



This consists of **convert the data from earth observation from a satellite to generate useful knowledge** to plan, monitor and manage infrastructure, control health or agricultural work safety risks, environmental monitoring to warn, for example, farmers of threats such as as pests, drought, frost or monitoring of livestock.

Currently the scientific community operates terrestrial observation data, however satellites collect information of great interest to other significant groups, such as agricultural or civil protection. **The opportunity lies in opening processing centres for satellite data (public and/or private) and, also, in creating cloud solutions for computers and mobile devices.**

Origin of the investment opportunity.



On the spatial level, there are applications markets upstream and downstream. The first is based on the observation of space; while the second focuses on earth observation. The turnover of the downstream applications is **ten times higher** than upstream.

A part of the scientific demand, there are **unmet needs** in business sectors such as agriculture and civil protection due to the shortage of **applications**. To promote satellite applications, the EU launched the "First Call For Innovative Apps in the environmental and social domain" under the MYGEOSS programme to promote the development of applications.

Besides the MYGEOSS Programme, Spain has the Centre for Acquisition, Processing, Archiving and Dissemination of images that gives access to **information collected by satellites** to different bodies or companies to facilitate the development of technologies and applications on PCs and smartphones.

At the technological level, Spain has a consolidated industry and spatial operators helped by the National Plan for Earth Observation Satellite (**PNOTS**) which is aimed at placing in orbit and operation of two satellites for earth observation with dual-use: military and civilian.

LOCATION OF THE INVESTMENT OPPORTUNITY IN THE SECTOR VALUE CHAIN



The business opportunity lies in the **operators** link, namely the tasks associated with "**data processing and exploitation**". Mainly for two reasons: first, easily exploitable and understandable information is not processed and made available to third parties ; second, the absence of easily interpretable applications, to optimise the economy of the collective potential (e.g: Agriculture).

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 resulting applications will target both meeting the needs of individual users and business. • End users will have better information available, for example, on air quality in real time. • Business users (agriculture, livestock and transport) will take the best decisions reducing the uncertainty generated by the environmental conditions. | <ul style="list-style-type: none"> • The opportunity opens the possibility of investment in two business areas: data processing and development of business applications. • Data processing opens doors to information technology companies for generation of exploitable information by third parties. • The development of cloud solutions with information tailored to the user's needs gives access to hidden demand | <ul style="list-style-type: none"> • The effects of the exploitation and use of information from space observation benefit welfare, safety and environmental sustainability. • The availability of interpretable information facilitates decision making allowing for damage from natural causes (disasters, plagues, etc.) to be minimised and the optimisation of production processes in order to avoid food shortages and protect people against price fluctuations. |

INVESTMENT OPPORTUNITY LIFE CYCLE



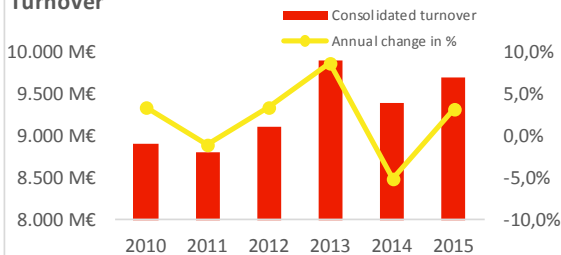
The opportunity is being introduced because, although Earth Observation satellites from the ESA (European Space Agency) constantly collect data and feed several applications, these are mostly restricted to the scientific community. **Reaching the business market and the individual consumer is the big challenge.**

It is anticipated that as the number of users increases, the demand for data will feed growth and therefore, new image-processing centres and cloud applications will be created to **meet the new demand.**



CHARACTERISTICS OF THE AEROSPACE SECTOR (1)

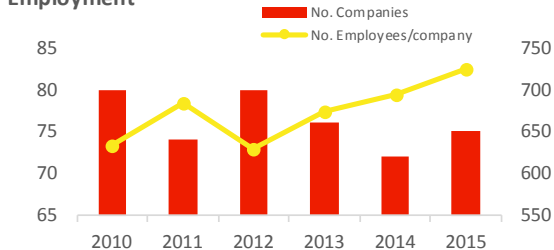
Turnover



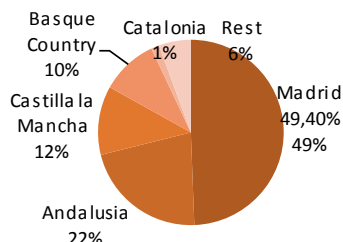
Exports



Employment



Territorial distribution of turnover (2015)



SUPPLY

TOP 5 COMPETITORS IN SPAIN

| # | Company | Net sales | Last available data |
|---|-------------------------------|-----------|---------------------|
| 1 | Elecnor | €1,075.4M | 2015 |
| 2 | HispaSAT | €87.87 M | 2015 |
| 3 | GMV Aerospace and Defence, SA | €67.1 M | 2015 |
| 4 | HisdeSAT | €61.31 M | 2015 |
| 5 | Sener Aeroespacial | €13.6M | 2015 |

DEMAND

GROWTH

- The observation of Earth by satellite is experiencing an global growth of **103.13%**, with **260 satellite launches** planned between 2009 and 2018, compared with 128 launches during the previous decade.
- In December, 15th 2016, the European Commission announced the beginning of the Galileo services, which means one more step to its full operation in 2020. It is expected that the Galileo infrastructure contributes to the market of applications and services of satellite navigation. This market is estimated to reach 135,000 M. € in 2025 by the GNSS European Agency (GSA).

SUCCESS STORIES



Leading company in providing satellite images. It has **every link in the value chain** integrated into its corporate structure, from the operation of the satellite to design customized solution. The total control of each phase results in faster execution times and punctual deliveries to its customers. Elecnor Deimos has facilities in Castilla-La Mancha that represent the company's satellite integration centre.

Elecnor Deimos owns two observation satellites, two ground monitoring and image downloading facilities, and a processing unit and data delivery service.



GMV is the **world's leading independent provider of Ground Control Systems** (also in data processing systems) for operators of commercial satellites and is ranked as the **3rd European company by volume of participation in Galileo**, a global leader in telematics systems for transport public. GMV is one of the most important companies in the space industry in the world, according to the ranking TOP-50 "**Space Manufacturing and Services List**", compiled by "**Space News**". In October 2016, the EC awarded GMV a framework contract, which is set to last 4 years, for the supply of the infrastructure of the return channel of the search and rescue services in the Galileo program.



SENER is a company with 40 years of experience that has provided more than **270 pieces of equipment and systems with no failures**. The company is an expert in space mechanisms; guidance systems, navigation and control; engineering and integration of Actuation and Control; ISR systems (Intelligence, Surveillance and Reconnaissance). It is worth mentioning that it was the first Spanish company to win a contract for the European Space Agency (then ESRO) in 1967. Since then, SENER has participated in **ESA and NASA** missions such as the Hubble Space Telescope, Columbus, Envisat, Rosetta, Meteosat, Herschel and Planck, Metop, Mars Science Laboratory and GAIA, as well as trade missions as Hispasat, Spainsat and XTAR -EUR. It is the contractor company of the Proba-3 program, for demonstrating orbital platforms and payloads.

Sources: (1) TEDAE, "Cifras TEDAE 2015". TEDAE (2016). GMV (2015). ELECNOR (2016). SENER Aerospace (2016). Eleconomista.com (companies ranking). Data bases Orbis and Informa.



POSITIVE FACTORS FOR INVESTING IN SPAIN

Favourable factors in Spain for the development of the opportunity

Spanish space industry relevant at European level

Spain is the 5th European country in terms of employment and turnover in the space sector. The Spanish company HISPASAT stands out, which is the **8th largest operator** of telecommunications satellites in the world and **4th in Latin America**. In the field of navigation systems satellites, **SENER** leads at EU level the development an effective technology for the formation flying of satellites. (2)

Two latest generation satellites of its own

It is expected that with the launch of the satellites themselves (**Paz and Ingenio**), Spain will gain autonomy and independence in Earth observation and the data available regarding its own territory. Paz is the first Spanish observation radar, and it will probably be in orbit before the summer of 2017. Ingenio will provide high resolution optical images. In December 2016, Spain got the support of the ESA to look for a launcher to put in orbit this satellite in maximum two years time.

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**. (3)

Social factors and habits

The effects of the exploitation and use of information from space observation benefit welfare, safety and environmental sustainability. The **availability of interpretable information** facilitates decision making allowing for the reduction of damage from natural causes (disasters, pests, etc.).

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 **4,67 billion euros**, representing 2.18 % of the exports of the industrial sector. (4)

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). (4)

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. (5)

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 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). Regarding the collection and processing of data, Spain has **one of the main five ESACs** (European Space Astronomy Centres), and the **CREPAD**, a data processing centre that offers any user pictures and processed data.

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. (6)

Sources: (2) Brand Spain, "Spanish Companies in the World" (2015). (3) Alma Consulting Group. (4) MINETUR, "Sectoral presentation: aerospace and construction industry" (2015). (5) Innovation in companies Survey 2015 (NACE 30) (6) Brand Spain, "Foreign investment in Spain and its socio-economic contribution" (2015); Ministerio de Fomento (DGAC): Coyuntura de las compañías en el mercado aéreo en España (August 2016).