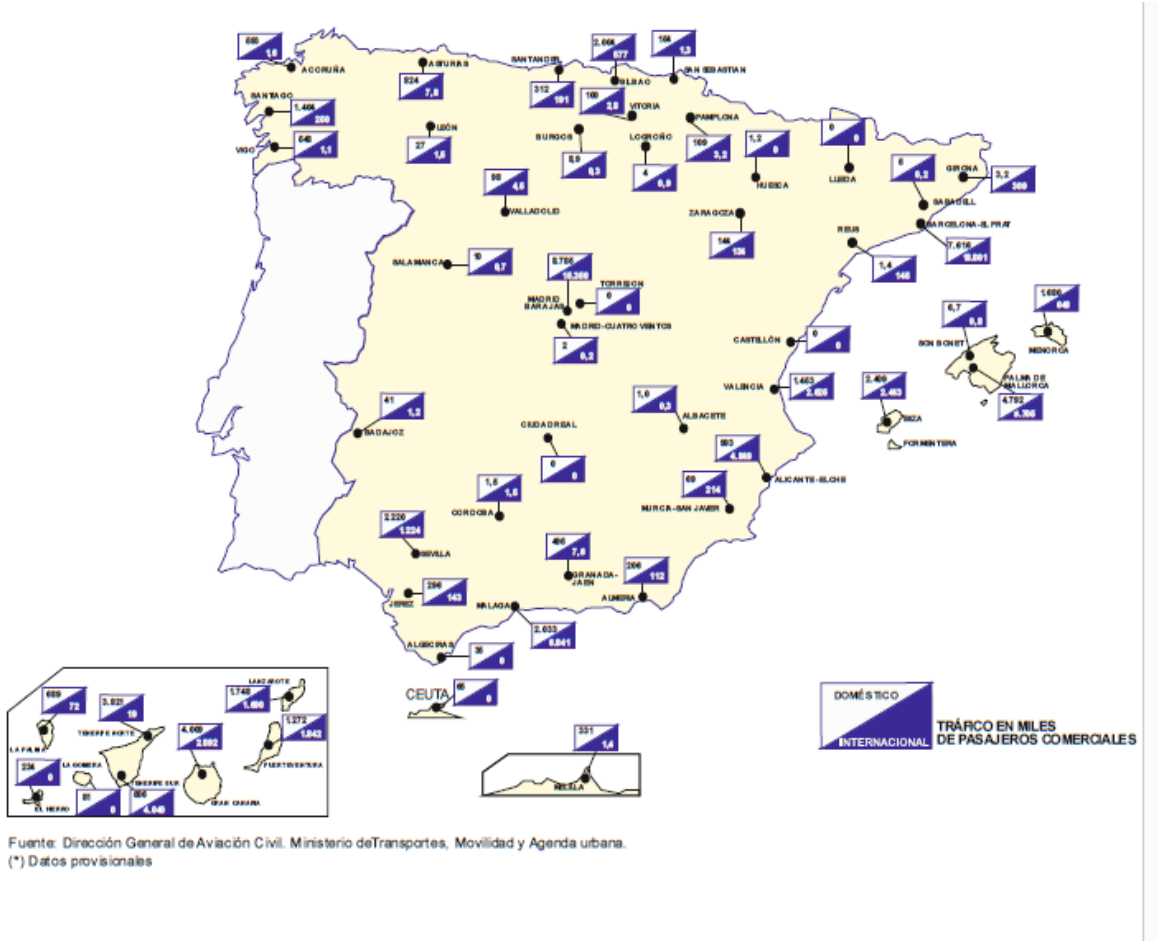
The investments in aeronautical infrastructure (in millions of euros) are as follows:

Concepto	2017	2018	2019	2020	2021 (P)	21/20
Aeropuertos (2)	371,24	523,69	521,54	503,20	672,65	33,7%
Navegación aérea (3)	71,56	87,44	100,75	99,97	124,48	24,5%
Total	**442,80**	**611,13**	**622,29**	**603,16**	**797,13**	**32,2%**

(P) Datos provisionales
(1) A partir de 2014 se produce la segregación organizativa de Aena, S.A. y Enaire. (RDL 8/2014, de 4 de julio). No se incluyen inversiones financieras.
(2) Desde 2014 Aena SME, S.A.
(3) Desde 2014 ENAIRE.
Fuente: Aena S.M.E., S.A. y ENAIRE. Ministerio de Transportes, Movilidad y Agenda Urbana.

Table 1: Investments in aeronautical infrastructure 2017-2021. Ministry of Transport, Mobility, and Urban Agenda

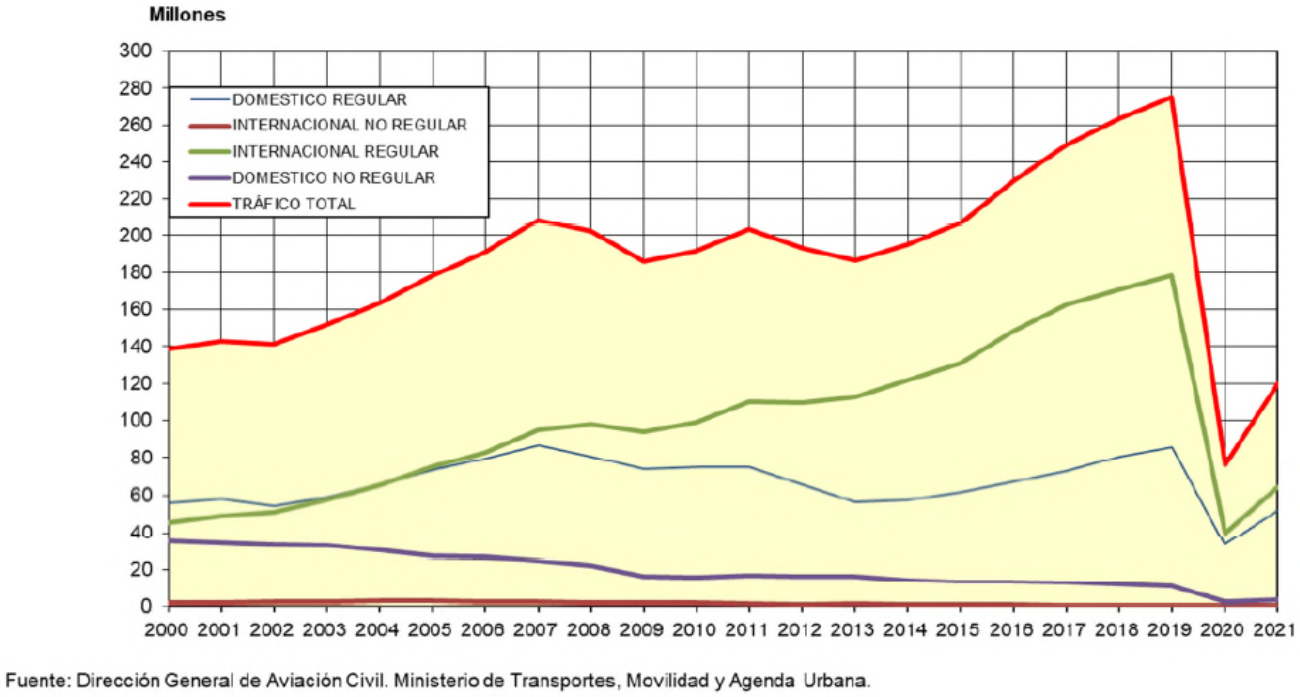
On the following page, the traffic of Spanish airports is shown based on commercial passengers in the year 2021. This graph has been taken from the publication of the Ministry of Transport, Mobility, and Urban Agenda: "Los Transportes y las Infraestructuras" (2021).



Fuente: Dirección General de Aviación Civil. Ministerio deTransportes, Movilidad y Agenda urbana.
(*) Datos provisionales

Figure 1: Traffic of Spanish airports based on commercial passengers in 2021. Ministry of Transport, Mobility, and Urban Agenda.

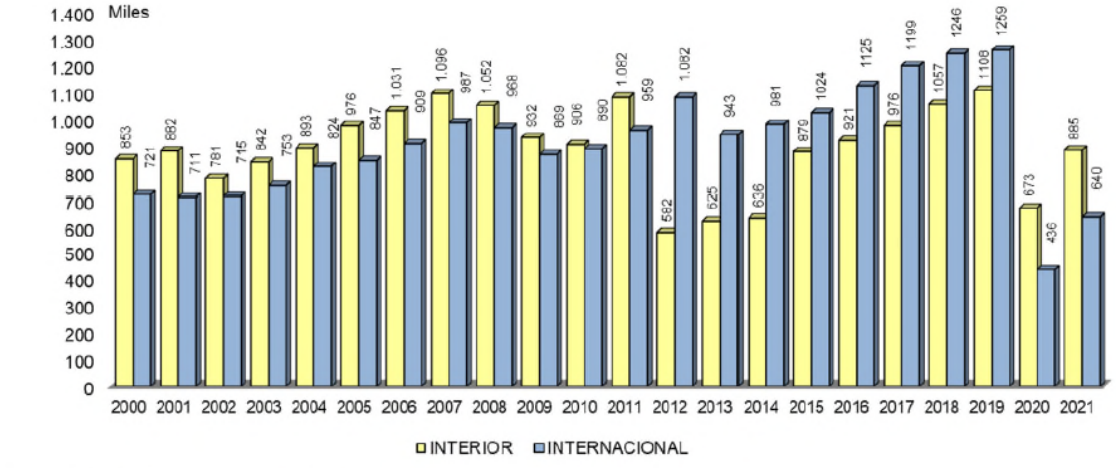
In the publication of the Ministry of Transport, Mobility, and Urban Agenda, "Los Transportes y las Infraestructuras" (2021), a graph also shows the movement of passengers in Spanish airports (reflecting the impact of the COVID-19 pandemic).



Fuente: Dirección General de Aviación Civil. Ministerio de Transportes, Movilidad y Agenda Urbana.

Figure 2: Movement of passengers in Spanish airports 2000-2021. Ministry of Transport, Mobility, and Urban Agenda.

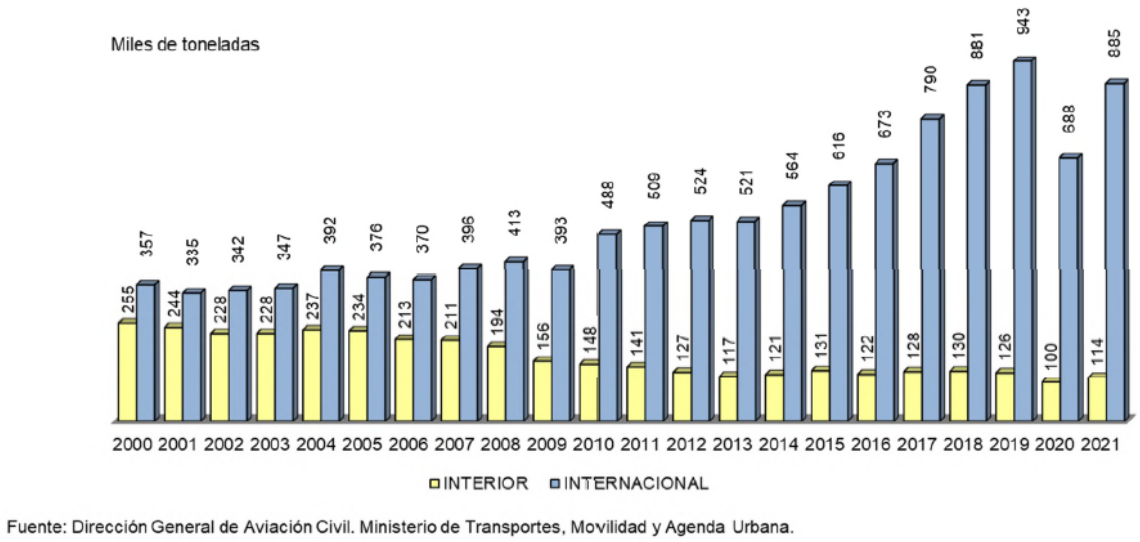
Regarding the air traffic in Spanish airports (arrivals and departures), the same publication of the Ministry of Transport, Mobility, and Urban Agenda includes the following graph:



Fuente: Dirección General de Aviación Civil. Ministerio de Transportes, Movilidad y Agenda Urbana.

Figure 3: Air traffic in Spanish airports 2000-2021. Ministry of Transport, Mobility, and Urban Agenda.

Regarding the cargo traffic in Spanish airports (arrivals and departures), the mentioned publication of the Ministry of Transport, Mobility, and Urban Agenda includes:



Fuente: Dirección General de Aviación Civil. Ministerio de Transportes, Movilidad y Agenda Urbana.

Figure 4: Cargo traffic in Spanish airports 2000-2021. Ministry of Transport, Mobility, and Urban Agenda.

3. Methodology used to evaluate the Airports

The methodology designed by Asociación Caminos includes an objective evaluation that analyzes quantitative indicators referenced to the most representative data of each sector, as well as a qualitative evaluation based on the opinions of a selected group of experts.

The **quantitative evaluation** is conducted through a comparative study with other countries in our economic and social environment, considering the most representative indicators of the sector (both from Spain and other countries). These indicators are obtained from publicly accessible databases available in important multilateral organizations such as EUROSTAT, OECD, World Bank, UN, World Economic Forum, International Transport Forum, among others. The preference is to gather data that has been collected using comparable criteria among different countries, allowing the analysis of indicators' evolution over time.

The **qualitative evaluation** exclusively pertains to Spain and is based on the responses obtained from a questionnaire sent to a selected group of experts in the sector. The responses obtained are processed anonymously and confidentially, adhering to the current data protection legislation. Once the expert responses are processed, they are integrated (with a weight of 50%) into the quantitative assessment of the sector to obtain the final evaluation of the sector in an international context.

To facilitate the evaluation, the analysis is grouped into eight sets of common characteristics for all sectors, but with specificities for each sector, referred to as "Criteria": Capacity, Performance, Financing, Adaptation to the Future and Sustainable Development, Operation and Maintenance, Security, Resilience, and Engineering and Innovation.

The evaluation of each Criterion is obtained as a result of a weighted assessment of the selected Indicators for that Criterion. Once the eight Criteria indices for each sector are obtained, the Sector index is also calculated as a result of a new weighted assessment of these Criterion indicators.

To establish an international comparison of the Spanish airport sector, large European countries such as Germany, France, the United Kingdom, Italy, and Turkey are selected, along with five countries from America: the USA, Brazil, Peru, Chile, and Mexico, and three countries from Asia: Japan, China, and India. However, not all countries have been evaluated for all indicators due to a lack of basic data.

The objective indicators and expert surveys address the following questions (similar to the ASCE report) for each Criterion of each sector:

- **Capacity**: Does the provision and capacity of the public works sector meet current demands?
- **Performance**: Are the current performance and physical conditions of the public works sector adequate to meet current user expectations?
- **Financing**: What investment is allocated to financing the public works sector? How much is applied to infrastructure creation and to operation and maintenance?
- **Adaptation to the Future and Sustainable Development**: Is the capacity and performance of the public works sector prepared to meet future expectations and demands? Are the resources and investments considered adequate to cover future sector needs? How are

actions promoting environmental sustainability being implemented? Are active measures applied to achieve the established objectives for decarbonizing public works and transportation?

- **Operation and Maintenance**: Is the public works sector being operated and maintained according to its needs?
- **Security**: Is the public works sector safe for users? Are effective measures implemented to ensure safe performance and operation?
- **Resilience**: When faced with threats and adverse incidents, what is the capacity of the public works sector to prevent, protect, and minimize consequences for users, the environment, the economy, and national security? Is the public works prepared to recover its initial state within a reasonable time once the threat or adverse incident has ceased? Are there alternatives to meet the service it provides?
- **Engineering and Innovation**: Are the resources allocated to engineering in the design, construction, conservation, management, and operation of the public works sector considered adequate? Is the investment in innovation sufficient? What new techniques, materials, technologies, and operational methods are being implemented to improve public works? Is progress being made in digitalization, monitoring, and sensing throughout the complete cycle of public works? Is the information provided to users adequate?

The methodology used to assess each Indicator is the result of an adjustment and transformation process of the selected ratios. **To avoid excessive data dispersion (due to topographical, territorial, economic, population distribution peculiarities, etc.) and to minimize the effect of outlier data points, it is necessary to limit them both from above and below. After obtaining the ratios, the dispersion of the values achieved in the different countries and years considered is analyzed.**

For this purpose, two methods have been considered for each indicator to avoid dispersion. The first method considers the mean and standard deviation of the data from the historical series, assigning as limit values the mean minus 1.5 times the standard deviation and the mean plus 1.5 times the standard deviation. The second method uses percentiles of the data from the historical series, analyzing the 90th or 80th percentile and the 10th percentile. The most suitable method to limit dispersion is adopted for each Indicator in each case. In some cases, there are exceptions to this general rule, such as the Safety indicators, for which the minimum value assigned is zero, considering it as the value that should obtain the highest score.

Once these values are obtained, they are transformed on a scale from 0 to 10, with 10 being the highest value and 0 being the lowest. Next, the following rating is assigned:

Rating System of Asociación Caminos							
Asociación Caminos	0 a 2,9	3,0 a 4,9	5,0 a 5,9	6,0 a 6,9	7,0 a 7,9	8,0 a 8,9	9,0 a 9,9
	Very Insufficient	Insufficient	Sufficient	Highly Sufficient	Good	Very Good	Excellent
	F	FX	E	D	C	B	A

Table 2: Rating system for Indicators, Criteria, and Sectors.

When all the Indicators for each Criterion are calculated, they are then weighted to calculate the Criterion Indicator. This weighting is done based on the importance assigned to each Indicator in forming the Criterion Indicator.

Assigning weights to each Indicator represents one of the major challenges. To address this, the input of experts is essential. Based on their experience and knowledge, they assign these weights.

It's important to note that, to form the Criterion Indicator as a weighted assessment of the Indicators, the maximum value that the Criterion Indicator can reach is the result of summing the weight assigned to each Indicator by the maximum rating (10) that the Indicator can achieve, adjusted by a reduction coefficient (which has been considered as 0.9). The application of this reduction coefficient is considered essential to balance the integration of the indicators (for example: in the "Adaptation to the Future" Criterion, growth ratios of investment in relation to the growth of motorization rates, traffic, and population are analyzed. If the motorization rate decreases due to the increase in shared vehicle use, the sector's indicator would decrease even if the traffic increases).

As an example, for the "Operation and Maintenance" Criterion, the minimum value would be 0 (zero), and the theoretical maximum value of the Safety Indicator would be 120, reduced by 10% to 108.

Indicators	Weight	Max Score	Total Max score	
I 5,1	4	10	40	Investment and maintenance as a % of national GDP
I 5,2	1	10	10	Investment in operation and maintenance per capita
I 5,3	2	10	20	Investment in operation and maintenance per equivalent km of roads
I 5,4	1	10	10	Investment in operation and maintenance per domestic road passenger traffic (€)
I 5,5	4	10	40	Investment in operation and maintenance per domestic road freight traffic (€)
Total:	**12**	**30**	**120**	
% Max score over Max Value		**90,0%**	**108,00**	

When forming the Criterion Indicator, the mean and standard deviation are not taken into account, as this would distort the Criterion Indicator by overvaluing the assessments of the integration of the Indicators. However, a reduction percentage is indeed taken into consideration.

Furthermore, since data for certain countries and certain years might not always be available, this document has chosen to calculate the ratios without considering or estimating data that is not available. Thus, unverifiable or erroneous data is not considered in the assessment of the Criterion Indicator or the Sector Indicator. In this way, the Criterion Index and Sector Index only evaluate data for which there is confirmed information, following a method to prevent it from distorting the assessment achieved by a particular country.

In the earlier example, if reliable data for Indicator I 5.5 is not available for a specific country, the assessment of the Operation and Maintenance Criterion for that country would be calculated based on the maximum value of 68 (which results from subtracting 40, the maximum score of Indicator I 6.5, from 108, which is the total maximum score of all indicators, after applying the

10% reduction coefficient). For the assessment of other countries with data in all indicators, the value of 108 would be considered as the maximum score.

In other words, each country is evaluated based on the data that is truly reliable and comparable, even if fewer indicators are used for comparison with other countries. In any case, when this effect occurs, it is noted in the assessment of Criteria and the sector.

4. Quantitative Indicators of Airports

For the comparative study, 72 quantitative indicators have been used, all referenced to the most representative data of the sector (both from Spain and other countries), obtained from publicly accessible databases available in important multilateral organizations (EUROSTAT, OECD, World Bank, UN, World Economic Forum, International Transport Forum, UIC, etc.). The selection of Indicators took into account the opinions of consulted experts and their experience. Having the appropriate database to compose each Indicator was also essential.

In the case of the airport report, the specific characteristics of this sector compared to others have been considered. Firstly, due to the type of indicators used, airports exclusively for military use are not within the scope of this report, as they are not assessed in any of the indicators. Additionally, to relate certain data, such as cargo or passenger traffic at airports, not only the population and wealth of a country were taken into account, but also other highly influential factors in this sector, such as the number of foreign tourists visiting each country annually.

After analyzing the available databases, it was deemed appropriate to use the databases from the main organizations that analyze the airport sector worldwide.

The period considered for this comparative study covers 5 years: from 2015 to 2019. It was not considered suitable to go beyond the year 2019 due to the distortion caused by the COVID-19 pandemic on traffic and transportation, which significantly alters the comparison of indicators during the year 2020 and partially in 2021.

After analyzing the available databases, the following databases have been considered suitable for use:

- The World Bank (WB)
  - Population
  - Area
  - GDP (USA $)
  - CO2 Emissions
- World Economic Forum (WEF)
  - Infrastructure quality indicators
- University of Notre Dame (ND-GAIN)
  - Global Adaptation Index indicators from the University of Notre Dame (ND-GAIN)
- OECD-International Transport Forum (OCDE)
  - Airport Networks (European countries)
  - Accident data
  - Domestic passenger and freight traffic
  - Investments
  - Investments in conservation and maintenance
  - Passenger Transport
  - Research, development, and innovation
- EUROSTAT and EU
  - National GDP (Current €)
  - Statistical Annex. Transport in the EU 2018.
  - Airport Networks for European countries

    - EU economic investment reports for 2017, 2018, 2019
    - EU Alternative Fuels Observatory
    - European Environment Agency
- International Union of Railways (UIC)
    - Airport Networks
    - Accident data
    - Operating expenses
    - Domestic passenger and freight traffic
- MINISTRY OF TRANSPORT, MOBILITY, AND URBAN AGENDA OF SPAIN
    - Statistical Yearbook 2019
    - Transport and Infrastructure 2019
    - Transport and Mobility Observatory 2019
- MINISTRY FOR THE ECOLOGICAL TRANSITION
    - Public Bank of Environmental Indicators

It is worth noting the EUROSTAT database (which is the statistical office of the European Commission, producing data about the European Union and its 28 member countries and promoting harmonization of statistical methods among EU members). Some indicators in this report, pertaining to both general transportation and specifically aviation, rely on EUROSTAT's databases for European countries. These data sources complement information from other international organizations.

- EU air fleet by operator country

  BD: Commercial aircraft fleet by type of aircraft

  http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=avia_eq_arc_typ&lang=en

- Air freight and mail loaded and unloaded

  BD: Freight and mail air transport by reporting country

  http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=avia_gooc&lang=en

- Air transport: passengers carried

  BD: Air passenger transport by reporting country

  http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=avia_paoc&lang=en

- Top 15 airports in the EU-28 by passengers carried (embarked and disembarked, million passengers)

  BD: Air passengers transport by main airports in each reporting country

  http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=avia_paoa&lang=en

- Extra EU-28 transport of passengers by air: share in total extra-EU-28 transport, passengers carried and annual growth rate

  BD: International extra-EU air Passenger transport by reporting country and partner world regions and countries

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=avia_paexcc&lang=en

- Persons killed in air accidents in the EU involving aircraft registered in the EU Member States by aviation category

  BD: Air accident victims in commercial air transport, by country of occurrence and country of registry of aircraft (EASA data)

  http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tran_sf_aviaca&lang=en

- BD: Air accident victims in aerial works, by country of occurrence and country of registry of aircraft (EASA data)

  http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tran_sf_aviaaw&lang=en

- BD: Air accident victims in general aviation, by country of occurrence and country of registry of aircraft - maximum take-off mass above 2250 kg (EASA data)

  http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tran_sf_aviagah&lang=en

- BD: Air accident victims in general aviation by country of occurrence and country of registry of aircraft - maximum take-off mass under 2250 kg (EASA data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tran_sf_aviagal&lang=en

The following table lists the indicators used in this report for evaluating the aviation sector in Spain in comparison with other countries worldwide. As you can observe, in the criteria indicators: Capacity, Performance, Operation and Maintenance, and Resilience, certain indicators (highlighted in blue background) have been exclusively included for EU countries (except Turkey). Their inclusion is deemed appropriate due to the high-quality data provided by EUROSTAT. This data complements and extends the information used for other indicators from various international organizations. Furthermore, these indicators enable a comparative evaluation within the airspace of European countries, encompassing both intra-community and extra-community passenger and cargo traffic. This approach allows for a more precise analysis of European countries, without compromising the rigor of quantitative assessment, based on a larger set of indicators (European countries are evaluated using approximately 70 indicators, whereas the rest of the world is evaluated using around 50 indicators).

INDICATORS AIRPORTS. 2023	
1	**CAPACITY**
AERO C.1	Total passengers transported - arrivals and departures - (Millions of passengers) (EU+WORLD)
AERO C.2	Total passengers transported - arrivals and departures - (Millions of passengers) / Real GDP ($) (EU+WORLD)
AERO C.3	Total air cargo and mail transported (t) (EU+WORLD)
AERO C.4	Total air cargo and mail transported (t) / Population (EU+WORLD)
AERO C.5	Number of airports / Millions of inhabitants
AERO C.6	Number of airports / Real GDP ($)
AERO C.7	Total passengers transported - National and international aircraft of the country - (Millions of passengers) (WB)
AERO C.8	Available seat capacity for regular flights per thousand inhabitants (OECD)
AERO C.9	EU countries. Total passengers transported within the EU - arrivals and departures - (Millions of passengers) (EUROSTAT)
AERO C.10	10. EU countries. National air passenger transport within the EU (Millions of passengers) (EUROSTAT)
AERO C.11	EU countries. Intra-EU passengers transported - includes domestic flights - (Millions of passengers) (EUROSTAT)
AERO C.12	EU countries. Extra-EU passengers transported (Millions of passengers) (EUROSTAT)
AERO C.13	EU countries. Total air cargo and mail transport (t) (EUROSTAT)
AERO C.14	EU countries. Domestic air cargo and mail transport (t) (EUROSTAT)
AERO C.15	EU countries. International air cargo and mail transport (t) (EUROSTAT)
AERO C.16	EU countries. Number of commercial air flights (passengers, cargo, and mail) (Millions) (EUROSTAT)
2	**PRESTACIONES**
AERO P.1	Global Logistics Performance Index (LPI) - WB
AERO P.2	Passenger traffic by nationalities of companies - international and domestic - (Millions of passenger-kilometers)
AERO P.3	Passenger traffic by nationalities of companies - international - (Millions of passenger-kilometers)
AERO P.4	Freight traffic (Millions of ton-kilometers) - WB
AERO P.5	Airport connectivity - GCI Score (WEF)
AERO P.6	Efficiency of Air Transport Services - GCI Score (WEF)
AERO P.7	EU countries. Passenger traffic transported (Millions of passenger-kilometers) - EUROSTAT
AERO P.8	EU countries. National and intra-EU27 international passenger traffic (Millions of passenger-kilometers) - EUROSTAT
AERO P.9	EU countries. Extra-EU27 international passenger traffic (Millions of passenger-kilometers) - EUROSTAT
AERO P.10	EU countries. National and international intra-EU27 merchandise traffic (Millions of ton-kilometers) - EUROSTAT
AERO P.11	EU countries. Extra-EU27 international merchandise traffic (Millions of ton-kilometers) - EUROSTAT
3	**FINANCING**
AERO F.1	Investment in airports (Millions of €) / Transported passengers (Millions of passengers)
AERO F.2	Investment in airports (€) / Cargo (tonnes)
AERO F.3	% Investment in airports (€) / Real GDP (€)
AERO F.4	Investment in airports (€) / Inhabitants
AERO F.5	Air passenger transport per one thousand units of current GDP (USD)
AERO F.6	Air cargo transport in tonne-kilometers per one thousand units of current GDP (USD)
4	**ADAPTATION TO THE FUTURE AND SUSTAINABILITY**
AERO A.1	Year-on-year cumulative growth index. Investment in airports / GDP (Index 100 in 2015)
AERO A.2	Year-on-year cumulative growth index. Investment in airports / (population + tourists) (Index 100 in 2015)
AERO A.3	Year-on-year cumulative growth index. Investment in airports / passengers (Index 100 in 2015)
AERO A.4	Year-on-year cumulative growth index. Investment in airports / cargo (Index 100 in 2015)
AERO A.5	Year-on-year cumulative growth index. Investment in airports / Departures of flights worldwide by companies registered in the country
AERO A.6	Share of CO2 emissions from navigation in total CO2 emissions from transportation (OECD)
AERO A.7	Percentage of CO2 emissions from national aviation in total CO2 emissions from transportation (OECD)
AERO A.8	Proportion of CO2 emissions from international aviation bunkers in total CO2 emissions (OECD)
AERO A.9	Development of Climate Change Mitigation Technologies related to Transportation (OECD)
5	**OPERATION AND MAINTENANCE**
AERO O.1	WB. Air Transport, Departures of flights worldwide by companies registered in the country (x 1000) / (Population + tourists)
AERO O.2	WB. Air Transport, Departures of flights worldwide by companies registered in the country (x1000000) / GDP ($)
AERO O.3	EU. Number of Commercial Air Flights (passengers, cargo, and mail) (Mills. X 1000000) / GDP ($)
AERO O.4	EU. Punctuality in minutes in departures from the most important airports (airports > 25 million passengers/year). Sep 2022
AERO O.5	EU. Punctuality in arrivals at the most important airports (airports > 25 million passengers/year). Sep 2022
AERO O.6	EU. Hub connectivity of the country's best airport (2022)
6	**SAFETY**
AERO S.1	Fatalities in passenger flights
AERO S.2	Fatalities in accidents in commercial air transport
AERO S.3	Injuries in accidents in commercial air transport
AERO S.4	Fatalities from accidents in aerial works
AERO S.5	Injuries in accidents in airport works
7	**RESILIENCE**
AERO R.1	Hub connectivity of the best airport in the country (2022) - EU
AERO R.2	Direct airport connectivity by country - Airport Council International Europe
AERO R.3	Indirect airport connectivity by country - Airport Council International Europe
AERO R.4	Connectivity as airports by country - Airport Council International Europe
8	**ENGINEERING AND INNOVATION**
AERO I.1	Ranking position in Skytrax
AERO I.2	Number of patents. Aeronautics and Air Transport (OECD)
AERO I.3	% of GDP devoted to Gross Domestic Expenditure on Research and Development (OECD R&D)
AERO I.4	Gross Domestic Expenditure on Research and Development ($)/Population (OECD R&D)
AERO I.5	% of GDP allocated to basic research expenditure (OECD R&D)
AERO I.6	% of GDP from private financing for Research and Development (OECD R&D)
AERO I.7	% of GDP from public financing for Research and Development (OECD R&D)
AERO I.8	Digitalization. Participation in new technologies. GCI Score (WEF)
AERO I.9	Digitalization. Index of Information and Communication Technology Infrastructure. (ND Index)
AERO I.10	Digitalization. % of people using the internet
AERO I.11	Engineering. Regulatory transparency. Index of services trade restrictiveness (OECD)
AERO I.12	Engineering. Barriers to competition. Index of services trade restrictiveness (OECD)
AERO I.13	Engineering. Restrictions on movement. Index of services trade restrictiveness (OECD)
AERO I.14	Engineering. Restrictions on entry of foreign engineers. Index of restrictiveness (OECD)
AERO I.15	Innovation Index. ND Gain Index

4.1. Capacity

The indicators in this criterion aim to answer the question: Does the provision and capacity of the public works sector meet current demands?

To address this, the following 16 indicators have been selected:

1 CAPACITY	
AERO C.1	Total passengers transported - arrivals and departures - (Millions of passengers) (EU+WORLD)
AERO C.2	Total passengers transported - arrivals and departures - (Millions of passengers) / Real GDP ($) (EU+WORLD)
AERO C.3	Total air cargo and mail transported (t) (EU+WORLD)
AERO C.4	Total air cargo and mail transported (t) / Population (EU+WORLD)
AERO C.5	Number of airports / Millions of inhabitants
AERO C.6	Number of airports / Real GDP ($)
AERO C.7	Total passengers transported - National and international aircraft of the country - (Millions of passengers) (WB)
AERO C.8	Available seat capacity for regular flights per thousand inhabitants (OECD)
AERO C.9	EU countries. Total passengers transported within the EU - arrivals and departures - (Millions of passengers) (EUROSTAT)
AERO C.10	10. EU countries. National air passenger transport within the EU (Millions of passengers) (EUROSTAT)
AERO C.11	EU countries. Intra-EU passengers transported - includes domestic flights - (Millions of passengers) (EUROSTAT)
AERO C.12	EU countries. Extra-EU passengers transported (Millions of passengers) (EUROSTAT)
AERO C.13	EU countries. Total air cargo and mail transport (t) (EUROSTAT)
AERO C.14	EU countries. Domestic air cargo and mail transport (t) (EUROSTAT)
AERO C.15	EU countries. International air cargo and mail transport (t) (EUROSTAT)
AERO C.16	EU countries. Number of commercial air flights (passengers, cargo, and mail) (Millions) (EUROSTAT)

According to ICAO (International Civil Aviation Organization), an airport's capacity is influenced by various factors, including the operational area configuration, utilization strategy, and other elements such as air traffic control (ATC) setup, navigation aids availability, demand characteristics, and environmental conditions. Given the complexity of determining the capacity of airports across an entire country, an approximation of Capacity assessment has been undertaken using indicators that offer insight into airport capacity. Considering the high costs associated with various means of expanding airport capacity, such as constructing new runways or suitable exits, recorded air traffic serves as a good indicator of the airport system's inherent capacity. This is facilitated by phased development plans for airports, allowing infrastructure capacity to grow gradually and in line with demand requirements.

In essence, to ascertain whether airports' capacity meets current and future demands, a set of indicators is proposed. These indicators encompass passenger and cargo traffic registered within a country and are correlated with the country's population, tourist numbers, and gross domestic product expressed in constant 2010 US dollars. This approach allows for the evaluation of the aerial capacity to accommodate both domestic and international passengers and cargo, as well as assessing the air traffic handled by the infrastructure relative to the country's economic wealth.

4.1.1. Capacity Indicators

4.1.1.1 Indicator AERO C.1: Total passengers transported - arrivals and departures - (Million passengers) (EU+WORLD)

AERO C.1	Pasajeros totales transportados -entradas y salidas- (Mills. pasajeros) (UE+WORLD)				
	2015	2016	2017	2018	2019
España	174,7	193,9	209,8	220,6	228,3
Alemania	193,9	200,7	212,4	222,4	226,8
Francia	140,9	145,3	154,1	162,0	168,7
Reino Unido	232,3	248,9	264,6	272,2	277,4
Italia	127,7	134,5	144,3	153,4	160,7
Turquía	171,4	174,2	179,4	184,8	190,3
EEUU	896,6	932,0	959,9	988,7	1018,4
México	113,6	126,0	129,8	133,7	137,7
Brasil	102,0	94,1	96,4	102,1	102,9
Perú	13,9	15,1	16,1	17,8	18,8
Chile	15,0	16,4	17,7	19,5	21,2
Japón	277,7	291,7	300,4	309,4	318,7
China	914,8	1016,4	1046,8	1078,3	1110,6
India	223,6	261,8	269,6	277,7	286,0
Maximo:	1110,60		Percentil 80%:	287,171	10,00
Mínimo:	13,878	MIN ((Media-Factor min *Desv);0):		0	1
Media:	283,705	Percentil 80%:	287,171	287,171	9,000
Factor max*Desv E	741,653	Percentil 10%:	18,714	Unidad:	0,031
Factor min*Desv Es	-174,243		Desv. Est.:	305,299	

Table 3: Values Indicator AERO C.1: Total passengers transported - arrivals and departures - (Million passengers) (EU+WORLD)

AERO C.1	Pasajeros totales transportados -entradas y salidas- (Mills. pasajeros) (UE+WORLD)						
	2015	2016	2017	2018	Calificación 2019		
España	6,5	7,1	7,6	7,9	8,2	MUY BIEN	B
Alemania	7,1	7,3	7,7	8,0	8,1	MUY BIEN	B
Francia	5,4	5,6	5,8	6,1	6,3	SUFICIENTE ALTO	D
Reino Unido	8,3	8,8	9,3	9,5	9,7	EXCELENTE	A
Italia	5,0	5,2	5,5	5,8	6,0	SUFICIENTE ALTO	D
Turquía	6,4	6,5	6,6	6,8	7,0	BIEN	C
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México	4,6	4,9	5,1	5,2	5,3	SUFICIENTE	E
Brasil	4,2	4,0	4,0	4,2	4,2	INSUFICIENTE	FX
Perú	1,4	1,5	1,5	1,6	1,6	MUY INSUFICIENTE	F
Chile	1,5	1,5	1,6	1,6	1,7	MUY INSUFICIENTE	F
Japón	9,7	10,0	10,0	10,0	10,0	EXCELENTE	A
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	8,0	9,2	9,5	9,7	10,0	EXCELENTE	A

Table 4: Indicator AERO C.1 rating: Total passengers transported - arrivals and departures - (Million passengers) (EU+WORLD)

4.1.1.2 *Indicator AERO C.2: Total passengers transported - arrivals and departures - (Million passengers) / Real GDP ($) (EU+WORLD)*

AERO C.2	Pasajeros totales transportados -entradas y salidas- (Mills. pasajeros) / PIB real ($) (UE+WORLD)				
	2015	2016	2017	2018	2019
España	0,008	0,008	0,008	0,009	0,009
Alemania	0,004	0,004	0,004	0,004	0,004
Francia	0,004	0,004	0,004	0,005	0,005
Reino Unido	0,006	0,007	0,007	0,007	0,007
Italia	0,005	0,005	0,005	0,005	0,005
Turquía	0,017	0,018	0,019	0,023	0,023
EEUU	0,018	0,018	0,018	0,019	0,018
México	0,013	0,016	0,016	0,016	0,015
Brasil	0,013	0,012	0,011	0,013	0,013
Perú	0,002	0,003	0,003	0,003	0,003
Chile	0,001	0,001	0,001	0,001	0,002
Japón	0,009	0,008	0,009	0,009	0,009
China	0,129	0,139	0,135	0,129	0,122
India	0,151	0,167	0,155	0,160	0,152
Maximo:	0,17		Percentil 80%:	0,018	10,00
Mínimo:	0,001	MIN ((Media-Factor min *Desv);0):		0	1
Media:	0,028	Percentil 80%:	0,018	0,018	9,000
Factor max*Desv E	0,101	Percentil 10%:	0,003	Unidad:	494,547
Factor min*Desv Es	-0,044		Desv. Est.:	0,048	

Table 5: Indicator AERO C.2 values: Total passengers transported - arrivals and departures - (Million passengers) / Real GDP ($) (EU+WORLD)

AERO C.2	Pasajeros totales transportados -entradas y salidas- (Mills. pasajeros) / PIB real ($) (UE+WORLD)						
	2015	2016	2017	2018	Calificación 2019		
España	4,7	5,0	5,2	5,2	5,3	SUFICIENTE	E
Alemania	3,0	2,8	3,0	3,1	3,0	INSUFICIENTE	FX
Francia	3,1	3,1	3,2	3,3	3,3	INSUFICIENTE	FX
Reino Unido	3,8	4,3	4,7	4,7	4,6	INSUFICIENTE	FX
Italia	3,3	3,4	3,5	3,6	3,6	INSUFICIENTE	FX
Turquía	9,6	9,8	10,0	10,0	10,0	EXCELENTE	A
EEUU	9,7	9,8	10,0	10,0	9,7	EXCELENTE	A
México	7,5	8,9	8,8	9,1	8,7	MUY BIEN	B
Brasil	7,4	6,9	6,4	7,5	7,4	BIEN	C
Perú	2,2	2,3	2,3	2,5	2,5	MUY INSUFICIENTE	F
Chile	1,6	1,7	1,7	1,7	1,8	MUY INSUFICIENTE	F
Japón	5,4	5,0	5,3	5,5	5,4	SUFICIENTE	E
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A

Table 6: Indicator AERO C.2 rating: Total passengers transported - arrivals and departures - (Million passengers) / Real GDP ($) (EU+WORLD)

4.1.1.3 Indicator AERO C.3: Total air transport of cargo and mail (t) (EU+WORLD)

AERO C.3	Transporte aéreo total de carga y correo (t) (UE+WORLD)				
	2015	2016	2017	2018	2019
España	594.393	639.237	742.443	806.518	815.612
Alemania	4.325.665	4.467.022	4.773.351	4.842.671	4.684.571
Francia	2.380.931	2.401.593	2.450.326	2.407.878	2.371.614
Reino Unido	2.405.225	2.511.011	2.738.784	2.748.539	2.650.232
Italia	916.755	991.688	1.077.874	1.066.221	1.021.941
Turquía	904.762	1.032.943	1.180.654	1.349.487	1.542.464
EEUU	23.779.314	24.364.414	25.095.346	25.848.207	26.623.653
México	821.665	873.403	925.807	981.356	1.040.237
Brasil					
Perú					
Chile					
Japón	5.311.495	5.425.116	5.587.869	5.755.506	5.928.171
China	14.094.003	15.104.057	16.010.300	16.970.918	17.989.174
India	2.705.891	2.890.930	3.064.386	3.248.249	3.443.144
Maximo:	26623653,02		Percentil 80%:	5.790.038,598	10,00
Mínimo:	594.393,000	MIN ((Media-Factor min *Desv);0):		0	1
Media:	5.758.636,674	Percentil 80%:	5.790.038,598	5790038,598	9,000
Factor max*Desv E	16.996.103,101	Percentil 10%:	842.360,200	Unidad:	0,000
Factor min*Desv Es	-5.478.829,754		Desv. Est.:	7.491.644,285	

Table 7: Indicator AERO C.3 values: Total air transport of cargo and mail (t) (EU+WORLD)

AERO C.3	Transporte aéreo total de carga y correo (t) (UE+WORLD)						
	2015	2016	2017	2018	Calificación 2019		
España	1,9	2,0	2,2	2,3	2,3	MUY INSUFICIENTE	F
Alemania	7,7	7,9	8,4	8,5	8,3	MUY BIEN	B
Francia	4,7	4,7	4,8	4,7	4,7	INSUFICIENTE	FX
Reino Unido	4,7	4,9	5,3	5,3	5,1	SUFICIENTE	E
Italia	2,4	2,5	2,7	2,7	2,6	MUY INSUFICIENTE	F
Turquía	2,4	2,6	2,8	3,1	3,4	INSUFICIENTE	FX
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México	2,3	2,4	2,4	2,5	2,6	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile							
Japón	9,3	9,4	9,7	9,9	10,0	EXCELENTE	A
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	5,2	5,5	5,8	6,0	6,4	SUFICIENTE ALTO	D

Table 8: Indicator AERO C.3 rating: Total air transport of cargo and mail (t) (EU+WORLD)

4.1.1.4 Indicator AERO C.4: Total air transport of cargo and mail (t) / Population (EU+WORLD)

AERO C.4	Transporte aéreo total de carga y correo (t) / Habitantes (UE+WORLD)				
	2015	2016	2017	2018	2019
España	0,0128	0,0138	0,0159	0,0172	0,0173
Alemania	0,0530	0,0542	0,0577	0,0584	0,0564
Francia	0,0358	0,0360	0,0366	0,0359	0,0353
Reino Unido	0,0369	0,0383	0,0415	0,0414	0,0397
Italia	0,0151	0,0164	0,0178	0,0176	0,0171
Turquía	0,0115	0,0129	0,0146	0,0164	0,0185
EEUU	0,0741	0,0754	0,0772	0,0791	0,0811
México	0,0067	0,0071	0,0074	0,0078	0,0082
Brasil					
Perú					
Chile					
Japón	0,0418	0,0427	0,0440	0,0454	0,0468
China	0,0101	0,0109	0,0114	0,0120	0,0128
India	0,0021	0,0022	0,0023	0,0024	0,0025
Maximo:	0,08		Percentil 80%:	0,046	10,00
Mínimo:	0,002	MIN ((Media-Factor min *Desv);0):		0	1
Media:	0,029	Percentil 80%:	0,046	0,046	9,000
Factor max*Desv Es	0,063	Percentil 10%:	0,007	Unidad:	197,058
Factor min*Desv Es	-0,005		Desv. Est.:	0,023	

Table 9: Indicator AERO C.4 values: Total air transport of cargo and mail (t) / Population (EU+WORLD)

AERO C.4	Transporte aéreo total de carga y correo (t) / Habitantes (UE+WORLD)						
	2015	2016	2017	2018	Calificación 2019		
España	3,5	3,7	4,1	4,4	4,4	INSUFICIENTE	FX
Alemania	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Francia	8,1	8,1	8,2	8,1	7,9	BIEN	C
Reino Unido	8,3	8,5	9,2	9,1	8,8	MUY BIEN	B
Italia	4,0	4,2	4,5	4,5	4,4	INSUFICIENTE	FX
Turquía	3,3	3,5	3,9	4,2	4,6	INSUFICIENTE	FX
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México	2,3	2,4	2,5	2,5	2,6	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile							
Japón	9,2	9,4	9,7	9,9	10,0	EXCELENTE	A
China	3,0	3,1	3,2	3,4	3,5	INSUFICIENTE	FX
India	1,4	1,4	1,5	1,5	1,5	MUY INSUFICIENTE	F

Table 10: Iindicator AERO C.4 rating: Total air transport of cargo and mail (t) / Population (EU+WORLD)

4.1.1.5 Indicator AERO C.5: Number of airports / Million inhabitants

AERO C.5	Nº de aeropuertos / Mills. habitantes				
	2015	2016	2017	2018	2019
España	0,797	0,817	0,816	0,791	1,124
Alemania	0,514	0,486	0,496	0,482	0,493
Francia	0,932	0,929	0,927	0,894	0,848
Reino Unido	0,645	0,655	0,636	0,617	0,613
Italia	0,609	0,610	0,578	0,596	0,603
Turquía	0,649	0,639	0,616	0,619	0,623
EEUU	0,776	0,771	0,766	0,762	0,758
México	0,361	0,357	0,353	0,349	0,345
Brasil					
Perú					
Chile					
Japón	0,488	0,488	0,488	0,489	0,490
China	0,109	0,117	0,115	0,115	0,115
India	0,040	0,041	0,040	0,040	0,039
Maximo:	1,12		Percentil 80%:	0,772	10,00
Mínimo:	0,039	MIN ((Media-Factor min *Desv);0):		0,126761103	1
Media:	0,536	Percentil 80%:	0,772	0,645	9,000
Factor max*Desv Es	0,945	Percentil 10%:	0,111	Unidad:	13,952
Factor min*Desv Es	0,127		Desv. Est.:	0,273	

Table 11: Indicator AERO C.5 values: Number of airports / Million inhabitants

AERO C.5	Nº de aeropuertos / Mills. habitantes						
	2015	2016	2017	2018	Calificación 2019		
España	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Alemania	6,4	6,0	6,2	6,0	6,1	SUFICIENTE ALTO	D
Francia	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Reino Unido	8,2	8,4	8,1	7,8	7,8	BIEN	C
Italia	7,7	7,7	7,3	7,5	7,6	BIEN	C
Turquía	8,3	8,1	7,8	7,9	7,9	BIEN	C
EEUU	10,0	10,0	9,9	9,9	9,8	EXCELENTE	A
México	4,3	4,2	4,2	4,1	4,0	INSUFICIENTE	FX
Brasil							
Perú							
Chile							
Japón	6,0	6,0	6,0	6,1	6,1	SUFICIENTE ALTO	D
China	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
India	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 12: Indicator AERO C.5 rating: Number of airports / Million inhabitants

4.1.1.6 Indicator AERO C.6: Number of airports / Real GDP ($)

AERO C.6	Nº de aeropuertos / PIB real ($)				
	2015	2016	2017	2018	2019
España	0,002	0,002	0,002	0,001	0,002
Alemania	0,001	0,001	0,001	0,001	0,001
Francia	0,002	0,002	0,002	0,002	0,002
Reino Unido	0,001	0,001	0,001	0,001	0,001
Italia	0,001	0,001	0,001	0,001	0,001
Turquía	0,005	0,005	0,005	0,006	0,006
EEUU	0,005	0,005	0,005	0,005	0,004
México	0,005	0,006	0,005	0,005	0,005
Brasil					
Perú					
Chile					
Japón	0,002	0,002	0,002	0,002	0,002
China	0,021	0,022	0,021	0,019	0,018
India	0,035	0,034	0,031	0,031	0,029
Maximo:	0,04		Percentil 80%:	0,006	10,00
Mínimo:	0,001	MIN ((Media-Factor min *Desv);0):		0	1
Media:	0,007	Percentil 80%:	0,006	0,006	9,000
Factor max*Desv Es	0,022	Percentil 10%:	0,001	Unidad:	1410,884
Factor min*Desv Es	-0,008		Desv. Est.:	0,010	

Table 13: Indicator AERO C.6 values: Number of airports / Real GDP ($)

AERO C.6	Nº de aeropuertos / PIB real ($)						
	2015	2016	2017	2018	Calificación 2019		
España	3,2	3,2	3,2	3,0	3,8	INSUFICIENTE	FX
Alemania	2,2	2,0	2,1	2,1	2,1	MUY INSUFICIENTE	F
Francia	3,6	3,6	3,5	3,4	3,2	INSUFICIENTE	FX
Reino Unido	2,5	2,6	2,7	2,6	2,5	MUY INSUFICIENTE	F
Italia	2,9	2,9	2,7	2,7	2,7	MUY INSUFICIENTE	F
Turquía	8,3	8,3	8,5	10,0	10,0	EXCELENTE	A
EEUU	7,9	7,7	7,6	7,6	7,0	BIEN	C
México	8,2	8,9	8,5	8,6	8,0	MUY BIEN	B
Brasil							
Perú							
Chile							
Japón	3,8	3,5	3,5	3,6	3,4	INSUFICIENTE	FX
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A

Table 14: Indicator: AERO C.6 rating: Number of airports / Real GDP ($)

4.1.1.7 *Indicator AERO C.7: Total passengers transported - Domestic and international airline traffic of the country - (Million passengers) (WB)*

AERO C.7	Pasajeros totales transportados -Aeronaves nacionales y líneas internacionales del país- (Mills. pasajeros) (WB)				
	2015	2016	2017	2018	2019
España	60,564	66,675	71,598	80,707	88,237
Alemania	117,223	116,714	114,161	109,796	109,634
Francia	65,040	65,363	68,316	70,188	71,289
Reino Unido	131,513	143,782	151,159	165,389	142,393
Italia	28,604	29,120	26,288	27,244	27,760
Turquía	96,605	100,366	107,917	115,595	111,131
EEUU	798,222	824,039	849,403	889,024	926,737
México	46,967	53,313	58,538	64,570	69,938
Brasil	102,039	94,142	96,396	102,110	102,918
Perú	13,878	15,082	16,094	17,759	18,821
Chile	15,007	16,362	17,665	19,517	21,198
Japón	114,128	117,708	123,898	126,388	130,233
China	436,184	487,960	551,235	611,440	659,629
India	98,928	119,578	139,752	164,036	167,499
Maximo:	926,74		Percentil 80%:	145,257	10,00
Mínimo:	13,878	MIN ((Media-Factor min *Desv);0):		0	1
Media:	171,124	Percentil 80%:	145,257	145,257	9,000
Factor max*Desv Es	518,773	Percentil 10%:	18,714	Unidad:	0,062
Factor min*Desv Es	-176,524		Desv. Est.:	231,765	

Table 15: Indicator AERO C.7 values: Total passengers transported - Domestic and international airline traffic of the country - (Million passengers) (WB)

AERO C.7	Pasajeros totales transportados -Aeronaves nacionales y líneas internacionales del país- (Mills. pasajeros) (WB)						
	2015	2016	2017	2018	Calificación 2019		
España	4,8	5,1	5,4	6,0	6,5	SUFICIENTE ALTO	D
Alemania	8,3	8,2	8,1	7,8	7,8	BIEN	C
Francia	5,0	5,0	5,2	5,3	5,4	SUFICIENTE	E
Reino Unido	9,1	9,9	10,0	10,0	9,8	EXCELENTE	A
Italia	2,8	2,8	2,6	2,7	2,7	MUY INSUFICIENTE	F
Turquía	7,0	7,2	7,7	8,2	7,9	BIEN	C
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México	3,9	4,3	4,6	5,0	5,3	SUFICIENTE	E
Brasil	7,3	6,8	7,0	7,3	7,4	BIEN	C
Perú	1,9	1,9	2,0	2,1	2,2	MUY INSUFICIENTE	F
Chile	1,9	2,0	2,1	2,2	2,3	MUY INSUFICIENTE	F
Japón	8,1	8,3	8,7	8,8	9,1	EXCELENTE	A
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	7,1	8,4	9,7	10,0	10,0	EXCELENTE	A

Table 16: Indicator AERO C.7 rating: Total passengers transported - Domestic and international airline traffic of the country - (Million passengers) (WB)

4.1.1.8 *Indicator AERO C.8: Available seat capacity for regular flights per thousand inhabitants (OECD)*

AERO C.8	Capacidad de asientos disponibles para vuelo regulares por cada mil habitantes (OCDE)				
	2015	2016	2017	2018	2019
España	1,65	1,86	2,03	2,21	2,41
Alemania	1,31	1,38	1,50	1,64	1,78
Francia	1,07	1,12	1,23	1,34	1,46
Reino Unido	1,85	2,03	2,22	2,42	2,63
Italia	0,97	1,04	1,14	1,24	1,35
Turquía	0,54	0,57	0,62	0,67	0,73
EEUU	0,40	0,42	0,46	0,50	0,54
México	0,19	0,20	0,22	0,24	0,26
Brasil					
Perú					
Chile	0,29	0,31	0,34	0,37	0,40
Japón	0,38	0,42	0,46	0,50	0,55
China	0,07	0,08	0,09	0,09	0,10
India	0,03	0,03	0,03	0,03	0,04
Maximo:	2,63		Percentil 80%:	1,528	10,00
Mínimo:	0,026	MIN ((Media-Factor min *Desv);0):		0	1
Media:	0,867	Percentil 80%:	1,528	1,528	9,000
Factor max*Desv Es	1,978	Percentil 10%:	0,078	Unidad:	5,892
Factor min*Desv Es	-0,244		Desv. Est.:	0,741	

Table 17: Indicator AERO C.8 values: Available seat capacity for regular flights per thousand inhabitants (OECD)

AERO C.8	Capacidad de asientos disponibles para vuelo regulares por cada mil habitantes (OCDE)						
	2015	2016	2017	2018	Calificación 2019		
España	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Alemania	8,7	9,1	9,8	10,0	10,0	EXCELENTE	A
Francia	7,3	7,6	8,2	8,9	9,6	EXCELENTE	A
Reino Unido	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Italia	6,7	7,1	7,7	8,3	9,0	EXCELENTE	A
Turquía	4,2	4,3	4,6	5,0	5,3	SUFICIENTE	E
EEUU	3,4	3,5	3,7	3,9	4,2	INSUFICIENTE	FX
México	2,1	2,2	2,3	2,4	2,5	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile	2,7	2,8	3,0	3,2	3,3	INSUFICIENTE	FX
Japón	3,3	3,5	3,7	4,0	4,2	INSUFICIENTE	FX
China	1,4	1,5	1,5	1,6	1,6	MUY INSUFICIENTE	F
India	1,2	1,2	1,2	1,2	1,2	MUY INSUFICIENTE	F

Table 18: Indicator AERO C.8 rating: Available seat capacity for regular flights per thousand inhabitants (OECD)

4.1.1.9 *Indicator AERO C.9: EU Countries. Total passengers transported within the EU - arrivals and departures - (Million passengers). EUROSTAT*

AERO C.9	Países UE. Pasajeros totales transportados UE -entradas y salidas- (Mills. pasajeros). EUROSTAT				
	2015	2016	2017	2018	2019
España	174,653	193,872	209,824	220,611	228,262
Alemania	193,936	200,687	212,389	222,422	226,764
Francia	140,868	145,281	154,096	161,991	168,727
Reino Unido	232,270	248,869	264,629	272,190	277,432
Italia	127,665	134,478	144,306	153,352	160,668
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	277,43	MAX ((Media+Factor max*Desv Est.):		262,53	10,00
Mínimo:	127,665	MIN ((Media-Factor min *Desv);0):		127,0871552	1
Media:	194,810	Percentil 90%:	258,325	135,445	9,000
Factor max*Desv Es	262,532	Percentil 10%:	142,243	Unidad:	0,066
Factor min*Desv Es	127,087		Desv. Est.:	45,148	

Table 19: Indicator AERO C.9 values: EU Countries. Total passengers transported within the EU - arrivals and departures - (Million passengers). EUROSTAT

AERO C.9	Países UE. Pasajeros totales transportados UE -entradas y salidas- (Mills. pasajeros). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	4,2	5,4	6,5	7,2	7,7	BIEN	C
Alemania	5,4	5,9	6,7	7,3	7,6	BIEN	C
Francia	1,9	2,2	2,8	3,3	3,8	INSUFICIENTE	FX
Reino Unido	8,0	9,1	10,0	10,0	10,0	EXCELENTE	A
Italia	1,0	1,5	2,1	2,7	3,2	INSUFICIENTE	FX
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 20: Indicator AERO C.9 rating: EU Countries. Total passengers transported within the EU - arrivals and departures - (Million passengers). EUROSTAT

4.1.1.10 Indicator AERO C.10: EU Countries. Domestic air passenger transport within the EU (Million passengers). EUROSTAT

AERO C.10	Países UE. Transporte aéreo nacional de pasajeros en la UE (Mills. pasajeros). EUROSTAT				
	2015	2016	2017	2018	2019
España	30,881	33,435	36,166	40,057	42,628
Alemania	23,157	23,775	23,833	23,626	23,182
Francia	28,166	28,968	30,024	31,035	31,715
Reino Unido	22,829	23,077	23,417	23,661	22,996
Italia	29,657	30,272	31,121	32,183	32,399
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	42,63	MAX ((Media+Factor max*Desv Est.):		37,24	10,00
Mínimo:	22,829	MIN ((Media-Factor min *Desv);0):		20,54166271	1
Media:	28,890	Percentil 90%:	35,074	16,697	9,000
Factor max*Desv Es	37,239	Percentil 10%:	23,109	Unidad:	0,539
Factor min*Desv Es	20,542		Desv. Est.:	5,566	

Table 21: Indicator AERO C.10 values: EU Countries. Domestic air passenger transport within the EU (Million passengers). EUROSTAT

AERO C.10	Países UE. Transporte aéreo nacional de pasajeros en la UE (Mills. pasajeros). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	6,6	7,9	9,4	10,0	10,0	EXCELENTE	A
Alemania	2,4	2,7	2,8	2,7	2,4	MUY INSUFICIENTE	F
Francia	5,1	5,5	6,1	6,7	7,0	BIEN	C
Reino Unido	2,2	2,4	2,5	2,7	2,3	MUY INSUFICIENTE	F
Italia	5,9	6,2	6,7	7,3	7,4	BIEN	C
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 22: Indicator AERO C.10 rating: EU Countries. Domestic air passenger transport within the EU (Million passengers). EUROSTAT

4.1.1.11 Indicator AERO C.11: EU Countries. Passengers transported within the EU - Includes passengers on domestic flights - (Million passengers) EUROSTAT

AERO C.11	Países UE. Pasajeros transportados intra-UE -Incluye pasaj. vuelos nacionales- (Mills. pasajeros) EUROSTAT				
	2015	2016	2017	2018	2019
España	113,054	124,725	134,526	144,369	149,659
Alemania	112,752	120,591	127,149	131,721	132,895
Francia	79,398	82,901	87,401	91,687	95,495
Reino Unido	137,883	153,581	165,191	167,477	171,028
Italia	90,926	95,535	101,707	106,824	111,268
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	171,03	MAX ((Media+Factor max*Desv Est.):		162,26	10,00
Mínimo:	79,398	MIN ((Media-Factor min *Desv);0):		80,11861656	1
Media:	121,190	Percentil 90%:	160,547	82,142	9,000
Factor max*Desv Es	162,261	Percentil 10%:	88,811	Unidad:	0,110
Factor min*Desv Es	80,119		Desv. Est.:	27,381	

Table 23: Indicator AERO C.11 values: EU Countries. Passengers transported within the EU - Includes passengers on domestic flights - (Million passengers) EUROSTAT

AERO C.11	Países UE. Pasajeros transportados intra-UE -Incluye pasaj. vuelos nacionales- (Mills. pasajeros) EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	4,6	5,9	7,0	8,0	8,6	MUY BIEN	B
Alemania	4,6	5,4	6,2	6,7	6,8	SUFICIENTE ALTO	D
Francia	1,0	1,3	1,8	2,3	2,7	MUY INSUFICIENTE	F
Reino Unido	7,3	9,0	10,0	10,0	10,0	EXCELENTE	A
Italia	2,2	2,7	3,4	3,9	4,4	INSUFICIENTE	FX
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 24: Indicator AERO C.11 rating: EU Countries. Passengers transported within the EU - Includes passengers on domestic flights - (Million passengers) EUROSTAT

4.1.1.12 Indicator AERO C.12: EU Countries. Passengers transported outside the EU - (Million passengers) EUROSTAT

AERO C.12	Países UE. Pasajeros transportados extra-UE de (Mills. pasajeros). EUROSTAT				
	2015	2016	2017	2018	2019
España	61,599	69,147	75,298	76,242	78,603
Alemania	81,184	80,097	85,241	90,701	93,869
Francia	61,470	62,379	66,695	70,304	73,232
Reino Unido	71,559	72,211	76,021	81,053	83,408
Italia	36,740	38,943	42,599	46,529	49,400
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	93,87	MAX ((Media+Factor max*Desv Est.):		92,58	10,00
Mínimo:	36,740	MIN ((Media-Factor min *Desv);0):		45,38531801	1
Media:	68,981	Percentil 90%:	84,508	47,191	9,000
Factor max*Desv Es	92,576	Percentil 10%:	44,171	Unidad:	0,191
Factor min*Desv Es	45,385		Desv. Est.:	15,730	

Table 25: Indicator AERO C.12 values: EU Countries. Passengers transported outside the EU - (Million passengers) EUROSTAT

AERO C.12	Países UE. Pasajeros transportados extra-UE de (Mills. pasajeros). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	4,1	5,5	6,7	6,9	7,3	BIEN	C
Alemania	7,8	7,6	8,6	9,6	10,0	EXCELENTE	A
Francia	4,1	4,2	5,1	5,8	6,3	SUFICIENTE ALTO	D
Reino Unido	6,0	6,1	6,8	7,8	8,3	MUY BIEN	B
Italia	1,0	1,0	1,0	1,2	1,8	MUY INSUFICIENTE	F
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 26: Indicator AERO C.12 rating: EU Countries. Passengers transported outside the EU - (Million passengers) EUROSTAT

4.1.1.13 Indicator AERO C.13: EU Countries. Total air transport of cargo and mail (t) - EUROSTAT

AERO C.13	Países UE. Transporte aéreo total de carga y correo (t). EUROSTAT				
	2015	2016	2017	2018	2019
España	594.393	639.237	742.443	806.518	815.612
Alemania	4.325.665	4.467.022	4.773.351	4.842.671	4.684.571
Francia	2.380.931	2.401.593	2.450.326	2.407.878	2.371.614
Reino Unido	2.405.225	2.511.011	2.738.784	2.748.539	2.650.232
Italia	916.755	991.688	1.077.874	1.066.221	1.021.941
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	4842671,00	MAX ((Media+Factor max*Desv Est.):		4405181,88	10,00
Mínimo:	594.393,000	MIN ((Media-Factor min *Desv);0):		141385,798	1
Media:	2.273.283,840	Percentil 90%:	4.597.551,280	4263796,084	9,000
Factor max*Desv Es	4.405.181,882	Percentil 10%:	768.072,820	Unidad:	0,000
Factor min*Desv Es	141.385,798		Desv. Est.:	1.421.265,361	

Table 27: Indicator AERO C.13 values: EU Countries. Total air transport of cargo and mail (t) - EUROSTAT

AERO C.13	Países UE. Transporte aéreo total de carga y correo (t). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	2,0	2,1	2,3	2,4	2,4	MUY INSUFICIENTE	F
Alemania	9,8	10,0	10,0	10,0	10,0	EXCELENTE	A
Francia	5,7	5,8	5,9	5,8	5,7	SUFICIENTE	E
Reino Unido	5,8	6,0	6,5	6,5	6,3	SUFICIENTE ALTO	D
Italia	2,6	2,8	3,0	3,0	2,9	MUY INSUFICIENTE	F
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 28: Indicator AERO C.13 rating: EU Countries. Total air transport of cargo and mail (t) - EUROSTAT

4.1.1.14 Indicator AERO C.14: EU Countries. Domestic air transport of cargo and mail (t) - EUROSTAT

AERO C.14	Países UE. Transporte aéreo doméstico de carga y correo (t). EUROSTAT				
	2015	2016	2017	2018	2019
España	57.600	59.961	61.061	59.093	57.003
Alemania	117.027	122.372	128.153	130.996	127.022
Francia	201.896	203.405	190.203	186.941	199.622
Reino Unido	106.328	96.607	96.919	92.813	92.763
Italia	44.984	52.420	49.388	49.727	51.049
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	203404,70	MAX ((Media+Factor max*Desv Est.):		186779,24	10,00
Mínimo:	44.984,000	MIN ((Media-Factor min *Desv);0):		24049,09056	1
Media:	105.414,164	Percentil 90%:	195.854,220	162730,147	9,000
Factor max*Desv Es	186.779,237	Percentil 10%:	50.255,800	Unidad:	0,000
Factor min*Desv Es	24.049,091		Desv. Est.:	54.243,382	

Table 29: Indicator AERO C.14 values: EU Countries. Domestic air transport of cargo and mail (t) - EUROSTAT

AERO C.14	Países UE. Transporte aéreo doméstico de carga y correo (t). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	2,9	3,0	3,0	2,9	2,8	MUY INSUFICIENTE	F
Alemania	6,1	6,4	6,8	6,9	6,7	SUFICIENTE ALTO	D
Francia	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Reino Unido	5,6	5,0	5,0	4,8	4,8	INSUFICIENTE	FX
Italia	2,2	2,6	2,4	2,4	2,5	MUY INSUFICIENTE	F
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 30: Indicator AERO C.14 rating: EU Countries. Domestic air transport of cargo and mail (t) - EUROSTAT

4.1.1.15 Indicator AERO C.15: EU Countries. International air transport of cargo and mail (t) - EUROSTAT

AERO C.15	Países UE. Transporte aéreo internacional de carga y correo (t). EUROSTAT				
	2015	2016	2017	2018	2019
España	536.793	579.276	681.381	747.425	758.609
Alemania	4.208.638	4.344.650	4.645.198	4.711.675	4.557.549
Francia	2.179.035	2.198.188	2.260.123	2.220.937	2.171.992
Reino Unido	2.298.897	2.414.404	2.641.865	2.655.726	2.557.469
Italia	871.771	939.268	1.028.486	1.016.494	970.892
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	4711675,00	MAX ((Media+Factor max*Desv Est.):		4257349,79	10,00
Mínimo:	536.793,000	MIN ((Media-Factor min *Desv);0):		78389,52504	1
Media:	2.167.869,660	Percentil 90%:	4.472.389,100	4178960,270	9,000
Factor max*Desv Es	4.257.349,795	Percentil 10%:	707.798,620	Unidad:	0,000
Factor min*Desv Es	78.389,525		Desv. Est.:	1.392.986,757	

Table 31: Indicator AERO C.7 values: EU Countries. International air transport of cargo and mail (t) - EUROSTAT

AERO C.15	Países UE. Transporte aéreo internacional de carga y correo (t). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	2,0	2,1	2,3	2,4	2,5	MUY INSUFICIENTE	F
Alemania	9,9	10,0	10,0	10,0	10,0	EXCELENTE	A
Francia	5,5	5,6	5,7	5,6	5,5	SUFICIENTE	E
Reino Unido	5,8	6,0	6,5	6,6	6,3	SUFICIENTE ALTO	D
Italia	2,7	2,9	3,0	3,0	2,9	MUY INSUFICIENTE	F
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 32: Indicator AERO C.7 rating: EU Countries. International air transport of cargo and mail (t) - EUROSTAT

4.1.1.16 Indicator AERO C.16: EU Countries. Number of commercial flights (passengers, cargo, and mail) (Million) - EUROSTAT

AERO C.16	Países UE. Nº Vuelos aéreos comerciales (pasajeros, carga y correo) (Mills.). EUROSTAT				
	2015	2016	2017	2018	2019
España	1,90	2,05	2,18	2,30	2,37
Alemania	1,70	1,74	1,78	1,86	1,85
Francia	1,24	1,27	1,28	1,30	1,32
Reino Unido	1,83	1,94	1,99	2,00	1,98
Italia	1,03	1,08	1,11	1,17	1,20
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	2,37	MAX ((Media+Factor max*Desv Est.):		2,28	10,00
Mínimo:	1,035	MIN ((Media-Factor min *Desv);0):		1,037179661	1
Media:	1,659	Percentil 90%:	2,128	1,244	9,000
Factor max*Desv Es	2,281	Percentil 10%:	1,134	Unidad:	7,237
Factor min*Desv Es	1,037		Desv. Est.:	0,415	

Table 33: Indicator AERO C.16 values: EU Countries. Number of commercial flights (passengers, cargo, and mail) (Million) – EUROSTAT

AERO C.16	Países UE. Nº Vuelos aéreos comerciales (pasajeros, carga y correo) (Mills.). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	7,2	8,3	9,3	10,0	10,0	EXCELENTE	A
Alemania	5,8	6,1	6,4	6,9	6,9	SUFICIENTE ALTO	D
Francia	2,5	2,7	2,8	2,9	3,1	INSUFICIENTE	FX
Reino Unido	6,8	7,5	7,9	8,0	7,8	BIEN	C
Italia	1,0	1,3	1,6	1,9	2,2	MUY INSUFICIENTE	F
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 34: Indicator AERO C.16 rating: EU Countries. Number of commercial flights (passengers, cargo, and mail) (Million) - EUROSTAT

4.1.2. Capacity Indicator

	Índice de Capacidad					Max valor 2019
	2015	2016	2017	2018	2019	
España	78,1	86,4	94,1	98,8	101,8	144
Alemania	105,3	107,7	112,6	115,6	115,8	144
Francia	83,1	85,1	89,2	92,1	94,5	144
Reino Unido	102,4	108,7	114,4	115,4	114,2	144
Italia	53,5	56,9	59,7	63,3	65,9	144
Turquía	49,3	50,4	52,0	55,1	56,1	72
EEUU	70,9	71,0	71,2	71,4	70,7	72
México	35,1	38,2	38,4	39,4	39,1	72
Brasil	18,9	17,7	17,4	19,0	19,0	27
Perú	5,5	5,7	5,8	6,1	6,2	27
Chile	7,7	8,0	8,3	8,7	9,1	36
Japón	54,7	55,2	56,7	57,9	58,1	72
China	55,4	55,6	55,7	55,9	56,1	72
India	43,9	46,7	48,5	49,4	50,0	72
Maximo:	115,820		Máxima puntuación:	144	10	
Mínimo:	5,508		Mínima puntuación:	0	0	
Media:	58,370		Dif:	144,000	10,000	

Table 35: Values of the Capacity Indicator

	Evaluación de Capacidad							Subindicadores considerados
	2015	2016	2017	2018	Calificación 2019			
España	5,4	6,0	6,5	6,9	7,1	BIEN	C	16
Alemania	7,3	7,5	7,8	8,0	8,0	MUY BIEN	B	16
Francia	5,8	5,9	6,2	6,4	6,6	SUFICIENTE ALTO	D	16
Reino Unido	7,1	7,5	7,9	8,0	7,9	BIEN	C	16
Italia	3,7	3,9	4,1	4,4	4,6	INSUFICIENTE	FX	16
Turquía	6,9	7,0	7,2	7,7	7,8	BIEN	C	8
EEUU	9,8	9,9	9,9	9,9	9,8	EXCELENTE	A	8
México	4,9	5,3	5,3	5,5	5,4	SUFICIENTE	E	8
Brasil	7,0	6,6	6,5	7,0	7,0	BIEN	C	3
Perú	2,0	2,1	2,2	2,3	2,3	MUY INSUFICIENTE	F	3
Chile	2,1	2,2	2,3	2,4	2,5	MUY INSUFICIENTE	F	4
Japón	7,6	7,7	7,9	8,0	8,1	MUY BIEN	B	8
China	7,7	7,7	7,7	7,8	7,8	BIEN	C	8
India	6,1	6,5	6,7	6,9	6,9	SUFICIENTE ALTO	D	8

Table 36: Rating of the Capacity Indicator

Subindicadores de Capacidad		Pesos	Total Max puntuación
AERO C.1	Pasajeros totales transportados -entradas y salidas- (Mills. pasajeros) (UE+WORLD)	1	10
AERO C.2	Pasajeros totales transportados -entradas y salidas- (Mills. pasajeros) / PIB real ($) (UE+WORLD)	1	10
AERO C.3	Transporte aéreo total de carga y correo (t) (UE+WORLD)	1	10
AERO C.4	Transporte aéreo total de carga y correo (t) / Habitantes (UE+WORLD)	1	10
AERO C.5	Nº de aeropuertos / Mills. habitantes	1	10
AERO C.6	Nº de aeropuertos / PIB real ($)	1	10
AERO C.7	Pasajeros totales transportados -Aeronaves nacionales y líneas internacionales del país- (Mills. pasajeros) (WB)	1	10
AERO C.8	Capacidad de asientos disponibles para vuelo regulares por cada mil habitantes (OCDE)	1	10
AERO C.9	Países UE. Pasajeros totales transportados UE -entradas y salidas- (Mills. pasajeros). EUROSTAT	1	10
AERO C.10	Países UE. Transporte aéreo nacional de pasajeros en la UE (Mills. pasajeros). EUROSTAT	1	10
AERO C.11	Países UE. Pasajeros transportados intra-UE -Incluye pasaj. vuelos nacionales- (Mills. pasajeros) EUROSTAT	1	10
AERO C.12	Países UE. Pasajeros transportados extra-UE de (Mills. pasajeros). EUROSTAT	1	10
AERO C.13	Países UE. Transporte aéreo total de carga y correo (t). EUROSTAT	1	10
AERO C.14	Países UE. Transporte aéreo doméstico de carga y correo (t). EUROSTAT	1	10
AERO C.15	Países UE. Transporte aéreo internacional de carga y correo (t). EUROSTAT	1	10
AERO C.16	Países UE. Nº Vuelos aéreos comerciales (pasajeros, carga y correo) (Mills.). EUROSTAT	1	10
		16	160

Table 37: Weights and Reduced Maximum Score of Capacity Indicators

In the indicators related to passengers, it is observed (logically) that countries that receive more tourists have higher ratios; in absolute terms (referring exclusively to total transported travelers), the United States, Japan, China, India, and the United Kingdom stand out. Following them is Spain, and to a lesser extent, Germany and France. The tourism potential of Spain is reflected in these indicators. In contrast to the indicators related to freight transport, where Spain and Italy stand out for the limited air movement of goods.

In the indicator "Number of airports per million inhabitants," Spain has the highest ratio (1.124 airports/million inhabitants), followed by France (with 0.848) and the United States (0.758). The indicator of the number of airports per GDP presents different values: Turkey, Mexico, China, and India stand out.

The EUROSTAT indicators that exclusively refer to European countries show the same trend as those analyzed for all countries in the world: Spain stands out in the number of intracommunity transported passengers (after the United Kingdom); and Germany and the United Kingdom stand out in extracommunity transported passengers.

In the overall evaluation of the Capacity Criterion, the highest score is obtained by the United States, followed by Japan, Germany, China, the United Kingdom, Turkey, and Spain (with an overall rating of 7.1 out of 10)

4.2. Performance

This criterion addresses the question: Are the current performance and physical conditions of the public infrastructure sector adequate to meet the current expectations of users?

The selected indicators are as follows:

2 PERFORMANCE	
AERO P.1	Global Logistics Performance Index (LPI) - WB
AERO P.2	Passenger traffic by nationalities of companies - international and domestic - (Millions of passenger-kilometers)
AERO P.3	Passenger traffic by nationalities of companies - international - (Millions of passenger-kilometers)
AERO P.4	Freight traffic (Millions of ton-kilometers) - WB
AERO P.5	Airport connectivity - GCI Score (WEF)
AERO P.6	Efficiency of Air Transport Services - GCI Score (WEF)
AERO P.7	EU countries. Passenger traffic transported (Millions of passenger-kilometers) - EUROSTAT
AERO P.8	EU countries. National and intra-EU27 international passenger traffic (Millions of passenger-kilometers) - EUROSTAT
AERO P.9	EU countries. Extra-EU27 international passenger traffic (Millions of passenger-kilometers) - EUROSTAT
AERO P.10	EU countries. National and international intra-EU27 merchandise traffic (Millions of ton-kilometers) - EUROSTAT
AERO P.11	EU countries. Extra-EU27 international merchandise traffic (Millions of ton-kilometers) - EUROSTAT

For the evaluation of airport performance, a variety of indicators from different sources and criteria have been used, including passenger and cargo traffic (in millions of passenger-kilometers and millions of ton-kilometers), the "Global Logistics Performance Index" (LPI Index)[4] from the World Bank, and others such as the World Economic Forum (WEF). The WEF provides two indicators directly related to airports: "Airport Transport Services Efficiency" and "Airport Connectivity," which are considered relevant for assessing the performance of the country's airport network[5].

[4] The International LPI (Logistics Performance Index) is an indicator that summarizes the performance of the logistics sector by combining data from six basic performance components into a single aggregated measure. You can find more information about it by consulting: **Home | Logistics Performance Index (worldbank.org)**

[5] The indicators that make up the "Global Competitiveness Index" (GCI) of the World Economic Forum (WEF) are detailed in an annex of this report.

4.2.1. Performance Indicators

4.2.1.1 Indicator AERO P.1: Global Logistics Index LPI (Logistics Performance Index - LPI -)

AERO P.1	Índice global de logística LPI WB (Logistics performance Index -LPI-)				
	2015	2016	2017	2018	2019
España					3,830
Alemania					4,200
Francia					3,840
Reino Unido					3,990
Italia					3,740
Turquía					3,150
EEUU					3,890
México					
Brasil					2,990
Perú					2,690
Chile					3,320
Japón					4,030
China					3,610
India					3,180
Maximo:	4,20		Percentil 80%:	3,950	10,00
Mínimo:	2,690	MIN ((Media-Factor min *Desv);0):		2,88	1
Media:	3,574	Percentil 80%:	3,950	1,069	9,000
Factor max*Desv Es	4,267	Percentil 10%:	3,022	Unidad:	8,419
Factor min*Desv Es	2,881		Desv. Est.:	0,462	

Table 38: Indicator AERO P.1 values: Global Logistics Index LPI (Logistics Performance Index - LPI -)

AERO P.1	Índice global de logística LPI WB (Logistics performance Index -LPI-)						
	2015	2016	2017	2018	Calificación 2019		
España					9,0	EXCELENTE	A
Alemania					10,0	EXCELENTE	A
Francia					9,1	EXCELENTE	A
Reino Unido					10,0	EXCELENTE	A
Italia					8,2	MUY BIEN	B
Turquía					3,3	INSUFICIENTE	FX
EEUU					9,5	EXCELENTE	A
México							
Brasil					1,9	MUY INSUFICIENTE	F
Perú					1,0	MUY INSUFICIENTE	F
Chile					4,7	INSUFICIENTE	FX
Japón					10,0	EXCELENTE	A
China					7,1	BIEN	C
India					3,5	INSUFICIENTE	FX

Table 39: Indicator AERO P.1 rating: Global Logistics Index LPI (Logistics Performance Index - LPI -)

4.2.1.2 *Indicator AERO P.2: Passenger traffic by nationalities of airlines -international and domestic- (Million passenger-kilometers)*

AERO P.2	Tráfico de pasajeros por nacionalidades de las compañías -internacionales e interiores- (mills. pasajeros-km)				
	2015	2016	2017	2018	2019
España	102.685	110.962	119.074	131.166	145.472
Alemania	249.091	251.175	248.024	242.054	250.462
Francia	184.146	183.571	192.910	201.955	210.880
Reino Unido	283.196	307.328	323.349	344.592	356.465
Italia					
Turquía	157.419	169.642	183.398	194.991	202.174
EEUU	1.452.002	1.502.250	1.551.965	1.627.879	1.698.805
México					
Brasil	122.868	117.135	123.096	134.841	135.078
Perú					
Chile					
Japón	170.019	179.989	191.538	197.830	204.188
China	725.901	836.516	950.425	1.070.347	1.169.680
India	140.474	163.967	190.344	221.194	220.200
Maximo:	1698805,00		Percentil 80%:	430.352,200	10,00
Mínimo:	102.685,000	MIN ((Media-Factor min *Desv);0):			1
Media:	408.894,240	Percentil 80%:	430.352,200	430352,200	9,000
Factor max*Desv Es	1.096.537,596	Percentil 10%:	123.073,200	Unidad:	0,000
Factor min*Desv Es	-278.749,116		Desv. Est.:	458.428,904	

Table 40: Indicator AERO P.2 values: Passenger traffic by nationalities of airlines -international and domestic- (Million passenger-kilometers)

AERO P.2	Tráfico de pasajeros por nacionalidades de las compañías -internacionales e interiores- (mills. pasajeros-km)						
	2015	2016	2017	2018	Calificación 2019		
España	3,1	3,3	3,5	3,7	4,0	INSUFICIENTE	FX
Alemania	6,2	6,3	6,2	6,1	6,2	SUFICIENTE ALTO	D
Francia	4,9	4,8	5,0	5,2	5,4	SUFICIENTE	E
Reino Unido	6,9	7,4	7,8	8,2	8,5	MUY BIEN	B
Italia							
Turquía	4,3	4,5	4,8	5,1	5,2	SUFICIENTE	E
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México							
Brasil	3,6	3,4	3,6	3,8	3,8	INSUFICIENTE	FX
Perú							
Chile							
Japón	4,6	4,8	5,0	5,1	5,3	SUFICIENTE	E
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	3,9	4,4	5,0	5,6	5,6	SUFICIENTE	E

Table 41: Indicator AERO P.2 rating: Passenger traffic by nationalities of airlines -international and domestic- (Million passenger-kilometers)

4.2.1.3 *Indicator AERO P.3: Passenger traffic by nationalities of international airlines (Million passenger-kilometers)*

AERO P.2	Tráfico de pasajeros por nacionalidades de las compañías -internacionales e interiores- (mills. pasajeros-km)				
	2015	2016	2017	2018	2019
España	102.685	110.962	119.074	131.166	145.472
Alemania	249.091	251.175	248.024	242.054	250.462
Francia	184.146	183.571	192.910	201.955	210.880
Reino Unido	283.196	307.328	323.349	344.592	356.465
Italia					
Turquía	157.419	169.642	183.398	194.991	202.174
EEUU	1.452.002	1.502.250	1.551.965	1.627.879	1.698.805
México					
Brasil	122.868	117.135	123.096	134.841	135.078
Perú					
Chile					
Japón	170.019	179.989	191.538	197.830	204.188
China	725.901	836.516	950.425	1.070.347	1.169.680
India	140.474	163.967	190.344	221.194	220.200
Maximo:	1698805,00		Percentil 80%:	430.352,200	10,00
Mínimo:	102.685,000	MIN ((Media-Factor min *Desv);0):			1
Media:	408.894,240	Percentil 80%:	430.352,200	430352,200	9,000
Factor max*Desv Es	1.096.537,596	Percentil 10%:	123.073,200	Unidad:	0,000
Factor min*Desv Es	-278.749,116		Desv. Est.:	458.428,904	

Table 42: Indicator AERO P.3 values: Passenger traffic by nationalities of international airlines (Million passenger-kilometers)

AERO P.2	Tráfico de pasajeros por nacionalidades de las compañías -internacionales e interiores- (mills. pasajeros-km)						
	2015	2016	2017	2018	Calificación 2019		
España	3,1	3,3	3,5	3,7	4,0	INSUFICIENTE	FX
Alemania	6,2	6,3	6,2	6,1	6,2	SUFICIENTE ALTO	D
Francia	4,9	4,8	5,0	5,2	5,4	SUFICIENTE	E
Reino Unido	6,9	7,4	7,8	8,2	8,5	MUY BIEN	B
Italia							
Turquía	4,3	4,5	4,8	5,1	5,2	SUFICIENTE	E
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México							
Brasil	3,6	3,4	3,6	3,8	3,8	INSUFICIENTE	FX
Perú							
Chile							
Japón	4,6	4,8	5,0	5,1	5,3	SUFICIENTE	E
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	3,9	4,4	5,0	5,6	5,6	SUFICIENTE	E

Table 43: Indicator AERO P.3 rating: Passenger traffic by nationalities of international airlines (Million passenger-kilometers)

4.2.1.4 Indicator AERO P.4: Cargo traffic (Million ton-kilometers)

AERO P.4	Tráfico de mercancías (mills. t-km) (WB)				
	2015	2016	2017	2018	2019
España	1.035	1.068	1.078	1.119	1.192
Alemania	6.986	6.943	7.902	7.970	7.764
Francia	4.098	4.155	4.261	4.444	4.523
Reino Unido	5.423	5.513	5.916	6.198	5.851
Italia	945	1.083	1.437	1.418	1.345
Turquía					
EEUU	37.866	38.658	41.592	42.985	42.498
México	714	761	929	1.063	1.073
Brasil	1.494	1.514	1.737	1.846	1.521
Perú	330	276	317	313	340
Chile	1.392	1.441	1.238	1.226	1.232
Japón	8.662	9.361	10.685	9.421	8.919
China	19.806	21.305	23.324	25.256	25.395
India	1.834	1.894	2.407	2.704	1.938
Maximo:	42985,30		Percentil 80%:	9.007,762	10,00
Mínimo:	276,175	MIN ((Media-Factor min *Desv);0):			1
Media:	7.645,096	Percentil 80%:	9.007,762	9007,762	9,000
Factor max*Desv E	24.663,644	Percentil 10%:	828,044	Unidad:	0,001
Factor min*Desv Es	-9.373,453		Desv. Est.:	11.345,699	

Table 44: Indicator AERO P.4 values: Cargo traffic (Million ton-kilometers)

AERO P.4	Tráfico de mercancías (mills. t-km) (WB)						
	2015	2016	2017	2018	Calificación 2019		
España	2,0	2,1	2,1	2,1	2,2	MUY INSUFICIENTE	F
Alemania	8,0	7,9	8,9	9,0	8,8	MUY BIEN	B
Francia	5,1	5,2	5,3	5,4	5,5	SUFICIENTE	E
Reino Unido	6,4	6,5	6,9	7,2	6,8	SUFICIENTE ALTO	D
Italia	1,9	2,1	2,4	2,4	2,3	MUY INSUFICIENTE	F
Turquía							
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México	1,7	1,8	1,9	2,1	2,1	MUY INSUFICIENTE	F
Brasil	2,5	2,5	2,7	2,8	2,5	MUY INSUFICIENTE	F
Perú	1,3	1,3	1,3	1,3	1,3	MUY INSUFICIENTE	F
Chile	2,4	2,4	2,2	2,2	2,2	MUY INSUFICIENTE	F
Japón	9,7	10,0	10,0	10,0	9,9	EXCELENTE	A
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	2,8	2,9	3,4	3,7	2,9	MUY INSUFICIENTE	F

Table 45: Indicator AERO P.4 rating: Cargo traffic (Million ton-kilometers)

4.2.1.5 Indicator AERO P.5: Airport connectivity. GCI Score (WEF)

AERO P.5	Conectividad aeroportuaria. GCI Score (WEF)				
	2015	2016	2017	2018	2019
España				100,0	100,0
Alemania				100,0	100,0
Francia				95,8	95,8
Reino Unido				100,0	100,0
Italia				97,1	97,1
Turquía				94,9	94,9
EEUU				100,0	100,0
México				92,4	92,4
Brasil				89,7	89,7
Perú				58,2	58,2
Chile				57,8	57,8
Japón				100,0	100,0
China				100,0	100,0
India				100,0	100,0
Maximo:	100,00		Percentil 90%:	100,000	10,00
Mínimo:	57,800	MIN ((Media-Factor min *Desv);0):		70,19330358	1
Media:	91,850	Percentil 90%:	100,000	29,807	9,000
Factor max*Desv Es	113,507	Percentil 10%:	58,200	Unidad:	0,302
Factor min*Desv Es	70,193		Desv. Est.:	14,438	

Table 46: Indicator AERO P.5 values: Airport connectivity. GCI Score (WEF)

AERO P.5	Conectividad aeroportuaria. GCI Score (WEF)						
	2015	2016	2017	2018	Calificación 2019		
España				10,0	10,0	EXCELENTE	A
Alemania				10,0	10,0	EXCELENTE	A
Francia				8,7	8,7	MUY BIEN	B
Reino Unido				10,0	10,0	EXCELENTE	A
Italia				9,1	9,1	EXCELENTE	A
Turquía				8,5	8,5	MUY BIEN	B
EEUU				10,0	10,0	EXCELENTE	A
México				7,7	7,7	BIEN	C
Brasil				6,9	6,9	SUFICIENTE ALTO	D
Perú				1,0	1,0	MUY INSUFICIENTE	F
Chile				1,0	1,0	MUY INSUFICIENTE	F
Japón				10,0	10,0	EXCELENTE	A
China				10,0	10,0	EXCELENTE	A
India				10,0	10,0	EXCELENTE	A

Table 47: Indicator AERO P.5 rating: Airport connectivity. GCI Score (WEF)

4.2.1.6 Indicator AERO P.6: Efficiency of Air Transport Services. GCI Score (WEF)

AERO P.6	Eficiencia de los Servicios de Transporte Aéreo. GCI Score (WEF)				
	2015	2016	2017	2018	2019
España				76,6	76,6
Alemania				77,0	74,5
Francia				75,0	74,9
Reino Unido				77,8	72,2
Italia				63,0	65,4
Turquía				71,0	74,0
EEUU				81,5	79,6
México				58,7	57,4
Brasil				57,3	56,7
Perú				53,4	54,2
Chile				65,6	65,7
Japón				85,0	86,7
China				60,5	60,7
India				64,1	64,3
Maximo:	86,70		Percentil 90%:	100,000	10,00
Mínimo:	53,400	MIN ((Media-Factor min *Desv);0):		54,51733578	1
Media:	68,907	Percentil 90%:	100,000	45,483	9,000
Factor max*Desv E	83,297	Percentil 10%:	57,120	Unidad:	0,198
Factor min*Desv Es	54,517		Desv. Est.:	9,593	

Table 48: Indicator AERO P.6 values: Efficiency of Air Transport Services. GCI Score (WEF)

AERO P.6	Eficiencia de los Servicios de Transporte Aéreo. GCI Score (WEF)						
	2015	2016	2017	2018	Calificación 2019		
España				5,4	5,4	SUFICIENTE	E
Alemania				5,4	5,0	INSUFICIENTE	FX
Francia				5,1	5,0	SUFICIENTE	E
Reino Unido				5,6	4,5	INSUFICIENTE	FX
Italia				2,7	3,2	INSUFICIENTE	FX
Turquía				4,3	4,9	INSUFICIENTE	FX
EEUU				6,3	6,0	SUFICIENTE ALTO	D
México				1,8	1,6	MUY INSUFICIENTE	F
Brasil				1,6	1,4	MUY INSUFICIENTE	F
Perú				1,0	1,0	MUY INSUFICIENTE	F
Chile				3,2	3,2	INSUFICIENTE	FX
Japón				7,0	7,4	BIEN	C
China				2,2	2,2	MUY INSUFICIENTE	F
India				2,9	2,9	MUY INSUFICIENTE	F

Table 49: Indicator AERO P.6 rating: Efficiency of Air Transport Services. GCI Score (WEF)

4.2.1.7 Indicator AERO P.7: EU Countries. Passenger Traffic (mill. passenger-km). EUROSTAT

AERO P.7	Países UE. Tráfico de pasajeros (mills. de pasajeros-km). EUROSTAT				
	2015	2016	2017	2018	2019
España	84.474	93.272	101.732	105.936	109.355
Alemania	111.625	116.121	124.326	130.827	131.882
Francia	160.978	172.883	185.558	191.895	194.440
Reino Unido					
Italia	59.729	61.654	66.356	71.510	74.211
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	194440,00	MAX ((Media+Factor max*Desv Est.):		183361,60	10,00
Mínimo:	59.729,000	MIN ((Media-Factor min *Desv);0):		51514,79622	1
Media:	117.438,200	Percentil 90%:	186.191,700	131846,808	9,000
Factor max*Desv Es	183.361,604	Percentil 10%:	65.885,800	Unidad:	0,000
Factor min*Desv Es	51.514,796		Desv. Est.:	43.948,936	

Table 50: Indicator AERO P.7 values: EU Countries. Passenger Traffic (mill. passenger-km). EUROSTAT

AERO P.7	Países UE. Tráfico de pasajeros (mills. de pasajeros-km). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	3,2	3,9	4,4	4,7	4,9	INSUFICIENTE	FX
Alemania	5,1	5,4	6,0	6,4	6,5	SUFICIENTE ALTO	D
Francia	8,5	9,3	10,0	10,0	10,0	EXCELENTE	A
Reino Unido							
Italia	1,6	1,7	2,0	2,4	2,5	MUY INSUFICIENTE	F
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 51: Indicator AERO P.7 rating: EU Countries. Passenger Traffic (mill. passenger-km). EUROSTAT

4.2.1.8 Indicator AERO P.8: EU Countries. Domestic and Intra-EU27 International Passenger Traffic (mill. passenger-km). EUROSTAT

AERO P.8	Países UE. Tráfico nacional y transporte internacional intra-UE27 pasajeros (mills. Pasajeros-km). EUROSTAT				
	2015	2016	2017	2018	2019
España	42.414	47.233	51.309	54.509	56.193
Alemania	36.545	39.235	41.113	42.189	42.706
Francia	37.708	39.487	41.432	43.265	44.620
Reino Unido					
Italia	29.259	30.420	32.234	33.944	35.440
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	56193,00	MAX ((Media+Factor max*Desv Est.):		52088,38	10,00
Mínimo:	29.259,000	MIN ((Media-Factor min *Desv);0):		30037,12125	1
Media:	41.062,750	Percentil 90%:	51.629,000	22051,257	9,000
Factor max*Desv Es	52.088,379	Percentil 10%:	32.052,600	Unidad:	0,000
Factor min*Desv Es	30.037,121		Desv. Est.:	7.350,419	

Table 52: Indicator AERO P.8 values: EU Countries. Domestic and Intra-EU27 International Passenger Traffic (mill. passenger-km). EUROSTAT

AERO P.8	Países UE. Tráfico nacional y transporte internacional intra-UE27 pasajeros (mills. Pasajeros-km). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	6,1	8,0	9,7	10,0	10,0	EXCELENTE	A
Alemania	3,7	4,8	5,5	6,0	6,2	SUFICIENTE ALTO	D
Francia	4,1	4,9	5,7	6,4	7,0	SUFICIENTE ALTO	D
Reino Unido							
Italia	1,0	1,2	1,9	2,6	3,2	INSUFICIENTE	FX
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 53: Indicator AERO P.8 rating: EU Countries. Domestic and Intra-EU27 International Passenger Traffic (mill. passenger-km). EUROSTAT

4.2.1.9 Indicator: AERO P.9: EU Countries. Extra-EU27 International Passenger Traffic (mill. passenger-km). EUROSTAT

AERO P.9	Países UE. Tráfico internacional extra-UE27 pasajeros (mills. Pasajeros-km). EUROSTAT				
	2015	2016	2017	2018	2019
España	21.808	24.264	26.165	26.548	27.002
Alemania	24.516	23.945	25.356	27.145	27.427
Francia	22.584	22.850	24.256	24.975	25.204
Reino Unido					
Italia	11.416	11.358	12.254	13.259	13.603
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	27427,00	MAX ((Media+Factor max*Desv Est.):		30482,92	10,00
Mínimo:	11.358,000	MIN ((Media-Factor min *Desv);0):		13110,58351	1
Media:	21.796,750	Percentil 90%:	27.016,300	17372,333	9,000
Factor max*Desv Es	30.482,916	Percentil 10%:	12.170,200	Unidad:	0,001
Factor min*Desv Es	13.110,584		Desv. Est.:	5.790,778	

Table 54: Indicator AERO P.9 values: EU Countries. Extra-EU27 International Passenger Traffic (mill. passenger-km). EUROSTAT

AERO P.9	Países UE. Tráfico internacional extra-UE27 pasajeros (mills. Pasajeros-km). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	5,5	6,8	7,8	8,0	8,2	MUY BIEN	B
Alemania	6,9	6,6	7,3	8,3	8,4	MUY BIEN	B
Francia	5,9	6,0	6,8	7,1	7,3	BIEN	C
Reino Unido							
Italia	1,0	1,0	1,0	1,1	1,3	MUY INSUFICIENTE	F
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 55: Indictor AERO P.9 rating: EU Countries. Extra-EU27 International Passenger Traffic (mill. passenger-km). EUROSTAT

4.2.1.10 Indicator: AERO P.10: EU Countries. Intra-EU27 National and International Freight Traffic (mill. t-km). EUROSTAT

AERO P.10	Países UE. Tráfico nacional e internacional de mercancías intra-UE27 (mills. t-km). EUROSTAT				
	2015	2016	2017	2018	2019
España	77,0	80,0	85,0	86,0	91,0
Alemania	334,0	357,0	371,0	364,0	367,0
Francia	242,0	245,0	243,0	234,0	239,0
Reino Unido					
Italia	69,0	70,0	69,0	68,0	67,0
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	371,00	MAX ((Media+Factor max*Desv Est.):		371,93	10,00
Mínimo:	67,000	MIN ((Media-Factor min *Desv);0):		3,871462453	1
Media:	187,900	Percentil 90%:	364,300	368,057	9,000
Factor max*Desv Es	371,929	Percentil 10%:	68,900	Unidad:	0,024
Factor min*Desv Es	3,871		Desv. Est.:	122,686	

Table 56: EU Countries. Intra-EU27 National and International Freight Traffic (mill. t-km). EUROSTAT

AERO P.10	Países UE. Tráfico nacional e internacional de mercancías intra-UE27 (mills. t-km). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	2,8	2,9	3,0	3,0	3,1	INSUFICIENTE	FX
Alemania	9,1	9,6	10,0	9,8	9,9	EXCELENTE	A
Francia	6,8	6,9	6,8	6,6	6,7	SUFICIENTE ALTO	D
Reino Unido							
Italia	2,6	2,6	2,6	2,6	2,5	MUY INSUFICIENTE	F
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 57: Indicator AERO P.10 rating: EU Countries. Intra-EU27 National and International Freight Traffic (mill. t-km). EUROSTAT

4.2.1.11 Indicator: AERO P.11: EU Countries. Extra-EU27 International Freight Traffic (mill. t-km). EUROSTAT

AERO P.11	Países UE. Tráfico internacional de mercancías extra-UE27 (mills. t-km). EUROSTAT				
	2015	2016	2017	2018	2019
España	120,0	123,0	141,0	160,0	166,0
Alemania	1076,0	1105,0	1182,0	1202,0	1144,0
Francia	479,0	470,0	485,0	480,0	451,0
Reino Unido					
Italia	147,0	134,0	151,0	148,0	127,0
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	1202,00	MAX ((Media+Factor max*Desv Est.):		1104,20	10,00
Mínimo:	120,000	MIN ((Media-Factor min *Desv);0):			1
Media:	474,550	Percentil 90%:	1.147,800	1104,197	9,000
Factor max*Desv Es	1.104,197	Percentil 10%:	126,600	Unidad:	0,008
Factor min*Desv Es	-155,097		Desv. Est.:	419,765	

Table 58: Indicator AERO P.11 values: EU Countries. Extra-EU27 International Freight Traffic (mill. t-km). EUROSTAT

AERO P.11	Países UE. Tráfico internacional de mercancías extra-UE27 (mills. t-km). EUROSTAT						
	2015	2016	2017	2018	Calificación 2019		
España	2,0	2,0	2,1	2,3	2,4	MUY INSUFICIENTE	F
Alemania	9,8	10,0	10,0	10,0	10,0	EXCELENTE	A
Francia	4,9	4,8	5,0	4,9	4,7	INSUFICIENTE	FX
Reino Unido							
Italia	2,2	2,1	2,2	2,2	2,0	MUY INSUFICIENTE	F
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 59: Indicator AERO P.11 rating: EU Countries. Extra-EU27 International Freight Traffic (mill. t-km). EUROSTAT

4.2.2. Performance Indicator

	Índice de Prestaciones					Max valor 2019
	2015	2016	2017	2018	2019	
España	28,4	32,8	36,7	53,7	64,0	99
Alemania	57,3	59,2	62,4	79,3	89,5	99
Francia	45,7	47,4	50,2	65,4	75,6	99
Reino Unido	23,0	23,9	24,7	41,0	49,8	54
Italia	10,3	10,6	12,2	25,0	34,4	81
Turquía	9,3	9,8	10,5	23,8	28,2	45
EEUU	30,0	30,0	30,0	46,3	55,5	54
México	1,7	1,8	1,9	11,6	11,3	27
Brasil	8,1	8,0	8,4	17,4	18,9	54
Perú	1,3	1,3	1,3	3,3	4,3	36
Chile	2,4	2,4	2,2	6,4	11,1	36
Japón	17,8	18,6	19,1	36,5	46,9	54
China	26,4	27,8	28,8	42,1	49,4	54
India	9,8	10,5	11,9	26,0	28,6	54
Maximo:	89,543		Máxima puntuación:	99	10	
Mínimo:	1,276		Mínima puntuación:			
Media:	27,165		Dif:	99,000	10,000	

Table 60: Performance Indicator Values

	Evaluación de Prestaciones							Subindicadores considerados
	2015	2016	2017	2018	Calificación 2019			
España	4,0	4,6	5,1	6,0	6,5	SUFICIENTE ALTO	D	11
Alemania	8,0	8,2	8,7	8,8	9,0	EXCELENTE	A	11
Francia	6,3	6,6	7,0	7,3	7,6	BIEN	C	11
Reino Unido	8,5	8,9	9,1	9,1	9,2	EXCELENTE	A	6
Italia	1,9	2,0	2,3	3,5	4,3	INSUFICIENTE	FX	9
Turquía	5,2	5,5	5,8	6,6	6,3	SUFICIENTE ALTO	D	5
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	6
México	1,9	2,0	2,1	4,3	4,2	INSUFICIENTE	FX	3
Brasil	3,0	3,0	3,1	3,9	3,5	INSUFICIENTE	FX	6
Perú	1,5	1,4	1,5	1,2	1,2	MUY INSUFICIENTE	F	4
Chile	2,7	2,7	2,5	2,4	3,1	INSUFICIENTE	FX	4
Japón	6,6	6,9	7,1	8,1	8,7	MUY BIEN	B	6
China	9,8	10,0	10,0	9,4	9,1	EXCELENTE	A	6
India	3,6	3,9	4,4	5,8	5,3	SUFICIENTE	E	6

Table 61: Performance Indicator Rating

Subindicadores de Prestaciones		Pesos	Total Max puntuación
AERO P.1	Índice global de logística LPI WB (Logistics performance Index -LPI-)	1	10
AERO P.2	Tráfico de pasajeros por nacionalidades de las compañías -internacionales e interiores- (mills. pasajeros-km)	1	10
AERO P.3	Tráfico de pasajeros por nacionalidades de las compañías -internacionales- (mills. pasajeros-km)	1	10
AERO P.4	Tráfico de mercancías (mills. t-km) (WB)	1	10
AERO P.5	Conectividad aeroportuaria. GCI Score (WEF)	1	10
AERO P.6	Eficiencia de los Servicios de Transporte Aéreo. GCI Score (WEF)	1	10
AERO P.7	Países UE. Tráfico de pasajeros (mills. de pasajeros-km). EUROSTAT	1	10
AERO P.8	Países UE. Tráfico nacional y transporte internacional intra-UE27 pasajeros (mills. Pasajeros-km). EUROSTAT	1	10
AERO P.9	Países UE. Tráfico internacional extra-UE27 pasajeros (mills. Pasajeros-km). EUROSTAT	1	10
AERO P.10	Países UE. Tráfico nacional e internacional de mercancías intra-UE27 (mills. t-km). EUROSTAT	1	10
AERO P.11	Países UE. Tráfico internacional de mercancías extra-UE27 (mills. t-km). EUROSTAT	1	10
		11	110
		% Valorado de la Max. Puntuación del Criterio	99

Table 62: Weights and reduced maximum score of Performance Indicators

The "World Bank Global Logistics Index (LPI)" indicator gives the highest rating to Germany, the United Kingdom, Japan, and the USA, followed by Turkey, France, and Spain (9.0 out of 10).

In the "Passenger traffic by nationality of the companies" indicator, the USA stands out (1,698,805 million passenger-km) along with China (1,169,680 million passenger-km). Reaching a distant position, the United Kingdom follows with 356,465 million passenger-km. The rest of the European countries have values below 250,000 million passenger-km. Spain has the lowest values within the EU. The pattern of cargo traffic, in million t-km, follows a similar sequence to that of passengers.

The World Economic Forum (WEF) indicator related to airports, "Airport Connectivity," gives the highest rating to Japan, China, India, Germany, USA, the United Kingdom, and Spain (100 out of 100). In the WEF indicator "Efficiency of airport service," Japan also stands out with an index of 86.7 out of 100. Spain obtains a score of 76.6.

In the overall set of WEF indicators that make up "The Global Competitiveness Index" (GCI), which refers to 141 countries worldwide, Spain ranks seventh in the "2nd Pillar: Infrastructure" (with a rating of 90 out of a maximum of 100).

The best overall rating for the Performance criterion is obtained by the USA with a score of 10 out of 10. Germany, the United Kingdom, and China receive an excellent rating. Spain achieves a high satisfactory score (6.5).

4.3. Financing

The question this criterion seeks to answer is: What investment is allocated to the financing of the public infrastructure? How much is applied to infrastructure creation? And how much to operation and maintenance?

The financing of infrastructure involves two distinct elements: investment for infrastructure creation and investment for preservation, operation, maintenance, and management. In countries where airport infrastructure is mature, the overall investment is lower than in countries where it is under development, resulting in a significant proportion being allocated to conservation relative to creation. Conversely, in countries where infrastructure is being created and developed, the investment in infrastructure creation is substantial compared to investment in conservation. Unfortunately, it's not easy to separate investment for creation from investment for conservation.

For the purposes of this report, the following six indicators have been considered:

3 FINANCING	
AERO F.1	Investment in airports (Millions of €) / Transported passengers (Millions of passengers)
AERO F.2	Investment in airports (€) / Cargo (tonnes)
AERO F.3	% Investment in airports (€) / Real GDP (€)
AERO F.4	Investment in airports (€) / Inhabitants
AERO F.5	Air passenger transport per one thousand units of current GDP (USD)
AERO F.6	Air cargo transport in tonne-kilometers per one thousand units of current GDP (USD)

To measure the level of financing in a country, the amount invested in airports must be related to the number of passengers and cargo transported through them, as well as to the population and the economic capacity of the country (through GDP at constant prices). Although various indicators are relevant, the most representative one is the investment in airports relative to the national GDP. The evolution of this indicator over the years provides valuable information about the degree of infrastructure development in the country and the state of its preservation. A high percentage relative to the GDP indicates that the airport network is in a process of creation, as seen in the cases of China and Turkey.

4.3.1. Financing Indicators

4.3.1.1 Indicator AERO F.1: Investment in airports (million €) / Transported passengers (million passengers)

AERO F.1	Inversión en aeropuertos (mills. €) / Pasajeros transportados (mills. Pasaj.)				
	2015	2016	2017	2018	2019
España	1,678	1,950	2,121	2,797	2,782
Alemania	4,383	4,485	5,226	6,159	8,555
Francia	3,635	5,328	5,198	5,778	6,099
Reino Unido					
Italia	1,159	0,528	0,291	0,241	0,218
Turquía	8,388	12,922	14,158	13,911	13,668
EEUU					
México	4,776	5,484	10,829	10,532	1,877
Brasil					
Perú					
Chile	7,210	9,195	14,198	12,647	10,020
Japón	4,915	5,600	5,307	5,847	5,906
China	29,115	29,722	30,027	29,812	24,022
India	2,125	0,923	0,896	0,870	0,844
Maximo:	30,03		Percentil 80%:	12,702	10,00
Mínimo:	0,218	MIN ((Media-Factor min *Desv);0):		0,0000	1
Media:	7,887	Percentil 80%:	12,702	12,702	9,000
Factor max*Desv Es	20,000	Percentil 10%:	0,867	Unidad:	0,709
Factor min*Desv Es	-4,225		Desv. Est.:	8,075	

Table 63: Indicator AERO F.1 values: Investment in airports (million €) / Transported passengers (million passengers)

AERO F.1	Inversión en aeropuertos (mills. €) / Pasajeros transportados (mills. Pasaj.)						
	2015	2016	2017	2018	Calificación 2019		
España	2,2	2,4	2,5	3,0	3,0	INSUFICIENTE	FX
Alemania	4,1	4,2	4,7	5,4	7,1	BIEN	C
Francia	3,6	4,8	4,7	5,1	5,3	SUFICIENTE	E
Reino Unido							
Italia	1,8	1,4	1,2	1,2	1,2	MUY INSUFICIENTE	F
Turquía	6,9	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU							
México	4,4	4,9	8,7	8,5	2,3	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile	6,1	7,5	10,0	10,0	8,1	MUY BIEN	B
Japón	4,5	5,0	4,8	5,1	5,2	SUFICIENTE	E
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	2,5	1,7	1,6	1,6	1,6	MUY INSUFICIENTE	F

Table 64: Indicator AERO F.1 rating: Investment in airports (million €) / Transported passengers (million passengers)

4.3.1.2 Indicator AERO F.2: Investment in airports (€) / Cargo (t)

AERO F.2	Inversión en aeropuertos (€) / Carga (t)				
	2015	2016	2017	2018	2019
España	492,940	591,330	599,373	765,017	778,556
Alemania	196,502	201,477	232,541	282,902	414,125
Francia	215,042	322,286	326,895	388,724	433,882
Reino Unido					
Italia	161,439	71,595	38,966	34,702	34,249
Turquía	1589,058	2178,622	2151,072	1904,536	1686,256
EEUU					
México	660,397	791,302	1518,232	1434,847	248,539
Brasil					
Perú					
Chile					
Japón	257,007	301,063	285,337	314,376	317,538
China	1889,684	1999,972	1963,348	1894,089	1483,043
India	175,577	83,559	78,829	74,367	70,157
Maximo:	2178,62		Percentil 80%:	1.532,397	10,00
Mínimo:	34,249	MIN ((Media-Factor min *Desv);0):		0,0000	1
Media:	709,630	Percentil 80%:	1.532,397	1532,397	9,000
Factor max*Desv Es	1.771,751	Percentil 10%:	72,704	Unidad:	0,006
Factor min*Desv Es	-352,491		Desv. Est.:	708,081	

Table 65: Indicator AERO F.2 values: Investment in airports (€) / Cargo (t)

AERO F.2	Inversión en aeropuertos (€) / Carga (t)						
	2015	2016	2017	2018	Calificación 2019		
España	3,9	4,5	4,5	5,5	5,6	SUFICIENTE	E
Alemania	2,2	2,2	2,4	2,7	3,4	INSUFICIENTE	FX
Francia	2,3	2,9	2,9	3,3	3,5	INSUFICIENTE	FX
Reino Unido							
Italia	1,9	1,4	1,2	1,2	1,2	MUY INSUFICIENTE	F
Turquía	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU							
México	4,9	5,6	9,9	9,4	2,5	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile							
Japón	2,5	2,8	2,7	2,8	2,9	MUY INSUFICIENTE	F
China	10,0	10,0	10,0	10,0	9,7	EXCELENTE	A
India	2,0	1,5	1,5	1,4	1,4	MUY INSUFICIENTE	F

Table 66: Indicator AERO F.2 rating: Investment in airports (€) / Cargo (t)

4.3.1.3 Indicator AERO F.3: % Investment in airports (€) / Real GDP (€)

AERO F.3	% Inversión en aeropuertos (€) / PIB real (€)				
	2015	2016	2017	2018	2019
España	0,0272%	0,0339%	0,0383%	0,0513%	0,0510%
Alemania	0,0212%	0,0199%	0,0254%	0,0321%	0,0424%
Francia	0,0233%	0,0346%	0,0349%	0,0396%	0,0422%
Reino Unido					
Italia	0,0089%	0,0042%	0,0024%	0,0021%	0,0019%
Turquía	0,1850%	0,2864%	0,3339%	0,3903%	0,3830%
EEUU					
México	0,0515%	0,0710%	0,1367%	0,1359%	0,0228%
Brasil					
Perú					
Chile	0,0495%	0,0668%	0,1023%	0,0987%	0,0854%
Japón	0,0341%	0,0361%	0,0365%	0,0424%	0,0411%
China	0,2696%	0,2976%	0,2882%	0,2730%	0,2083%
India	0,0246%	0,0117%	0,0104%	0,0103%	0,0094%
Maximo:	0,3903%		Percentil 80%:	0,1463%	10,00
Mínimo:	0,0019%	MIN ((Media-Factor min *Desv);0):			1
Media:	0,0906%	Percentil 80%:	0,1463%	0,001	9,000
Factor max*Desv E	0,2546%	Percentil 10%:	0,000	Unidad:	6149,740
Factor min*Desv Es	-0,0735%		Desv. Est.:	0,1094%	

Table 67: Indicator AERO F.3 values: % Investment in airports (€) / Real GDP (€)

AERO F.3	% Inversión en aeropuertos (€) / PIB real (€)						
	2015	2016	2017	2018	Calificación 2019		
España	2,7	3,1	3,4	4,2	4,1	INSUFICIENTE	FX
Alemania	2,3	2,2	2,6	3,0	3,6	INSUFICIENTE	FX
Francia	2,4	3,1	3,1	3,4	3,6	INSUFICIENTE	FX
Reino Unido							
Italia	1,5	1,3	1,1	1,1	1,1	MUY INSUFICIENTE	F
Turquía	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU							
México	4,2	5,4	9,4	9,4	2,4	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile	4,0	5,1	7,3	7,1	6,3	SUFICIENTE ALTO	D
Japón	3,1	3,2	3,2	3,6	3,5	INSUFICIENTE	FX
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	2,5	1,7	1,6	1,6	1,6	MUY INSUFICIENTE	F

Table 68: Indicator AERO F.3 rating: % Investment in airports (€) / Real GDP (€)

4.3.1.4 Indicator AERO F.4: Investment in airports (€) / Population

AERO F.4	Inversión en aeropuertos (€) / Habitantes				
	2015	2016	2017	2018	2019
España	6,309	8,132	9,551	13,184	13,472
Alemania	10,406	10,929	13,429	16,525	23,347
Francia	7,694	11,600	11,970	13,949	15,301
Reino Unido					
Italia	2,437	1,171	0,694	0,612	0,586
Turquía	18,308	28,191	31,309	31,214	31,176
EEUU					
México	4,453	5,604	11,265	11,158	2,027
Brasil					
Perú					
Chile	6,021	8,263	13,578	13,179	11,208
Japón	10,737	12,853	12,557	14,268	14,865
China	19,161	21,732	22,293	22,797	18,921
India	0,363	0,183	0,180	0,179	0,176
Maximo:	31,31		Percentil 80%:	18,431	10,00
Mínimo:	0,176	MIN ((Media-Factor min *Desv);0):		0,0000	1
Media:	11,790	Percentil 80%:	18,431	18,431	9,000
Factor max*Desv E	24,702	Percentil 10%:	0,564	Unidad:	0,488
Factor min*Desv Es	-1,122		Desv. Est.:	8,608	

Table 69: Indicator AERO F.4 values: Investment in airports (€) / Population

AERO F.4	Inversión en aeropuertos (€) / Habitantes						
	2015	2016	2017	2018	Calificación 2019		
España	4,1	5,0	5,7	7,4	7,6	BIEN	C
Alemania	6,1	6,3	7,6	9,1	10,0	EXCELENTE	A
Francia	4,8	6,7	6,8	7,8	8,5	MUY BIEN	B
Reino Unido							
Italia	2,2	1,6	1,3	1,3	1,3	MUY INSUFICIENTE	F
Turquía	9,9	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU							
México	3,2	3,7	6,5	6,4	2,0	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile	3,9	5,0	7,6	7,4	6,5	SUFICIENTE ALTO	D
Japón	6,2	7,3	7,1	8,0	8,3	MUY BIEN	B
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	1,2	1,1	1,1	1,1	1,1	MUY INSUFICIENTE	F

Table 70: Indicator AERO F.4 rating: Investment in airports (€) / Population

4.3.1.5 Indicator AERO F.5: Air passenger transport per thousand units of current GDP (USD)

AERO F.5	Transporte aéreo de pasajeros por mil unidades del PIB actual (USD)				
	2015	2016	2017	2018	2019
España	0,051	0,054	0,055	0,057	0,063
Alemania	0,035	0,034	0,031	0,028	0,028
Francia	0,027	0,026	0,026	0,025	0,026
Reino Unido	0,045	0,053	0,057	0,058	0,050
Italia	0,016	0,016	0,013	0,013	0,014
Turquía	0,112	0,116	0,126	0,149	0,146
EEUU	0,044	0,044	0,044	0,043	0,043
México	0,040	0,049	0,050	0,053	0,055
Brasil					
Perú					
Chile	0,062	0,065	0,064	0,066	0,076
Japón	0,026	0,024	0,026	0,026	0,026
China	0,039	0,043	0,045	0,044	0,046
India	0,046	0,052	0,053	0,059	0,058
Maximo:	0,15		Percentil 80%:	0,058	10,00
Mínimo:	0,013	MIN ((Media-Factor min *Desv);0):		0,0059	1
Media:	0,049	Percentil 80%:	0,058	0,052	9,000
Factor max*Desv Es	0,093	Percentil 10%:	0,025	Unidad:	171,664
Factor min*Desv Es	0,006		Desv. Est.:	0,029	

Table 71: Indicator AERO F.5 values: Air passenger transport per thousand units of current GDP (USD)

AERO F.5	Transporte aéreo de pasajeros por mil unidades del PIB actual (USD)						
	2015	2016	2017	2018	Calificación 2019		
España	8,7	9,3	9,4	9,7	10,0	EXCELENTE	A
Alemania	6,0	5,8	5,3	4,8	4,9	INSUFICIENTE	FX
Francia	4,6	4,5	4,5	4,3	4,5	INSUFICIENTE	FX
Reino Unido	7,7	9,2	9,7	9,9	8,6	MUY BIEN	B
Italia	2,7	2,7	2,3	2,2	2,4	MUY INSUFICIENTE	F
Turquía	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU	7,5	7,5	7,5	7,4	7,4	BIEN	C
México	6,9	8,5	8,6	9,0	9,4	EXCELENTE	A
Brasil							
Perú							
Chile	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Japón	4,5	4,1	4,4	4,4	4,4	INSUFICIENTE	FX
China	6,8	7,4	7,7	7,5	7,9	BIEN	C
India	7,9	9,0	9,1	10,0	10,0	EXCELENTE	A

Table 72: Indicator AERO F.5 rating: Air passenger transport per thousand units of current GDP (USD)

4.3.1.6 *Indicator AERO F.6: Air cargo transport in tonne-kilometers per thousand units of current GDP (USD)*

AERO F.6	Transporte aéreo de carga en toneladas-km por mil unidades del PIB actual (USD)				
	2015	2016	2017	2018	2019
España	0,866	0,866	0,822	0,787	0,855
Alemania	2,081	2,001	2,146	2,011	2,011
Francia	1,680	1,680	1,642	1,594	1,666
Reino Unido	1,849	2,047	2,222	2,169	2,067
Italia	0,515	0,577	0,733	0,678	0,671
Turquía	3,338	4,021	5,589	7,661	8,955
EEUU	2,076	2,062	2,128	2,086	1,983
México	0,610	0,704	0,799	0,867	0,843
Brasil					
Perú					
Chile	5,710	5,751	4,468	4,126	4,414
Japón	1,973	1,902	2,195	1,901	1,761
China	1,791	1,897	1,895	1,818	1,778
India	0,854	0,827	0,917	0,979	0,671
Maximo:	8,96		Percentil 80%:	4,70	10,00
Mínimo:	0,515	MIN ((Media-Factor min *Desv);0):			1
Media:	2,126	Percentil 80%:	2,174	4,702	9,000
Factor max*Desv Es	4,702	Percentil 10%:	0,701	Unidad:	1,914
Factor min*Desv Es	-0,449		Desv. Est.:	1,717	

Table 73: Indicator AERO F.6 values: Air cargo transport in tonne-kilometers per thousand units of current GDP (USD)

AERO F.6	Transporte aéreo de carga en toneladas-km por mil unidades del PIB actual (USD)						
	2015	2016	2017	2018	Calificación 2019		
España	2,7	2,7	2,6	2,5	2,6	MUY INSUFICIENTE	F
Alemania	5,0	4,8	5,1	4,8	4,8	INSUFICIENTE	FX
Francia	4,2	4,2	4,1	4,1	4,2	INSUFICIENTE	FX
Reino Unido	4,5	4,9	5,3	5,2	5,0	SUFICIENTE	E
Italia	2,0	2,1	2,4	2,3	2,3	MUY INSUFICIENTE	F
Turquía	7,4	8,7	10,0	10,0	10,0	EXCELENTE	A
EEUU	5,0	4,9	5,1	5,0	4,8	INSUFICIENTE	FX
México	2,2	2,3	2,5	2,7	2,6	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile	10,0	10,0	9,6	8,9	9,4	EXCELENTE	A
Japón	4,8	4,6	5,2	4,6	4,4	INSUFICIENTE	FX
China	4,4	4,6	4,6	4,5	4,4	INSUFICIENTE	FX
India	2,6	2,6	2,8	2,9	2,3	MUY INSUFICIENTE	F

Table 74: Indicator AERO F.6 rating: Air cargo transport in tonne-kilometers per thousand units of current GDP (USD)

4.3.2. Financing Indicator

	Índice de Financiación					Max valor 2019
	2015	2016	2017	2018	2019	
España	24,2	26,9	28,0	32,3	32,9	54
Alemania	25,6	25,5	27,6	29,7	33,8	54
Francia	21,8	26,2	26,2	28,0	29,6	54
Reino Unido	12,2	14,1	15,0	15,1	13,6	18
Italia	12,2	10,4	9,6	9,3	9,4	54
Turquía	54,3	58,7	60,0	60,0	60,0	54
EEUU	12,5	12,5	12,5	12,4	12,2	18
México	25,6	30,4	45,7	45,4	21,2	54
Brasil						
Perú						
Chile	34,1	37,7	44,5	43,4	40,3	45
Japón	25,6	27,0	27,4	28,6	28,6	54
China	51,2	52,1	52,3	52,0	52,0	54
India	18,8	17,5	17,7	18,6	17,9	54
Maximo:	60,000		Máxima puntuación:	54	10	
Mínimo:	9,327		Mínima puntuación:			
Media:	29,164		Dif:	54,000	10,000	

Table 75: Financing Indicator Values

Subindicadores de Financiación		Pesos	Total Max puntuación
AERO F.1	Inversión en aeropuertos (mills. €) / Pasajeros transportados (mills. Pasaj.)	1	10
AERO F.2	Inversión en aeropuertos (€) / Carga (t)	1	10
AERO F.3	% Inversión en aeropuertos (€) / PIB real (€)	1	10
AERO F.4	Inversión en aeropuertos (€) / Habitantes	1	10
AERO F.5	Transporte aéreo de pasajeros por mil unidades del PIB actual (USD)	1	10
AERO F.6	Transporte aéreo de carga en toneladas-km por mil unidades del PIB actual (USD)	1	10
		6	60

Tabls 76: Financing Indicator Weights

	Evaluación de Financiación							Subindicadores considerados
	2015	2016	2017	2018	Calificación 2019			
España	4,5	5,0	5,2	6,0	6,1	SUFICIENTE ALTO	D	6
Alemania	4,7	4,7	5,1	5,5	6,3	SUFICIENTE ALTO	D	6
Francia	4,0	4,9	4,9	5,2	5,5	SUFICIENTE	E	6
Reino Unido	6,8	7,8	8,3	8,4	7,5	BIEN	C	2
Italia	2,3	1,9	1,8	1,7	1,7	MUY INSUFICIENTE	F	6
Turquía	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	6
EEUU	6,9	6,9	7,0	6,9	6,8	SUFICIENTE ALTO	D	2
México	4,7	5,6	8,5	8,4	3,9	INSUFICIENTE	FX	6
Brasil								
Perú								
Chile	7,6	8,4	9,9	9,6	8,9	MUY BIEN	B	5
Japón	4,7	5,0	5,1	5,3	5,3	SUFICIENTE	E	6
China	9,5	9,6	9,7	9,6	9,6	EXCELENTE	A	6
India	3,5	3,2	3,3	3,5	3,3	INSUFICIENTE	FX	6

Table 77: Financing Criterion Rating

As mentioned before, the most relevant indicator is the Investment in Airports as a % of GDP. The average value for the analyzed countries and years is 0.09%, with a maximum of 0.39% reached in 2018 by Turkey. Spain has a low value, 0.051% of GDP in 2019. The highest values in 2019 are observed in China (0.74%) and Turkey, which have maintained high investments in the last five years. These data indicate that both China and Turkey have been consistently creating new airport infrastructure in recent years. Among European countries, the United Kingdom (0.051%) and France (0.0422%) are the ones that invest the most. Data for the United States are not available. The data is sourced from the OECD and cross-referenced with information provided by the Ministry of Transport, Mobility, and Urban Agenda for Spain.

Some interesting insights from the used indicators are summarized in the following table:

Indicator	Average	Minimum value 2019	Maximum value 2019
Percentage of investment in airports relative to GDP	**0,09%**	**0,0019%**	**0,38%**
Investment per Passengers transported	**7,8€**	**0,2€**	**24€**
Investment per Inhabitant	**11,7€**	**0,17€**	**31€**

The wide range of results presented in the previous table reflects a reality: countries that are creating new infrastructure or undergoing significant transformation in their network during the analyzed years (2015-2019) show high values, indicating a significant commitment to the development and improvement of the airport network. An average investment may indicate that airports do not require more investment than they have already made, or it may suggest that they are not making substantial investments.

Spain receives a final rating of "sufficient high" (6.1) in this Criterion, among the higher ratings of the analyzed European countries. The highest rating goes to Turkey (10), followed by China (9.6) and Chile (8.9).

4.4. Future Adaptation and Sustainable Development

The questions addressed in this criterion are: Is the capacity and performance of the public infrastructure sector prepared to meet future expectations and demands? Are the resources and investments considered sufficient to cover the future needs of the sector? How are actions promoting environmental sustainability being implemented? Are active measures being taken to achieve the established goals for decarbonizing public infrastructure and transportation?

The selected Indicators are as follows:

4 ADAPTATION TO THE FUTURE AND SUSTAINABILITY	
AERO A.1	Year-on-year cumulative growth index. Investment in airports / GDP (Index 100 in 2015)
AERO A.2	Year-on-year cumulative growth index. Investment in airports / (population + tourists) (Index 100 in 2015)
AERO A.3	Year-on-year cumulative growth index. Investment in airports / passengers (Index 100 in 2015)
AERO A.4	Year-on-year cumulative growth index. Investment in airports / cargo (Index 100 in 2015)
AERO A.5	Year-on-year cumulative growth index. Investment in airports / Departures of flights worldwide by companies registered in the country
AERO A.6	Share of CO2 emissions from navigation in total CO2 emissions from transportation (OECD)
AERO A.7	Percentage of CO2 emissions from national aviation in total CO2 emissions from transportation (OECD)
AERO A.8	Proportion of CO2 emissions from international aviation bunkers in total CO2 emissions (OECD)
AERO A.9	Development of Climate Change Mitigation Technologies related to Transportation (OECD)

The growth trend of investment relative to GDP, national population plus tourists, passengers, cargo, and flight departures worldwide by companies registered in the country are good indicators for analyzing the future adaptability of airport investments over the last five years. The index of 100 has been set in the year 2015.

Three environmental-related indicators have also been considered: the percentage of national aviation CO2 emissions in total CO2 emissions, the proportion of international aviation bunker fuel CO2 emissions in total CO2 emissions (OECD), and the development of climate change mitigation technologies related to transportation. Data for these indicators come from the OECD.

4.4.1. Indicators of Future Adaptation and Sustainable Development

4.4.1.1 Indicator AERO A.1: Year-on-Year Cumulative Growth Index. Airport Investment / GDP (Index 100 in 2015)

AERO A.1	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / PIB (Índice 100 en 2015)				
	2015	2016	2017	2018	2019
España		124,812	140,861	188,587	187,676
Alemania		93,657	119,848	151,347	199,739
Francia		148,756	149,716	170,059	181,255
Reino Unido					
Italia		46,829	27,051	23,362	21,789
Turquía		154,816	180,489	210,932	206,992
EEUU					
México		137,873	265,559	264,061	44,282
Brasil					
Perú					
Chile		134,920	206,776	199,398	172,572
Japón		105,832	107,194	124,464	120,680
China		110,366	106,903	101,268	77,251
India		47,524	42,318	42,042	38,100
Maximo:	265,56	MAX ((Media+Factor max*Desv Est.):		227,77	10,00
Mínimo:	21,789	MIN ((Media-Factor min *Desv);0):		31,12446001	1
Media:	129,449	Percentil 90%:	206,798	196,649	9,000
Factor max*Desv Es	227,773	Percentil 10%:	41,648	Unidad:	0,046
Factor min*Desv Es	31,124		Desv. Est.:	65,550	

Table 78: Indicator AERO A.1 values: Year-on-Year Cumulative Growth Index. Airport Investment / GDP (Index 100 in 2015)

AERO A.1	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / PIB (Índice 100 en 2015)						
	2015	2016	2017	2018	Calificación 2019		
España		5,3	6,0	8,2	8,2	MUY BIEN	B
Alemania		3,9	5,1	6,5	8,7	MUY BIEN	B
Francia		6,4	6,4	7,4	7,9	BIEN	C
Reino Unido							
Italia		1,7	1,0	1,0	1,0	MUY INSUFICIENTE	F
Turquía		6,7	7,8	9,2	9,0	EXCELENTE	A
EEUU							
México		5,9	10,0	10,0	1,6	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile		5,8	9,0	8,7	7,5	BIEN	C
Japón		4,4	4,5	5,3	5,1	SUFICIENTE	E
China		4,6	4,5	4,2	3,1	INSUFICIENTE	FX
India		1,8	1,5	1,5	1,3	MUY INSUFICIENTE	F

Table 79: Indicator AERO A.1 rating: Year-on-Year Cumulative Growth Index. Airport Investment / GDP (Index 100 in 2015)

4.4.1.2 Indicator AERO A.2: Year-on-Year Cumulative Growth Index. Airport Investment / (Population + Tourists) (Index 100 in 2015)

AERO A.2	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / (población + turistas) (Índice 100 en 2015)				
	2015	2016	2017	2018	2019
España		121,406	135,512	186,231	190,142
Alemania		104,762	126,835	154,387	217,072
Francia		152,900	153,721	176,474	193,826
Reino Unido					
Italia		47,320	26,628	22,843	21,216
Turquía		153,979	116,848	109,582	109,962
EEUU					
México		123,780	243,062	238,501	43,432
Brasil					
Perú					
Chile		137,224	167,136	167,640	150,300
Japón		116,292	110,208	123,215	127,774
China		113,235	116,111	118,561	98,402
India		50,415	49,635	49,204	48,495
Maximo:	243,06	MAX ((Media+Factor max*Desv Est.):		208,43	10,00
Mínimo:	21,216	MIN ((Media-Factor min *Desv);0):		37,28076358	1
Media:	122,857	Percentil 90%:	190,510	171,152	9,000
Factor max*Desv Es	208,433	Percentil 10%:	46,932	Unidad:	0,053
Factor min*Desv Es	37,281		Desv. Est.:	57,051	

Table 80: Indicator AERO A.2 values: Year-on-Year Cumulative Growth Index. Airport Investment / (Population + Tourists) (Index 100 in 2015)

AERO A.2	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / (población + turistas) (Índice 100 en 2015)						
	2015	2016	2017	2018	Calificación 2019		
España		5,4	6,2	8,8	9,0	EXCELENTE	A
Alemania		4,5	5,7	7,2	10,0	EXCELENTE	A
Francia		7,1	7,1	8,3	9,2	EXCELENTE	A
Reino Unido							
Italia		1,5	1,0	1,0	1,0	MUY INSUFICIENTE	F
Turquía		7,1	5,2	4,8	4,8	INSUFICIENTE	FX
EEUU							
México		5,5	10,0	10,0	1,3	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile		6,3	7,8	7,9	6,9	SUFICIENTE ALTO	D
Japón		5,2	4,8	5,5	5,8	SUFICIENTE	E
China		5,0	5,1	5,3	4,2	INSUFICIENTE	FX
India		1,7	1,6	1,6	1,6	MUY INSUFICIENTE	F

Table 81: Indicator AERO A.2 rating: Year-on-Year Cumulative Growth Index. Airport Investment / (Population + Tourists) (Index 100 in 2015)

4.4.1.3 Indicator AERO A.3: Year-on-Year Cumulative Growth Index. Airport Investment / Passengers (Index 100 in 2015)

AERO A.3	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / pasajeros (Índice 100 en 2015)				
	2015	2016	2017	2018	2019
España		116,221	126,419	166,711	165,824
Alemania		102,321	119,242	140,534	195,195
Francia		146,580	143,015	158,974	167,792
Reino Unido					
Italia		45,543	25,106	20,812	18,791
Turquía		154,051	168,790	165,840	162,942
EEUU					
México		114,827	226,730	220,519	39,310
Brasil					
Perú					
Chile		127,533	196,910	175,401	138,976
Japón		113,926	107,975	118,964	120,161
China		102,085	103,134	102,394	82,508
India		43,434	42,169	40,941	39,748
Maximo:	226,73	MAX ((Media+Factor max*Desv Est.):		203,24	10,00
Mínimo:	18,791	MIN ((Media-Factor min *Desv);0):		35,17420478	1
Media:	119,209	Percentil 90%:	177,380	168,069	9,000
Factor max*Desv Es	203,243	Percentil 10%:	39,704	Unidad:	0,054
Factor min*Desv Es	35,174		Desv. Est.:	56,023	

Table 82: Indicator AERO A.3 values: Year-on-Year Cumulative Growth Index. Airport Investment / Passengers (Index 100 in 2015)

AERO A.3	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / pasajeros (Índice 100 en 2015)						
	2015	2016	2017	2018	Calificación 2019		
España		5,3	5,9	8,0	8,0	MUY BIEN	B
Alemania		4,6	5,5	6,6	9,6	EXCELENTE	A
Francia		7,0	6,8	7,6	8,1	MUY BIEN	B
Reino Unido							
Italia		1,6	1,0	1,0	1,0	MUY INSUFICIENTE	F
Turquía		7,4	8,2	8,0	7,8	BIEN	C
EEUU							
México		5,3	10,0	10,0	1,2	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile		5,9	9,7	8,5	6,6	SUFICIENTE ALTO	D
Japón		5,2	4,9	5,5	5,6	SUFICIENTE	E
China		4,6	4,6	4,6	3,5	INSUFICIENTE	FX
India		1,4	1,4	1,3	1,2	MUY INSUFICIENTE	F

Table 83: Indicator AERO A.3 rating: Year-on-Year Cumulative Growth Index. Airport Investment / Passengers (Index 100 in 2015)

4.4.1.4 Indicator AERO A.4: Year-on-Year Cumulative Growth Index. Airport Investment / Cargo (Index 100 in 2015)

AERO A.4	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / carga (Índice 100 en 2015)				
	2015	2016	2017	2018	2019
España		119,960	121,592	155,195	157,941
Alemania		102,532	118,341	143,969	210,749
Francia		149,871	152,015	180,767	201,766
Reino Unido					
Italia		44,348	24,136	21,495	21,215
Turquía		137,101	135,368	119,853	106,117
EEUU					
México		119,822	229,897	217,270	37,635
Brasil					
Perú					
Chile					
Japón		117,142	111,023	122,322	123,552
China		105,836	103,898	100,233	78,481
India		47,591	44,897	42,356	39,958
Maximo:	229,90	MAX ((Media+Factor max*Desv Est.):		197,70	10,00
Mínimo:	21,215	MIN ((Media-Factor min *Desv);0):		28,2028519	1
Media:	112,951	Percentil 90%:	191,266	169,497	9,000
Factor max*Desv Es	197,700	Percentil 10%:	38,797	Unidad:	0,053
Factor min*Desv Es	28,203		Desv. Est.:	56,499	

Table 84: Indicator AERO A.4 values: Year-on-Year Cumulative Growth Index. Airport Investment / Cargo (Index 100 in 2015)

AERO A.4	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / carga (Índice 100 en 2015)						
	2015	2016	2017	2018	Calificación 2019		
España		5,9	6,0	7,7	7,9	BIEN	C
Alemania		4,9	5,8	7,1	10,0	EXCELENTE	A
Francia		7,5	7,6	9,1	10,0	EXCELENTE	A
Reino Unido							
Italia		1,9	1,0	1,0	1,0	MUY INSUFICIENTE	F
Turquía		6,8	6,7	5,9	5,1	SUFICIENTE	E
EEUU							
México		5,9	10,0	10,0	1,5	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile							
Japón		5,7	5,4	6,0	6,1	SUFICIENTE ALTO	D
China		5,1	5,0	4,8	3,7	INSUFICIENTE	FX
India		2,0	1,9	1,8	1,6	MUY INSUFICIENTE	F

Table 85: Indicator AERO A.4 rating: Year-on-Year Cumulative Growth Index. Airport Investment / Cargo (Index 100 in 2015)

4.4.1.5 *Indicator AERO A.5: Year-on-Year Cumulative Growth Index. Airport Investment / Departures of Flights Worldwide by Companies Registered in the Country (Index 100 in 2015)*

AERO A.5	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / Salidas de vuelos en todo el mundo de compañías registradas en el país (Índice 100 en 2015)				
	2015	2016	2017	2018	2019
España		121,754	140,104	175,696	171,086
Alemania		106,394	132,177	169,003	246,258
Francia		153,124	158,511	185,798	203,930
Reino Unido					
Italia		47,246	31,830	27,170	24,816
Turquía		148,610	168,032	163,302	172,033
EEUU					
México		116,515	231,985	226,229	40,014
Brasil					
Perú					
Chile		139,406	217,276	197,408	158,903
Japón		116,207	107,832	126,769	129,445
China		103,776	97,907	93,015	72,973
India		43,663	38,921	33,385	33,118
Maximo:	246,26		Percentil 90%:	205,26	10,00
Mínimo:	24,816	MIN ((Media-Factor min *Desv);0):		32,41690444	1
Media:	126,791	Percentil 90%:	205,265	172,848	9,000
Factor max*Desv Es	221,164	Percentil 10%:	33,359	Unidad:	0,052
Factor min*Desv Es	32,417		Desv. Est.:	62,916	

Table 86: Indicator AERO A.5 values: Year-on-Year Cumulative Growth Index. Airport Investment / Departures of Flights Worldwide by Companies Registered in the Country (Index 100 in 2015)

AERO A.5	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / Salidas de vuelos en todo el mundo de compañías registradas en el país (Índice 100 en 2015)						
	2015	2016	2017	2018	Calificación 2019		
España		5,7	6,6	8,5	8,2	MUY BIEN	B
Alemania		4,9	6,2	8,1	10,0	EXCELENTE	A
Francia		7,3	7,6	9,0	9,9	EXCELENTE	A
Reino Unido							
Italia		1,8	1,0	1,0	1,0	MUY INSUFICIENTE	F
Turquía		7,1	8,1	7,8	8,3	MUY BIEN	B
EEUU							
México		5,4	10,0	10,0	1,4	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile		6,6	10,0	9,6	7,6	BIEN	C
Japón		5,4	4,9	5,9	6,1	SUFICIENTE ALTO	D
China		4,7	4,4	4,2	3,1	INSUFICIENTE	FX
India		1,6	1,3	1,1	1,0	MUY INSUFICIENTE	F

Table 87: Indicator AERO A.5 rating: Year-on-Year Cumulative Growth Index. Airport Investment / Departures of Flights Worldwide by Companies Registered in the Country (Index 100 in 2015)

4.4.1.6 Indicator AERO A.6: Share of CO2 Emissions from Aviation in Total Transport CO2 Emissions (OECD)

AERO A.6	Participación de las emisiones de CO2 de la navegación en las emisiones totales de CO2 del transporte (OCDE)				
	2015	2016	2017	2018	2019
España	1,600	2,200	3,300	3,400	3,500
Alemania	0,600	0,500	0,500	0,500	0,500
Francia	1,100	1,100	1,100	1,100	1,200
Reino Unido	2,200	2,300	2,200	2,200	2,300
Italia	2,900	3,000	2,800	2,000	1,900
Turquía	1,200	1,200	1,100	1,400	1,400
EEUU	1,400	1,400	1,400	1,500	1,500
México	1,600	1,700	1,400	1,300	1,400
Brasil					
Perú					
Chile	3,700	4,000	4,400	4,200	3,700
Japón	4,800	4,800	4,800	4,900	5,000
China	7,900	8,000	8,700	8,300	8,500
India	0,900	0,800	1,300	1,500	1,600
Maximo:	8,70	MAX ((Media+Factor max*Desv Est.):		5,91	1,00
Mínimo:	0,500	MIN ((Media-Factor min *Desv);0):			10
Media:	2,645	Percentil 90%:	4,810	5,911	-9,000
Factor max*Desv Es	5,911	Percentil 10%:		Unidad:	-1,523
Factor min*Desv Es	-0,621		Desv. Est.:	2,177	

Table 88: Indicator AERO A.6: Share of CO2 Emissions from Aviation in Total Transport CO2 Emissions (OECD)

AERO A.6	Participación de las emisiones de CO2 de la navegación en las emisiones totales de CO2 del transporte (OCDE)						
	2015	2016	2017	2018	Calificación 2019		
España	7,6	6,7	5,0	4,8	4,7	INSUFICIENTE	FX
Alemania	9,1	9,2	9,2	9,2	9,2	EXCELENTE	A
Francia	8,3	8,3	8,3	8,3	8,2	MUY BIEN	B
Reino Unido	6,7	6,5	6,7	6,7	6,5	SUFICIENTE ALTO	D
Italia	5,6	5,4	5,7	7,0	7,1	BIEN	C
Turquía	8,2	8,2	8,3	7,9	7,9	BIEN	C
EEUU	7,9	7,9	7,9	7,7	7,7	BIEN	C
México	7,6	7,4	7,9	8,0	7,9	BIEN	C
Brasil							
Perú							
Chile	4,4	3,9	3,3	3,6	4,4	INSUFICIENTE	FX
Japón	2,7	2,7	2,7	2,5	2,4	MUY INSUFICIENTE	F
China	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
India	8,6	8,8	8,0	7,7	7,6	BIEN	C

Table 89: Indicator AERO A.6 rating: Share of CO2 Emissions from Aviation in Total Transport CO2 Emissions (OECD)

4.4.1.7 Indicator AERO A.7: Percentage of CO2 Emissions from Domestic Aviation in Total Transport CO2 Emissions (OECD)

AERO A.7	Porcentaje de emisiones de CO2 de la aviación nacional en las emisiones totales de CO2 del transporte (OCDE)				
	2015	2016	2017	2018	2019
España	6,300	6,600	6,900	7,100	7,400
Alemania	1,400	1,500	1,200	1,200	1,400
Francia	3,600	3,700	3,800	4,100	4,100
Reino Unido	2,100	2,000	2,100	2,200	2,300
Italia	2,000	2,100	2,400	2,600	2,700
Turquía					
EEUU	9,400	9,700	10,100	10,100	10,300
México					
Brasil					
Perú					
Chile	6,300	5,400	5,600	5,900	6,600
Japón	4,800	4,900	5,000	5,200	5,200
China	6,500	7,200	7,900	8,400	9,100
India	3,600	4,000	4,200	4,400	4,200
Maximo:	10,30	MAX ((Media+Factor max*Desv Est.):		9,68	1,00
Mínimo:	1,200	MIN ((Media-Factor min *Desv);0):		0,187245995	10
Media:	4,936	Percentil 90%:	7,950	9,498	-9,000
Factor max*Desv Es	9,685	Percentil 10%:		Unidad:	-0,948
Factor min*Desv Es	0,187		Desv. Est.:	3,166	

Table 90: Indicator AERO A.7 values: Percentage of CO2 Emissions from Domestic Aviation in Total Transport CO2 Emissions (OECD)

AERO A.7	Porcentaje de emisiones de CO2 de la aviación nacional en las emisiones totales de CO2 del transporte (OCDE)						
	2015	2016	2017	2018	Calificación 2019		
España	4,2	3,9	3,6	3,4	3,2	INSUFICIENTE	FX
Alemania	8,9	8,8	9,0	9,0	8,9	MUY BIEN	B
Francia	6,8	6,7	6,6	6,3	6,3	SUFICIENTE ALTO	D
Reino Unido	8,2	8,3	8,2	8,1	8,0	MUY BIEN	B
Italia	8,3	8,2	7,9	7,7	7,6	BIEN	C
Turquía							
EEUU	1,3	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
México							
Brasil							
Perú							
Chile	4,2	5,1	4,9	4,6	3,9	INSUFICIENTE	FX
Japón	5,6	5,5	5,4	5,2	5,2	SUFICIENTE	E
China	4,0	3,4	2,7	2,2	1,6	MUY INSUFICIENTE	F

Table 91: Indicator AERO A.7 values: Percentage of CO2 Emissions from Domestic Aviation in Total Transport CO2 Emissions (OECD)

4.4.1.8 Indicator AERO A.8: Proportion of CO2 Emissions from International Aviation Bunkers in Total CO2 Emissions (OECD)

AERO A.8	Proporción de emisiones de CO2 de los búnkeres de la aviación internacional en las emisiones totales de CO2 (OCDE)				
	2015	2016	2017	2018	2019
España	4,700	5,200	5,300	5,600	6,200
Alemania	3,300	3,500	4,000	4,300	4,500
Francia	5,500	5,400	5,400	5,800	6,200
Reino Unido	8,200	8,700	9,700	9,900	10,400
Italia	2,900	3,000	3,200	3,600	3,800
Turquía	3,300	3,000	2,800	3,000	3,600
EEUU	1,400	1,500	1,600	1,500	1,600
México	2,300	2,500	2,700	2,900	3,000
Brasil					
Perú					
Chile	2,100	2,000	2,100	2,400	2,500
Japón	1,700	1,800	1,900	2,000	1,800
China	0,300	0,300	0,300	0,300	0,300
India	0,500	0,600	0,600	0,600	0,500
Maximo:	10,40	MAX ((Media+Factor max*Desv Est.):		7,18	1,00
Mínimo:	0,300	MIN ((Media-Factor min *Desv);0):			10
Media:	3,327	Percentil 90%:	5,840	7,183	-9,000
Factor max*Desv Es	7,183	Percentil 10%:		Unidad:	-1,253
Factor min*Desv Es	-0,529		Desv. Est.:	2,571	

Table 92: Indicator AERO A.8 values: Proportion of CO2 Emissions from International Aviation Bunkers in Total CO2 Emissions (OECD)

AERO A.8	Proporción de emisiones de CO2 de los búnkeres de la aviación internacional en las emisiones totales de CO2 (OCDE)						
	2015	2016	2017	2018	Calificación 2019		
España	4,1	3,5	3,4	3,0	2,2	MUY INSUFICIENTE	F
Alemania	5,9	5,6	5,0	4,6	4,4	INSUFICIENTE	FX
Francia	3,1	3,2	3,2	2,7	2,2	MUY INSUFICIENTE	F
Reino Unido	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Italia	6,4	6,2	6,0	5,5	5,2	SUFICIENTE	E
Turquía	5,9	6,2	6,5	6,2	5,5	SUFICIENTE	E
EEUU	8,2	8,1	8,0	8,1	8,0	MUY BIEN	B
México	7,1	6,9	6,6	6,4	6,2	SUFICIENTE ALTO	D
Brasil							
Perú							
Chile	7,4	7,5	7,4	7,0	6,9	SUFICIENTE ALTO	D
Japón	7,9	7,7	7,6	7,5	7,7	BIEN	C
China	9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
India	9,4	9,2	9,2	9,2	9,4	EXCELENTE	A

Table 93: Indicator AERO A.8 rating: Proportion of CO2 Emissions from International Aviation Bunkers in Total CO2 Emissions (OECD)

4.4.1.9 *Indicator AERO A.9: Development of Climate Change Mitigation Technologies related to Transport (OECD)*

AERO A.9	Desarrollo de Tecnologías de mitigación del cambio climático relacionado con el transporte (OCDE)				
	2015	2016	2017	2018	2019
España	1,850	0,890	0,580	0,910	0,840
Alemania	4,250	4,480	5,120	7,270	4,770
Francia	4,160	3,940	4,460	5,120	4,930
Reino Unido	3,010	3,200	3,160	4,770	3,880
Italia	2,200	1,650	2,590	3,790	2,120
Turquía	1,260	0,670	0,730	0,650	0,480
EEUU	2,800	3,170	2,920	3,280	2,070
México	1,870	1,300	2,020	3,750	1,680
Brasil	0,980	1,140	2,770	3,310	1,260
Perú	1,880	1,880	2,910	2,910	2,910
Chile	0,820	0,820	0,820	0,820	0,340
Japón	3,100	3,080	2,940	4,310	2,400
China	0,730	1,100	1,120	1,100	0,900
India	1,190	1,650	1,590	2,080	1,330
Maximo:	7,27	MAX ((Media+Factor max*Desv Est.):		4,60	10,00
Mínimo:	0,340	MIN ((Media-Factor min *Desv);0):		0,166684102	1
Media:	2,383	Percentil 90%:	4,462	4,432	9,000
Factor max*Desv Es	4,598	Percentil 10%:	0,811	Unidad:	2,031
Factor min*Desv Es	0,167		Desv. Est.:	1,477	

Table 94: Indicator AERO A.9 values: Development of Climate Change Mitigation Technologies related to Transport (OECD)

AERO A.9	Desarrollo de Tecnologías de mitigación del cambio climático relacionado con el transporte (OCDE)						
	2015	2016	2017	2018	Calificación 2019		
España	4,4	2,5	1,8	2,5	2,4	MUY INSUFICIENTE	F
Alemania	9,3	9,8	10,0	10,0	10,0	EXCELENTE	A
Francia	9,1	8,7	9,7	10,0	10,0	EXCELENTE	A
Reino Unido	6,8	7,2	7,1	10,0	8,5	MUY BIEN	B
Italia	5,1	4,0	5,9	8,4	5,0	SUFICIENTE	E
Turquía	3,2	2,0	2,1	2,0	1,6	MUY INSUFICIENTE	F
EEUU	6,3	7,1	6,6	7,3	4,9	INSUFICIENTE	FX
México	4,5	3,3	4,8	8,3	4,1	INSUFICIENTE	FX
Brasil	2,7	3,0	6,3	7,4	3,2	INSUFICIENTE	FX
Perú	4,5	4,5	6,6	6,6	6,6	SUFICIENTE ALTO	D
Chile	2,3	2,3	2,3	2,3	1,4	MUY INSUFICIENTE	F
Japón	7,0	6,9	6,6	9,4	5,5	SUFICIENTE	E
China	2,1	2,9	2,9	2,9	2,5	MUY INSUFICIENTE	F
India	3,1	4,0	3,9	4,9	3,4	INSUFICIENTE	FX

Table 95: Indicator AERO A.9 rating: Development of Climate Change Mitigation Technologies related to Transport (OECD)

4.4.2. Future Adaptation and Sustainable Development Indicator

	Índice de Adaptación al futuro y Desarrollo Sost.					Max valor 2019
	2015	2016	2017	2018	2019	
España	20,3	44,1	44,5	55,1	53,7	81
Alemania	33,1	56,2	61,5	68,5	80,7	81
Francia	27,3	62,1	63,3	68,7	71,8	81
Reino Unido	22,6	22,9	22,9	25,7	24,0	36
Italia	25,4	32,3	30,6	33,5	29,9	81
Turquía	17,3	51,4	52,9	51,8	50,1	72
EEUU	23,7	24,1	23,5	24,2	21,6	36
México	19,1	45,5	69,2	72,7	25,2	72
Brasil	2,7	3,0	6,3	7,4	3,2	9
Perú	4,5	4,5	6,6	6,6	6,6	9
Chile	18,3	43,3	54,4	52,2	45,1	72
Japón	23,1	48,8	46,9	52,9	49,4	81
China	16,8	40,9	39,9	38,8	32,3	81
India	27,8	36,9	35,1	35,1	33,3	81
Maximo:	80,737		Máxima puntuación:	81	10	
Mínimo:	2,652		Mínima puntuación:			
Media:	35,367		Dif:	81,000	10,000	

Table 96: Future Adaptation and Sustainable Development Indicator Values

	Evaluación de Adaptación al futuro y Desarrollo Sost.							Subindicadores considerados
	2015	2016	2017	2018	Calificación 2019			
España	5,6	5,4	5,5	6,8	6,6	SUFICIENTE ALTO	D	9
Alemania	9,2	6,9	7,6	8,5	10,0	EXCELENTE	A	9
Francia	7,6	7,7	7,8	8,5	8,9	MUY BIEN	B	9
Reino Unido	6,3	6,4	6,4	7,2	6,7	SUFICIENTE ALTO	D	4
Italia	7,0	4,0	3,8	4,1	3,7	INSUFICIENTE	FX	9
Turquía	6,4	7,1	7,3	7,2	7,0	BIEN	C	8
EEUU	6,6	6,7	6,5	6,7	6,0	SUFICIENTE ALTO	D	4
México	7,1	6,3	9,6	10,0	3,5	INSUFICIENTE	FX	8
Brasil	2,9	3,3	7,0	8,2	3,6	INSUFICIENTE	FX	1
Perú	5,0	5,0	7,3	7,3	7,3	BIEN	C	1
Chile	5,1	6,0	7,6	7,2	6,3	SUFICIENTE ALTO	D	8
Japón	6,4	6,0	5,8	6,5	6,1	SUFICIENTE ALTO	D	9
China	4,7	5,1	4,9	4,8	4,0	INSUFICIENTE	FX	9
India	7,7	4,6	4,3	4,3	4,1	INSUFICIENTE	FX	9

Table 97: Future Adaptation and Sustainable Development Indicator Rating

Subindicadores de Adaptación al futuro y Desarrollo Sost.		Pesos	Total Max puntuación
AERO A.1	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / PIB (Índice 100 en 2015)	1	10
AERO A.2	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / (población + turistas) (Índice 100 en 2015)	1	10
AERO A.3	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / pasajeros (Índice 100 en 2015)	1	10
AERO A.4	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / carga (Índice 100 en 2015)	1	10
AERO A.5	Índice del crecimiento interanual acumulado. Inversión en aeropuertos / Salidas de vuelos en todo el mundo de compañías registradas en el país (Índice 100 en 2015)	1	10
AERO A.6	Participación de las emisiones de CO2 de la navegación en las emisiones totales de CO2 del transporte (OCDE)	1	10
AERO A.7	Porcentaje de emisiones de CO2 de la aviación nacional en las emisiones totales de CO2 del transporte (OCDE)	1	10
AERO A.8	Proporción de emisiones de CO2 de los búnkeres de la aviación internacional en las emisiones totales de CO2 (OCDE)	1	10
AERO A.9	Desarrollo de Tecnologías de mitigación del cambio climático relacionado con el transporte (OCDE)	1	10
		9	90

Table 98: Future Adaptation and Sustainable Development Indicator Weight and Maximum Rating

The indicators related to the annual compounded growth index rate assess most of the analyzed European countries very well (with the exception of Italy).

The average share of CO_2 emissions from navigation in total CO_2 emissions ranges from a maximum of 8.7% (China) to a minimum of 0.5% in Germany. Spain receives an insufficient rating (3.5%) in this regard. The same trend is observed in the indicator for national aviation and for bunker emissions.

In the final index of future adaptation and sustainable development, Germany is the best-rated country. Spain receives a lower rating (6.6) compared to other European countries (except for Italy).

4.5. Operation and maintenance

The questions addressed in this criterion are: Is the public infrastructure being operated and maintained according to its needs? Is the necessary investment being made to ensure proper conservation and maintenance?

The selected indicators are as follows:

5	OPERATION AND MAINTENANCE
AERO O.1	WB. Air Transport, Departures of flights worldwide by companies registered in the country (x 1000) / (Population + tourists)
AERO O.2	WB. Air Transport, Departures of flights worldwide by companies registered in the country (x1000000) / GDP ($)
AERO O.3	EU. Number of Commercial Air Flights (passengers, cargo, and mail) (Mills. X 1000000) / GDP ($)
AERO O.4	EU. Punctuality in minutes in departures from the most important airports (airports > 25 million passengers/year). Sep 2022
AERO O.5	EU. Punctuality in arrivals at the most important airports (airports > 25 million passengers/year). Sep 2022
AERO O.6	EU. Hub connectivity of the country's best airport (2022)

For the assessment of this criterion, the number of flight departures and punctuality in minutes for departures and arrivals have been taken into account. The connectivity HUB of the best airport in each analyzed country has also been considered.

4.5.1. Operation and Maintenance Indicators

4.5.1.1 Indicator AERO O.1: WB. Air Transport, Flight Departures Worldwide by Companies Registered in the Country (x 1000) / (Residents + Tourists)

AERO O.1	WB. Transporte aéreo, Salidas de vuelos en todo el mundo de compañías registradas en el país (x 1000) / (Habitantes + turistas)				
	2015	2016	2017	2018	2019
España	4,667	4,653	4,514	4,947	5,186
Alemania	8,293	8,166	7,958	7,576	7,310
Francia	4,021	4,015	3,899	3,819	3,822
Reino Unido	11,091	11,637	11,200	11,824	9,990
Italia	2,453	2,457	2,052	2,063	2,098
Turquía	8,991	9,316	6,252	6,033	5,747
EEUU	23,854	24,181	23,959	24,301	24,778
México	3,304	3,510	3,461	3,483	3,586
Brasil	4,619	4,011	3,749	3,853	3,746
Perú	4,259	4,200	3,687	3,873	3,827
Chile	6,485	6,384	4,989	5,507	6,134
Japón	6,509	6,514	6,652	6,326	6,425
China	2,499	2,727	2,964	3,186	3,370
India	0,595	0,688	0,759	0,878	0,872
Maximo:	24,78	MAX ((Media+Factor max*Desv Est.):		14,79	10,00
Mínimo:	0,595	MIN ((Media-Factor min *Desv);0):			1
Media:	6,354	Percentil 90%:	11,243	14,795	9,000
Factor max*Desv Es	14,795	Percentil 10%:	2,094	Unidad:	0,608
Factor min*Desv Es	-2,087		Desv. Est.:	5,627	

Table 99: Indicator AERO O.1 values: WB. Air Transport, Flight Departures Worldwide by Companies Registered in the Country (x 1000) / (Residents + Tourists)

AERO O.1	WB. Transporte aéreo, Salidas de vuelos en todo el mundo de compañías registradas en el país (x 1000) / (Habitantes + turistas)						
	2015	2016	2017	2018	Calificación 2019		
España	3,8	3,8	3,7	4,0	4,2	INSUFICIENTE	FX
Alemania	6,0	6,0	5,8	5,6	5,4	SUFICIENTE	E
Francia	3,4	3,4	3,4	3,3	3,3	INSUFICIENTE	FX
Reino Unido	7,7	8,1	7,8	8,2	7,1	BIEN	C
Italia	2,5	2,5	2,2	2,3	2,3	MUY INSUFICIENTE	F
Turquía	6,5	6,7	4,8	4,7	4,5	INSUFICIENTE	FX
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México	3,0	3,1	3,1	3,1	3,2	INSUFICIENTE	FX
Brasil	3,8	3,4	3,3	3,3	3,3	INSUFICIENTE	FX
Perú	3,6	3,6	3,2	3,4	3,3	INSUFICIENTE	FX
Chile	4,9	4,9	4,0	4,4	4,7	INSUFICIENTE	FX
Japón	5,0	5,0	5,0	4,8	4,9	INSUFICIENTE	FX
China	2,5	2,7	2,8	2,9	3,1	INSUFICIENTE	FX
India	1,4	1,4	1,5	1,5	1,5	MUY INSUFICIENTE	F

Table 100: Indicator AERO O.1 rating: WB. Air Transport, Flight Departures Worldwide by Companies Registered in the Country (x 1000) / (Residents + Tourists)

4.5.1.2 Indicator AERO O.2: WB. Air Transport, Flight Departures Worldwide by Companies Registered in the Country (x1000000) / GDP ($)

AERO O.2	WB. Transporte aéreo, Salidas de vuelos en todo el mundo de compañías registradas en el país (x1000000) / PIB ($)				
	2015	2016	2017	2018	2019
España	0,447	0,460	0,442	0,451	0,486
Alemania	0,288	0,277	0,259	0,232	0,231
Francia	0,249	0,242	0,231	0,214	0,219
Reino Unido	0,373	0,433	0,438	0,428	0,369
Italia	0,149	0,148	0,124	0,120	0,130
Turquía	0,817	0,855	0,864	0,993	0,976
EEUU	0,522	0,516	0,495	0,481	0,473
México	0,434	0,516	0,490	0,477	0,477
Brasil	0,524	0,461	0,390	0,434	0,435
Perú	0,684	0,677	0,620	0,634	0,619
Chile	0,481	0,466	0,450	0,456	0,517
Japón	0,215	0,197	0,210	0,198	0,199
China	0,327	0,352	0,354	0,338	0,348
India	0,375	0,400	0,388	0,444	0,427
Maximo:	0,99	MAX ((Media+Factor max*Desv Est.):		0,71	10,00
Mínimo:	0,120	MIN ((Media-Factor min *Desv);0):		0,133405313	1
Media:	0,421	Percentil 90%:	0,638	0,574	9,000
Factor max*Desv Es	0,708	Percentil 10%:	0,199	Unidad:	15,668
Factor min*Desv Es	0,133		Desv. Est.:	0,191	

Table 101: Indicator AERO O.2 values: WB. Air Transport, Flight Departures Worldwide by Companies Registered in the Country (x1000000) / GDP ($)

AERO O.2	WB. Transporte aéreo, Salidas de vuelos en todo el mundo de compañías registradas en el país (x1000000) / PIB ($)						
	2015	2016	2017	2018	Calificación 2019		
España	5,9	6,1	5,8	6,0	6,5	SUFICIENTE ALTO	D
Alemania	3,4	3,3	3,0	2,5	2,5	MUY INSUFICIENTE	F
Francia	2,8	2,7	2,5	2,3	2,3	MUY INSUFICIENTE	F
Reino Unido	4,8	5,7	5,8	5,6	4,7	INSUFICIENTE	FX
Italia	1,2	1,2	1,0	1,0	1,0	MUY INSUFICIENTE	F
Turquía	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU	7,1	7,0	6,7	6,5	6,3	SUFICIENTE ALTO	D
México	5,7	7,0	6,6	6,4	6,4	SUFICIENTE ALTO	D
Brasil	7,1	6,1	5,0	5,7	5,7	SUFICIENTE	E
Perú	9,6	9,5	8,6	8,8	8,6	MUY BIEN	B
Chile	6,4	6,2	6,0	6,1	7,0	BIEN	C
Japón	2,3	2,0	2,2	2,0	2,0	MUY INSUFICIENTE	F
China	4,0	4,4	4,5	4,2	4,4	INSUFICIENTE	FX
India	4,8	5,2	5,0	5,9	5,6	SUFICIENTE	E

Table 102: Indicator AERO O.2 rating: WB. Air Transport, Flight Departures Worldwide by Companies Registered in the Country (x1000000) / GDP ($)

4.5.1.3 *Indicator AERO O.3: EU. Number of Commercial Air Flights (passenger, cargo, and mail) (Millions x 1000000) / GDP ($)*

AERO O.3	UE. Nº Vuelos aéreos comerciales (pasajeros, carga y correo) (Mills. X 1000000) / PIB ($)				
	2015	2016	2017	2018	2019
España	1,589	1,663	1,661	1,619	1,701
Alemania	0,507	0,503	0,483	0,467	0,477
Francia	0,509	0,512	0,494	0,465	0,484
Reino Unido	0,620	0,711	0,736	0,690	0,686
Italia	0,563	0,574	0,567	0,557	0,598
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	1,70	MAX ((Media+Factor max*Desv Est.):		1,45	10,00
Mínimo:	0,465	MIN ((Media-Factor min *Desv);0):		0,101646099	1
Media:	0,777	Percentil 90%:	1,644	1,352	9,000
Factor max*Desv Es	1,453	Percentil 10%:	0,479	Unidad:	6,659
Factor min*Desv Es	0,102		Desv. Est.:	0,451	

Table 103: Indicator AERO O.3 values: EU. Number of Commercial Air Flights (passenger, cargo, and mail) (Millions x 1000000) / GDP ($)

AERO O.3	UE. Nº Vuelos aéreos comerciales (pasajeros, carga y correo) (Mills. X 1000000) / PIB ($)						
	2015	2016	2017	2018	Calificación 2019		
España	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Alemania	3,7	3,7	3,5	3,4	3,5	INSUFICIENTE	FX
Francia	3,7	3,7	3,6	3,4	3,5	INSUFICIENTE	FX
Reino Unido	4,5	5,1	5,2	4,9	4,9	INSUFICIENTE	FX
Italia	4,1	4,1	4,1	4,0	4,3	INSUFICIENTE	FX
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 104: Iindicator AERO O.3 rating: EU. Number of Commercial Air Flights (passenger, cargo, and mail) (Millions x 1000000) / GDP ($)

4.5.1.4 *Indicator AERO O.4: EU. Punctuality in minutes in departures from the major airports (airports >25 million passengers/year). Sep 2022*

AERO O.4	UE. Puntualidad en minutos en salidas de los aeropuertos más importantes (aeropuertos>25 mills. Pasajeros / año). Sep 2022				
	2015	2016	2017	2018	2019
España					63,967
Alemania					54,050
Francia					
Reino Unido					53,733
Italia					59,750
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	63,97	MAX ((Media+Factor max*Desv Est.):		65,24	10,00
Mínimo:	53,733	MIN ((Media-Factor min *Desv);0):		50,50573669	1
Media:	57,875	Percentil 90%:	62,702	14,739	9,000
Factor max*Desv Es	65,244	Percentil 10%:	53,828	Unidad:	0,611
Factor min*Desv Es	50,506		Desv. Est.:	4,913	

Table 105: Indicator AERO O.4 values: EU. Punctuality in minutes in departures from the major airports (airports >25 million passengers/year). Sep 2022

AERO O.4	UE. Puntualidad en minutos en salidas de los aeropuertos más importantes (aeropuertos>25 mills. Pasajeros / año). Sep 2022						
	2015	2016	2017	2018	Calificación 2019		
España					9,2	EXCELENTE	A
Alemania					3,2	INSUFICIENTE	FX
Francia							
Reino Unido					3,0	INSUFICIENTE	FX
Italia					6,6	SUFICIENTE ALTO	D
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 106: Indicator AERO O.4 rating: EU. Punctuality in minutes in departures from the major airports (airports >25 million passengers/year). Sep 2022

4.5.1.5 *Indicator AERO O.5: EU. Punctuality in minutes in arrivals at the major airports (airports >25 million passengers/year). Sep 2022*

AERO O.5	UE. Puntualidad en llegadas de los aeropuertos más importantes (aeropuertos>25 mills. Pasajeros / año). Sep 2022				
	2015	2016	2017	2018	2019
España					69,533
Alemania					67,267
Francia					
Reino Unido					55,633
Italia					63,750
Turquía					
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	69,53	MAX ((Media+Factor max*Desv Est.):		73,18	10,00
Mínimo:	55,633	MIN ((Media-Factor min *Desv);0):		54,90755817	1
Media:	64,046	Percentil 90%:	68,853	18,277	9,000
Factor max*Desv Es	73,184	Percentil 10%:	58,068	Unidad:	0,492
Factor min*Desv Es	54,908		Desv. Est.:	6,092	

Table 107: Indicator AERO O.5 values: EU. Punctuality in minutes in arrivals at the major airports (airports >25 million passengers/year). Sep 2022

AERO O.5	UE. Puntualidad en llegadas de los aeropuertos más importantes (aeropuertos>25 mills. Pasajeros / año). Sep 2022						
	2015	2016	2017	2018	Calificación 2019		
España					8,2	MUY BIEN	B
Alemania					7,1	BIEN	C
Francia							
Reino Unido					1,4	MUY INSUFICIENTE	F
Italia					5,4	SUFICIENTE	E
Turquía							
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 108: Indicator AERO O.5 rating: EU. Punctuality in minutes in arrivals at the major airports (airports >25 million passengers/year). Sep 2022

4.5.1.6 Indicator AERO O.6: EU. Hub connectivity of the best airport in the country (2022)

AERO O.6	UE. Hub connectivity del mejor aeropuerto del país (2022)				
	2015	2016	2017	2018	2019
España					15.535
Alemania					55.972
Francia					31.271
Reino Unido					23.545
Italia					
Turquía					46.297
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	55972,00	MAX ((Media+Factor max*Desv Est.):		59289,03	10,00
Mínimo:	15.535,000	MIN ((Media-Factor min *Desv);0):		9758,972698	1
Media:	34.524,000	Percentil 90%:	52.102,000	49530,055	9,000
Factor max*Desv Es	59.289,027	Percentil 10%:	18.739,000	Unidad:	0,000
Factor min*Desv Es	9.758,973		Desv. Est.:	16.510,018	

Table 109: Indicator AERO O.6 values: EU. Hub connectivity of the best airport in the country (2022)

AERO O.6	UE. Hub connectivity del mejor aeropuerto del país (2022)						
	2015	2016	2017	2018	Calificación 2019		
España					2,0	MUY INSUFICIENTE	F
Alemania					9,4	EXCELENTE	A
Francia					4,9	INSUFICIENTE	FX
Reino Unido					3,5	INSUFICIENTE	FX
Italia							
Turquía					7,6	BIEN	C
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							

Table 110: Indicator AERO O.6 rating: EU. Hub connectivity of the best airport in the country (2022)

4.5.2. Operation and Maintenance Indicator

	Índice de Operación y mantenimiento					Max valor 2019
	2015	2016	2017	2018	2019	
España	19,8	19,9	19,6	20,0	40,2	54
Alemania	13,2	12,9	12,3	11,6	31,1	54
Francia	10,0	9,9	9,5	9,0	14,1	36
Reino Unido	17,0	18,8	18,8	18,7	24,5	54
Italia	7,8	7,9	7,4	7,3	19,6	45
Turquía	16,5	16,7	14,8	14,7	22,1	27
EEUU	17,1	17,0	16,7	16,5	16,3	18
México	8,7	10,1	9,7	9,5	9,6	18
Brasil	10,9	9,6	8,3	9,1	9,0	18
Perú	13,2	13,1	11,9	12,2	11,9	18
Chile	11,4	11,1	10,0	10,4	11,7	18
Japón	7,2	7,0	7,2	6,9	6,9	18
China	6,6	7,1	7,3	7,1	7,4	18
India	6,1	6,6	6,5	7,4	7,1	18
Maximo:	40,157		Máxima puntuación:	54	10	
Mínimo:	6,141		Mínima puntuación:			

Table 111: Operation and Maintenance Indicator Values

Subindicadores de Operación y mantenimiento		Pesos	Total Max puntuación
AERO O.1	WB. Transporte aéreo, Salidas de vuelos en todo el mundo de compañías registradas en el país (x 1000) / (Habitantes + turistas)	1	10
AERO O.2	WB. Transporte aéreo, Salidas de vuelos en todo el mundo de compañías registradas en el país (x1000000) / PIB ($)	1	10
AERO O.3	UE. Nº Vuelos aéreos comerciales (pasajeros, carga y correo) (Mills. X 1000000) / PIB ($)	1	10
AERO O.4	UE. Puntualidad en minutos en salidas de los aeropuertos más importantes (aeropuertos>25 mills. Pasajeros / año). Sep 2022	1	10
AERO O.5	UE. Puntualidad en llegadas de los aeropuertos más importantes (aeropuertos>25 mills. Pasajeros / año). Sep 2022	1	10
AERO O.6	UE. Hub connectivity del mejor aeropuerto del país (2022)	1	10
		6	60
		% Valorado de la Max. Puntuación del Criterio	54

Table 112: Operation and Maintenance Indicator Weights

	Evaluación de Operación y mantenimiento							Subindicadores considerados
	2015	2016	2017	2018	Calificación 2019			
España	7,3	7,4	7,3	7,4	7,4	BIEN	C	6
Alemania	4,9	4,8	4,6	4,3	5,8	SUFICIENTE	E	6
Francia	3,7	3,7	3,5	3,3	3,9	INSUFICIENTE	FX	4
Reino Unido	6,3	7,0	7,0	6,9	4,5	INSUFICIENTE	FX	6
Italia	2,9	2,9	2,7	2,7	4,4	INSUFICIENTE	FX	5
Turquía	9,1	9,3	8,2	8,2	8,2	MUY BIEN	B	3
EEUU	9,5	9,4	9,3	9,1	9,1	EXCELENTE	A	2
México	4,8	5,6	5,4	5,3	5,3	SUFICIENTE	E	2
Brasil	6,1	5,3	4,6	5,0	5,0	SUFICIENTE	E	2
Perú	7,3	7,3	6,6	6,8	6,6	SUFICIENTE ALTO	D	2
Chile	6,3	6,2	5,6	5,8	6,5	SUFICIENTE ALTO	D	2
Japón	4,0	3,9	4,0	3,8	3,9	INSUFICIENTE	FX	2
China	3,6	3,9	4,0	4,0	4,1	INSUFICIENTE	FX	2
India	3,4	3,7	3,6	4,1	4,0	INSUFICIENTE	FX	2

Table 113: Operation and Maintenance Indicator Rating

The combination of these criteria, analyzed through six indicators, awards the highest rating to the United States, followed by Turkey and Spain.

4.6. Safety

Within this criterion, the safety of the infrastructure is evaluated. The questions that this criterion aims to answer are: Is the public works sector safe for users? Are effective measures implemented to ensure safe performance and operation?

The chosen indicators are:

6	SAFETY
AERO S.1	Fatalities in passenger flights
AERO S.2	Fatalities in accidents in commercial air transport
AERO S.3	Injuries in accidents in commercial air transport
AERO S.4	Fatalities from accidents in aerial works
AERO S.5	Injuries in accidents in airport works

The selection of indicators corresponds to those commonly used: accidents with casualties and fatalities.

As mentioned in the methodological notes, for the indicators in this Criterion, the minimum value for evaluation has not followed the general rule: it has been set at zero, as society as a whole considers achieving the elimination of accidents in air transport an indispensable goal.

4.6.1. Safety Indicators

4.6.1.1 Indicator AERO S.1: Fatalities in passenger flights.

AERO S.1	Víctimas mortales en vuelos de pasajeros				
	2015	2016	2017	2018	2019
España	1	0	0	0	0
Alemania	0	0	1	0	1
Francia	0	0	0	0	0
Reino Unido	2	0	0	0	0
Italia	0	0	0	0	0
Turquía	0	0	0	0	0
EEUU	5	5	6	7	13
México	2	1	1	1	3
Brasil	1	0	1	1	1
Perú	0	0	1	0	0
Chile	0	0	0	0	2
Japón	0	1	1	0	0
China	0	1	0	1	0
India	1	0	0	0	1
Maximo:	13,00	MAX:		13,00	1,00
Mínimo:	0,001	MIN (0):		0,0	10
Media:	0,887	Percentil 90%:	2,000	13,000	-9,000
Factor max*Desv Es	3,946	Percentil 10%:	0,001	Unidad:	-0,692
Factor min*Desv Es	-2,172		Desv. Est.:	2,039	

Table 114: Indicator AERO S.1 values: Fatalities in passenger flights.

AERO S.1	Víctimas mortales en vuelos de pasajeros						
	2015	2016	2017	2018	Calificación 2019		
España	9,3	10,0	10,0	10,0	10,0	EXCELENTE	A
Alemania	10,0	10,0	9,3	10,0	9,3	EXCELENTE	A
Francia	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Reino Unido	8,6	10,0	10,0	10,0	10,0	EXCELENTE	A
Italia	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Turquía	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU	6,5	6,5	5,8	5,2	1,0	MUY INSUFICIENTE	F
México	8,6	9,3	9,3	9,3	7,9	BIEN	C
Brasil	9,3	10,0	9,3	9,3	9,3	EXCELENTE	A
Perú	10,0	10,0	9,3	10,0	10,0	EXCELENTE	A
Chile	10,0	10,0	10,0	10,0	8,6	MUY BIEN	B
Japón	10,0	9,3	9,3	10,0	10,0	EXCELENTE	A
China	10,0	9,3	10,0	9,3	10,0	EXCELENTE	A
India	9,3	10,0	10,0	10,0	9,3	EXCELENTE	A

Table 115: Indicator AERO S.1 rating: Fatalities in passenger flights.

4.6.1.2 Indicator AERO S.2: Fatalities in commercial aviation accidents.

AERO S.2	Víctimas mortales en accidentes en el transporte aéreo comercial				
	2015	2016	2017	2018	2019
España	1	0	0	0	0
Alemania	0	0	3	4	0
Francia	150	0	0	0	0
Reino Unido	0	0	0	0	0
Italia	3	0	6	0	0
Turquía	0	0	0	0	0
EEUU	0	0	0	0	0
México	0	0	0	0	0
Brasil	0	0	0	0	0
Perú	0	0	0	0	0
Chile	0	0	0	0	0
Japón	0	0	0	0	0
China	0	0	0	0	0
India	0	0	0	0	0
Maximo:	150,00	MAX:		150,00	1,00
Mínimo:	0,000	MIN (0):		0,0	10
Media:	2,392	Percentil 90%:	0,010	150,000	-9,000
Factor max*Desv E	29,280	Percentil 10%:	0,000	Unidad:	-0,060
Factor min*Desv Es	-24,495		Desv. Est.:	17,925	

Table 116: Indicator AERO S.2 values: Fatalities in commercial aviation accidents.

AERO S.2	Víctimas mortales en accidentes en el transporte aéreo comercial						
	2015	2016	2017	2018	Calificación 2019		
España	9,9	10,0	10,0	10,0	10,0	EXCELENTE	A
Alemania	10,0	10,0	9,8	9,8	10,0	EXCELENTE	A
Francia	1,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Reino Unido	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Italia	9,8	10,0	9,6	10,0	10,0	EXCELENTE	A
Turquía	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Brasil	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Perú	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Chile	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Japón	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A

Table 117: Indicator AERO S.2 Rating: Fatalities in commercial aviation accidents.

4.6.1.3 Indicator AERO S.3: Injured in commercial aviation accidents.

AERO S.3	Heridos en accidentes en el transporte aéreo comercial				
	2015	2016	2017	2018	2019
España	6	0	6	0	0
Alemania	5	1	3	3	0
Francia	5	1	8	0	0
Reino Unido	2	0	6	1	0
Italia	2	0	0	2	0
Turquía	0	0	0	0	0
EEUU	0	0	0	0	0
México	0	0	0	0	0
Brasil	0	0	0	0	0
Perú	0	0	0	0	0
Chile	0	0	0	0	0
Japón	0	0	0	0	0
China	0	0	0	0	0
India	0	0	0	0	0
Maximo:	8,00	MAX:		8,00	1,00
Mínimo:	0,001	MIN (0):		0,0	10
Media:	0,735	Percentil 90%:	3,000	8,000	-9,000
Factor max*Desv Es	3,396	Percentil 10%:	0,001	Unidad:	-1,125
Factor min*Desv Es	-1,926		Desv. Est.:	1,774	

Table 118: Indicator AERO S.3 values: Injured in commercial aviation accidents.

AERO S.3	Heridos en accidentes en el transporte aéreo comercial						
	2015	2016	2017	2018	Calificación 2019		
España	3,3	10,0	3,3	10,0	10,0	EXCELENTE	A
Alemania	4,4	8,9	6,6	6,6	10,0	EXCELENTE	A
Francia	4,4	8,9	1,0	10,0	10,0	EXCELENTE	A
Reino Unido	7,8	10,0	3,3	8,9	10,0	EXCELENTE	A
Italia	7,8	10,0	10,0	7,8	10,0	EXCELENTE	A
Turquía	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Brasil	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Perú	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Chile	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Japón	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A

Table 119: Indicator AERO S.3 Rating: Injured in commercial aviation accidents.

4.6.1.4 Indicator AERO S.4: Fatalities in aerial construction accidents.

AERO S.5	Heridos en accidentes aéreos en obras aeroportuarias				
	2015	2016	2017	2018	2019
España	0	0	0	0	0
Alemania	2	1	0	0	0
Francia	5	1	9	0	2
Reino Unido	0	0	0	0	0
Italia	0	1	3	0	0
Turquía	0	0	0	0	0
EEUU	0	0	0	0	0
México	0	0	0	0	0
Brasil	0	0	0	0	0
Perú	0	0	0	0	0
Chile	0	0	0	0	0
Japón	0	0	0	0	0
China	0	0	0	0	0
India	0	0	0	0	0
Maximo:	9,00	MAX:		9,00	1,00
Mínimo:	0,001	MIN (0):		0,0	10
Media:	0,350	Percentil 90%:	1,000	9,000	-9,000
Factor max*Desv Es	2,307	Percentil 10%:	0,001	Unidad:	-1,000
Factor min*Desv Es	-1,607		Desv. Est.:	1,305	

Table 120: Indicator AERO S.4 values: Fatalities in aerial construction accidents.

AERO S.5	Heridos en accidentes aéreos en obras aeroportuarias						
	2015	2016	2017	2018	Calificación 2019		
España	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Alemania	8,0	9,0	10,0	10,0	10,0	EXCELENTE	A
Francia	5,0	9,0	1,0	10,0	8,0	MUY BIEN	B
Reino Unido	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Italia	10,0	9,0	7,0	10,0	10,0	EXCELENTE	A
Turquía	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Brasil	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Perú	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Chile	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Japón	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A

Table 121: Indicator AERO S.4 rating: Fatalities in aerial construction accidents.

4.6.1.5 Indicator AERO S.5: Injured in aerial construction accidents at airports.

AERO S.5	Heridos en accidentes aéreos en obras aeroportuarias				
	2015	2016	2017	2018	2019
España	0	0	0	0	0
Alemania	2	1	0	0	0
Francia	5	1	9	0	2
Reino Unido	0	0	0	0	0
Italia	0	1	3	0	0
Turquía	0	0	0	0	0
EEUU	0	0	0	0	0
México	0	0	0	0	0
Brasil	0	0	0	0	0
Perú	0	0	0	0	0
Chile	0	0	0	0	0
Japón	0	0	0	0	0
China	0	0	0	0	0
India	0	0	0	0	0
Maximo:	9,00	MAX:		9,00	1,00
Mínimo:	0,001	MIN (0):		0,0	10
Media:	0,350	Percentil 90%:	1,000	9,000	-9,000
Factor max*Desv Es	2,307	Percentil 10%:	0,001	Unidad:	-1,000
Factor min*Desv Es	-1,607		Desv. Est.:	1,305	

Table 122: Indicator AERO S.5 values: Injured in aerial construction accidents at airports.

AERO S.5	Heridos en accidentes aéreos en obras aeroportuarias						
	2015	2016	2017	2018	Calificación 2019		
España	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Alemania	8,0	9,0	10,0	10,0	10,0	EXCELENTE	A
Francia	5,0	9,0	1,0	10,0	8,0	MUY BIEN	B
Reino Unido	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Italia	10,0	9,0	7,0	10,0	10,0	EXCELENTE	A
Turquía	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Brasil	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Perú	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Chile	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Japón	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A

Table 123: Indicator AERO S.5 Rating: Injured in aerial construction accidents at airports.

4.6.2. Safety Indicator

	Índice de Seguridad					Max valor 2019
	2015	2016	2017	2018	2019	
España	36,5	50,0	40,2	47,0	50,0	45
Alemania	42,4	41,9	42,8	46,4	46,3	45
Francia	21,4	47,9	29,0	44,0	42,0	45
Reino Unido	46,3	50,0	43,2	48,8	50,0	45
Italia	47,6	43,0	40,6	47,7	50,0	45
Turquía	49,9	49,9	49,9	49,9	49,9	45
EEUU	46,5	46,5	45,8	45,1	40,9	45
México	48,6	49,3	49,3	49,3	47,9	45
Brasil	49,3	49,9	49,3	49,3	49,3	45
Perú	49,9	49,9	49,3	49,9	49,9	45
Chile	49,9	49,9	49,9	49,9	48,6	45
Japón	49,9	49,3	49,3	49,9	49,9	45
China	49,9	49,3	49,9	49,3	49,9	45
India	49,3	49,9	49,9	49,9	49,3	45
Maximo:	49,995		Máxima puntuación:	45	10	
Mínimo:	21,374		Mínima puntuación:			
Media:	**47,187**		Dif:	45,000	10,000	

Table 124: Safety Indicator Values

Subindicadores de Seguridad		Pesos	Total Max puntuación
AERO S.1	Víctimas mortales en vuelos de pasajeros	1	10
AERO S.2	Víctimas mortales en accidentes en el transporte aéreo comercial	1	10
AERO S.3	Heridos en accidentes en el transporte aéreo comercial	1	10
AERO S.4	Víctimas mortales de accidentes aéreos en obras aéreas	1	10
AERO S.5	Heridos en accidentes aéreos en obras aeroportuarias	1	10
		5	50

Table 125: Safety Indicator Weights

	Evaluación de Seguridad							Subindicadores considerados
	2015	2016	2017	2018	Calificación 2019			
España	8,1	10,0	8,9	10,0	10,0	EXCELENTE	A	5
Alemania	9,4	9,3	9,5	10,0	10,0	EXCELENTE	A	5
Francia	4,7	10,0	6,4	9,8	9,3	EXCELENTE	A	5
Reino Unido	10,0	10,0	9,6	10,0	10,0	EXCELENTE	A	5
Italia	10,0	9,6	9,0	10,0	10,0	EXCELENTE	A	5
Turquía	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	5
EEUU	10,0	10,0	10,0	10,0	9,1	EXCELENTE	A	5
México	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	5
Brasil	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	5
Perú	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	5
Chile	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	5
Japón	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	5
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	5
India	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	5

Table 126: Security Criterion Rating

As observed in the results of the indicators and the final evaluation, the rating is excellent for all the countries analyzed.

4.7. Resilience

Resilience is the ability of a system to recover its initial state when disruptions that have altered the system have ceased. The question posed is as follows: When threats and adverse incidents occur, what is the capacity of public infrastructure to prevent, protect, and minimize consequences for users, the environment, the economy, and national security? Is public infrastructure prepared to recover its initial state within a reasonable time after the threat or adverse incident has ceased? Are there alternatives to maintain the service it provides?

The chosen indicators are:

7	RESILIENCE
AERO R.1	Hub connectivity of the best airport in the country (2022) - EU
AERO R.2	Direct airport connectivity by country - Airport Council International Europe
AERO R.3	Indirect airport connectivity by country - Airport Council International Europe
AERO R.4	Connectivity as airports by country - Airport Council International Europe

To adequately address the posed question, data on the technical characteristics of airport design should be available: terrain conditions and their vulnerability to adverse phenomena; drainage capacity of the infrastructure (to verify if the return period of floods is appropriate for preventing inundations); stability of slopes and earthworks of the infrastructure; organization and equipment of maintenance teams to efficiently and rapidly respond to any contingency; integrated system for winter road maintenance; etc.

As it is not feasible to obtain all these data for the entire set of airports (which would be a labor-intensive task), the approach taken is to consider indicators that, indirectly, may provide some insight into the resilience of the airport network. Thus, the selected indicators are related to both direct and indirect airport connectivity, including airports and hubs.

Due to a lack of data, only European countries have been evaluated. The data is sourced from EUROSTAT.

4.7.1. Resiliency Indicators

4.7.1.1 Indicator AERO R.1: Direct Airport Connectivity by Country (Airport Council International Europe)

AERO R.1	Conectividad directa aeroportuaria por país. (Airport Council International Europe)				
	2015	2016	2017	2018	2019
España				19.895	20.393
Alemania				19.167	19.164
Francia				14.807	14.604
Reino Unido				18.290	18.151
Italia				12.183	12.639
Turquía				12.653	12.975
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	20393,00		Percentil 90%:	19.822,200	10,00
Mínimo:	12.183,000	MIN ((Media-Factor min *Desv);0):		11430,20228	1
Media:	16.243,417	Percentil 90%:	19.822,200	8391,998	9,000
Factor max*Desv E	21.056,631	Percentil 10%:	12.640,400	Unidad:	0,001
Factor min*Desv Es	11.430,202		Desv. Est.:	3.208,810	

Table 127: Indicator AERO R.1 values: Direct Airport Connectivity by Country (Airport Council International Europe)

AERO R.1	Conectividad directa aeroportuaria por país. (Airport Council International Europe)						
	2015	2016	2017	2018	Calificación 2019		
España				10,0	10,0	EXCELENTE	A
Alemania				9,3	9,3	EXCELENTE	A
Francia				4,6	4,4	INSUFICIENTE	FX
Reino Unido				8,4	8,2	MUY BIEN	B
Italia				1,8	2,3	MUY INSUFICIENTE	F
Turquía				2,3	2,7	MUY INSUFICIENTE	F
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 128: Indicator AERO R.1 Rating: Direct Airport Connectivity by Country (Airport Council International Europe)

4.7.1.2 *Indicator AERO R.2: Indirect Airport Connectivity by Country (Airport Council International Europe)*

AERO R.2	Conectividad indirecta aeroportuaria por país. (Airport Council International Europe)				
	2015	2016	2017	2018	2019
España				31.056	33.058
Alemania				53.183	54.687
Francia				30.140	31.530
Reino Unido				39.538	39.680
Italia				29.296	30.826
Turquía				12.742	14.482
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	54687,00		Percentil 90%:	51.832,700	10,00
Mínimo:	12.742,000	MIN ((Media-Factor min *Desv);0):		14434,85984	1
Media:	33.351,500	Percentil 90%:	51.832,700	37397,840	9,000
Factor max*Desv Es	52.268,140	Percentil 10%:	15.963,400	Unidad:	0,000
Factor min*Desv Es	14.434,860		Desv. Est.:	12.611,093	

Table 129: Indicator AERO R.2 values: Indirect Airport Connectivity by Country (Airport Council International Europe)

AERO R.2	Conectividad indirecta aeroportuaria por país. (Airport Council International Europe)						
	2015	2016	2017	2018	Calificación 2019		
España				5,0	5,5	SUFICIENTE	E
Alemania				10,0	10,0	EXCELENTE	A
Francia				4,8	5,1	SUFICIENTE	E
Reino Unido				7,0	7,1	BIEN	C
Italia				4,6	4,9	INSUFICIENTE	FX
Turquía				1,0	1,0	MUY INSUFICIENTE	F
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 130: Indicator AERO R.2 Rating: Indirect Airport Connectivity by Country (Airport Council International Europe)

4.7.1.3 Indicator AERO R.3: Airport Connectivity by Country (Airport Council International Europe)

AERO R.3	Conectividad como aeropuertos por país. (Airport Council International Europe)				
	2015	2016	2017	2018	2019
España	42.471	43.582	46.825	50.921	53.450
Alemania	68.386	67.103	67.884	72.351	73.850
Francia	43.247	42.424	43.130	44.947	46.135
Reino Unido	54.981	56.057		57.827	57.083
Italia	38.659	38.206	39.557	41.479	43.465
Turquía	23.914	24.691	22.969	25.396	27.457
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	73850,00		Percentil 90%:	67.984,400	10,00
Mínimo:	22.969,000	MIN ((Media-Factor min *Desv);0):		25121,86414	1
Media:	46.842,985	Percentil 90%:	67.984,400	42862,536	9,000
Factor max*Desv Es	68.564,107	Percentil 10%:	25.255,000	Unidad:	0,000
Factor min*Desv Es	25.121,864		Desv. Est.:	14.480,748	

Table 131: Indicator AERO R.3 values: Airport Connectivity by Country (Airport Council International Europe)

AERO R.3	Conectividad como aeropuertos por país. (Airport Council International Europe)						
	2015	2016	2017	2018	Calificación 2019		
España	4,6	4,9	5,6	6,4	6,9	SUFICIENTE ALTO	D
Alemania	10,0	9,8	10,0	10,0	10,0	EXCELENTE	A
Francia	4,8	4,6	4,8	5,2	5,4	SUFICIENTE	E
Reino Unido	7,3	7,5		7,9	7,7	BIEN	C
Italia	3,8	3,7	4,0	4,4	4,9	INSUFICIENTE	FX
Turquía	1,0	1,0	1,0	1,1	1,5	MUY INSUFICIENTE	F
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 132: Indicator AERO R.3 Rating: Airport Connectivity by Country (Airport Council International Europe)

4.7.1.4 Indicator AERO R.4: Airport Connectivity as HUB by Country (Airport Council International Europe)

AERO R.4	Conectividad como HUB aeroportuaria por país. (Airport Council International Europe)				
	2015	2016	2017	2018	2019
España	20.897	21.386	21.801	25.631	27.990
Alemania	110.304	104.955	107.966	120.910	121.14
Francia	55.359	50.190	49.386	50.757	49.972
Reino Unido	39.379	37.372	38.001	39.306	39.650
Italia	14.807	15.380	14.895	16.363	17.750
Turquía	36.888	37.595	36.421	38.675	45.675
EEUU					
México					
Brasil					
Perú					
Chile					
Japón					
China					
India					
Maximo:	120910,00		Percentil 90%:	105.557,200	10,00
Mínimo:	14.807,000	MIN ((Media-Factor min *Desv);0):			1
Media:	44.333,138	Percentil 90%:	105.557,200	105557,200	9,000
Factor max*Desv Es	88.991,125	Percentil 10%:	16.166,400	Unidad:	0,000
Factor min*Desv Es	-324,849		Desv. Est.:	29.771,991	

Table 133: Indicator AERO R.4 Values: Airport Connectivity as HUB by Country (Airport Council International Europe)

AERO R.4	Conectividad como HUB aeroportuaria por país. (Airport Council International Europe)						
	2015	2016	2017	2018	Calificación 2019		
España	2,8	2,8	2,9	3,2	3,4	INSUFICIENTE	FX
Alemania	10,0	9,9	10,0	10,0	10,0	EXCELENTE	A
Francia	5,7	5,3	5,2	5,3	5,3	SUFICIENTE	E
Reino Unido	4,4	4,2	4,2	4,4	4,4	INSUFICIENTE	FX
Italia	2,3	2,3	2,3	2,4	2,5	MUY INSUFICIENTE	F
Turquía	4,1	4,2	4,1	4,3	4,9	INSUFICIENTE	FX
EEUU							
México							
Brasil							
Perú							
Chile							
Japón							
China							
India							

Table 134: Indicator AERO R.4 Rating: Airport Connectivity as HUB by Country (Airport Council International Europe)

4.7.2. Resiliency Indicator

	Índice de Resiliencia					Max valor 2019
	2015	2016	2017	2018	2019	
España	7,4	7,7	8,4	24,6	25,8	36
Alemania	20,0	19,8	20,0	39,3	39,3	36
Francia	10,5	9,9	10,0	19,9	20,2	36
Reino Unido	11,6	11,7	4,2	27,6	27,4	36
Italia	6,1	6,1	6,3	13,2	14,6	36
Turquía	5,1	5,2	5,1	8,7	10,1	36
EEUU						
México						
Brasil						
Perú						
Chile						
Japón						
China						
India						
Maximo:	39,297		Máxima puntuación:	36	10	
Mínimo:	4,240		Mínima puntuación:			
Media:	14,860		Dif:	36,000	10,000	

Table 135: Resiliency Indicator Values

Subindicadores de Resiliencia		Pesos	Total Max puntuación
AERO R.1	Conectividad directa aeroportuaria por país. (Airport Council International Europe)	1	10
AERO R.2	Conectividad indirecta aeroportuaria por país. (Airport Council International Europe)	1	10
AERO R.3	Conectividad como aeropuertos por país. (Airport Council International Europe)	1	10
AERO R.4	Conectividad como HUB aeroportuaria por país. (Airport Council International Europe)	1	10
		4	40
		% Valorado de la Max. Puntuación del Criterio	36

Table 136: Resiliency Indicator Weights

	Evaluación de Resiliencia							Subindicadores considerados
	2015	2016	2017	2018	Calificación 2019			
España	4,1	4,3	4,7	6,8	7,2	BIEN	C	4
Alemania	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	4
Francia	5,8	5,5	5,6	5,5	5,6	SUFICIENTE	E	4
Reino Unido	6,5	6,5	4,7	7,7	7,6	BIEN	C	4
Italia	3,4	3,4	3,5	3,7	4,1	INSUFICIENTE	FX	4
Turquía	2,9	2,9	2,8	2,4	2,8	MUY INSUFICIENTE	F	4
EEUU								
México								
Brasil								
Perú								
Chile								
Japón								
China								
India								

Table 137: Resiliency Criterion Rating

The highest overall rating in this indicator is obtained by Germany, followed by the United Kingdom (6.5), and Spain.

4.8. Engineering and Innovation

The evaluation of innovation through indicators aims to answer the following questions: Are the resources allocated to engineering in the design, construction, maintenance, management, and operation of the public works sector adequate? Is the investment in innovation appropriate? What new techniques, materials, technologies, and operational methods are being implemented to improve public works? Is there progress in digitalization, monitoring, and sensorization throughout the entire lifecycle of public works? Is the information provided to users adequate?

The selected indicators are:

8	ENGINEERING AND INNOVATION
AERO I.1	Ranking position in Skytrax
AERO I.2	Number of patents. Aeronautics and Air Transport (OECD)
AERO I.3	% of GDP devoted to Gross Domestic Expenditure on Research and Development (OECD R&D)
AERO I.4	Gross Domestic Expenditure on Research and Development ($)/Population (OECD R&D)
AERO I.5	% of GDP allocated to basic research expenditure (OECD R&D)
AERO I.6	% of GDP from private financing for Research and Development (OECD R&D)
AERO I.7	% of GDP from public financing for Research and Development (OECD R&D)
AERO I.8	Digitalization. Participation in new technologies. GCI Score (WEF)
AERO I.9	Digitalization. Index of Information and Communication Technology Infrastructure. (ND Index)
AERO I.10	Digitalization. % of people using the internet
AERO I.11	Engineering. Regulatory transparency. Index of services trade restrictiveness (OECD)
AERO I.12	Engineering. Barriers to competition. Index of services trade restrictiveness (OECD)
AERO I.13	Engineering. Restrictions on movement. Index of services trade restrictiveness (OECD)
AERO I.14	Engineering. Restrictions on entry of foreign engineers. Index of restrictiveness (OECD)
AERO I.15	Innovation Index. ND Gain Index

To analyze engineering and innovation in airports, a comprehensive understanding of new techniques, materials, and technologies applied in airports is required, along with insights into implemented innovations, the state of airport engineering, progress in digitalization, and resources allocated to engineering and innovation. One of the best indicators of technological advancement in airports is the position in the SKYTRAX ranking. Additionally, a specific patent indicator has been identified: "Number of patents in aeronautics and air transport (OECD)."

Despite efforts to gather more specific and reliable data for the airport infrastructure sector, concrete data related to airports has been challenging to find. In the absence of such data, the approach taken involves analyzing the state of research, development, and innovation (RDI) in different countries as a proxy for evaluating airport status. For this purpose, the database and indicators provided in the report **"Main Science and Technology Indicators, Volume 2021"** published in 2022 by the OECD, have been selected. This extensive report offers a set of indicators reflecting the level and structure of efforts made by OECD member countries and seven non-member economies (Argentina, China, Romania, Russia, Singapore, and South Africa) in the field of science and technology. These indicators cover research and development resources, patent families, and international trade in research-intensive industries. The ND Gain Innovation Index has also been considered.

To analyze the progress of digitalization, three indicators have been included: Participation in new technologies (GCI - WEF), Information and Communication Technology (ICT) Infrastructure Index (ND Gain Index. ICT infrastructure), and the number of internet users.

To assess the state of engineering in the airport sector, it would have been beneficial to have precise information about the training of airport engineers, the number of engineers involved in airport design, construction, maintenance, and management per unit of economic investment. Particularly valuable would have been economic data related to engineering investment in relation to investment in airport construction, maintenance, operation, and management networks. Unfortunately, obtaining such data has not been feasible. As an alternative, four OECD indicators related to engineering have been considered: regulatory transparency, barriers to competition, restrictions on the movement of engineers, and restrictions on the entry of foreign engineers. All of these are linked to the trade in services restriction index periodically compiled by the **OECD**.

4.8.1. Innovation Indicators

4.8.1.1 Indicator AERO I.1: Position in the Skytrax ranking

AERO I.1	Posición en el ranking Skytrax				
	2015	2016	2017	2018	2019
España				41	26
Alemania				7	9
Francia				25	23
Reino Unido				31	19
Italia				75	72
Turquía				18	27
EEUU				5	6
México				101	101
Brasil				53	50
Perú					
Chile					
Japón				3	3
China				6	4
India				55	58
Maximo:	101,00	MAX:		100,00	0,00
Mínimo:	3,000	MIN:		1,0	10,00
Media:	**34,083**	Percentil 90%:	74,100	99,000	-10,000
Factor max*Desv E	79,598	Percentil 10%:	4,300	Unidad:	-0,101
Factor min*Desv Es	-11,431		Desv. Est.:	30,343	

Table 138: Indicator AERO I.1 values: Position in the Skytrax ranking

AERO I.1	Posición en el ranking Skytrax						
	2015	2016	2017	2018	Calificación 2019		
España				6,0	7,5	BIEN	C
Alemania				9,4	9,2	EXCELENTE	A
Francia				7,6	7,8	BIEN	C
Reino Unido				7,0	8,2	MUY BIEN	B
Italia				2,5	2,8	MUY INSUFICIENTE	F
Turquía				8,3	7,4	BIEN	C
EEUU				9,6	9,5	EXCELENTE	A
México				0,0	0,0	MUY INSUFICIENTE	F
Brasil				4,7	5,1	SUFICIENTE	E
Perú							
Chile							
Japón				9,8	9,8	EXCELENTE	A
China				9,5	9,7	EXCELENTE	A
India				4,5	4,2	INSUFICIENTE	FX

Table 139: Indicator AERO I.1 Rating: Position in the Skytrax ranking

4.8.1.2 Indicator AERO I.2: Number of patents. Aeronautics and Air Transport (OECD)

AERO I.2	Número de patentes. Aeronáutica y Transporte Aéreo / 100.000.000.000$ de PIB OCDE)				
	2015	2016	2017	2018	2019
España	1,87	1,37	1,18	0,74	1,53
Alemania	4,94	3,78	3,70	4,16	3,16
Francia	8,09	7,04	7,54	7,72	9,14
Reino Unido	3,91	3,73	4,11	9,85	7,90
Italia	0,56	0,43	0,76	0,67	0,72
Turquía	0,35	0,00	0,17	0,39	0,00
EEUU	4,60	5,00	4,40	4,19	3,05
México	0,16	0,09	0,33	0,29	0,08
Brasil					
Perú					
Chile					
Japón	0,83	0,64	0,83	1,37	0,70
China	0,13	0,24	0,22	0,14	0,07
India	0,96	1,05	1,06	1,22	0,60
Maximo:	9,85	MAX ((Media+Factor max*Desv Est.):		6,47	10,00
Mínimo:	0,000	MIN ((Media-Factor min *Desv);0):		0,0	1
Media:	**2,395**	Percentil 90%:	7,339	6,469	9,000
Factor max*Desv E	6,470	Percentil 10%:	0,134	Unidad:	1,391
Factor min*Desv Es	-1,679		Desv. Est.:	2,716	

Table 140: Indicator AERO I.2 values: Number of patents. Aeronautics and Air Transport (OECD)

AERO I.2	Número de patentes. Aeronáutica y Transporte Aéreo / 100.000.000.000$ de PIB OCDE)						
	2015	2016	2017	2018	Calificación 2019		
España	3,6	2,9	2,6	2,0	3,1	INSUFICIENTE	FX
Alemania	7,9	6,3	6,1	6,8	5,4	SUFICIENTE	E
Francia	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Reino Unido	6,4	6,2	6,7	10,0	10,0	EXCELENTE	A
Italia	1,8	1,6	2,1	1,9	2,0	MUY INSUFICIENTE	F
Turquía	1,5	1,0	1,2	1,5	1,0	MUY INSUFICIENTE	F
EEUU	7,4	8,0	7,1	6,8	5,2	SUFICIENTE	E
México	1,2	1,1	1,5	1,4	1,1	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile							
Japón	2,2	1,9	2,2	2,9	2,0	MUY INSUFICIENTE	F
China	1,2	1,3	1,3	1,2	1,1	MUY INSUFICIENTE	F
India	2,3	2,5	2,5	2,7	1,8	MUY INSUFICIENTE	F

Table 141: Indicator AERO I.2 values: Number of patents. Aeronautics and Air Transport (OECD)

4.8.1.3 Indicator AERO I.3: % of GDP allocated to Gross Domestic Expenditure on R&D (OECD R&D)

AERO I.3	% del PIB destinado al Gasto interior bruto en I+D (OCDE R&D)				
	2015	2016	2017	2018	2019
España	1,22%	1,19%	1,21%	1,24%	1,25%
Alemania	2,93%	2,94%	3,05%	3,11%	3,17%
Francia	2,23%	2,22%	2,20%	2,20%	2,19%
Reino Unido	1,63%	1,64%	1,66%	1,70%	1,71%
Italia	1,34%	1,37%	1,37%	1,42%	1,46%
Turquía	0,88%	0,94%	0,95%	1,03%	1,06%
EEUU	2,79%	2,85%	2,91%	3,01%	3,18%
México	0,43%	0,39%	0,33%	0,31%	0,28%
Brasil					
Perú					
Chile	0,38%	0,37%	0,36%	0,37%	0,34%
Japón	3,24%	3,11%	3,17%	3,22%	3,21%
China	2,06%	2,10%	2,12%	2,14%	2,23%
India					
Maximo:	3,24%	MAX ((Media+Factor max*Desv Est.):		3,25%	10
Mínimo:	0,28%	MIN ((Media-Factor min *Desv);0):		0,29%	1
Media:	1,77%	Percentil 90%:	3,15%	2,95%	9,000
Factor max*Desv Es	3,25%	Percentil 10%:	0,37%	Unidad:	304,670
Factor min*Desv Es	0,29%		Desv. Est.:	0,98%	

Table 142: Indicator AERO I.13 values: % of GDP allocated to Gross Domestic Expenditure on R&D (OECD R&D)

AERO I.3	% del PIB destinado al Gasto interior bruto en I+D (OCDE R&D)						
	2015	2016	2017	2018	Calificación 2019		
España	3,8	3,7	3,8	3,9	3,9	INSUFICIENTE	FX
Alemania	9,0	9,1	9,4	9,6	9,8	EXCELENTE	A
Francia	6,9	6,9	6,8	6,8	6,8	SUFICIENTE ALTO	D
Reino Unido	5,1	5,1	5,2	5,3	5,3	SUFICIENTE	E
Italia	4,2	4,3	4,3	4,4	4,6	INSUFICIENTE	FX
Turquía	2,8	3,0	3,0	3,2	3,3	INSUFICIENTE	FX
EEUU	8,6	8,8	9,0	9,3	9,8	EXCELENTE	A
México	1,4	1,3	1,1	1,0	1,0	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile	1,3	1,2	1,2	1,2	1,1	MUY INSUFICIENTE	F
Japón	10,0	9,6	9,8	9,9	9,9	EXCELENTE	A
China	6,4	6,5	6,6	6,6	6,9	SUFICIENTE ALTO	D
India							

Table 143: Indicator AERO I.3: % of GDP allocated to Gross Domestic Expenditure on R&D (OECD R&D)

4.8.1.4 Indicator AERO I.4: Gross Domestic Expenditure on R&D ($) / Population (OECD R&D)

AERO I.4	Gasto interior bruto en I+D ($)/Población (OCDE R&D)				
	2015	2016	2017	2018	2019
España	427	444	479	506	522
Alemania	1.397	1.487	1.617	1.717	1.763
Francia	909	952	977	1.019	1.070
Reino Unido	701	733	770	811	838
Italia	498	550	575	619	649
Turquía	227	250	269	290	289
EEUU	1.581	1.651	1.740	1.892	2.066
México	79	76	66	63	57
Brasil					
Perú					
Chile	86	86	87	94	86
Japón	1.326	1.263	1.315	1.361	1.364
China	266	284	303	334	376
India					
Maximo:	2.066,000	MAX ((Media+Factor max*Desv Est.):		1.653,041	10
Mínimo:	57,000	MIN ((Media-Factor min *Desv);0):			1
Media:	750,129	Percentil 90%:	1.584,600	1653,041	9,000
ax*Desv Estándar:	1.653,041	Percentil 10%:		Unidad:	0,005
in*Desv Estándar:	-152,783		Desv. Est.:	601,941	

Table 144: Indicator AERO I.4 values: Gross Domestic Expenditure on R&D ($) / Population (OECD R&D)

AERO I.4	Gasto interior bruto en I+D ($)/Población (OCDE R&D)						
	2015	2016	2017	2018	Calificación 2019		
España	3,3	3,4	3,6	3,8	3,8	INSUFICIENTE	FX
Alemania	8,6	9,1	9,8	10,0	10,0	EXCELENTE	A
Francia	5,9	6,2	6,3	6,5	6,8	SUFICIENTE ALTO	D
Reino Unido	4,8	5,0	5,2	5,4	5,6	SUFICIENTE	E
Italia	3,7	4,0	4,1	4,4	4,5	INSUFICIENTE	FX
Turquía	2,2	2,4	2,5	2,6	2,6	MUY INSUFICIENTE	F
EEUU	9,6	10,0	10,0	10,0	10,0	EXCELENTE	A
México	1,4	1,4	1,4	1,3	1,3	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile	1,5	1,5	1,5	1,5	1,5	MUY INSUFICIENTE	F
Japón	8,2	7,9	8,2	8,4	8,4	MUY BIEN	B
China	2,4	2,5	2,6	2,8	3,0	INSUFICIENTE	FX
India							

Table 145: Indicator AERO I.4 Rating: Gross Domestic Expenditure on R&D ($) / Population (OECD R&D)

4.8.1.5 Indicator AERO I.5: % of GDP devoted to basic research expenditure (OECD R&D)

AERO I.5	% del PIB destinado a gasto en investigación básica (OCDE R&D))				
	2015	2016	2017	2018	2019
España	0,27%	0,26%	0,26%	0,26%	0,29%
Alemania					
Francia	0,54%	0,50%	0,50%	0,50%	0,50%
Reino Unido	0,27%	0,30%	0,29%	0,31%	0,31%
Italia	0,33%	0,32%	0,30%	0,31%	0,31%
Turquía					
EEUU	0,46%	0,46%	0,46%	0,47%	0,48%
México	0,14%	0,12%	0,10%	0,09%	0,09%
Brasil					
Perú					
Chile					
Japón	0,39%	0,39%	0,42%	0,41%	0,40%
China	0,10%	0,11%	0,12%	0,12%	0,13%
India					
Maximo:	0,54%			0,50%	10
Mínimo:	0,09%	MIN ((Media-Factor min *Desv);0):		0,10%	1
Media:	0,31%	Percentil 90%:	0,50%	0,40%	9,000
Factor max*Desv Es	0,52%	Percentil 10%:	0,11%	Unidad:	2244,981
Factor min*Desv Es	0,10%		Desv. Est.:	0,14%	

Table 146: Indicator AERO I.5 values: % of GDP devoted to basic research expenditure (OECD R&D)

AERO I.5	% del PIB destinado a gasto en investigación básica (OCDE R&D))						
	2015	2016	2017	2018	Calificación 2019		
España	4,8	4,6	4,6	4,6	5,3	SUFICIENTE	E
Alemania							
Francia	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Reino Unido	4,8	5,5	5,3	5,7	5,7	SUFICIENTE	E
Italia	6,2	6,0	5,5	5,7	5,7	SUFICIENTE	E
Turquía							
EEUU	9,1	9,1	9,1	9,3	9,6	EXCELENTE	A
México	1,9	1,5	1,0	1,0	1,0	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile							
Japón	7,5	7,5	8,2	8,0	7,8	BIEN	C
China	1,0	1,2	1,5	1,5	1,7	MUY INSUFICIENTE	F
India							

Table 147: Indicator AERO I.5 Rating: % of GDP devoted to basic research expenditure (OECD R&D)

4.8.1.6 Indicator AERO I.6: % of GDP from Private funding for R&D (OECD R&D)

AERO I.6	% del PIB de Financiación privada destinada a I+D (OCDE R&D)				
	2015	2016	2017	2018	2019
España	0,56%	0,56%	0,58%	0,61%	0,61%
Alemania	1,93%	1,92%	2,02%	2,05%	2,04%
Francia	1,23%	1,24%	1,24%	1,24%	1,24%
Reino Unido	0,80%	0,85%	0,89%	0,93%	0,92%
Italia	0,67%	0,71%	0,74%	0,78%	0,82%
Turquía	0,39%	0,44%	0,47%	0,55%	0,60%
EEUU	1,76%	1,83%	1,84%	1,93%	2,08%
México	0,07%	0,07%	0,06%	0,05%	0,05%
Brasil					
Perú					
Chile	0,12%	0,13%	0,11%	0,11%	0,11%
Japón	2,53%	2,43%	2,48%	2,55%	2,54%
China	1,54%	1,60%	1,62%	1,64%	1,70%
India					
Maximo:	2,55%	MAX ((Media+Factor max*Desv Est.):		2,27%	10
Mínimo:	0,05%	MIN ((Media-Factor min *Desv);0):			1
Media:	1,10%	Percentil 90%:	2,07%	2,27%	9,000
Factor max*Desv Es	2,27%	Percentil 10%:	0,11%	Unidad:	396,101
Factor min*Desv Es	-0,07%		Desv. Est.:	0,78%	

Table 148: Indicator AERO I.6 Values: % of GDP from Private funding for R&D (OECD R&D)

AERO I.6	% del PIB de Financiación privada destinada a I+D (OCDE R&D)						
	2015	2016	2017	2018	Calificación 2019		
España	3,2	3,2	3,3	3,4	3,4	INSUFICIENTE	FX
Alemania	8,6	8,6	9,0	9,1	9,1	EXCELENTE	A
Francia	5,9	5,9	5,9	5,9	5,9	SUFICIENTE	E
Reino Unido	4,2	4,4	4,5	4,7	4,6	INSUFICIENTE	FX
Italia	3,7	3,8	3,9	4,1	4,2	INSUFICIENTE	FX
Turquía	2,5	2,7	2,9	3,2	3,4	INSUFICIENTE	FX
EEUU	8,0	8,2	8,3	8,6	9,2	EXCELENTE	A
México	1,3	1,3	1,2	1,2	1,2	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile	1,5	1,5	1,4	1,4	1,4	MUY INSUFICIENTE	F
Japón	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China	7,1	7,3	7,4	7,5	7,7	BIEN	C
India							

Table 149: Indicator AERO I.6 Rating: % of GDP from Private funding for R&D (OECD R&D)

4.8.1.7 Indicator AERO I.7: % of GDP from Public funding for R&D (OECD R&D)

AERO I.7	% del PIB de Financiación pública destinada a I+D (OCDE R&D)				
	2015	2016	2017	2018	2019
España	0,50%	0,48%	0,47%	0,47%	0,47%
Alemania	0,82%	0,84%	0,84%	0,87%	0,88%
Francia	0,79%	0,72%	0,71%	0,69%	0,69%
Reino Unido	0,45%	0,43%	0,43%	0,44%	0,46%
Italia	0,51%	0,48%	0,44%	0,47%	0,47%
Turquía	0,34%	0,33%	0,32%	0,33%	0,31%
EEUU	0,69%	0,66%	0,65%	0,66%	0,66%
México	0,34%	0,30%	0,25%	0,24%	0,22%
Brasil					
Perú					
Chile	0,16%	0,17%	0,17%	0,17%	0,15%
Japón	0,50%	0,47%	0,47%	0,47%	0,47%
China	0,44%	0,42%	0,42%	0,43%	0,46%
India					
Maximo:	0,88%	MAX ((Media+Factor max*Desv Est.):		0,77%	10
Mínimo:	0,15%	MIN ((Media-Factor min *Desv);0):		0,19%	1
Media:	0,48%	Percentil 90%:	0,76%	0,58%	9,000
Factor max*Desv E	0,77%	Percentil 10%:	0,23%	Unidad:	1549,441

Table 150: Indicator AERO I.7 Values: % of GDP from Public funding for R&D (OECD R&D)

AERO I.7	% del PIB de Financiación pública destinada a I+D (OCDE R&D)						
	2015	2016	2017	2018	Calificación 2019		
España	5,8	5,5	5,3	5,3	5,3	SUFICIENTE	E
Alemania	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Francia	10,0	9,2	9,0	8,7	8,7	MUY BIEN	B
Reino Unido	5,0	4,7	4,7	4,9	5,2	SUFICIENTE	E
Italia	5,9	5,5	4,9	5,3	5,3	SUFICIENTE	E
Turquía	3,3	3,2	3,0	3,2	2,8	MUY INSUFICIENTE	F
EEUU	8,7	8,3	8,1	8,3	8,3	MUY BIEN	B
México	3,3	2,7	1,9	1,8	1,4	MUY INSUFICIENTE	F
Brasil							
Perú							
Chile	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Japón	5,8	5,3	5,3	5,3	5,3	SUFICIENTE	E
China	4,9	4,5	4,5	4,7	5,2	SUFICIENTE	E
India							

Table 151: Indicator AERO I.7 Rating: % of GDP from Public funding for R&D (OECD R&D)

4.8.1.8 Indicator AERO I.8: Digitalization. Participation in new technologies. GCI Score (WEF)

AERO I.8	Digitalización. Participación en la nuevas tecnologías. Puntuación GCI (WEF)				
	2015	2016	2017	2018	2019
España					98,3%
Alemania					92,1%
Francia					96,6%
Reino Unido					98,3%
Italia					95,5%
Turquía					86,0%
EEUU					98,3%
México					94,4%
Brasil					97,2%
Perú					86,5%
Chile					82,0%
Japón					98,3%
China					90,5%
India					95,5%
Maximo:	98,30%	MAX ((Media+Factor max*Desv Est.):		100,00%	10
Mínimo:	82,00%	MIN ((Media-Factor min *Desv);0):		85,50%	1
Media:	93,54%	Percentil 90%:	98,30%	14,50%	9,000
Factor max*Desv E	101,57%	Percentil 10%:	86,15%	Unidad:	62,086
Factor min*Desv Es	85,50%		Desv. Est.:	5,35%	

Table 152: Indicator AERO I.8 values: Digitalization. Participation in new technologies. GCI Score (WEF)

AERO I.8	Digitalización. Participación en la nuevas tecnologías. Puntuación GCI (WEF)						
	2015	2016	2017	2018	Calificación 2019		
España					8,9	MUY BIEN	B
Alemania					5,1	SUFICIENTE	E
Francia					7,9	BIEN	C
Reino Unido					8,9	MUY BIEN	B
Italia					7,2	BIEN	C
Turquía					1,3	MUY INSUFICIENTE	F
EEUU					8,9	MUY BIEN	B
México					6,5	SUFICIENTE ALTO	D
Brasil					8,3	MUY BIEN	B
Perú					1,6	MUY INSUFICIENTE	F
Chile					1,0	MUY INSUFICIENTE	F
Japón					8,9	MUY BIEN	B
China					4,1	INSUFICIENTE	FX
India					7,2	BIEN	C

Table 153: Indicator AERO I.8 Rating: Digitalization. Participation in new technologies. GCI Score (WEF)

4.8.1.9 Indicator AERO I.9: Digitalization. Index of Information and Communication Technology Infrastructure. (ND Gain Index. ICT infrastructure)

AERO I.9	Digitalización. Índice de las Infraestructuras de tecnologías de información y comunicación. (ND Index)				
	2015	2016	2017	2018	2019
España	0,622	0,632	0,648	0,656	0,671
Alemania	0,698	0,694	0,699	0,706	0,710
Francia	0,698	0,706	0,713	0,719	0,725
Reino Unido	0,702	0,712	0,701	0,703	0,710
Italia	0,542	0,554	0,566	0,598	0,603
Turquía	0,454	0,469	0,491	0,514	0,524
EEUU	0,620	0,650	0,654	0,657	0,661
México	0,466	0,475	0,488	0,498	0,512
Brasil	0,476	0,483	0,502	0,512	0,521
Perú	0,392	0,405	0,420	0,432	0,446
Chile	0,530	0,550	0,548	0,556	0,560
Japón	0,670	0,679	0,678	0,680	0,687
China	0,479	0,497	0,519	0,535	0,558
India	0,295	0,300	0,303	0,308	0,331
Maximo:	0,725	MAX ((Media+Factor max*Desv Est.):		1	10
Mínimo:	0,295	MIN ((Media-Factor min *Desv);0):		0,39	1
Media:	0,567	Percentil 90%:	0,706	0,358	9,000
ax*Desv Estándar:	0,746	Percentil 10%:	0,418	Unidad:	25,140
in*Desv Estándar:	0,388		Desv. Est.:	0,119	

Table 154: Indicator AERO I.9 Values: Digitalization. Index of Information and Communication Technology Infrastructure. (ND Gain Index. ICT infrastructure)

AERO I.9	Digitalización. Índice de las Infraestructuras de tecnologías de información y comunicación. (ND Index)						
	2015	2016	2017	2018	Calificación 2019		
España	6,9	7,2	7,5	7,8	8,1	MUY BIEN	B
Alemania	8,8	8,7	8,8	9,0	9,1	EXCELENTE	A
Francia	8,8	9,0	9,2	9,3	9,5	EXCELENTE	A
Reino Unido	8,9	9,1	8,9	8,9	9,1	EXCELENTE	A
Italia	4,9	5,2	5,5	6,3	6,4	SUFICIENTE ALTO	D
Turquía	2,7	3,0	3,6	4,2	4,4	INSUFICIENTE	FX
EEUU	6,8	7,6	7,7	7,8	7,9	BIEN	C
México	3,0	3,2	3,5	3,8	4,1	INSUFICIENTE	FX
Brasil	3,2	3,4	3,9	4,1	4,3	INSUFICIENTE	FX
Perú	1,1	1,4	1,8	2,1	2,5	MUY INSUFICIENTE	F
Chile	4,6	5,1	5,0	5,2	5,3	SUFICIENTE	E
Japón	8,1	8,3	8,3	8,3	8,5	MUY BIEN	B
China	3,3	3,8	4,3	4,7	5,3	SUFICIENTE	E
India	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 155: Indicator AERO I.9 Rating: Digitalization. Index of Information and Communication Technology Infrastructure. (ND Gain Index. ICT infrastructure)

4.8.1.10 Indicator AERO I.10: Digitalization. Number of Internet users.

AERO I.10	Digitalización. % de personas que usan internet				
	2015	2016	2017	2018	2019
España	78,7%	81,7%	84,6%	86,1%	90,7%
Alemania	87,6%	86,0%	84,4%	87,0%	88,1%
Francia	78,0%	79,3%	80,5%	82,0%	83,3%
Reino Unido	92,0%	91,2%	90,4%	90,7%	92,5%
Italia	58,1%	60,6%	63,1%	74,4%	78,0%
Turquía	53,7%	59,2%	64,7%	71,0%	74,0%
EEUU	74,6%	81,0%	87,3%	88,5%	90,0%
México	57,4%	60,7%	63,9%	65,8%	70,1%
Brasil	58,3%	62,9%	67,5%	70,4%	73,9%
Perú	40,9%	45,7%	50,5%	55,1%	60,0%
Chile	76,6%	79,5%	82,3%		
Japón	91,1%	91,4%	91,7%	91,3%	92,7%
China	50,3%	52,3%	54,3%		
India	17,0%	18,0%	19,0%	20,1%	21,0%
Maximo:	92,70%	MAX ((Media+Factor max*Desv Est.):		100,00%	10
Mínimo:	17,00%	MIN ((Media-Factor min *Desv);0):		40,05%	1
Media:	70,37%	Percentil 90%:	91,15%	59,95%	9,000
Factor max*Desv Es	100,69%	Percentil 10%:	48,00%	Unidad:	15,012
Factor min*Desv Es	40,05%		Desv. Est.:	20,21%	

Table 156: indicator AERO I.10 Values: Digitalization. Number of Internet users.

AERO I.10	Digitalización. % de personas que usan internet						
	2015	2016	2017	2018	Calificación 2019		
España	6,8	7,2	7,7	7,9	8,6	MUY BIEN	B
Alemania	8,1	7,9	7,7	8,0	8,2	MUY BIEN	B
Francia	6,7	6,9	7,1	7,3	7,5	BIEN	C
Reino Unido	8,8	8,7	8,6	8,6	8,9	MUY BIEN	B
Italia	3,7	4,1	4,5	6,2	6,7	SUFICIENTE ALTO	D
Turquía	3,0	3,9	4,7	5,6	6,1	SUFICIENTE ALTO	D
EEUU	6,2	7,1	8,1	8,3	8,5	MUY BIEN	B
México	3,6	4,1	4,6	4,9	5,5	SUFICIENTE	E
Brasil	3,7	4,4	5,1	5,6	6,1	SUFICIENTE ALTO	D
Perú	1,1	1,8	2,6	3,3	4,0	INSUFICIENTE	FX
Chile	6,5	6,9	7,3				
Japón	8,7	8,7	8,8	8,7	8,9	MUY BIEN	B
China	2,5	2,8	3,1				
India	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 157: Indicator AERO I.10 Values: Digitalization. Number of Internet users.

4.8.1.11 Indicator AERO I.11: Engineering. Regulatory transparency. Trade in Services Restrictiveness Index (OECD).

AERO I.11	Ingeniería. Transparencia regulatoria. Índice de restricción del comercio de servicios (OCDE)				
	2015	2016	2017	2018	2019
España	0,028	0,028	0,028	0,028	0,028
Alemania	0,014	0,014	0,014	0,014	0,028
Francia	0,028	0,028	0,028	0,014	0,014
Reino Unido	0,028	0,028	0,028	0,028	0,028
Italia	0,028	0,028	0,028	0.028	0,028
Turquía	0,028	0,028	0,028	0,028	0,042
EEUU	0,014	0,014	0,014	0,014	0,014
México	0,028	0,028	0,042	0,042	0,042
Brasil	0,000	0,000	0,014		
Perú	0,014	0,014	0,014	0,014	0,042
Chile	0,042	0,042	0,042	0,042	0,042
Japón	0,000	0,000	0,000	0,000	0,000
China	0,000	0,000	0,000	0,000	0,000
India	0,042	0,042	0,042	0,042	0,042
Maximo:	0,04	MAX ((Media+Factor max*Desv Est.):		0,04	1,00
Mínimo:	0,000	MIN ((Media-Factor min *Desv);0):		0,000755204	10
Media:	0,023	Percentil 90%:	0,042	0,044	-9,000
Factor max*Desv Es	0,045	Percentil 10%:	0,000	Unidad:	-204,335
Factor min*Desv Es	0,001		Desv. Est.:	0,015	

Table 158: Indicator AERO I.11 Values: Engineering. Regulatory transparency. Trade in Services Restrictiveness Index (OECD).

AERO I.11	Ingeniería. Transparencia regulatoria. Índice de restricción del comercio de servicios (OCDE)						
	2015	2016	2017	2018	Calificación 2019		
España	4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX
Alemania	7,3	7,3	7,3	7,3	4,4	INSUFICIENTE	FX
Francia	4,4	4,4	4,4	7,3	7,3	BIEN	C
Reino Unido	4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX
Italia	4,4	4,4	4,4	1,0	4,4	INSUFICIENTE	FX
Turquía	4,4	4,4	4,4	4,4	1,6	MUY INSUFICIENTE	F
EEUU	7,3	7,3	7,3	7,3	7,3	BIEN	C
México	4,4	4,4	1,6	1,6	1,6	MUY INSUFICIENTE	F
Brasil	10,0	10,0	7,3				
Perú	7,3	7,3	7,3	7,3	1,6	MUY INSUFICIENTE	F
Chile	1,6	1,6	1,6	1,6	1,6	MUY INSUFICIENTE	F
Japón	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	1,6	1,6	1,6	1,6	1,6	MUY INSUFICIENTE	F

Table 159: Indicator AERO I.11 Rating: Engineering. Regulatory transparency. Trade in Services Restrictiveness Index (OECD).

4.8.1.12 Indicator AERO I.12: Engineering. Barriers to competition. Trade in Services Restrictiveness Index (OECD).

AERO I.12	Ingeniería. Barreras a la competencia. Índice de restricción del comercio de servicios (OCDE)				
	2015	2016	2017	2018	2019
España	0,009	0,009	0,009	0,009	0,009
Alemania	0,019	0,019	0,019	0,019	0,019
Francia	0,009	0,009	0,009	0,009	0,009
Reino Unido					
Italia	0,009	0,009	0,009	0,009	0,009
Turquía	0,019	0,019	0,019	0,028	0,028
EEUU	0,000	0,000	0,000	0,000	0,000
México	0,000	0,000	0,000	0,000	0,000
Brasil	0,009	0,009	0,009	0,009	0,009
Perú	0,009	0,009	0,009	0,009	0,009
Chile	0,009	0,009	0,009	0,009	0,009
Japón	0,000	0,000	0,000	0,000	0,000
China	0,019	0,000	0,000	0,000	0,000
India	0,000	0,000	0,000	0,000	0,000
Maximo:	0,03	MAX ((Media+Factor max*Desv Est.):		0,02	1
Mínimo:	0,000	MIN ((Media-Factor min *Desv);0):		0,0	10
Media:	0,008	Percentil 90%:	0,019	0,018	-9,000
Factor max*Desv Es	0,019	Percentil 10%:	0,000	Unidad:	-509,739
Factor min*Desv Es	-0,003		Desv. Est.:	0,007	

Table 160: Indicator AERO I.12 Values: Engineering. Barriers to competition. Trade in Services Restrictiveness Index (OECD).

AERO I.12	Ingeniería. Barreras a la competencia. Índice de restricción del comercio de servicios (OCDE)						
	2015	2016	2017	2018	Calificación 2019		
España	5,9	5,9	5,9	5,9	5,9	SUFICIENTE	E
Alemania	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Francia	5,9	5,9	5,9	5,9	5,9	SUFICIENTE	E
Reino Unido							
Italia	5,9	5,9	5,9	5,9	5,9	SUFICIENTE	E
Turquía	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Brasil	5,9	5,9	5,9	5,9	5,9	SUFICIENTE	E
Perú	5,9	5,9	5,9	5,9	5,9	SUFICIENTE	E
Chile	5,9	5,9	5,9	5,9	5,9	SUFICIENTE	E
Japón	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China	1,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A

Table 161: Indicator AERO I.12 Rating: Engineering. Barriers to competition. Trade in Services Restrictiveness Index (OECD).

4.8.1.13 Indicator AERO I.13: Engineering. Restrictions on movement. Trade in Services Restrictiveness Index (OECD).

AERO I.13	Ingeniería. Restricciones al movimiento. Índice de restricción del comercio de servicios (OCDE)				
	2015	2016	2017	2018	2019
España	0,048	0,048	0,048	0,048	0,048
Alemania	0,097	0,097	0,097	0,097	0,097
Francia	0,065	0,081	0,081	0,081	0,081
Reino Unido	0,097	0,097	0,113	0,113	0,113
Italia	0,323	0,323	0,323	0,323	0,323
Turquía	0,097	0,097	0,097	0,097	0,097
EEUU	0,129	0,129	0,129	0,129	0,129
México	0,129	0,129	0,129	0,129	0,129
Brasil	0,113	0,113	0,113	0,113	0,113
Perú	0,097	0,097	0,097	0,097	0,097
Chile	0,065	0,065	0,065	0,065	0,065
Japón	0,048	0,048	0,048	0,048	0,048
China	0,065	0,065	0,065	0,065	0,048
India	0,097	0,097	0,097	0,097	0,097
Maximo:	0,32	MAX ((Media+Factor max*Desv Est.):		0,21	1,00
Mínimo:	0,048	MIN ((Media-Factor min *Desv);0):		0,0	10
Media:	0,106	Percentil 90%:	0,129	0,198	-9,000
Factor max*Desv Es	0,205	Percentil 10%:	0,048	Unidad:	-45,557
Factor min*Desv Es	0,008		Desv. Est.:	0,066	

Table 162: Indicator AERO I.13 Values: Engineering. Restrictions on movement. Trade in Services Restrictiveness Index (OECD).

AERO I.13	Ingeniería. Restricciones al movimiento. Índice de restricción del comercio de servicios (OCDE)						
	2015	2016	2017	2018	Calificación 2019		
España	8,2	8,2	8,2	8,2	8,2	MUY BIEN	B
Alemania	5,9	5,9	5,9	5,9	5,9	SUFICIENTE	E
Francia	7,4	6,7	6,7	6,7	6,7	SUFICIENTE ALTO	D
Reino Unido	5,9	5,9	5,2	5,2	5,2	SUFICIENTE	E
Italia	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Turquía	5,9	5,9	5,9	5,9	5,9	SUFICIENTE	E
EEUU	4,5	4,5	4,5	4,5	4,5	INSUFICIENTE	FX
México	4,5	4,5	4,5	4,5	4,5	INSUFICIENTE	FX
Brasil	5,2	5,2	5,2	5,2	5,2	SUFICIENTE	E
Perú	5,9	5,9	5,9	5,9	5,9	SUFICIENTE	E
Chile	7,4	7,4	7,4	7,4	7,4	BIEN	C
Japón	8,2	8,2	8,2	8,2	8,2	MUY BIEN	B
China	7,4	7,4	7,4	7,4	8,2	MUY BIEN	B
India	5,9	5,9	5,9	5,9	5,9	SUFICIENTE	E

Table 163: Indicator AERO I.13 Rating: Engineering. Restrictions on movement. Trade in Services Restrictiveness Index (OECD).

4.8.1.14 Indicator AERO I.14: Engineering. Restrictions on entry of foreign engineers. Trade in Services Restrictiveness Index (OECD).

AERO I.14	Ingeniería. Restricciones a la entrada de ingenieros del extranjero. Índice de restricción del comercio de servicios (OCDE)				
	2015	2016	2017	2018	2019
España	0.047	0.047	0.047	0.047	0.047
Alemania	0,047	0,047	0,047	0,047	0,047
Francia	0,024	0,024	0,024	0,024	0,024
Reino Unido	0,024	0,024	0,024	0,024	0,024
Italia	0,071	0,071	0,071	0,071	0,071
Turquía	0,036	0,036	0,036	0.047	0.047
EEUU	0,024	0,024	0,024	0,024	0,024
México	0,071	0,071	0,071	0,071	0,071
Brasil	0,095	0,107	0,107	0,118	0,118
Perú	0,071	0,071	0,071	0,071	0,071
Chile	0,024	0,024	0,024	0,024	0,024
Japón	0,012	0,012	0,024	0,024	0,024
China	0,142	0,130	0,130	0,118	0,118
India	0,083	0,083	0,083	0,083	0,083
Maximo:	0,14	MAX ((Media+Factor max*Desv Est.):		0,11	1,00
Mínimo:	0,012	MIN ((Media-Factor min *Desv);0):		0,0	10
Media:	0,057	Percentil 90%:	0,116	0,105	-9,000
Factor max*Desv Es	0,110	Percentil 10%:	0,024	Unidad:	-85,434
Factor min*Desv Es	0,004		Desv. Est.:	0,035	

Table 164: Indicator AERO I.14 Values: Engineering. Restrictions on entry of foreign engineers. Trade in Services Restrictiveness Index (OECD).

AERO I.14	Ingeniería. Restricciones a la entrada de ingenieros del extranjero. Índice de restricción del comercio de servicios (OCDE)						
	2015	2016	2017	2018	Calificación 2019		
España	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Alemania	6,3	6,3	6,3	6,3	6,3	SUFICIENTE ALTO	D
Francia	8,3	8,3	8,3	8,3	8,3	MUY BIEN	B
Reino Unido	8,3	8,3	8,3	8,3	8,3	MUY BIEN	B
Italia	4,3	4,3	4,3	4,3	4,3	INSUFICIENTE	FX
Turquía	7,3	7,3	7,3	1,0	1,0	MUY INSUFICIENTE	F
EEUU	8,3	8,3	8,3	8,3	8,3	MUY BIEN	B
México	4,3	4,3	4,3	4,3	4,3	INSUFICIENTE	FX
Brasil	2,2	1,2	1,2	1,0	1,0	MUY INSUFICIENTE	F
Perú	4,3	4,3	4,3	4,3	4,3	INSUFICIENTE	FX
Chile	8,3	8,3	8,3	8,3	8,3	MUY BIEN	B
Japón	9,3	9,3	8,3	8,3	8,3	MUY BIEN	B
China	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 165: Indicator AERO I.14 Rating: Engineering. Restrictions on entry of foreign engineers. Trade in Services Restrictiveness Index (OECD).

4.8.1.15 Indicator AERO I.15: Innovation index. ND Gain Index.

AERO I.15	Índice de innovación. ND Gain Index				
	2015	2016	2017	2018	2019
España	0,282	0,276	0,217	0,152	0,128
Alemania	1,000	1,000	1,000	1,000	1,000
Francia	1,000	0,995	1,000	0,996	0,980
Reino Unido	1,000	0,988	0,941	0,905	0,843
Italia	0,672	0,682	0,667	0,690	0,722
Turquía	0,318	0,365	0,471	0,406	0,441
EEUU	1,000	1,000	1,000	1,000	1,000
México	0,052	0,050	0,050	0,058	0,048
Brasil	0,106	0,118	0,123	0,111	0,121
Perú	0,010	0,011	0,015	0,013	0,020
Chile	0,115	0,099	0,107	0,101	0,108
Japón	1,000	1,000	1,000	1,000	1,000
China	1,000	1,000	1,000	1,000	1,000
India	0,045	0,047	0,052	0,056	0,066
Maximo:	1,00	MAX ((Media+Factor max*Desv Est.):		1,18	10,00
Mínimo:	0,010	MIN ((Media-Factor min *Desv);0):		0,0	1
Media:	0,541	Percentil 90%:	1,000	1,177	9,000
Factor max*Desv Es	1,178	Percentil 10%:	0,048	Unidad:	7,648
Factor min*Desv Es	-0,097		Desv. Est.:	0,425	

Table 166: Indicator AERO I.15 Values: Innovation index. ND Gain Index.

AERO I.15	Índice de innovación. ND Gain Index						
	2015	2016	2017	2018	Calificación 2019		
España	3,1	3,1	2,7	2,2	2,0	MUY INSUFICIENTE	F
Alemania	8,6	8,6	8,6	8,6	8,6	MUY BIEN	B
Francia	8,6	8,6	8,6	8,6	8,5	MUY BIEN	B
Reino Unido	8,6	8,6	8,2	7,9	7,4	BIEN	C
Italia	6,1	6,2	6,1	6,3	6,5	SUFICIENTE ALTO	D
Turquía	3,4	3,8	4,6	4,1	4,4	INSUFICIENTE	FX
EEUU	8,6	8,6	8,6	8,6	8,6	MUY BIEN	B
México	1,4	1,4	1,4	1,4	1,4	MUY INSUFICIENTE	F
Brasil	1,8	1,9	1,9	1,8	1,9	MUY INSUFICIENTE	F
Perú	1,1	1,1	1,1	1,1	1,1	MUY INSUFICIENTE	F
Chile	1,9	1,7	1,8	1,8	1,8	MUY INSUFICIENTE	F
Japón	8,6	8,6	8,6	8,6	8,6	MUY BIEN	B
China	8,6	8,6	8,6	8,6	8,6	MUY BIEN	B
India	1,3	1,3	1,4	1,4	1,5	MUY INSUFICIENTE	F

Table 167: Indicator AERO I.15 Rating: Innovation index. ND Gain Index.

4.8.2. Engineering and Innovation Indicator

	Índice de Ingeniería e Innovación					Max valor 2019
	2015	2016	2017	2018	2019	
España	60,9	60,4	60,7	66,3	79,5	135
Alemania	90,3	88,8	90,0	101,1	102,2	126
Francia	98,9	98,0	98,3	109,0	117,5	135
Reino Unido	75,4	75,9	75,1	86,3	96,9	126
Italia	55,8	56,2	56,5	59,3	71,7	135
Turquía	40,1	41,6	44,1	48,2	46,2	126
EEUU	103,1	105,8	106,1	116,7	125,6	135
México	41,7	41,1	37,9	38,1	44,9	135
Brasil	32,1	32,1	30,6	28,4	37,8	72
Perú	26,7	27,8	28,9	29,9	26,9	72
Chile	41,3	42,1	42,5	35,4	36,4	99
Japón	106,6	105,4	105,8	116,5	124,6	135
China	56,9	67,1	68,4	75,5	82,5	126
India	26,4	26,6	26,6	31,4	37,5	90
Maximo:	125,600		Máxima puntuación:	135	10	
Mínimo:	26,431		Mínima puntuación:			
Media:	65,272		Dif:	135,000	10,000	

Table 168: Indicator Engineering and Innovation Values

AERO I.1	Posición en el ranking Skytrax	1	10
AERO I.2	Número de patentes. Aeronáutica y Transporte Aéreo / 100.000.000.000$ de PIB OCDE)	1	10
AERO I.3	% del PIB destinado al Gasto interior bruto en I+D (OCDE R&D)	1	10
AERO I.4	Gasto interior bruto en I+D ($)/Población (OCDE R&D)	1	10
AERO I.5	% del PIB destinado a gasto en investigación básica (OCDE R&D))	1	10
AERO I.6	% del PIB de Financiación privada destinada a I+D (OCDE R&D)	1	10
AERO I.7	% del PIB de Financiación pública destinada a I+D (OCDE R&D)	1	10
AERO I.9	Digitalización. Índice de las Infraestructuras de tecnologías de información y comunicación. (ND Index)	1	10
AERO I.10	Digitalización. % de personas que usan internet	1	10
AERO I.11	Ingeniería. Transparencia regulatoria. Índice de restricción del comercio de servicios (OCDE)	1	10
AERO I.12	Ingeniería. Barreras a la competencia. Índice de restricción del comercio de servicios (OCDE)	1	10
AERO I.13	Ingeniería. Restricciones al movimiento. Índice de restricción del comercio de servicios (OCDE)	1	10
AERO I.14	Ingeniería. Restricciones a la entrada de ingenieros del extranjero. Índice de restricción del comercio de servicios (OCDE)	1	10
AERO I.15	Índice de innovación. ND Gain Index	1	10
		15	150

Tabla 169: Indicator Engineering and Innovation Weights

	Evaluación de Ingeniería e Innovación							Subindicadores considerados
	2015	2016	2017	2018	Calificación 2019			
España	5,2	5,2	5,2	5,3	5,9	SUFICIENTE	E	15
Alemania	8,4	8,2	8,3	8,6	8,1	MUY BIEN	B	14
Francia	8,5	8,4	8,4	8,6	8,7	MUY BIEN	B	15
Reino Unido	7,0	7,0	7,0	7,4	7,7	BIEN	C	14
Italia	4,8	4,8	4,8	4,7	5,3	SUFICIENTE	E	15
Turquía	3,7	3,8	4,1	4,1	3,7	INSUFICIENTE	FX	14
EEUU	8,8	9,0	9,1	9,3	9,3	EXCELENTE	A	15
México	3,6	3,5	3,2	3,0	3,3	INSUFICIENTE	FX	15
Brasil	5,1	5,1	4,9	4,5	5,2	SUFICIENTE	E	8
Perú	4,2	4,4	4,6	4,7	3,7	INSUFICIENTE	FX	8
Chile	4,2	4,3	4,3	3,9	3,7	INSUFICIENTE	FX	11
Japón	9,1	9,0	9,0	9,2	9,2	EXCELENTE	A	15
China	4,9	5,7	5,8	6,5	6,5	SUFICIENTE ALTO	D	14
India	3,7	3,7	3,7	3,9	4,2	INSUFICIENTE	FX	10

Table 170: Criterion Engineering and Innovation Rating

The indicator "Position in the SKYTRAX ranking" gives the highest ratings to Germany, the USA, Japan, and China. Spain receives a score of 6 out of 10.

The OECD indicators related to research and development (R&D) showcase the global strategic position of countries in various sectors of the economy concerning research. For instance, the indicator "% of GDP spent on gross domestic R&D" across the analyzed countries displays a wide range, from a maximum of 3.21% in Japan to a minimum of 0.28% in Mexico. Spain falls within the lower band at 1.25%, trailing all EU countries. It's logical that the world's most technologically advanced countries invest more in R&D: Japan (3.21%), USA (3.18%), Germany (3.17%). France (2.19%) and the United Kingdom (1.71%) occupy intermediate positions. Over the five years analyzed (2015 to 2019), these percentages remain relatively constant, indicating an increasingly important technological gap.

The indicator "% of GDP of private funding allocated to R&D" provides an interesting insight: the USA, Germany, and Japan exceed 2% of GDP in private funding. Undoubtedly, private impetus is a determining factor in boosting R&D financing, as demonstrated by the indicator "% of GDP of public funding allocated to R&D": no country surpasses 1%, and the differences in investment percentages narrow (Spain's results are equivalent to those of the UK, Italy, and Japan).

In terms of gross R&D investment per population, the results also reveal significant differences: Spain ($522 per capita), USA ($2,066 per capita), and Germany ($1,763 per capita).

The three selected indicators to assess digitization yield very similar results across the analyzed countries. However, Spain ranks among the top countries: 90.7% of individuals use the internet (only surpassed by the UK and Japan); the score awarded by the World Economic Forum for the indicator "participation in new technologies" is 98.3% (surpassed only by Japan and equal to the USA); however, the University of Notre Dame's indicator "ICT Infrastructure Index" assigns Spain a value of 0.671, surpassed by Germany (0.710), France (0.725), the UK (0.710), and Japan (0.687).

As mentioned earlier, due to the unavailability of specific economic investment data for airport engineering and the number of engineers and their related education, four OECD indicators were used to analyze engineering status: regulatory transparency, barriers to competition, restrictions on the movement of engineers, and restrictions on the entry of foreign engineers. All of these are linked to the trade in services restriction index periodically compiled by the OECD. In these indicators, Spain falls in an intermediate position among the analyzed countries: performing well in restrictions on the movement of engineers, satisfactory in barriers to competition, and inadequate in restrictions on the entry of foreign engineers and regulatory transparency.

The global innovation index from the University of Notre Dame has also been analyzed. The best results are achieved by Germany, the USA, China, and Japan (with the maximum score of "1"); followed by France (0.98), the UK (0.84), and Italy (0.722). Spain is among the lower-performing countries in the analysis (0.128).

The overall evaluation of the Engineering and Innovation criterion assigns the highest ratings to the USA (9.3), Japan (9.2), followed by Germany (8.1), and France (8.7). Spain receives a rating of 5.9, below that of China (6.5).

5. Evaluation of Airports Based on Objective Indicators

The assessment based on the established criteria is as follows:

AERO I C	Capacidad							
	2010	2015	2016	2017	2018	Calificación 2019		
España		5,4	6,0	6,5	6,9	7,1	BIEN	C
Alemania		7,3	7,5	7,8	8,0	8,0	MUY BIEN	B
Francia		5,8	5,9	6,2	6,4	6,6	SUFICIENTE ALTO	D
Reino Unido		7,1	7,5	7,9	8,0	7,9	BIEN	C
Italia		3,7	3,9	4,1	4,4	4,6	INSUFICIENTE	FX
Turquía		6,9	7,0	7,2	7,7	7,8	BIEN	C
EEUU		9,8	9,9	9,9	9,9	9,8	EXCELENTE	A
México		4,9	5,3	5,3	5,5	5,4	SUFICIENTE	E
Brasil		7,0	6,6	6,5	7,0	7,0	BIEN	C
Perú		2,0	2,1	2,2	2,3	2,3	MUY INSUFICIENT	F
Chile		2,1	2,2	2,3	2,4	2,5	MUY INSUFICIENT	F
Japón		7,6	7,7	7,9	8,0	8,1	MUY BIEN	B
China		7,7	7,7	7,7	7,8	7,8	BIEN	C
India		6,1	6,5	6,7	6,9	6,9	SUFICIENTE ALTO	D

Table 171: Capacity Criterion Rating

AERO I P	Prestaciones							
	2010	2015	2016	2017	2018	Calificación 2019		
España		4,0	4,6	5,1	6,0	6,5	SUFICIENTE ALTO	D
Alemania		8,0	8,2	8,7	8,8	9,0	EXCELENTE	A
Francia		6,3	6,6	7,0	7,3	7,6	BIEN	C
Reino Unido		8,5	8,9	9,1	9,1	9,2	EXCELENTE	A
Italia		1,9	2,0	2,3	3,5	4,3	INSUFICIENTE	FX
Turquía		5,2	5,5	5,8	6,6	6,3	SUFICIENTE ALTO	D
EEUU		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México		1,9	2,0	2,1	4,3	4,2	INSUFICIENTE	FX
Brasil		3,0	3,0	3,1	3,9	3,5	INSUFICIENTE	FX
Perú		1,5	1,4	1,5	1,2	1,2	MUY INSUFICIENT	F
Chile		2,7	2,7	2,5	2,4	3,1	INSUFICIENTE	FX
Japón		6,6	6,9	7,1	8,1	8,7	MUY BIEN	B
China		9,8	10,0	10,0	9,4	9,1	EXCELENTE	A
India		3,6	3,9	4,4	5,8	5,3	SUFICIENTE	E

Table 172: Performance Criterion Rating

AERO I F	Financiación							
	2010	2015	2016	2017	2018	Calificación 2019		
España		4,5	5,0	5,2	6,0	6,1	SUFICIENTE ALTO	D
Alemania		4,7	4,7	5,1	5,5	6,3	SUFICIENTE ALTO	D
Francia		4,0	4,9	4,9	5,2	5,5	SUFICIENTE	E
Reino Unido		6,8	7,8	8,3	8,4	7,5	BIEN	C
Italia		2,3	1,9	1,8	1,7	1,7	MUY INSUFICIENT	F
Turquía		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU		6,9	6,9	7,0	6,9	6,8	SUFICIENTE ALTO	D
México		4,7	5,6	8,5	8,4	3,9	INSUFICIENTE	FX
Brasil								
Perú								
Chile		7,6	8,4	9,9	9,6	8,9	MUY BIEN	B
Japón		4,7	5,0	5,1	5,3	5,3	SUFICIENTE	E
China		9,5	9,6	9,7	9,6	9,6	EXCELENTE	A
India		3,5	3,2	3,3	3,5	3,3	INSUFICIENTE	FX

Table 173: Financing Criterion Rating

AERO I A	Adaptación al futuro y desarrollo sostenible							
	2010	2015	2016	2017	2018	Calificación 2019		
España		5,6	5,4	5,5	6,8	6,6	SUFICIENTE ALTO	D
Alemania		9,2	6,9	7,6	8,5	10,0	EXCELENTE	A
Francia		7,6	7,7	7,8	8,5	8,9	MUY BIEN	B
Reino Unido		6,3	6,4	6,4	7,2	6,7	SUFICIENTE ALTO	D
Italia		7,0	4,0	3,8	4,1	3,7	INSUFICIENTE	FX
Turquía		6,4	7,1	7,3	7,2	7,0	BIEN	C
EEUU		6,6	6,7	6,5	6,7	6,0	SUFICIENTE ALTO	D
México		7,1	6,3	9,6	10,0	3,5	INSUFICIENTE	FX
Brasil		2,9	3,3	7,0	8,2	3,6	INSUFICIENTE	FX
Perú		5,0	5,0	7,3	7,3	7,3	BIEN	C
Chile		5,1	6,0	7,6	7,2	6,3	SUFICIENTE ALTO	D
Japón		6,4	6,0	5,8	6,5	6,1	SUFICIENTE ALTO	D
China		4,7	5,1	4,9	4,8	4,0	INSUFICIENTE	FX
India		7,7	4,6	4,3	4,3	4,1	INSUFICIENTE	FX

Table 174: Adaptation to the Future and Sustainable Development Criterion Rating

AERO I O	Operación y mantenimiento							
	2010	2015	2016	2017	2018	Calificación 2019		
España		7,3	7,4	7,3	7,4	7,4	BIEN	C
Alemania		4,9	4,8	4,6	4,3	5,8	SUFICIENTE	E
Francia		3,7	3,7	3,5	3,3	3,9	INSUFICIENTE	FX
Reino Unido		6,3	7,0	7,0	6,9	4,5	INSUFICIENTE	FX
Italia		2,9	2,9	2,7	2,7	4,4	INSUFICIENTE	FX
Turquía		9,1	9,3	8,2	8,2	8,2	MUY BIEN	B
EEUU		9,5	9,4	9,3	9,1	9,1	EXCELENTE	A
México		4,8	5,6	5,4	5,3	5,3	SUFICIENTE	E
Brasil		6,1	5,3	4,6	5,0	5,0	SUFICIENTE	E
Perú		7,3	7,3	6,6	6,8	6,6	SUFICIENTE ALTO	D
Chile		6,3	6,2	5,6	5,8	6,5	SUFICIENTE ALTO	D
Japón		4,0	3,9	4,0	3,8	3,9	INSUFICIENTE	FX
China		3,6	3,9	4,0	4,0	4,1	INSUFICIENTE	FX
India		3,4	3,7	3,6	4,1	4,0	INSUFICIENTE	FX

Table 175: Operation and Maintenance Criterion Rating

AERO I S	Seguridad							
	2010	2015	2016	2017	2018	Calificación 2019		
España		8,1	10,0	8,9	10,0	10,0	EXCELENTE	A
Alemania		9,4	9,3	9,5	10,0	10,0	EXCELENTE	A
Francia		4,7	10,0	6,4	9,8	9,3	EXCELENTE	A
Reino Unido		10,0	10,0	9,6	10,0	10,0	EXCELENTE	A
Italia		10,0	9,6	9,0	10,0	10,0	EXCELENTE	A
Turquía		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU		10,0	10,0	10,0	10,0	9,1	EXCELENTE	A
México		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Brasil		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Perú		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Chile		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A

Table 176: Security Criterion Rating

AERO I R	Resiliencia							
	2010	2015	2016	2017	2018	Calificación 2019		
España		4,1	4,3	4,7	6,8	7,2	BIEN	C
Alemania		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Francia		5,8	5,5	5,6	5,5	5,6	SUFICIENTE	E
Reino Unido		6,5	6,5	4,7	7,7	7,6	BIEN	C
Italia		3,4	3,4	3,5	3,7	4,1	INSUFICIENTE	FX
Turquía		2,9	2,9	2,8	2,4	2,8	MUY INSUFICIENT	F
EEUU								
México								
Brasil								
Perú								
Chile								
Japón								
China								
India								

Table 177: Resiliency Criterion Rating

AERO I I	Ingeniería e Innovación							
	2010	2015	2016	2017	2018	Calificación 2019		
España		5,2	5,2	5,2	5,3	5,9	SUFICIENTE	E
Alemania		8,4	8,2	8,3	8,6	8,1	MUY BIEN	B
Francia		8,5	8,4	8,4	8,6	8,7	MUY BIEN	B
Reino Unido		7,0	7,0	7,0	7,4	7,7	BIEN	C
Italia		4,8	4,8	4,8	4,7	5,3	SUFICIENTE	E
Turquía		3,7	3,8	4,1	4,1	3,7	INSUFICIENTE	FX
EEUU		8,8	9,0	9,1	9,3	9,3	EXCELENTE	A
México		3,6	3,5	3,2	3,0	3,3	INSUFICIENTE	FX
Brasil		5,1	5,1	4,9	4,5	5,2	SUFICIENTE	E
Perú		4,2	4,4	4,6	4,7	3,7	INSUFICIENTE	FX
Chile		4,2	4,3	4,3	3,9	3,7	INSUFICIENTE	FX
Japón		9,1	9,0	9,0	9,2	9,2	EXCELENTE	A
China		4,9	5,7	5,8	6,5	6,5	SUFICIENTE ALTO	D
India		3,7	3,7	3,7	3,9	4,2	INSUFICIENTE	FX

Table 178: Engineering and Innovation Criterion Rating

With the evaluations of the different Criteria, the overall assessment of the Airport sector is formed by applying weights to each criterion. The assigned weights are as follows:

Criterios de Aeropuertos		Pesos	Punt. Max.
AERO I C	Capacidad	1	10
AERO I P	Prestaciones	1	10
AERO I F	Financiación	1	10
AERO I A	Adaptación al futuro y desarrollo sostenible	1	10
AERO I O	Operación y mantenimiento	1	10
AERO I S	Seguridad	1	10
AERO I R	Resiliencia	1	10
AERO I I	Ingeniería e Innovación	1	10
		8	
		% Valorado de la Max. Puntuación de los Criterios	100,0%

Table 179: Weights assigned to the Criteria for the formation of the Evaluation of the Airport Sector:

	Evaluación de la Aeropuertos								Subindicadores considerados
	2010	2015	2016	2017	2018	Calificación 2019			
España		5,5	6,0	6,0	6,9	7,1	BIEN	C	72
Alemania		7,7	7,5	7,7	8,0	8,4	MUY BIEN	B	71
Francia		5,8	6,6	6,2	6,8	7,0	BIEN	C	70
Reino Unido		7,3	7,6	7,5	8,1	7,7	BIEN	C	57
Italia		4,5	4,1	4,0	4,4	4,7	INSUFICIENTE	FX	69
Turquía		6,8	7,0	6,9	7,0	7,0	BIEN	C	53
EEUU		8,8	8,9	8,8	8,8	8,6	MUY BIEN	B	42
México		5,3	5,5	6,3	6,6	5,1	SUFICIENTE	E	47
Brasil		5,7	5,5	6,0	6,4	5,7	SUFICIENTE	E	25
Perú		5,0	5,0	5,3	5,4	5,2	SUFICIENTE	E	23
Chile		5,4	5,7	6,0	5,9	5,9	SUFICIENTE	E	39
Japón		6,9	6,9	7,0	7,3	7,3	BIEN	C	51
China		7,2	7,4	7,5	7,4	7,3	BIEN	C	50
India		5,4	5,1	5,1	5,5	5,4	SUFICIENTE	E	46

Table 180: Evaluation of the Airport Sector based on objective indicators

The assessment of each country in each year in the overall evaluation has been conducted using the maximum score of the country and the corresponding year as a reference (without making any adjustments or limiting the maximum and minimum), to not distort the assessment in case of missing data for certain criteria. It's important to consider this aspect, as the overall evaluation only considers the Criteria for which there are reliable data.

In countries where data for certain criteria are missing, the overall Sector assessment could potentially increase or decrease, depending on the outcome of the criterion or criteria that are not evaluated.

As seen in the following table for the year 2019: Spain, Germany, France, the United Kingdom, Italy, and Turkey have been assessed for all Criteria; Japan, China, and India have not been evaluated for Security; the United States, Mexico, Brazil, Peru, Chile, Japan, China, and India have not been evaluated for Resilience. Brazil and Peru have not been evaluated for Financing.

The highest-ranked countries based on the established indicators are the United States (8.6) and Germany (8.4). Other well-rated countries include France, the United Kingdom, Turkey, Japan, and China. Spain also receives a good rating (7.1), similar to France.

Spain receives an excellent rating in Security (10); a good rating in Capacity (7.6), Operation and Maintenance, and Resilience (7.1, 7.4, and 7.2, respectively); a high satisfactory rating in Performance, Financing, Adaptation to the Future and Sustainable Development; and a satisfactory rating in Engineering and Innovation.

5.1. Sensitivity Analysis by Objective Indicators

A sensitivity analysis has been conducted by varying the weights assigned to each Criterion. In general terms, when the weights of the criteria are changed, the evaluation of countries fluctuates slightly without significantly altering the overall assessment. The following are the results obtained by varying the weights of the Criteria.

5.1.1. Emphasized weights in Capacity, Performance, and Safety (3); Medium weights in Financing, Adaptation to the future and sustainable development, and Operation and Maintenance (2); and low weights in Resilience and Engineering and Innovation (1)

Criterios de Aeropuertos		Pesos	Punt. Max.	Total Max puntuación
AERO I C	Capacidad	3	10	30
AERO I P	Prestaciones	3	10	30
AERO I F	Financiación	1	10	10
AERO I A	Adaptación al futuro y desarrollo sostenible	1	10	10
AERO I O	Operación y mantenimiento	1	10	10
AERO I S	Seguridad	3	10	30
AERO I R	Resiliencia	1	10	10
AERO I I	Ingeniería e Innovación	1	10	10
		14		140
		% Valorado de la Max. Puntuación de los Criterios	100,0%	140

Table 181: Sensitivity Analysis. Emphasized weights in Criteria: Capacity, Performance, and Safety (3).

	Evaluación de la Aeropuertos								Subindicadores considerados
	2010	2015	2016	2017	2018	Calificación 2019			
España		5,7	6,4	6,4	7,2	7,4	BIEN	C	72
Alemania		7,9	7,8	8,1	8,4	8,7	MUY BIEN	B	71
Francia		5,7	7,0	6,4	7,3	7,4	BIEN	C	70
Reino Unido		7,8	8,1	8,1	8,5	8,3	MUY BIEN	B	57
Italia		4,8	4,5	4,5	5,0	5,4	SUFICIENTE	E	69
Turquía		7,0	7,2	7,3	7,5	7,4	BIEN	C	53
EEUU		9,3	9,4	9,3	9,4	9,1	EXCELENTE	A	42
México		5,4	5,6	6,1	6,6	5,8	SUFICIENTE	E	47
Brasil		6,2	6,0	6,3	6,7	6,3	SUFICIENTE ALTO	D	25
Perú		4,8	4,8	4,9	4,9	4,9	INSUFICIENTE	FX	23
Chile		5,2	5,4	5,5	5,5	5,6	SUFICIENTE	E	39
Japón		7,5	7,5	7,6	7,9	8,1	MUY BIEN	B	51
China		8,1	8,3	8,3	8,2	8,1	MUY BIEN	B	50
India		6,0	5,9	6,0	6,4	6,3	SUFICIENTE ALTO	D	46

Table 182: Sensitivity Analysis. Emphasized in Criteria: Capacity, Performance, and Safety (3). Airport Evaluation.

5.1.2. Sensitivity Analysis. Emphasized in Criteria: Capacity, Performance, and Safety (2); Medium weights in the rest of the criteria (1)

Criterios de Aeropuertos		Pesos	Punt. Max.	Total Max puntuación
AERO I C	Capacidad	2	10	20
AERO I P	Prestaciones	2	10	20
AERO I F	Financiación	1	10	10
AERO I A	Adaptación al futuro y desarrollo sostenible	1	10	10
AERO I O	Operación y mantenimiento	1	10	10
AERO I S	Seguridad	2	10	20
AERO I R	Resiliencia	1	10	10
AERO I I	Ingeniería e Innovación	1	10	10
		11		110
		% Valorado de la Max. Puntuación de los Criterios	100,0%	110

Table 183: Sensitivity Analysis. Emphasized weights in Criteria: Capacity, Performance, and Safety (2); in the rest of the Criteria (1).

	Evaluación de la Aeropuertos								Subindicadores considerados
	2010	2015	2016	2017	2018	Calificación 2019			
España		5,6	6,2	6,3	7,1	7,3	BIEN	C	72
Alemania		7,9	7,7	8,0	8,2	8,6	MUY BIEN	B	71
Francia		5,8	6,8	6,3	7,1	7,2	BIEN	C	70
Reino Unido		7,6	8,0	7,9	8,3	8,0	MUY BIEN	B	57
Italia		4,7	4,4	4,3	4,8	5,2	SUFICIENTE	E	69
Turquía		6,9	7,1	7,1	7,3	7,2	BIEN	C	53
EEUU		9,2	9,2	9,2	9,2	8,9	MUY BIEN	B	42
México		5,4	5,6	6,2	6,6	5,5	SUFICIENTE	E	47
Brasil		6,0	5,9	6,2	6,6	6,1	SUFICIENTE ALTO	D	25
Perú		4,8	4,9	5,1	5,1	5,0	SUFICIENTE	E	23
Chile		5,3	5,5	5,7	5,6	5,7	SUFICIENTE	E	39
Japón		7,3	7,3	7,4	7,7	7,8	BIEN	C	51
China		7,8	8,0	8,0	7,9	7,8	BIEN	C	50
India		5,8	5,6	5,7	6,1	6,0	SUFICIENTE ALTO	D	46

Table 184: Sensitivity Analysis. Emphasized weights in Criteria: Capacity, Performance, and Safety (2); in the rest of the Criteria (1). Evaluation of Airports.

5.2. Conclusions from the Evaluation based on Objective Indicators

As seen in the tables of the Airport Sector evaluation, Spain is generally well positioned compared to the analyzed countries: excellent rating in Safety (10); a good rating in Capacity (7.6), Operation and Maintenance, and Resilience (7.1, 7.4, and 7.2 respectively); sufficiently high ratings in Performance, Financing, Adaptation to the Future, and Sustainable Development; and a sufficient rating in Engineering and Innovation.

The strong global position of Germany and the United States should be highlighted. Japan, China, and European countries (with the exception of Italy) receive similar magnitudes of ratings as Spain.

5.2.1. Criterion of Capacity

According to ICAO, the capacity of an airport is determined by various factors, including the operational area configuration and its utilization strategy, as well as other factors like ATC configuration, navigation aids availability, demand characteristics, and environmental conditions.

Due to the complexity of determining the capacity of airports across an entire country, the evaluation of Capacity has been approximated using indicators that provide an insight into airport capacity. Given the high costs associated with various methods of increasing airport capacity, such as building new runways or suitable exits, registered traffic serves as a good indicator of the airport system's capacity. This is supported by the existence of phased development plans in airports, which allow infrastructure capacity to be gradually developed in parallel with the demand requirements.

In essence, to determine if the airport capacity meets current and future demands, a series of indicators have been proposed that relate passenger and cargo traffic in a country to the number of inhabitants, tourists, and the Gross Domestic Product expressed in constant 2010 US dollars. This approach allows the assessment of the aerial capacity to serve a number of passengers, whether domestic or foreign, as well as the air cargo traffic, while considering the country's economic strength.

In passenger-related indicators, it is logical that countries receiving more tourists exhibit higher ratios. In terms of absolute numbers (referring exclusively to total transported passengers), the United States, Japan, China, India, and the United Kingdom stand out. Spain follows, with Germany and France following to a lesser extent. These indicators reflect Spain's tourism potential. In contrast, for indicators related to air cargo transport, Spain and Italy stand out due to their low air cargo movement.

In the indicator "Number of airports per million inhabitants," Spain has the highest ratio (1.124 airports per million inhabitants), followed by France (0.848) and the United States (0.758). The indicator of the number of airports per GDP presents different values, with Turkey, Mexico, China, and India standing out.

EUROSTAT indicators that specifically refer to European countries exhibit the same trends as those analyzed for all countries worldwide: Spain excels in the number of intracommunity transported passengers (after the United Kingdom), while Germany and the United Kingdom stand out in extracommunity transported passengers.

In the overall evaluation of the Capacity Criterion, the highest score is achieved by the United States, followed by Japan, Germany, China, the United Kingdom, Turkey, and Spain (with an overall rating of 7.1 out of 10).

5.2.2. Criterion of Performance

For the evaluation of airport performance, indicators from various sources and criteria have been utilized, including passenger and cargo traffic (in millions of passenger-kilometers and millions of ton-kilometers), the "World Bank's Logistics Performance Index" (LPI Index), and others like the World Economic Forum (WEF). The latter organization has two indicators directly related to airports: "Efficiency of airport transport services" and "Airport connectivity," which are considered relevant for estimating the performance of the country's airport network.

The "World Bank's Logistics Performance Index (LPI)" gives the highest rating to Germany, the United Kingdom, Japan, and the United States, followed by Turkey, France, and Spain (9.0 out of 10).

In the "Passenger traffic by nationality of airlines" indicator, the United States stands out (1,698,805 million passenger-kilometers), followed by China (1,169,680 million passenger-kilometers). The United Kingdom is at a considerable distance (356,465). The rest of the European countries have values below 250,000 million passenger-kilometers. Spain has the lowest values in the EU. The cargo traffic indicator, in millions of ton-kilometers, follows a similar sequence as passengers.

The World Economic Forum (WEF) indicator related to airports, "Airport connectivity," gives the highest rating to Japan, China, India, Germany, the United States, the United Kingdom, and Spain (100 out of 100). In the indicator "Efficiency of airport service," also from the WEF, Japan stands out with a score of 86.7 out of 100. Spain receives a score of 76.6.

In the set of WEF indicators that make up "The Global Competitiveness Index" (GCI), which covers 141 countries worldwide, Spain ranks seventh in the "2nd Pillar: Infrastructure" (with a score of 90 out of a maximum of 100).

The highest overall rating in the Performance criterion is obtained by the United States, with a score of 10 out of 10. Germany, the United Kingdom, and China receive an excellent rating. Spain receives a high-passing score (6.5).

5.2.3. Criterion of Financing

The financing of infrastructure is an essential criterion for evaluating the quality of infrastructure, encompassing two distinct elements: investment for infrastructure creation and investment for conservation, operation, maintenance, and management. In countries with mature airport infrastructure, overall investment is less compared to countries where infrastructure is being developed, resulting in a significant percentage being allocated to conservation relative to creation. Conversely, in countries where infrastructure is yet to be developed and is in a developmental phase, investment directed towards creating infrastructure is substantial compared to investment in conservation. Unfortunately, distinguishing between investment for creation and investment for conservation is not straightforward.

To measure a country's level of financing, the amount invested in airports needs to be related to the number of passengers and cargo transported through them, as well as the population and economic capacity of the country (using GDP at constant prices). Nevertheless, the most representative indicator is the investment in airports as a percentage of the national GDP. The evolution of this indicator over the years provides valuable insights into the extent of infrastructure development in the country and the state of its conservation. A high percentage relative to GDP indicates that the airport network is undergoing creation, as seen in the case of China and Turkey.

The indicator "Investment in Airports as % of GDP" shows an average value for the countries and years analyzed of 0.09%, with a maximum of 0.39% reached in 2018 by Turkey. Spain has a lower value, 0.051% of GDP in 2019. The highest values in 2019 are recorded by China (0.74%) and Turkey, which have maintained high investments over the last five years. These data demonstrate that both China and Turkey have been consistently creating new airport infrastructure in recent years. Among European countries, the United Kingdom (0.051%) and France (0.0422%) are the highest investors. Data for the United States is not available. The data is sourced from the OECD and has been cross-referenced with information provided by the Ministry of Transport, Mobility, and Urban Agenda in the case of Spain.

Some interesting insights derived from the utilized indicators are presented in the following table:

Indicator	Average	Min Value 2019	Max Value 2019
Percentage of investment in airports relative to GDP	**0,09%**	**0,0019%**	**0,38%**
Investment per transported passenger	**7,8€**	**0,2€**	**24€**
Investment per capita	**11,7€**	**0,17€**	**31€**

The wide dispersion of the results shown in the previous table reflects a reality: countries that are creating new infrastructure or undergoing significant transformation in their network during the analyzed years (2015-2019) exhibit high values, indicating a significant commitment to the development and improvement of their airport network. An average investment may suggest that airports do not require more investment than what has already been made or that they are not making significant investments.

Spain receives a final rating of "sufficient high" (6.1) in this criterion, which is among the higher ratings among the analyzed European countries. The highest rating is achieved by Turkey (10), followed by China (9.6), and Chile (8.9).

5.2.4. Criterion of Future Adaptation and Sustainable Development

To analyze the indicators of future adaptation of airport investments in the last five years, the growth trend of investment in relation to GDP, national population plus tourists, passengers, cargo, and departures worldwide by companies registered in the country has been considered. The index of 100 has been established in the year 2015.

Three indicators related to the environment have also been considered: the percentage of national aviation's CO_2 emissions in total CO_2 emissions, the proportion of CO_2 emissions from international aviation bunkers in total CO_2 emissions (OECD), and the development of climate change mitigation technologies related to transportation. The data for these indicators come from the OECD.

The indicators related to the annual compounded growth rate index score very well for almost all European countries analyzed (except Italy).

The average participation of navigation's CO_2 emissions in total CO_2 emissions ranges from a maximum of 8.7% (China) to a minimum of 0.5% in Germany. Spain receives an insufficient rating (3.5%). The same trend is observed in the indicators for national aviation and bunker emissions.

In the final index of future adaptation and sustainable development, the best-rated country is Germany. Spain receives a lower rating (6.6) compared to European countries (except Italy).

5.2.5. Criterion of Operation and Maintenance

For the assessment of this criterion, the number of flight departures and punctuality in minutes for departures and arrivals have been considered. The connectivity HUB of the best airport in each analyzed country has also been considered.

The combination of this criterion, analyzed through six indicators, awards the highest rating to the USA, followed by Turkey and Spain.

5.2.6. Criterion of Security

The selection of indicators corresponds to those commonly used: accidents with casualties and fatalities. The results of the indicators and the final evaluation are excellent in all the analyzed countries.

5.2.7. Criterion of Resiliency

To assess Resilience, data related to the technical characteristics of airport design should be available: terrain conditions and vulnerability to adverse phenomena, drainage capacity of the infrastructure (to determine if the return period of floods is appropriate for prevention), stability of slopes and embankments of the infrastructure, organization and equipment of maintenance teams to efficiently and rapidly address any eventuality, comprehensive winter road maintenance system, etc.

Since obtaining all these data for all airports would be a labor-intensive task, the approach taken is to consider indicators that indirectly provide some insight into the resilience of the airport network. Thus, the selected indicators are related to direct and indirect airport connectivity, both as individual airports and as hubs.

Due to data limitations, only European countries have been evaluated. The data is sourced from EUROSTAT.

Germany receives the highest overall rating in this indicator, followed by the United Kingdom (6.5), and Spain (7.2).

5.2.8. Criterion of Engineering and Innovation

To analyze the indicators of engineering and innovation in airports, an in-depth understanding of new techniques, materials, and technologies applied in airports is required, along with knowledge

of implemented innovations, the state of airport engineering, progress in digitalization, and resources allocated to engineering and innovation financing.

One of the best indicators of technological advancements in airports is the position in the SKYTRAX ranking. Additionally, a specific patent indicator has been identified: "Number of patents in aeronautics and air transport (OECD)."

Despite efforts to gather more specific data on the airport infrastructure sector, reliable and verifiable data has not been found. As a result, the approach taken is to analyze the state of R&D+i (Research, Development, and Innovation) globally in different countries, assuming these data points can reflect the state of airports. For this purpose, a database and indicators from the report **"Main Science and Technology Indicators, Volume 2021"** published by the OECD in 2022, have been selected. This comprehensive report provides indicators that reflect the level and structure of efforts made by OECD member countries and seven non-member economies (Argentina, People's Republic of China, Romania, Russian Federation, Singapore, and South Africa) in the field of science and technology. These indicators cover resources dedicated to research and development, patent families, and international trade in R&D-intensive industries. The ND Gain Index of Innovation has also been considered.

To assess the progress of digitalization, three indicators have been included: Participation in new technologies (GCI - WEF), ICT infrastructure index (ND Gain Index), and the number of internet users.

To evaluate the state of engineering in the airport sector, it would have been ideal to have precise information about the training of airport engineers, the number of engineers working in design, construction, maintenance, and management of airports per unit of economic investment. Particularly valuable would have been economic data related to investment in engineering compared to investment in construction, maintenance, operation, and management of airport networks. Unfortunately, this data is unavailable, so four OECD indicators related to engineering as a whole have been considered: regulatory transparency, barriers to competition, restrictions on movement of engineers, and restrictions on entry of foreign engineers. All of these are related to the trade in services restriction index periodically published by the **OECD**.

The "Position in the SKYTRAX ranking" indicator assigns the highest ratings to Germany, the United States, Japan, and China. Spain receives a score of 6 out of 10.

OECD indicators related to research and development show the global strategic position of countries across all economic sectors in relation to research. The indicator "% of GDP allocated to gross domestic expenditure on R&D" among analyzed countries presents a broad spectrum: from a maximum of 3.21% (Japan) to a minimum of 0.28% (Mexico). Spain is situated in the lower band (1.25%), surpassed by all EU countries. It's logical that the world's most technologically advanced countries invest more in R&D: Japan (3.21%), the United States (3.18%), Germany (3.17%). France (2.19%), and the United Kingdom (1.71%) are in an intermediate position. These percentages remain relatively constant over the five years analyzed (2015 to 2019), indicating a growing technological gap.

The indicator "% of GDP for private financing allocated to R&D" provides interesting data: the United States, Germany, and Japan exceed 2% of GDP for private financing. It's clear that private investment plays a determining role in increasing R&D financing, as shown by the indicator "% of GDP for public financing allocated to R&D": no country exceeds 1%, and the percentage

investment differences narrow (Spain's results are comparable to those of the United Kingdom, Italy, and Japan).

Looking at gross R&D investment per population, significant differences are also apparent: Spain ($522 per capita), the United States ($2,066 per capita), and Germany ($1,763 per capita).

The three indicators selected to evaluate digitalization show very similar results among analyzed countries. Nonetheless, Spain is among the top countries: 90.7% of people use the internet (only surpassed by the United Kingdom and Japan); the score given by the World Economic Forum for the indicator "participation in new technologies" is 98.3% (surpassed only by Japan and on par with the United States); however, the indicator from the University of Notre Dame in Indiana, "ICT infrastructure index," awards Spain a value of 0.671, surpassed by Germany (0.710), France (0.725), the United Kingdom (0.710), and Japan (0.687).

As mentioned earlier, since specific economic investment data for airport engineering and the number of engineers and their related training weren't available, four OECD indicators related to engineering have been used: regulatory transparency, barriers to competition, restrictions on movement of engineers, and restrictions on entry of foreign engineers. Spain falls in an intermediate position among the analyzed countries: very good in restrictions on movement of engineers, sufficient in barriers to competition, and insufficient in restrictions on entry of foreign engineers and regulatory transparency.

The global evaluation of the Engineering and Innovation criterion assigns the highest ratings to the United States (9.3), Japan (9.2), followed by Germany (8.1), and France (8.7). Spain receives a rating of 5.9, below China (6.5).

6. Qualitative Evaluation: Surveys to Experts

As described in the methodology employed by Asociación Caminos, once the objective indicators (which have served as the basis for the objective evaluation of the sector in comparison to selected countries) were obtained, a series of questions (grouped into the eight analyzed criteria) were drafted for assessment on the same scale as the assessment of the objective indicators. The questions posed include the possibility of providing comments and suggestions in each group of criteria, to capture those criteria that experts might consider relevant and are not included in the objective indicators or the questionnaire presented.

The questions were directed at a group of experts selected by Asociación Caminos. The survey was transformed into a Google form to facilitate analysis and integration of results.

Two complementary questions are included in the questionnaire sent to the experts:

- What infrastructure and equipment actions do you consider necessary for airports in the next 10 years?
- Approximately, what is the estimated investment required to meet the infrastructure and equipment needs of the sector in the next 10 years?

Since the questions in the questionnaire are very general (evaluating the public works sector of Spain as a whole), it is difficult to provide a precise qualitative and numerical rating. Therefore, a qualitative non-numerical rating has been requested; although to integrate the result obtained with the objective numerical indicators, a numerical assignment is subsequently given to each qualitative rating.

Rating system of Asociación Caminos							
Asociación Caminos							
	VERY INSUFFICIENT	**INFUFFICIENT**	**SUFFICIENT**	**HIGHLY SUFFICIENT**	**GOOD**	**VERTY GOOD**	**EXCELLENT**
	F	**FX**	**E**	**D**	**C**	**B**	**A**

Table 185: Qualitative evaluation rating system by the experts

Rating	**Numerical Assignment**
Excellent	9,5
Very good	8,5
Good	7,5
Highly sufficient	6,5
Sufficient	5,5
Insufficient	4,0
Very insufficient	2,0
Insufficient criterion or no response	-

Table 186: Numerical assignment of qualitative evaluation by experts.

In a schematic way, the evaluation process for each sector is as follows:

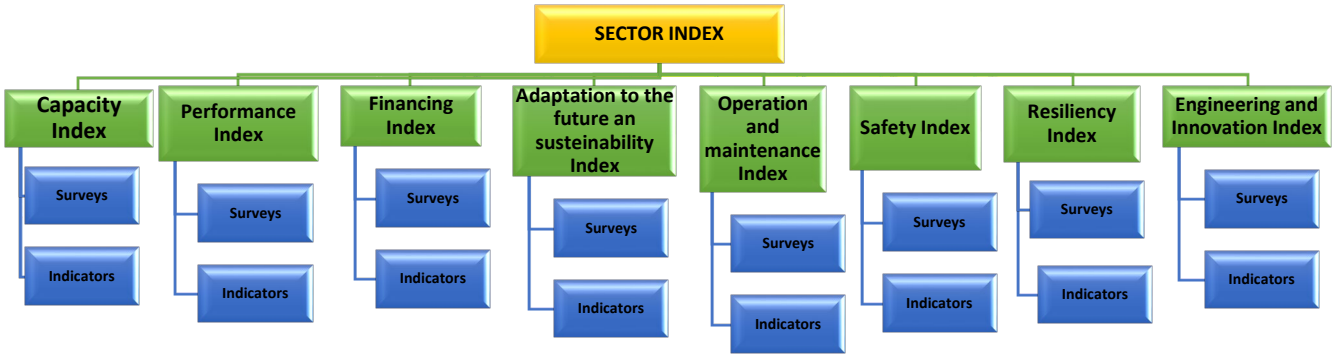


Figure 5: Scheme of the evaluation system for public works sectors

Once the responses have been obtained, the results achieved have been analyzed, combining them with the results obtained through the objective indicators.

In general [1], a weighting is established for each Criterion between the quantitative indicators (expressed by objective indicators) and the qualitative evaluation from experts to obtain the Criterion Index, in the following proportions:

A. Quantitative evaluation of each Criterion: 50%

B. Qualitative evaluation of each Criterion by experts through surveys, questionnaires, and opinions 50%

[1] In some sectors, such as Ports, there is the possibility of modifying this weighting due to the difficulty of quantitative indicators accurately reflecting the reality of the sector.

6.1. Survey for expert evaluation

A total of 23 responses have been obtained with the following results.

6.1.1. Capacity

Peso	EVALUACIÓN DE CAPACIDAD (Encuestas a expertos) (Max 10)			
1	1.1. ¿Cómo valora la capacidad de los aeropuertos españoles para hacer frente al tráfico aéreo existente en la actualidad?	8,1	MUY BIEN	B
1	1.2. Teniendo en cuenta las características de la población en España y la importante estacionalidad en muchas zonas, ¿cómo valora la capacidad de las instalaciones aeroportuarias de atender las puntas de demanda estacionales?	7,3	BIEN	C
1	1.3. Teniendo en cuenta las características de la población en España, la fuerte estacionalidad de la misma en muchas zonas, y la posible evolución de los desplazamientos turísticos en un futuro próximo, ¿ cómo valora la capacidad de las instalaciones aeroportuarias en España para atender las fluctuaciones en los viajes aéreos en el horizonte de los próximos 10 años?	6,3	SUFICIENTE ALTO	D
3	TOTAL EVALUACIÓN CAPACIDAD POR LOS EXPERTOS:	7,2	BIEN	C

Table 187: Expert assessment of capacity.

Comments, suggestions, and recommendations from the experts

- In some airports, the capacity of a subsystem (e.g., runways at Barcelona) needs to be expanded to accommodate foreseeable traffic growth.
- More flexible and rapidly adaptable spaces, especially in Terminals, are needed to respond to changing demands more efficiently and sustainably, both for increases and decreases in demand.
- Spain's airport network is one of the best in the world in terms of capacity and service.
- The infrastructure offering is reasonably aligned with the demand for services.
- The characteristics of demand and seasonality vary by airport. Investments are clearly more necessary in some than in others.
- There are examples of undersized Spanish airports, such as A Coruña and Madrid, which are not prepared for sustained growth over 10 years.
- There are ongoing projects to address this situation.
- The capacity of Spanish airports is generally good, but in small airports, there is a mismatch between the provided capacity and existing demand. This leaves room to accept increased demand to align with that capacity.
- It would be interesting to analyze if it's possible to generate new routes at airports with a low number of flights by increasing their offerings.
- It could be examined whether institutional support through involved agents such as regional governments, provincial councils, and municipalities to promote their territories for their value and tourist attractiveness would boost demand at low-traffic airports.

- Creation of programs to incentivize private initiative. There are small cities (with airports) whose tourists arrive through major airports in large cities. Could it be viable for tourists to arrive directly at the existing airport in those small cities?
- Promoting the appeal of these provinces, connecting air transport with promoting wine routes/wineries, cultural routes, gastronomic routes, attracting students to the universities in these cities.
- Increasing collaboration among involved parties, airport managers, airlines, tour operators, and local and regional authorities.
- The current situation in air transport makes the current capacity good, but for the future, it's essential to continue working on airport development in terms of capacity, quality, sustainability, customer experience, etc., given the importance of tourism in Spain. It's not enough to have a "good" situation; work must continue to be at the forefront of airports globally and, above all, to ensure that peak capacity, essential for places like the islands.
- Although facilities are sufficient, perhaps they are not managed in the most efficient way.
- To achieve this, the philosophy of space flexibility should be introduced in the design phase. It should be considered for the conception of structures and facilities.
- Analyze the current capacity of the major airports and their projection for 10 years, considering the priority of continuing to size the main airports to increase the number of operations to consolidate them as top-tier international hubs and competitive entities.
- Expansion and refurbishment works are being carried out in several terminal areas to increase capacity and improve service. Investment in process improvement should continue.
- Improvement is needed in terms of bureaucracy to provide quicker responses to mobilize new innovative solutions, such as biometrics and the implementation of hydrogen at the airport.
- Establish accurate traffic forecasts considering the entire sector, translate the needs into a realistic and feasible investment plan, as well as a strategy to implement them within the sector's demanded timelines. Demand identification procedures and investment execution must adapt to market evolution.
- Update an airport investment strategic plan free from political interests based on updated demand forecasts.
- Projections for the next 10 years should be reexamined in a post-pandemic situation to update infrastructure needs.
- Aena should be guided by parameters such as quality and excellence, not just price.
- Airports should be made more flexible to efficiently adapt to diverse demands.

6.1.2. Performance

Peso	EVALUACIÓN DE PRESTACIONES (Encuestas a expertos) (Max 10)			
1	2.1. ¿Cómo valora la calidad del servicio de gestión de tráfico aéreo en los aeropuertos españoles?	8,3	MUY BIEN	B
1	2.2. ¿Cómo valora la calidad de los servicios ofrecidos a las líneas aéreas en los aeropuertos españoles (servicios en terminales, servicios en aeronaves)?	7,7	BIEN	C
1	2.3. ¿Cómo valora la calidad de los servicios complementarios ofrecidos a los viajeros en los aeropuertos españoles (puntos de información, servicios de alquiler de coches, air rooms, cambio de moneda, consignas, equipajes perdidos, etc.) ?	7,7	BIEN	C
1	2.4. De forma global, ¿ cómo valora la atención al público y la gestión de incidencias aeroportuarias en España?	7,2	BIEN	C
4	TOTAL EVALUACIÓN PRESTACIONES POR LOS EXPERTOS:	7,7	BIEN	C

Table 188: Evaluation by the experts of the performance

Comments, suggestions, and recommendations from the experts

- Evaluating these services as "Sufficient," it's worth noting that this rating has deteriorated significantly in recent years; the services have decreased in performance and quality.
- Spanish airports are focused on passenger and aircraft service quality.
- Overall, the Spanish network offers a quality of service above the European average, especially considering its level of fees for facility use, and it's not financed at all from the State General Budgets.
- As a user, the quality of customer service has progressively declined, although it depends on various stakeholders: airport, airlines, security, or handling agents.
- In comparison with our European and Mediterranean environment, services at Spanish airports are generally very good.
- Although the overall airport services in Spain are good, there's room for improvement by creating more commercial activity around the airports, what we call "airport city."
- Another aspect for improvement is enhancing access to certain airports. Although most are located about 10 km from the city center, at certain times, access may not be as fast or straightforward.
- Consider the future creation of vertiports within airports to generate an additional access point to the airport.
- There have been recent cases of "unusual" situations with certain airlines. Layovers at airports when the booked flight was supposed to be direct. This had never happened before.
- The value of the passenger experience is diminishing.
- Greater importance and value should be given to these services.
- Improve the flexibility of services during peak days.

- A more structured approach to passenger-related services, not traveler-related, is needed, such as VIP lounges or similar.
- Cost-driven hiring policies often lead to a reduction in service levels. A balance between cost and service needs to be struck without compromising the latter.
- If airport management is made more flexible, it could lead to the continuity of workers. It's essential to start valuing professionalism.

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6.1.3. Financing

Peso	EVALUACIÓN DE FINANCIACIÓN (Encuestas a expertos) (Max 10)			
1	3.1. ¿Considera suficiente la inversión actual en las instalaciones aeroportuarias en España?	6,5	SUFICIENTE ALTO	D
1	3.2. ¿Cómo valora la robustez de las actuales fuentes de financiación de obras aeroportuarias?	7,6	BIEN	C
1	3.3. ¿Cómo considera que se está gestionando la inversión en obras aeroportuarias civiles en España?	5,2	SUFICIENTE	E
1	3.4. ¿Cómo considera la actual participación de la inversión privada en el proyecto, construcción y/o explotación de obras aeroportuarias en España?	4,4	INSUFICIENTE	FX
4	TOTAL EVALUACIÓN FINANCIACIÓN POR LOS EXPERTOS:	5,9	SUFICIENTE	E

Table 189: Expert assessment of Funding

Comments, suggestions, and recommendations from the experts

- The investment management model in airport projects, based on awarding to the lowest cost bidder, can lead to a decrease in the quality of the work, and negatively impact the sector.
- The participation of private companies in project and construction of airport works is excellent, but their involvement in operation is very insufficient.
- The involvement of private investment is not apparent, as many actions are completely contrary to how they would be constructed and operated from a private business perspective.
- Almost complete monopoly of AENA as the manager of Spanish airports.
- In airport management models, there usually isn't a significant difference whether the operator is private or public, as observed in the Spanish case, where AENA remains more or less the same with private capital entering.
- Investment in airports depends solely on landing fees and non-aeronautical revenues, managed by AENA and executed by AENA without the involvement of any other actor in the industry beyond the client-provider relationship, contrary to what happens in countries with a robust airport industry.
- Currently, AENA follows a policy of investments and contracting both for engineering and construction solely based on price, disregarding the quality and innovation of supplier companies.
- Civil airport construction investment in Spain should be considered with a long-term economic analysis, rather than short-term, which is how it's being done currently. What seems to be saved now, with the way the projects are being carried out, will double the cost tomorrow.

- Diversify the market by giving other operators the opportunity to compete in management.
- There should be more investment in innovation with a win-win cooperation with the private sector.
- Improve relationships with all sector stakeholders: planners, designers, technology companies, and constructors to align objectives and innovate in this important sector for Spain's economy.
- Return to tenders with reckless bids, real technical assessment (not just a minimum of technical quality), and evaluation of technical improvement and innovation proposals.

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6.1.4. Adaptation to the Future and Sustainable Development

Peso	EVALUACIÓN DE ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE (Encuestas a expertos) (Max 10)			
1	4.1. ¿Cómo considera los instrumentos de planificación aeroportuaria en vigor con relación a la adaptación a las demandas futuras del tráfico aéreo en España?	6,3	SUFICIENTE ALTO	D
1	4.2. ¿Cómo evalúa la adaptación de los aeropuertos España a la protección del medio ambiente?	7,3	BIEN	C
1	4.3. ¿Cómo valora las acciones que se están tomando para reducir las emisiones de CO2 y otros gases de efecto invernadero en los procesos de construcción, conservación y mantenimiento de los aeropuertos?	6,7	SUFICIENTE ALTO	D
1	4.4. ¿Considera adecuadas las medidas que se adoptan para reducir el impacto ambiental y el tratamiento de los residuos en la construcción y conservación de los aeropuertos?	6,6	SUFICIENTE ALTO	D
4	TOTAL EVALUACIÓN ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE POR LOS EXPERTOS:	6,7	SUFICIENTE ALTO	D

Table 190: Evaluation by the experts of Future Adaptation and Sustainable Development

Comments, suggestions, and recommendations from the experts

- True environmental protection involves investments that would penalize current management, as it would clearly reduce profits. The transformation towards sustainability is not cheap and requires a commitment beyond the current bottom line.
- Renewable energy sources are currently being implemented as the main source at airports.
- The carbon footprint is a major challenge for the sector. Airports currently have a low contribution compared to airlines, but they are making good progress in decarbonizing their facilities, as well as airport stakeholders such as handling agents.
- Airport management is beginning to have initiatives focused on sustainability and reducing the environmental impact of their activities, which is less than the impact of aircraft.
- There is still no real sustainability strategy in AENA regarding operations, maintenance, or airport construction.
- Regarding sustainability, the following proposals are made:
    - Improvements in taxiing, noise reduction, increased electric taxiing (aircraft/push back) on apron and taxiways.
    - Operational efficiency in high-traffic airports. Analysis of process times.
- Taxi delay times, engine-on time leave a significant gas footprint.
- Related to energy efficiency, include LED lighting systems. Reduction in consumption.
- Terminal design using efficiency solutions, use of materials, architectural solutions, geothermal solutions, increased use of renewable installations, more efficient climate control systems.
- Design and construction of infrastructure with LEED certification (Silver-Gold-Platinum).
- Smart buildings and systems. Incorporation of AI, Big Data.

- Design, construction, maintenance: BIM (Building Information Modeling).
- Advancing in asset management policy (Asset Management Plan).
- Continued work is needed on these aspects; the process is too slow.
- Collaboration between airports and local administrations with environmental responsibilities remains deficient. There are no clear channels for handling situations.

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6.1.5. Operation and maintenance

Peso	EVALUACIÓN DE OPERACIÓN Y MANTENIMIENTO (Encuestas a expertos) (Max 10)			
1	5.1. ¿Cómo valora la inversión en conservación y mantenimiento de las instalaciones aeroportuarias en España?	5,9	SUFICIENTE	E
1	5.2. ¿Considera que los medios aplicados a la operación, conservación y mantenimiento de las instalaciones aeroportuarias son los adecuados para atender las demandas de los usuarios?	6,0	SUFICIENTE ALTO	D
1	5.3. ¿Cómo valora el estado de conservación y mantenimiento de los aeropuertos españoles?	6,4	SUFICIENTE ALTO	D
1	5.4. ¿Cómo valora la eficiencia energética de las instalaciones aeroportuarias en España?	5,8	SUFICIENTE	E
4	TOTAL EVALUACIÓN OPERACIÓN Y MANTENIMIENTO POR LOS EXPERTOS:	6,0	SUFICIENTE ALTO	D

Table 191: Assessment by experts of operation and maintenance

Comments, suggestions, and recommendations from the experts

- In recent years, the operation, maintenance, and conservation of airports have deteriorated significantly.
- It is very appropriate.
- Iconic facilities in Spain, such as Madrid's T4, lack conservation and maintenance to meet the expected level of service. There's a lack of investment in both conservation and new technologies that are already implemented in airports with similar or lower traffic levels around the world.
- Overall, maintenance is very good, but there are no real energy efficiency measures in AENA's airports.
- There is a big difference between the major airports in the network and the medium/small ones.
- There's room for improvement in making airport facilities more energy-efficient by embracing innovation.
- For example, attempting to include LED-type beacons in the configuration, which results in significant savings. Conduct studies that allow the aeronautical authority, EASA, to modify regulations and enable these mixed configurations (conventional beacons with LED beacons in the same system, such as a taxiway centerline, for instance).
- Explore and implement new energy generation installations.
- Consider the possibility of creating systems that environmentally achieve a net-zero emissions balance.
- Electric taxiing, wind, solar, biomass, H_2 generation, etc.
- Equip Terminal Buildings with new aerothermal and geothermal technology designs.
- Make progress in creating Asset Management Plans that lead to significant savings during maintenance.

- The BIM methodology can be a powerful tool in this field.
- Efficiently incorporate the Asset Management Plan from the conceptual design phase, enabling the airport operator's management to make decisions that save costs and consumption, reduce processing times, and improve the lifespan of the facilities.
- These are complex facilities that require qualified personnel with appropriate compensation and proper consideration. Working conditions for sector employees have deteriorated to the point that there are hardly any professionals left. It's necessary to reverse this situation. Recognize the value of suppliers and treat them well.
- Continue to invest in the renovation and continuous improvement of facilities, particularly in the field of energy efficiency, to ensure the best impression for travelers, especially considering the high percentage of tourists, to consolidate Spain as a top-quality tourist destination.
- Incorporate new inspection and monitoring technologies.
- Increase investment in infrastructure conservation as well as new technologies for security, boarding, flight information, etc.
- Integrate sustainable certification processes into airport project development.

6.1.6. Security

Peso	EVALUACIÓN DE SEGURIDAD (Encuestas a expertos) (Max 10)			
1	6.1. ¿Cómo valora las medidas de control existentes para garantizar la seguridad aeroportuaria en España?	7,9	BIEN	C
1	6.2. ¿Cómo valora la seguridad de las instalaciones aeroportuarias en España frente a ataques físicos?	7,7	BIEN	C
1	6.3. De forma global, ¿ cómo valora la seguridad de las instalaciones aeroportuarias en España frente a ataques de tipo lógico (ciberseguridad)?	6,9	SUFICIENTE ALTO	D
1	6.4. ¿Considera que se están tomando medidas para reducir en el futuro las incidencias relacionadas con ataques físicos y/o lógicos a las instalaciones aeroportuarias en España?	7,1	BIEN	C
4	TOTAL EVALUACIÓN SEGURIDAD POR LOS EXPERTOS:	7,4		C

Table 192: Evaluation by experts on safety

Comments, suggestions, and recommendations from the experts

- I am unaware of the measures AENA takes against potential cyberattacks, as well as attacks on the facilities.
- In Spain, due to our experience with terrorism, the level of security is acceptable. However, in terms of cybersecurity, an effort must be made as it will be the gateway for many attacks.
- There is room to advance and research new security control systems that provide passengers with a better experience and save time and inconvenience.
- One of the determining factors for choosing another mode of transportation is precisely the passenger's inconvenience during this airport process.
- Include a drone surveillance system to increase access control.
- In this case, "sufficient" is not acceptable; more can and should be done.
- In response to question 6.3: Airports work with closed networks, which has led to slow development of cybersecurity. This will change in the coming years, as there is already a program for the implementation of cybersecurity at airports, and we are working on it.
- More investment and better resource management are required.

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6.1.7. Resiliency

Peso	EVALUACIÓN DE RESILIENCIA (Encuestas a expertos) (Max 10)			
1	7.1. ¿Cómo valora la capacidad de las instalaciones aeroportuarias en España para recuperar el estado de servicio inicial cuando se producen situaciones adversas (climatológicas, accidentes aéreos, etc.)?	7,2	BIEN	C
1	7.2. ¿Cómo valora las medidas adoptadas por los operadores aeroportuarios para restablecer el tráfico aéreo ante incidentes naturales o provocados?	7,4	BIEN	C
1	7.3. ¿Cómo evaluaría de forma global la implantación de los planes de contingencia y autoprotección de los aeropuertos considerados como infraestructuras críticas a efectos de la aplicación de la legislación sobre protección de Infraestructuras Críticas Vigente?	7,1	BIEN	C
1	7.4. ¿Cómo valora la interconexión de la red de aeropuertos españoles a efectos de su capacidad de mantener la navegación aérea en situaciones de destrucción o daño grave de una parte dela red?	7,8	BIEN	C
4	TOTAL EVALUACIÓN RESILIENCIA POR LOS EXPERTOS:	7,4	BIEN	C

Table 193: Evaluation by the experts of resilience

Comments, suggestions, and recommendations from the experts

- The network allows responding to security disturbances. Resilience is above the European average.
- The pandemic has taught us that we must have rapid and efficient protocols for emergency situations.
- Airport infrastructures should be designed considering these types of situations, providing the necessary spaces for appropriate controls.
- All involved personnel, from operations to airport security, handling agents, control personnel, firefighting and rescue personnel, security forces, etc., should be trained and prepared for any incident.
- Airport infrastructures should be equipped with the necessary spaces for these operations.
- Sanitary control should remain in international airports if we aim to provide quality and ensure an acceptable level of passenger control.
- There are skilled professionals at airports, and usually, situations are managed, but there's a need to improve planning and preparedness for these situations.
- There's a need for better preparation of staff, training in protocols and procedures. In many cases, staff doesn't know what to do in case of an emergency or incident.
- Greater effort should be put into planning action plans.

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6.1.8. Engineering and innovation

Peso	EVALUACIÓN DE INGENIERÍA E INNOVACIÓN (Encuestas a expertos) (Max 10)			
1	8.1. ¿Considera que la inversión en la ingeniería de diseño, construcción, gestión y conservación de los aeropuertos es adecuada?	4,6	INSUFICIENTE	FX
1	8.2. ¿Cómo valora los conocimientos y la actitud técnica de los ingenieros aeroportuarios actuales?	7,7	BIEN	C
1	8.3. ¿Considera adecuados y ajustados a las nuevas tecnologías los conocimientos impartidos en las universidades a los ingenieros?	6,6	SUFICIENTE ALTO	D
1	8.4. ¿Cómo valora la utilización de nuevas técnicas, tecnologías y materiales en la construcción, conservación y mantenimiento de instalaciones aeroportuarias en España?	6,5	SUFICIENTE ALTO	D
1	8.5. ¿Cómo valora las medidas adoptadas en la licitación pública para favorecer la innovación en el sector aeroportuario (peso de la oferta técnica en las licitaciones, etc.)?	3,4	INSUFICIENTE	FX
1	8.6. ¿Cómo valora la colaboración público-privada en los proyectos de investigación en el sector aeroportuario en España?	3,8	INSUFICIENTE	FX
1	8.7. ¿Cómo valora las instalaciones de reciclaje y puesta fuera de servicio de aeronaves en España(aeropuerto de Teruel, etc.)?	7,3	BIEN	C
1	8.8. ¿Cómo valora la investigación, desarrollo e innovación que se está desarrollando en España con relación a los aeropuertos?	4,5	INSUFICIENTE	FX
1	8.9. ¿Cómo valora la tecnología actual que se está aplicando en los aeropuertos?	6,2	SUFICIENTE ALTO	D
1	8.10. ¿Cómo considera el avance en la digitalización y monitorización del comportamiento de los elementos de los aeropuertos?	6,1	SUFICIENTE ALTO	D

Table 194: Evaluation by experts of Engineering and Innovation

Comments, suggestions, and recommendations from the experts

- With highly skilled and knowledgeable airport engineers in Spain, due to the devaluation of engineering in this sector and the recent shift towards electronic auctions in tenders, there are few professionals remaining in this field in the country. This leads to a talent drain.
- There's little or no weight given to the technical aspect in AENA's tenders, which hampers professional development in engineering and affects innovation.
- There's a clear lack of innovation due to the objectives of the Spanish network, which relies on public contract auctions based solely on price, not allowing for sufficient value-added in design and planning contracts. Additionally, the protection of intellectual

property (IP) for new ideas is not adequately managed, hindering the necessary mutual trust for these opportunities.

- One of the causes of the adaptation problems of airport infrastructures is the tender procedures for projects and works, where price is the main criterion for evaluating proposals. This prevents the utilization of the high potential of technicians and designers in Spain, which hinders our country from leading in the industry on a global scale.
- The selection criterion in AENA's tender processes is exclusively the lowest price, once a technical threshold is met. This implies a lack of interest in promoting innovation in this sector.
- Regarding investment management, there's room for improvement in the contracting of consultancy and engineering services. Budgets for airport planning, detailed design, technical assistance, and project management should be increased to align with the costs required to ensure the necessary quality.
- Saving in this investment phase of any airport infrastructure increases the probability of errors, defective quality, contradictions between study documents (plans, reports, annexes, etc.), inability to meet tender requirements, and a higher likelihood of encountering technical problems during construction that weren't detected during the drafting of the Constructive Project.
- In terms of innovation, there's significant potential to progress, and it's crucial for the development of airport infrastructures.
- Digitalization is essential for improving the passenger experience, creating platforms with augmented reality, AI, to make passengers more comfortable throughout their journey, from trip planning to arrival. Attempting to provide passengers with a "contactless" experience is the future that needs to be aligned with data protection laws. For example, analyzing the viability of biometric recognition for process improvement.
- When cost is the primary and almost sole argument in AENA's decisions, the aspects discussed in this section become secondary. It shouldn't be this way. For instance, in Spain, there are excellent airport engineers, but many are leaving for other countries due to the undervaluation of their work (insufficient remuneration). If we continue to let our best professionals go abroad, we won't be able to advance in innovation, sustainability, new technologies, etc.
- Engineering and innovation represent talent. If talent isn't rewarded, retained, or cultivated, it won't flourish.
- Change in public tender procedures.
- AENA should act as a driver, promoting added value from its suppliers, who are currently moving to more profitable and reliable markets.
- Efforts and investment in sustainability and innovation strategy should be significantly strengthened. Moreover, the current model of contracting projects and works is outdated and entirely inefficient, simultaneously detrimental to all segments of the aviation transportation chain: users, airlines, consultants, designers, constructors, and service companies. Contracting systems based on technically evaluated fixed-price offers have proven to be highly efficient in other countries, while aligning all stakeholders' objectives.
- Real weighting of technical and innovative aspects in airport engineering and consultancy tenders. Reintroduction of rational underbidding and favoring quality and innovation of proposals over price.

- Price should not be the sole criterion for evaluating intellectual work in tender adjudication.

6.2. Supplementary Questionnaire

Among the questions posed to the experts, a supplementary questionnaire has been included with the following questions:

CP.1 **What infrastructure needs do you consider necessary for the airport sector in Spain in the next 10 years?**

CP.2 **Approximately how much investment do you estimate is needed to fulfill the infrastructure needs in the airport sector in Spain in the next 10 years?**

CP.1 ¿Qué necesidades de infraestructura considera que son necesarias para el sector aeroportuario en España en los próximos 10 años?

- It's not so much about new infrastructure as it is about transformation, conservation, and improvement of existing ones. New infrastructure should be considered for sustainable transformation, especially in the field of renewable energy generation, reuse, and recycling.
- More digitalization, interconnection, continuous improvement, and modernization of both terminal and taxiway infrastructure, and increased capacity at key airports.
- Railway/airport interconnections, modernization of terminals.
- Global improvement in technology.
- A comprehensive evaluation of mobility across all modes and cargo types is required.
- Expansions in certain terminal areas of airports, technological enhancements, innovation, and sustainability across all of them.
- Adaptation to new technologies, vertiports, drones, hydrogen fuel cells, etc.
- Construct new terminals instead of expanding old ones. For example, T123 at Madrid.
- Increase the competitive capacity of major airports to operate as hubs, both in Terminal Buildings and operations, and upgrade/improve the infrastructure of medium and small airports.
- Infrastructure and system improvement plan to make them more efficient and safer.
- Digitalization plan for airport systems and processes.
- Study the inclusion of vertiports at airports to provide passengers with urban air mobility options.
- Streamline transfers to/from aircraft. Interconnect with other modes of transportation.
- Most of our major airports are close to 20 years old; it's time to increase capacity and improve facilities, with sustainability as the goal.
- Net-zero buildings, operational efficiency, on-land infrastructure to increase public transportation access.
- Infrastructure needed to meet established capacity standards, with an impact on sustainability, economic efficiency, and processes.

- Areas designated for aeronautical industrial development. Cargo traffic zones. Boost regional airports.

CP.2.- How much approximate investment do you estimate is needed to develop the infrastructure requirements in the airport sector in the next 10 years?

- €7 - €10 billion
- €4.5 billion, following the effort of the latest DORA (Spanish Airport Regulation Document)
- Tens of billions of euros
- At least €40 billion in Spanish airports.
- Between €50 billion and €100 billion
- €8 billion
- It will depend on the results of the improvement plans analysis.
- €5 billion
- €30 billion
- In Spain? €5 trillion
- €8 billion - €10 billion
- €5 billion.

6.3. Overall evaluation of the airports by the experts

Integrating the evaluation provided by the experts across different criteria, the overall result of the evaluation of the airports is as follows:

Evaluación del sector Aeropuertos por los expertos (Max: 10)		23		
Pesos del criterio	CRITERIOS	CALIFICACIÓN AICCP		
1	CAPACIDAD	7,2	BIEN	C
1	PRESTACIONES	7,7	BIEN	C
1	FINANCIACIÓN	5,9	SUFICIENTE	E
1	ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE	6,7	SUFICIENTE ALTO	D
1	OPERACIÓN Y MANTENIMIENTO	6,0	SUFICIENTE ALTO	D
1	SEGURIDAD	7,4	BIEN	C
1	RESILIENCIA	7,4	BIEN	C
1	INGENIERÍA E INNOVACIÓN	5,7	SUFICIENTE	E
Sector aeropuertos. Evaluación ponderada por los expertos		6,8	SUFICIENTE ALTO	D
Respuestas recibidas: 23				

Table 195: Overall evaluation of the airports by the experts

7. Overall assessment based on objective indicators and expert evaluations

Evaluación del sector Aeropuertos por los expertos (Max: 10)		23		
Pesos del criterio	CRITERIOS	CALIFICACIÓN AICCP		
1	CAPACIDAD	7,2	BIEN	C
1	PRESTACIONES	7,7	BIEN	C
1	FINANCIACIÓN	5,9	SUFICIENTE	E
1	ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE	6,7	SUFICIENTE ALTO	D
1	OPERACIÓN Y MANTENIMIENTO	6,0	SUFICIENTE ALTO	D
1	SEGURIDAD	7,4	BIEN	C
1	RESILIENCIA	7,4	BIEN	C
1	INGENIERÍA E INNOVACIÓN	5,7	SUFICIENTE	E
Sector aeropuertos. Evaluación ponderada por los expertos		6,8	SUFICIENTE ALTO	D
Respuestas recibidas: 23				

Table 196: Overall assessment by the experts

Evaluación del sector Aeropuertos por indicadores objetivos (Max: 10)				
Pesos del criterio	CRITERIOS	CALIFICACIÓN AICCP		
1	CAPACIDAD	7,1	BIEN	C
1	PRESTACIONES	6,5	SUFICIENTE ALTO	D
1	FINANCIACIÓN	6,1	SUFICIENTE ALTO	D
1	ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE	6,6	SUFICIENTE ALTO	D
1	OPERACIÓN Y MANTENIMIENTO	7,4	BIEN	C
1	SEGURIDAD	10,0	EXCELENTE	A
1	RESILIENCIA	7,2	BIEN	C
1	INGENIERÍA E INNOVACIÓN	5,9	SUFICIENTE	E
Sector Aeropuertos. Evaluación ponderada por indicadores objetivos		7,1	BIEN	C
Indicadores considerados:: 72				

Table 197: Overall assessment based on objective indicators

Evaluación final del sector Aeropuertos (Max: 10)				
Pesos del criterio	CRITERIOS	CALIFICACIÓN FINAL AICCP (50% evaluación por indicadores; 50% evaluación por expertos)		
1	CAPACIDAD	7,1	BIEN	C
1	PRESTACIONES	7,1	BIEN	C
1	FINANCIACIÓN	6,0	SUFICIENTE ALTO	D
1	ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE	6,7	SUFICIENTE ALTO	D
1	OPERACIÓN Y MANTENIMIENTO	6,7	SUFICIENTE ALTO	D
1	SEGURIDAD	8,7	MUY BIEN	B
1	RESILIENCIA	7,3	BIEN	C
1	INGENIERÍA E INNOVACIÓN	5,8	SUFICIENTE	E
Sector Aeropuertos. Evaluación ponderada final		6,9	SUFICIENTE ALTO	D

Table 198: Final evaluation based on objective indicators and by the experts

Evaluación del sector Aeropuertos por los expertos (Max: 10)	
CRITERIOS	Diferencias (Indicadores- expertos)
CAPACIDAD	-0,2
PRESTACIONES	-1,2
FINANCIACIÓN	0,2
ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE	-0,1
OPERACIÓN Y MANTENIMIENTO	1,4
SEGURIDAD	2,6
RESILIENCIA	-0,2
INGENIERÍA E INNOVACIÓN	0,2
Sector Aeropuertos. Diferencias (indicadores-expertos)	0,3

Table 199: Differences between objective evaluation and experts

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Acronyms

ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
BTS	BUREAU OF TRANSPORTATION STATISTICS (USA)
DGMT	DIRECTORATE GENERAL FOR MOBILITY AND TRANSPORT (EC)
EC	EUROPEAN COMMISSION
ITF	INTERNATIONAL TRANSPORT FORUM
OECD	ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
EE.UU.	THE UNITED STATES OF AMERICA
USDT	U.S. DEPARTMENT OF TRANSPORTATION
WB	THE WORLD BANK
WEF	WORLD ECONOMIC FORUM
GCI	GLOBAL COMPETITIVENESS INDEX (WEF)
LPI	LOGISTIC PERFORMANCE INDEX (WB)
PCA	PRINCIPAL COMPONENT ANALYSIS

ANNEXE 4

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- Civil Aviation Administration of China: http://www.caac.gov.cn/index.html
- ASN: https://aviation-safety.net/database/
- Skytrax: http://www.worldairportawards.com/

ANNEXE 5

Infrastructure Indicators from Key International Organizations

For the Airport sector, indicators from the following international organizations have been analyzed:

- OECD-International Transport Forum. **https://www.itf-oecd.org/**
- EUROSTAT.**https://ec.europa.eu/info/departments/eurostat-european-statistics_es**
- World Bank. **https://worldroadstatistics.org/**
- World Economic Forum **https://www.weforum.org/**
- Comisión Europea **https://ec.europa.eu/commission/index_es**
- International Energy Agency **https://www.iea.org/**
- American Society of Civil Engineers. **https://www.fhwa.dot.gov/**

These international organizations, which have been used as references, also have complementary databases that enable the creation of new quantitative indices. These basic data, carefully selected, along with information from databases of various countries, have been the primary source of information to configure the Airport indicators.

For the preparation of this report, compatibility and comparability with other representative countries have been taken into account. The methodology has been defined by analyzing the indicators used by different international organizations. Typically, these figures are published annually, and some indicators use data from databases and surveys conducted by various international entities. This preliminary work helps identify the most representative indicators that these organizations use for each sector, their methodologies, and the available databases to develop our own indicators.

The main indicators of the state of public works, in a global and comparable context, have been obtained from the work carried out by the World Bank, which defines the Logistics Performance Index (LPI), and the World Economic Forum (WEF), which defines the Global Competitiveness Index (GCI). These indicators have served as a reference for developing a methodology specifically tailored to public works, and their results will guide us in adjusting the methodology used.

In the specific case of the report on airports, the particularities of this sector compared to others have been taken into account. First, due to the type of indicators used, airports that are exclusively military are not within the scope of this report, as they are not evaluated in any of the indicators. Additionally, when relating data such as cargo or passenger transport by airports, factors beyond population and wealth of a country have been considered, including the number of foreign tourists visiting each country annually, which is crucial in this sector.

The data sources described in the following sections are examples of the various possibilities when defining indicators, with the aim of selecting the most suitable ones based on those used in other reports.

The goal of the study, on the other hand, is to use indicators that can be internationally compared with freely accessible data sources, which may have a lower level of detail compared to evaluations at a national level, as they need to be straightforward.

Below, you will find detailed information about evaluations, indices, and indicators from the major organizations that assess Airports.

- *"Report Card for America´s infrastructure*." American Society of Civil Engineers (ASCE).
- "The Global Competitiveness Report". World Economic Forum.
- "Transport in the European Union". European Commission.

1.- "Report Card for America´s infrastructure." American Society of Civil Engineers (ASCE)

The "Report Card for America's Infrastructure" by ASCE (American Society of Civil Engineers) is the reference used by the Asociación Caminos for the preparation of this report. The report exclusively focuses on the scope of the United States, without conducting comparative studies with other countries or describing the specific methodology employed. The established indicators are not known, but the report provides generalized results with a rating that allows us to conclude whether the analyzed sectors of public works and services in the U.S. have improved or deteriorated compared to the previous period.

The latest edition of the "Infrastructure Report Card" [2] from 2021, analyzes eight criteria: capacity, physical condition, financing, future needs, operation and maintenance, public safety, resilience, and innovation.

Figure 6: Criteria analyzed in the IRC Report, ASCE 2021

As can be seen in the table below, the assessment system used by Asociación Caminos is similar to the ASCE [3] system.

ESPAÑA	0,0 a 2,9	3,0 a 4,9	5,0 a 5,9	6,0 a 6,9	7,0 a 7,9	8,0 a 8,9	9,0 a 10
	SUSPENSO		APROBADO		NOTABLE		SOBRESALIENTE
ECTS	FAIL	FAIL	SUFFICIENT	SATISFACTORY	GOOD	VERY GOOD	EXCELLENT
	F	FX	E	D	C	B	A
ASOCIACIÓN CAMINOS	MUY INSUFICIENTE	INSUFICIENTE	SUFICIENTE	SUFIENTE ALTO	BIEN	MUY BIEN	EXCELENTE
	F	FX	E	D	C	B	A
INFORME ASCE	CRITICAL	FAILING	POOR		MEDIOCRE	GOOD	EXCEPTIONAL
	1 (F)	2 (F)	3 (D)		4 (C)	4 (B)	5 (A)
GPA EEUU 1	F		C B-	B	B+		A
GPA EEUU 2	F		D- D	D+ C-	C C+	B- B	B+ A- A

Table 200: Rating system of the sector index used by Asociación Caminos and its equivalence with the system used in this report

The full global report can be found at: **https://infrastructurereportcard.org/wp-content/uploads/2020/12/National_IRC_2021-report.pdf**

[2] National_IRC_2021-report-2.pdf (infrastructurereportcard.org)

[3] The ASCE system uses letters accompanied by "+" and "-" signs to indicate if it is slightly above or below the assigned letter level. To create an equivalent system, the Report of Asociación Caminos, which quantifies the state of the sector numerically on a scale of 0 to 10, allows for a correspondence with the previously published Infrastructure Report Card (IRC) reports.

2.- "The Global Competitiveness Report". World Economic Forum

The World Economic Forum (WEF) produces a series of annual economic reports. Among them, the "Global Competitiveness Report (2019)" [4] provides an analysis of countries with data from the year 2019, creating a list of indicators and a main index called the Global Competitiveness Index (GCI).

This global competitiveness index combines 114 components grouped into twelve policy domains or "pillars" that measure, through an indicator, three main categories or "sub-indices." Each category assesses the development of each "pillar" for the 141 participating countries.

The main categories are:

- S1: Basic Requirements
- S2: Enhancers of Efficiency
- S3: Innovation and Complexity Factors

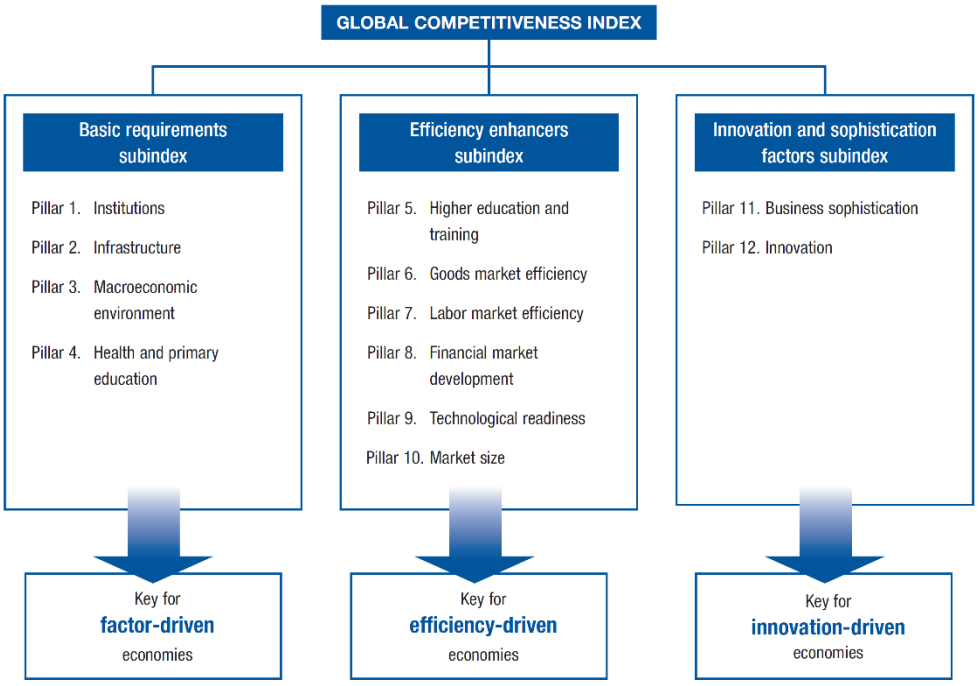


Figure 7: Outline of the Composition of the GCI Indicator by the WEF

Infrastructure is considered a fundamental requirement for a country's development, and it has sufficient significance to be part of one of the four pillars comprising Subindex 1 - Basic Requirements. The assessment of its indicator is carried out through nine main components based on survey ratings and objective data.

[4] WEF_TheGlobalCompetitivenessReport2019.pdf (weforum.org)

The calculation of the Global Competitiveness Index (GCI) is based on successive aggregations of ratings of the disaggregated indicator levels until the overall GCI is obtained. The weighting of the three main categories (subindices) depends on the development level of each country. To determine the weight of each pillar, a percentage weight is assigned to each indicator in advance, and the value of each component of the pillar is obtained from a series of surveys, adjusted with objective data to which a weight is assigned. The maximum rating is 100 and the minimum is 0.

Pillar 2: Infrastructure represents 8.3% of weight in the overall index, with the following weighting:

Pillar 2: Infrastructure 8.3%

A. Transport infrastructure ..... 50%[2]

I. Road 25%
- 2.01 Quality of road network
- 2.02 Quality of road infrastructure

II. Rail 25%
- 2.03 Railroad density
- 2.04 Efficiency of train services

III. Air 25%
- 2.05 Airport connectivity
- 2.06 Efficiency of air transport services

IV. Sea 25%
- 2.07 Liner shipping connectivity[3]
- 2.08 Efficiency of seaport services

B. Utility infrastructure 50%

I. Electricity 50%
- 2.09 Electricity access
- 2.10 Electricity quality

II. Water 50%
- 2.11 Exposure to unsafe drinking water
- 2.12 Reliability of water supply

Figure 8: Weighting of the Infrastructure Indicator in the 2019 GCI (Global Competitiveness Index) by the WEF (World Economic Forum)

Airports represent 25% of the total transport infrastructure rating.

Spain's score in the infrastructure pillar is 90.3 out of 100, ranking seventh out of 141 countries worldwide.

2nd pillar: Infrastructure 0–100	-	**90.3** ↑	**7**
Transport infrastructure 0–100	-	**83.6** ↑	**9**
2.01 Road connectivity 0–100 (best)	100.0	100.0 ↑	1
2.02 Quality of road infrastructure 1–7 (best)	5.7	78.4 ↑	11
2.03 Railroad density km/1,000 km[[2	31.1	77.9 ↑	28
2.04 Efficiency of train services 1–7 (best)	5.4	72.9 ↓	9
2.05 Airport connectivity score	813,743.1	100.0 =	8
2.06 Efficiency of air transport services 1–7 (best)	5.6	76.9 ↑	18
2.07 Liner shipping connectivity 0–100 (best)	90.1	90.1 ↑	11
2.08 Efficiency of seaport services 1–7 (best)	5.4	73.0 ↑	16
Utility infrastructure 0–100	-	**97.0** ↑	**19**
2.09 Electricity access % of population	100.0	100.0 =	2
2.10 Electricity supply quality % of output	9.5	94.3 ↓	56
2.11 Exposure to unsafe drinking water % of population	0.4	100.0 =	19
2.12 Reliability of water supply 1–7 (best)	6.6	93.6 ↑	16

Figure 9: Infrastructure indicators of the GCI (Global Competitiveness Index) from the WEF (World Economic Forum) in 2019.

In Airports, the indicator used is "Airport Connectivity." Spain achieves a 100% score and holds the 8th position.

Spain's overall rating in the GCI indicator is 75%, placing it 23rd out of 141 countries.

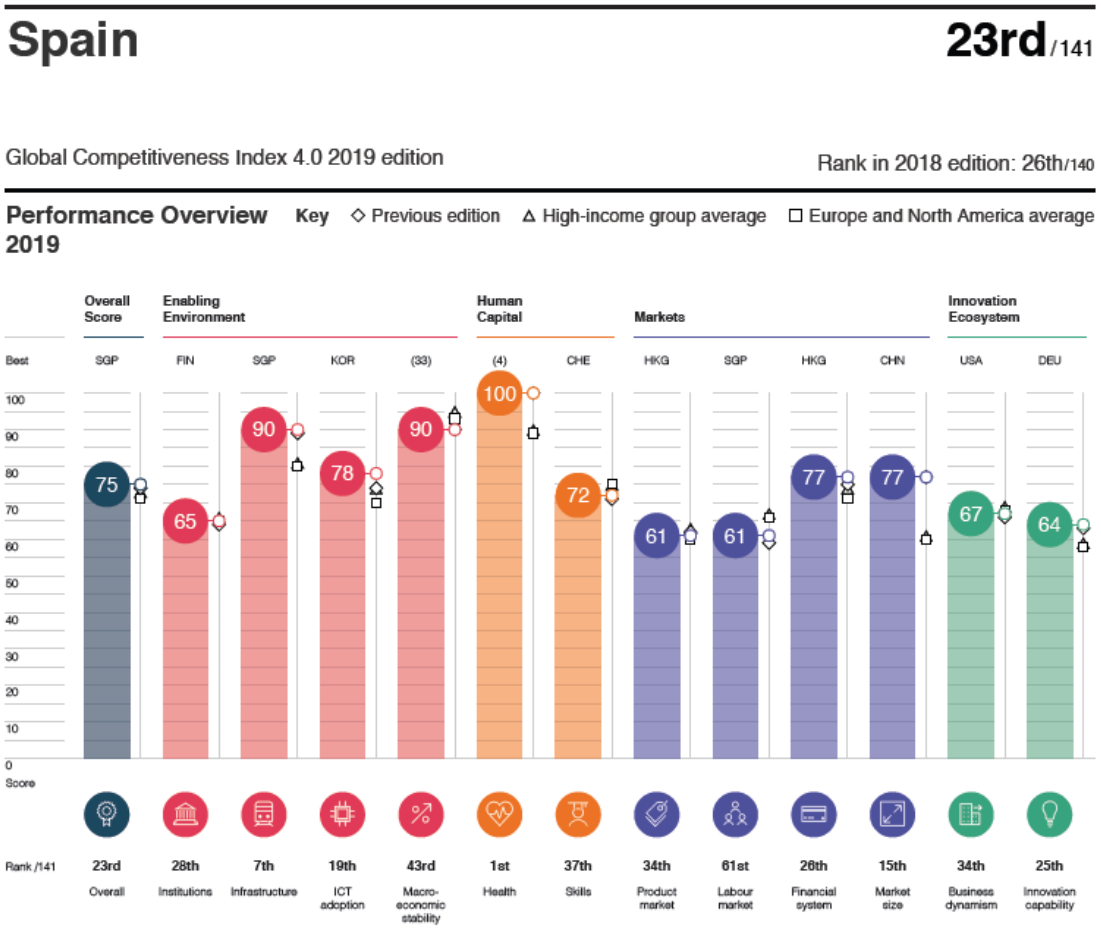


Figure 10: Spain's overall assessment in the GCI indicator of the World Economic Forum (2019) is 75%.

3.- "The Global Adaptation Index (ND-Gain Indicators)". University of Notre Dame (EE.UU.)

The Global Adaptation Index (ND-GAIN) [5] by the University of Notre Dame is an open-source index that assesses a country's **vulnerability** [6] to climate change and its **readiness** [7] to utilize public and private sector investment for implementing adaptation actions to address climate change. The ND-GAIN index comprises over 74 variables, forming 45 basic indicators to measure the vulnerability and readiness of 192 UN member countries from 1995 to the present (due to data availability, ND-GAIN measures vulnerability for 182 countries and readiness for 184 countries).

Government agencies, multilateral organizations, NGOs, and many other entities that study the climate change adaptation measures implemented by countries use this classification and the associated indicators to evaluate countries' efforts in relation to climate change. All countries, to varying degrees, face the challenges of climate change adaptation. Some countries are more vulnerable to climate change impacts due to their geographic location or socioeconomic conditions. Additionally, certain countries are better prepared to take adaptation actions by leveraging public and private sector investments through national government policies, societal awareness, and the capacity of the private sector to engage. ND-GAIN measures both dimensions: vulnerability and readiness.

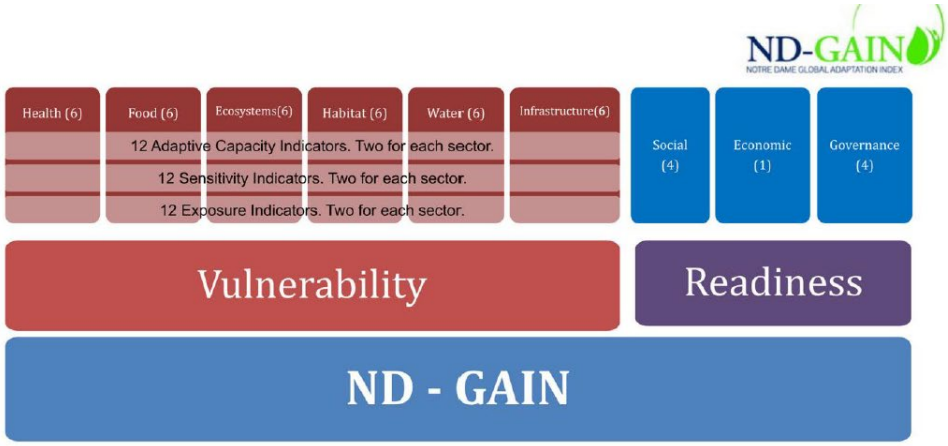


Figure 11: Summary of the vulnerability and readiness indicators from ND-GAIN.

[5] Rankings // Notre Dame Global Adaptation Initiative // University of Notre Dame (nd.edu)
[6] ND-GAIN defines the concept of Vulnerability as: The propensity or predisposition of human societies to be negatively affected by climate threats.
[7] ND-GAIN defines the concept of Readiness as: The willingness to make effective use of investments for adaptation actions due to a secure and efficient business and governmental environment.

The vulnerability is composed of 36 indicators grouped into three components (each component has 12 indicators) and six sectors (each sector has 6 indicators). The readiness consists of 9 indicators, grouped into three sectors.

The ND-GAIN index can be represented as a scatter plot matrix of readiness versus vulnerability.

Figure 12: Scatter plot: Vulnerability vs. Readiness by ND Gain.

For assessment purposes: a higher vulnerability score indicates higher vulnerability ("worse"), a higher readiness score indicates greater readiness ("better"). Thus, vulnerability indicators are measured between 1 (lowest score) and 0 (highest score). Readiness indicators are measured between 1 (highest score) and 0 (lowest score).

The latest published ranking is from the year 2020 and shows the following results:

Rank countries by ND-GAIN Country Index, Vulnerability and Readiness.

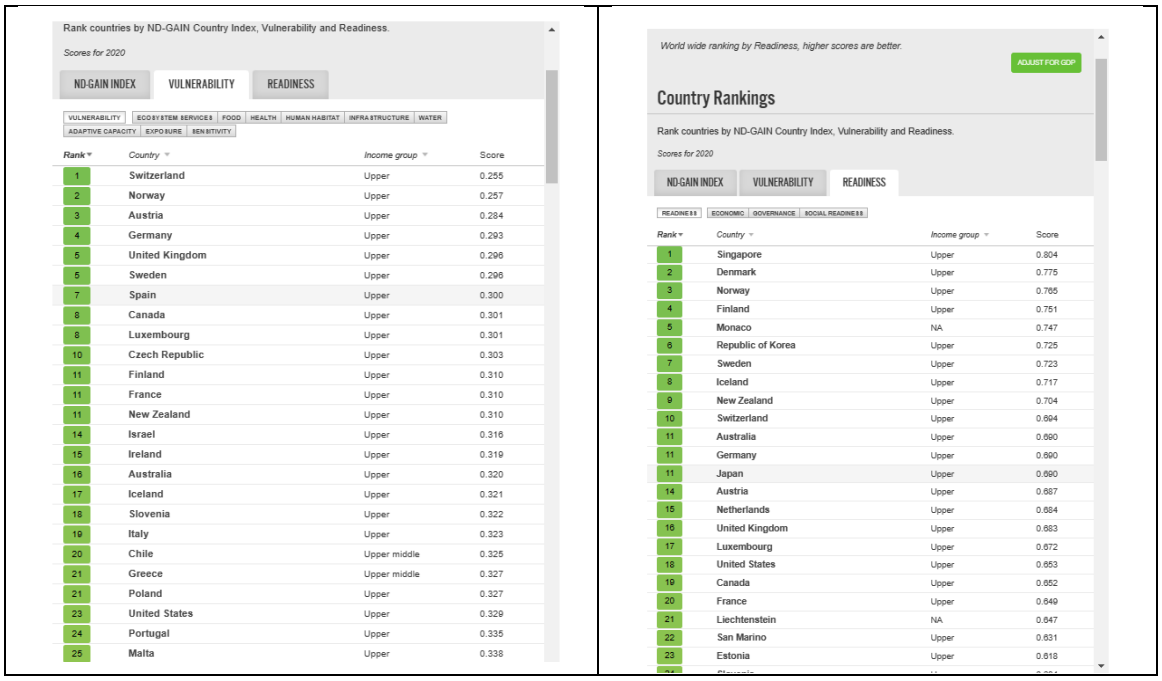
Scores for 2020

ND-GAIN INDEX | VULNERABILITY | READINESS

Rank	Country	Income group	Score
1	Norway	Upper	75.4
2	Finland	Upper	72.0
3	Switzerland	Upper	71.9
4	Sweden	Upper	71.3
5	Denmark	Upper	71.1
6	Singapore	Upper	70.6
7	Austria	Upper	70.1
8	Germany	Upper	69.8
8	Iceland	Upper	69.8
10	New Zealand	Upper	69.7
11	United Kingdom	Upper	69.4
12	Luxembourg	Upper	68.6
13	Australia	Upper	68.5
14	Canada	Upper	67.5
15	Republic of Korea	Upper	67.2
16	France	Upper	66.9
17	Netherlands	Upper	66.6
18	United States	Upper	66.2
19	Japan	Upper	65.5
20	Slovenia	Upper	64.1
21	Ireland	Upper	64.0
22	Estonia	Upper	62.8
23	Belgium	Upper	62.7
24	Czech Republic	Upper	62.6
25	Portugal	Upper	62.2
26	Spain	Upper	61.8

Figure 13: Global ranking of the ND Gain Index for 2020.

In the global ND Gain index, Spain ranks 28th with a score of 61.8 (the top country, Norway, has a score of 75.4).



Rank countries by ND-GAIN Country Index, Vulnerability and Readiness.

Scores for 2020

ND-GAIN INDEX | VULNERABILITY | READINESS

Rank	Country	Income group	Score
1	Switzerland	Upper	0.255
2	Norway	Upper	0.257
3	Austria	Upper	0.284
4	Germany	Upper	0.293
5	United Kingdom	Upper	0.296
5	Sweden	Upper	0.296
7	Spain	Upper	0.300
8	Canada	Upper	0.301
8	Luxembourg	Upper	0.301
10	Czech Republic	Upper	0.303
11	Finland	Upper	0.310
11	France	Upper	0.310
11	New Zealand	Upper	0.310
14	Israel	Upper	0.316
15	Ireland	Upper	0.319
16	Australia	Upper	0.320
17	Iceland	Upper	0.321
18	Slovenia	Upper	0.322
19	Italy	Upper	0.323
20	Chile	Upper middle	0.325
21	Greece	Upper middle	0.327
21	Poland	Upper	0.327
23	United States	Upper	0.329
24	Portugal	Upper	0.335
25	Malta	Upper	0.338

World wide ranking by Readiness, higher scores are better.

ADJUST FOR GDP

Country Rankings

Rank countries by ND-GAIN Country Index, Vulnerability and Readiness.

Scores for 2020

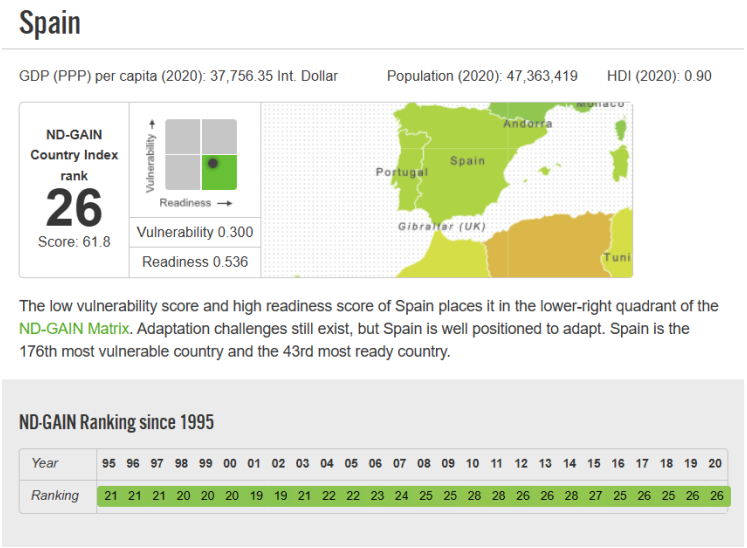
ND-GAIN INDEX | VULNERABILITY | READINESS

Rank	Country	Income group	Score
1	Singapore	Upper	0.804
2	Denmark	Upper	0.775
3	Norway	Upper	0.765
4	Finland	Upper	0.751
5	Monaco	NA	0.747
6	Republic of Korea	Upper	0.725
7	Sweden	Upper	0.723
8	Iceland	Upper	0.717
9	New Zealand	Upper	0.704
10	Switzerland	Upper	0.694
11	Australia	Upper	0.690
11	Germany	Upper	0.690
11	Japan	Upper	0.690
14	Austria	Upper	0.687
15	Netherlands	Upper	0.684
16	United Kingdom	Upper	0.683
17	Luxembourg	Upper	0.672
18	United States	Upper	0.653
19	Canada	Upper	0.652
20	France	Upper	0.649
21	Liechtenstein	NA	0.647
22	San Marino	Upper	0.631
23	Estonia	Upper	0.618

Figure 14: Ranking of Vulnerability and Preparedness in the 2020 ND Gain Index.

In vulnerability, Spain ranks 7th with a score of 0.300 (the top country, Switzerland, has a score of 0.255). In preparedness, Spain scores 0.536 (the highest-scoring country is Singapore with 0.804).

The profile of Spain [8] breaks down the results of all the indicators.



Spain

GDP (PPP) per capita (2020): 37,756.35 Int. Dollar Population (2020): 47,363,419 HDI (2020): 0.90

ND-GAIN Country Index rank 26

Score: 61.8

Vulnerability

Readiness →

Vulnerability 0.300

Readiness 0.536

The low vulnerability score and high readiness score of Spain places it in the lower-right quadrant of the ND-GAIN Matrix. Adaptation challenges still exist, but Spain is well positioned to adapt. Spain is the 176th most vulnerable country and the 43rd most ready country.

ND-GAIN Ranking since 1995

Year	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Ranking	21	21	21	20	20	20	19	19	21	22	22	23	24	25	25	28	28	26	26	28	27	25	26	25	26	26

Figure 15: Position of Spain in the scatterplot and annual assessment of ND Gain.

[8] Matrix // Notre Dame Global Adaptation Initiative // University of Notre Dame (nd.edu)

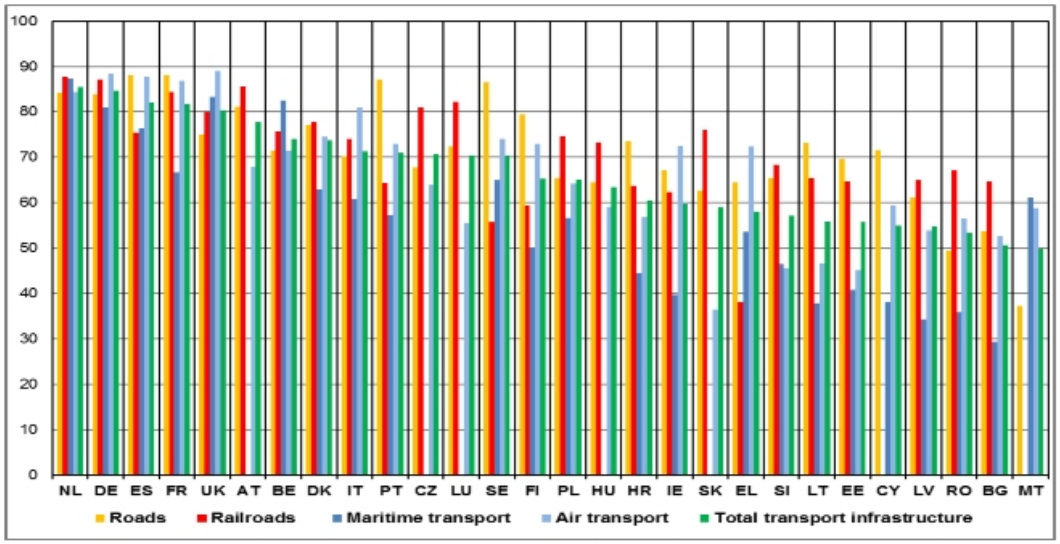
4.- "Transport in the European Union. Current Trends and Issues". European Commission [9]

In this report, published by the European Commission in March 2019 and led by the Directorate-General for Mobility and Transport, issues of mobility in the EU and the implications of transportation on climate change are addressed.

It contains information from all European Union countries on various transportation-related matters.

Of particular relevance is the classification of EU countries in relation to the satisfaction of their citizens regarding the quality of major infrastructures: Roads, Airports, Maritime Transport, and Air Transport. It also provides an overall assessment of the infrastructure across EU countries.

Figure 5: Satisfaction with infrastructure quality (2018)



Source: World Economic Forum, The Global Competitiveness Report database 2018. Scale from 1 to 100 [best]. The countries were ranked on their overall performance on transport infrastructure. Note that after a change in methodology, the 2018 edition of the Global Competitiveness Report is of limited comparability to previous editions.

Figure 16: Satisfaction with the quality of infrastructure, European Commission, 2019.

Below is the information on transportation in Spain along with indicators and a summary of the World Bank, World Economic Forum, and other OECD indices.

[9] https://ec.europa.eu/transport/sites/transport/files/2018-transport-in-the-eu-current-trends-and-issues.pdf

ANNEXE 6

Indicators from the main Spanish organizations for Airports.

In Spain, there are two fundamental organizations for providing airport data:

- Ministry of Transport, Mobility, and Urban Agenda: Observatory of Transportation and Logistics in Spain. http://observatoriotransporte.fomento.es/OTLE/LANG_CASTELLANO/
- AENA. http://www.aena.es/

The Observatory of Transportation and Logistics in Spain contains data and indicators from the following sources:

- Indicators.
- Database.
- Statistical Yearbook 2019.
- SISTIA - System of Indicators for Monitoring Transportation and its Environmental Impact.

The indicators are classified by types, and for each one, a fact sheet is prepared.

Figure 17: Classification of Indicators by the Ministry of Transport, Mobility and Urban Agenda.

The most relevant air transportation indicators are:

- Mobility
  - Air passenger transportation (passenger-kilometers) by type of traffic.
  - Air passenger transportation (tonnes) by type of traffic.
  - Number of flights by type of destination.
  - Number of seats offered in air transportation by type of destination.
  - Passenger-to-flight ratio by type of traffic.
  - Evolution of the occupancy rate (number of passengers transported/number of seats offered) by type of traffic.
  - Evolution of average aircraft capacity (relation between the number of seats offered/number of flights).
- Infrastructure and transportation capital
  - Public transportation infrastructure investments by mode.
  - Public transportation infrastructure investments by mode. Ministry of Transport, Mobility and Urban Agenda.

  - GDP unit intensity of public transportation infrastructure investments by mode.
  - Intensity of public transportation infrastructure investment relative to gross fixed capital formation in the public sector. Constant prices.
  - Airport density (number of airports per 10,000 km2).
  - Airport density (number of airports per million inhabitants).

- Safety
  - Number of accidents and serious incidents in commercial air transportation, general aviation, and other flight operations.
  - Number of aircraft involved in accidents and serious incidents in commercial air transportation, general aviation, and other flight operations.
  - Fatalities and serious injuries in commercial air transportation, general aviation, and other flight operations.
- Environment
  - Energy consumption in transportation (TJ).
  - Energy consumption intensity in transportation (TJ/million euros of constant 2010 GDP).