



This involves the **installation of new communication systems and technologies** between the airport, the aircraft and the control centre to **increase the capacity of Air Navigation Services**, the systems of which are expected to reach saturation in the short term due the growing volume of air traffic. Systems must follow the rules issued by **ICAO** (International Civil Aviation Organization) and **Eurocontrol** to operate under the new European standard for management of the Single European Sky, the implementation phase of which is in 2020. Among the new systems those specialising in **communication and navigation** that stand out are: the communication of digital voice, multichannel signal recorders; and in **surveillance systems** those that stand out are: primary and secondary surface radars.

ORIGIN OF THE INVESTMENT OPPORTUNITY

- ECONOMIC/BUSINESS**
- DEMAND**
- REGULATIONS**
- TECHNOLOGY**

At present, European air traffic management is done at national level and hence the fragmentation of airspace and ineffective operation arises, **the deficiencies of which represent a cost of about 4 billion euros.** ⁽¹⁾

Europe is one of the **busiest airspaces in the world (9.5 million flights in the year 2012 according to SESAR)** and with steady increase in air traffic (33,000 new aircraft in the world by 2035 according to Airbus). To avoid a "capacity crisis" due to the increasing the air fleet, Europe aims to **modernise the infrastructure for air traffic management** through the SESAR programme (technological pillar of the Single European Sky Initiative).

In December 2014 , the European Commission (EC) announced the beginning of the deployment phase (2014-2020) of the SESAR Programme (Single European Sky ATM Research Programme) with €3.7 billion aimed at developing common projects and modernising the air traffic management system.

At the technological level, air traffic control systems include traffic management capabilities for 4D trajectories, interoperability and conflict prediction.

LOCATION OF THE INVESTMENT OPPORTUNITY IN THE SECTOR VALUE CHAIN



The opportunity arises for **manufacturers of navigation systems** (and by extension to its network of suppliers) and for **integrators of the final solution**. Following the publication of the ATM Master Plan (SESAR Programme) the deployment phase begins in 2014. During this phase old ground equipment and aircraft systems will be replaced, both in Spain and internationally.

DIFFERENTIATING FACTORS OF THE INVESTMENT OPPORTUNITY

| CONSUMER/USER | COMPANY/INNOVATION | SOCIETY |
|---|--|---|
| <ul style="list-style-type: none"> Innovation Price Quality | <ul style="list-style-type: none"> Operations Supplies New business lines | <ul style="list-style-type: none"> Environment Well-being Safety |
| <ul style="list-style-type: none"> The unification of the Single European Sky is expected to result in more efficient flight paths in terms of time and costs for airlines. The implementation of the "Single European Sky" system will gradually reduce the number of international connecting flights compared to the current routes, with a consequent reduction in the duration of flights, lost luggage and fuel. | <ul style="list-style-type: none"> The introduction of new technologies based on a potential "capacity crisis", together with the involvement of European institutions to agree on standard technologies, gives companies the possibility of opening of new business lines focused on the replacement and installation of new systems to achieve technological uniformity across Spanish and European airports. | <ul style="list-style-type: none"> The revitalisation of air traffic and capacity building are elements of great strategic importance to Spain as a recipient of tourism and because of its islands being highly dependent on air transport. Especially with regard to ensuring safety of travel and reduce the environmental and economic impact that the current inefficient use of air resources pose to the economy and the environment. |

INVESTMENT OPPORTUNITY LIFE CYCLE

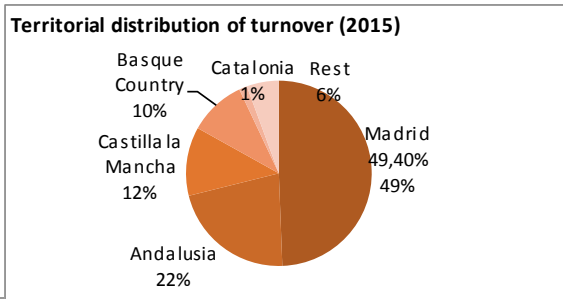
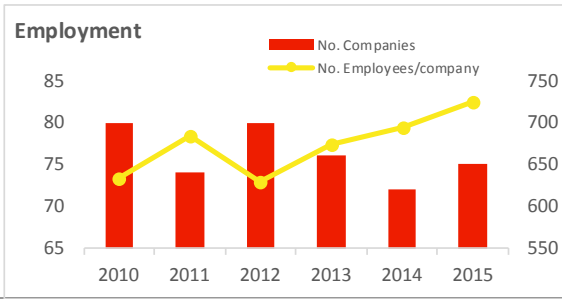
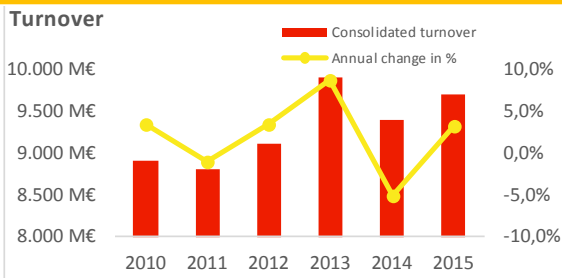


The opportunity is in a growth phase, driven by two factors. First, the maturity of the SESAR programme that is starting the third phase of deployment (2014 to 2020 and beyond) and in which the ATM Master Plan will be introduced, which means that there is a need for standard technology to be developed and implemented. Second, **the major players in the value chain** (suppliers of air navigation services and airports (ENAIRES, AENA's matrix), industry (INDRA), airspace users (IBERIA) and engineering consulting and research firms (INECO, ISDEFE)), **have actively participated in the development of the ATM Master Plan and are members of SESAR** which positions Spanish companies as a leaders at European level to actively participate in the transition to the single European system.

Sources: (1) "Modernization of air traffic management in Europe," European Commission (2008). Enaire (2012). AESA (2015). AENA (2015). IATA (2015). AIRBUS (Global Market Forecast, 2016-2035). SESAR (www.sesarju.eu, 2017).



CHARACTERISTICS OF THE AEROSPACE SECTOR (2)



SUPPLY

TOP 5 COMPETITORS IN SPAIN

| # | Company | Net sales | Last available data |
|---|--------------------------------|-------------|---------------------|
| 1 | INDRA SISTEMAS | €1,884.72 M | 2015 |
| 2 | INECO | €195.39 M | 2015 |
| 3 | INECO | €143.19 M | 2015 |
| 4 | FERRONATS AIR TRAFFIC SERVICES | €13.18 M | 2015 |
| 5 | ENAIRES* | N. avai. | - |

* Data not available in the queried database, INFORMA

DEMAND

GROWTH

In Europe there are over **4,500** airports, of which 938 are medium size, 153 are large capacity and 148 also have an IATA international code. **Medium and large airports** are potential customers and likely to adapt their navigation equipment. In 2015, there were **48 airports*** in Spain and 2017.4 million passengers, of which **16** are large (more than two million passengers), **17** are medium (**4** ranging between one and two million passengers and **13** range between half and one million) and the remaining **15** are small airports with less than 100,000 passengers annually.⁽³⁾

*This information applies only to the AENA network.

SUCCESS STORIES



Indra has for over 90 years provided Air Traffic Management systems worldwide, with more than **4,000 installations in over 160 countries**. Indra provides **comprehensive management solutions for air traffic at the airport**, including automation systems, communication, surveillance and navigation aids for the management of air traffic routes, approaches and airport surface control. INDRA is one of the partners with more importance in the SESAR program. In Europe, the company works with the main providers of air navigation services, such as ENAIRES (Spain), NATS (United Kingdom), DFS (Germany), LVNL (the Netherlands), etc.



Spanish public engineering company Ineco is responsible for the **planning of airspace and air traffic management (CNS/ATM, design and organization of airspace)**. INECO works in activities of the SESAR program, specifically, providing support to Eurocontrol in the development of the technical requirements and verification of the prototypes in the field of ATM/airport. It is also noteworthy its design of flight procedures for the airports in Muscat and Salalah in the Sultanate of Oman, as well as for Changi Airport in Singapore. The company has developed the satellite-based air navigation procedures (GNSS) for the international airports of Boa Vista and Sao Vicente in Cape Vert. They have provided systems design of ATM in Mozambique.



Thales Group is a French electronics company. It has 62,000 employees in 56 countries and dedicated to the development of **information systems and services for aerospace, defence and security**. In Spain, they employ 1,200 people in 13 facilities. For the aviation industry, Thales Spain provides a full range of **equipment and on-board systems for all types of aircraft** (civil aviation, military fighters, helicopters and UAVs). Its main activities include avionics for aeroplanes and for Tiger and NH-90 helicopters. It also builds flight simulators for the A400M, A300, A320, etc. and radio navigational aids for AENA.



POSITIVE FACTORS FOR INVESTING IN SPAIN

Favourable factors in Spain for the development of the opportunity

Aviation industry among the best in Europe

The Spanish aeronautical industry is ranked **5th in Europe in terms of turnover** and has a high investment in R+D+i at 10.8% of turnover in 2013, 8 times the average for R+D in Spain in 2013. Aerospace is, alongside the biotechnology sector, the sector with the highest percentage of resources allocated to innovation in Spain. INDRRA appears in the business innovation rankings of the European Union, with a R&D investment accounting for more than 150 M. €.

High participation in the European SESAR programme

The SESAR community brings together 70 organisations representing the entire aviation community, among which are **relevant Spanish companies and research organisations**, among which Indra, a company involved in 124 of the 302 SESAR projects, leading 28 of them, stands out.

Tax breaks to boost R+D+i

There are advantageous tax arrangements aimed at making **innovative projects** profitable in Spain. The research and development of technological innovation are subject to a **system of tax breaks** that can reach 42% of annual business spending. The tax system is compatible with domestic and European subsidies such as those from the **Clean Sky 2 programme, part of Horizon 2020**. ⁽⁵⁾

Social factors and habits

Spain is one of the countries with a highest amount of passenger air traffic. During the year 2015, the number of passengers in commercial flights in the Spanish air market grew by 5.9%, accounting for 207.42 million. According to the Spanish Ministry of Infrastructure, it is expected that the total number of passengers in year 2016 accounts for 230 million. All of the elements that contribute to the improvement of air infrastructure, contribute to improved systems for all connected actors.

Favourable factors for the sector in Spain

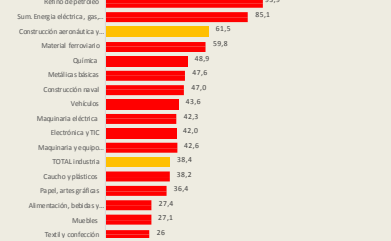
Macroeconomic situation

The **Added Value** of the aerospace sector in 2014 was **1.87 billion euros**, representing **1.47%** of the manufacturing sector. **Sector exports totalled 4.68 billion euros**, representing 2.18% of the exports of the industrial sector. ⁽⁶⁾

Labour market

The **average productivity per employee** in the aerospace sector is **93,600 euros** per year. Their **average individual remuneration** is **61,500 euros** per year. The **Unit Labour Cost** accounts for **65.7%** of the ratio between the remuneration per employee and the individual productivity (productivity defined as value added per employee). ⁽⁶⁾

Remuneration per employee (thousands of €)



Graph created using data from Sectoral Presentation: construction and aerospace sector. April 2015. Ministry of Industry, Energy and Tourism

Incentives

Spain has the **Strategic Plan for the aviation sector 2008-2016**, which includes a framework for aid under the collective name of the **National Aeronautics Plan**. Among the aid programs envisaged, the Strategic Technology, Research, Infrastructure and Programmes stand out, as well as the Technology Development Plan for the Auxiliary Industry. Furthermore, there are other cross-sectional programmes promoted by the CDTI such as the *línea Directa de Innovación*, the *línea de Innovación Global*, *Invierte* and *FEDER (ERDF) Ininterconecta*.

I+D+i

There are 33 **innovative companies** in the automotive and aerospace sector and the **percentage** of innovative companies is 64.7%, **spending** a total of 511 million euros on innovation. ⁽⁷⁾

Suppliers, Supplies, Raw materials

Spain has a **complete manufacturing chain** including aircraft and systems certification. TEDAE also states that the Spanish supply chain is structured to be able to expand its capacity to supply internationally, highlighting first level suppliers.

Geographic location

Spain is **within reach of three main regions**: the **European** region, the **Mediterranean** region and the **Atlantic** region. Spain is considered to be the gateway between North Africa and Europe, and a key link to Latin America, not only because of its geographical location but also because of its strong historical and cultural ties with the region. In Spain the **Canary Islands** play a key role with regards to **maritime traffic** with **West Africa**.

Technological and research infrastructure

Spain has R+D+i centres available to the industry. In particular the **horizontal stabilizers centres of excellence** responsible for the worldwide fame that Spain has in their manufacturer. In terms of development of new materials, Spain is **3rd on a European level in terms of turnover** and has an **Airbus Advanced Composites Centre**, one of three centres of excellence across the world for carbon fibre, and the FIDAMC (Foundation for the Research, Development and Application of composite materials).

Spanish airport network.



Graph created using airport locations listed on the AENA website (2015).

Transport infrastructure and logistics networks

There are **168 airlines** operating in Spain in its 47 airports; its high-speed rail network is the 2nd best in the world and the best in Europe; it is ranked **1st in the EU for its motorway network**; and it has excellent sea connections to its **46 ports** distributed along the Atlantic and Mediterranean coasts. ⁽⁸⁾