AJUNTAMENT DE VILADECANS

STRAIR
CONNECTING AIRPORT REGIONS

ENCOURAGING AEROSPACE CLUSTER DEVELOPMENT
The Case Of The Barcelona Airport Area

Ajuntament de Viladecans (Barcelona)
(Viladecans Town Council, Barcelona)

Innovation and Bussines Development indirectly related to airports

Strair
Strategic development and co-operation between airport regions

Initiative INTERREG IIIC North

Airport Regions Conference

European Union

GP Gestió i Promoció Aeroportuària

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Verd The study has been carried out by the Viladecans City Council, based on the European community initiative INTERREG III C North, within the sector based on indirect activities related to airports. Its objective is to determinate measures or recommendations which could be used in the creation of an aerospace cluster in the Barcelona airport catchment area.

Action for the development of airport facilities in Europe. Two study cases.

"Developing a Joint Action Plan for Business Development around Stockholm Arlanda Airport"
Stockholm Arlanda partnership

"Encouraging Aerospace Cluster Development. The case of the Barcelona Airport Area"
Ajuntament de Viladecans (Barcelona) (Viladecans Town Council, Barcelona)

Strair Strategic development and cooperation between airport regions

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Presentation

STRAIR – Strategic Development and Cooperation between Airport Regions – is an Interreg III C project focusing on the following issues:

- Directly airport-related business development
- Indirectly airport-related business development
- Land use and environmental impact in the airport hinterland

The STRAIR project, which was formally approved by the Interreg III C North Zone Steering Committee in its decision of 10 January 2005, will last until the second half of 2007. The lead Partner in the STRAIR project is the Office of Regional Planning and Urban Transportation/ Stockholm County Council, with SNP/Gardermoen as Functional Lead Partner.

The following airport regions and partners are participants in the STRAIR project:

- Oslo/SNP/Gardemoen Airport
- The Office of Regional Planning and Urban Transportation, the Uppsala Regional Development Council, the Board of Civil Aviation Stockholm Arlanda Airport, Sigtuna Municipality, Upplands Väsby Municipality, Vallentuna Municipality and Knivsta Municipality/Stockholm Arlanda Airport.
- Härryda Municipality/Landvetter Airport
- West Vlaams Intermunicipality/Ostende Airport
- Renfrewshire Council/Glasgow Airport
- Viladecans/El Prat/Barcelona Airport
- Sociedad Canaria de Fomento Economico SA PROEXCA/Canary Islands Airports

The Partnership in the Stockholm Arlanda region (Stockholm Joint Venture) and Viladecans/Barcelona Airport is collaborating in the STRAIR project on the principal issue of indirectly airport-related business development, and they are jointly responsible partners for Component 3, Innovation and business development indirectly related to airports. Within Component 3, Viladecans is carrying out a study into the prerequisites for, and feasibility of, a planned Catalan Aerospace and Mobility Park in Viladecans, near the Barcelona Airport.

For the Stockholm Arlanda region, the objective is to produce a joint action plan for business development in Stockholm Arlanda Airport's hinterland in a cooperation between the actors involved, i.e. local and regional actors, companies, financial institutions, real estate owners, other representatives of the business community, etc. The action plan is to identify – in a local and regional perspective – those needs and key factors that are strategically important in a short and long-term perspective in the creation of good conditions for education, training and skilled manpower supply, accessibility, supply of land and premises, and services to the business community in Stockholm Arlanda Airport's hinterland. The action plan is intended to coordinate this work, with the objective of promoting positive business development in the Stockholm Arlanda Airport's hinterland and positive development of Arlanda Airport. The effects of the project will also be disseminated beyond the immediate airport region, in other areas further away from Stockholm Arlanda Airport region. In the first place it will be disseminated in the Stockholm-Mälar region.

The same is true for the Viladecans/Barcelona airport region; the Baix Llobregat area – especially the towns of Viladecans and Prat de Llobregat, which actively take part in the considerations provided in the STRAIR objectives –, and the Barcelona Metropolitan Area (we must not forget that the Catalan Aerospace and Mobility Park in Viladecans, is one of the "strategic projects" in Barcelona's Strategic Metropolitan Plan). These are the geographic regions most directly affected, but the economic effects created by the Barcelona Airport extends across the whole Euro-region –integrated by the Spanish Autonomous Communities of Aragon, Catalonia, the Balearic Islands and the French regions of Midi-Pyrénées and Languedoc Roussillon–, as well as the neighbouring Valencian Autonomous Community and, in fact, all of Spain and the Western Mediterranean.

Introduction to Component 3 – Indirectly airport-related business development

Two studies have been produced within the component 3 - Indirectly airport-related business development. "Developing a Joint Action Plan for Business Development around Stockholm Arlanda Airport" by Stockholm Arlanda partnership and "Encouraging Aerospace Cluster Development - The case of the Viladecans/Barcelona Airport Area" by Ajuntament de Viladecans (Barcelona) (Viladecans Town Council, Barcelona). The two studies can provide the basis for fruitful collaboration between the Stockholm Arlanda Airport and Barcelona Airport regions in their strategic thinking processes and, potentially, in relation to specific actions where synergies can be identified.

While this benefit was not explicitly recognized at the outset of the projects, the continued dialogue between the two Regions and the initial outputs from the work have drawn attention to the similarities and the areas of common interest.

The airport regions of Stockholm Arlanda and Viladecans/Barcelona provide very interesting similarities. While the two studies have looked at quite separate issues in relation to business development around airports there are strong complementary elements which allow the cross-fertilisation of ideas at the regional level.

Description of the Stokholm Arlanda Airport and Viladecans/Barcelona Airport Regions

In 2005 the Stockholm Arlanda Airport handled 17.1 million passengers, 5, 2% more than the previous year, and 145.000 tons of freight traffic (airborne cargo), ranking eighteenth in Europe regarding passenger volume. Additional 170.000 tons of freight as Airway Bill is carried by truck to other airports, mainly to Copenhagen, Frankfurt and Amsterdam,

In 2005 Barcelona handled 27.1 million passengers, 10.5% more than in 2004, and 97.208 tons of freight, making it the ninth largest airport in Europe by passenger volume. It is also the fastest growing airport in Europe amongst the group of airports handling more than 20 million passengers per year.

In Stockholm's case, approximately two-thirds of the total passengers corresponded to international flights, while in the case of Barcelona only half of the total passengers were on international flights. Nevertheless, in both cases the aforementioned figures cover up the lack of long haul air services. With respect to Stockholm Arlanda, the offer of seats on intercontinental flights is around 10% of

those sold, while in Barcelona it is around 4%1. In both Stockholm and Barcelona, the corresponding local and regional administrations, development agencies, chambers of commerce and other stakeholders consider that this represents a weakness that must be solved, since the increase of accessibility is one of the highest priority aims in their respective territorial action plans.

In Stockholm's case achieving an improvement in intercontinental connectivity is seen as an essential measure. The study points to the development of territorial marketing, clearly identifying the need for the airport to work with a wide range of public and private sector organizations to develop the air services required, as well as the need to develop a coherent "product" combining business and tourism for the airport region as a whole to assist in attracting airlines to launch these economically valuable services. The project partners are seeking to work with a wide variety of sectors and agencies, particularly the traditionally strong logistics sector in the region, to bring about these changes.

Viladecans/Barcelona has gathered knowledge and important capabilities in the field of international marketing. The Port of Barcelona is the leading port used by Mediterranean cruise ships. It reached just over 1.2 million cruise passengers in 2005 and has a forecast of 1.4 million for 2006. In Stockholm, the cruise activity is not a big business today but the growth and the customer satisfaction have already reached a top level.

In both cases, logistics services are part of the directives of their development strategy.

In the same way that Stockholm has a good geographical location regarding the Baltic Sea and the Northern European markets; Viladecans/Barcelona has the same position regarding the Mediterranean sea, which means that there are practically no physical limitations in navigating the Suez Canal. At the moment, the Port of Barcelona handles more than 40 million tons of freight and more than 2 million TEU (Twenty foot Equivalent Unit) in containerized freight. When the important expansion works are completed in 2008, capacity will be increased to 85 million tons and 4.5 million TEU respectively.

There are currently no capacity problems foreseen in relation to Stockholm Arlanda's Airport infrastructure. The possibility of building a fourth runway at Arlanda airport has been foreseen by regional and national stakeholders, as well as significant improvements in surface access.

This is also true for Viladecans/Barcelona. Complying with the Director Plan, which was approved in 1999, a new runway came into operation in 2004 and a new control tower is being built along with a new high capacity terminal which is due to open in 2008. At the same time, surface access has been improved through the underground system, the extension of the regional railway infrastructure and a train station for the high speed train on the Madrid – Barcelona – French border rail link.

Currently, important talks about the possibility of expanding the airport on land reclaimed from the sea are also going on, which would allow capacity to be increased significantly.

Economical activities in the airport regions

Sweden has a number of important initiatives regarding intensive business activity in research and development. Defined clusters of the Stockholm region2 are, for example, ICT (e.g. Kista Science City), Life Science/Biotech (e.g. in Uppsala), Banking and Finance, Logistics and Health. It is a high degree of intensity of universities and R&D institutions in the Stockholm region, e.g. The Royal

1 Source: OAG
2 www.stockholmbusinessregion.se

Institute of Technology in Stockholm and Karolinska Institutet, a leader in the academic medical field in Sweden, the Nordic region and the international arena. The tourist industry will hopefully be one of the important industries in the region in the future, under the prerequisites that necessary resources are distributed for marketing the Stockholm destination.

One example of business and research activity in the wider Stockholm-Mälar region is Mjärdevi Science Park in Linköping, where also the SAAB Company has important business activities.

As far as Barcelona is concerned the core activity in research and development is of an equally high standard; in universities as well as in companies and applied research and technology transference institutions present in different activity fields. Apart from the already established centers, we must make reference to the Parque Científico de la Biomedicina de Barcelona (Barcelona Biomedical Science Park, created in May 2006, and in particular the Catalan Aerospace and Mobility Park in Viladecans, which is included in the second study case presented and which will become the future technology park for the space and aeronautical as well as mobility industry a basic component of the cluster to be developed.

The Airport organizations

As far as airport management is concerned, both Stockholm Arlanda airport and Viladecans/Barcelona Airport are administrated by a state run public institution.

In Sweden, Swedish Civil Aviation Administration (LFV - Luftfartsverket) is a public company that administrates 19 airports and is responsible for air traffic control services. It billed $794 million in 2004, with operating overheads at $70.2 million and a net profit of $16.9 million.3.

In Spain, AENA (Aeropuertos Españoles y Navegación Aérea) is a public institution assigned to the Ministry of Public Works and administrates more than 40 airports and is likewise responsible for air traffic control. In 2005 it generated revenue of $2,615.5 million, with operating overheads at $311.8 million and a net profit of $34.5 million2.

Both organizations are sensitive to market changes in air transportation. According to LFV, greater access to air travel at lower prices in the larger airports has led to a greater concentration of traffic in the large airports and a significant decrease of traffic in many smaller airports, which leads LFV to believe that it could be advantageous, both for the local regions and itself, to transfer some of the smaller airports to local or regional administrations.

On the other hand, LFV has created a joint venture company with Amsterdam Schipol Airport, the Arlanda Schiphol Development Company AB, whose aim is the commercial development of shops, restaurants and other commercial services, with the objective of increasing the commercial profits of Arlanda airport and those of LFV itself.4.

There is also an important political debate in Spain about the need to develop the system of airport administration to adapt it to the important changes in international tendencies in the air transport market, the increasing competition between airlines and the consequent competition between airports and airport regions.

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3 Airline Business; December 2005.
4 Luftfartsverket; Annual Report 2005.

The Ministry of Public Works has defined some priorities for the air transport system for the period 2005 to 2008; emphasizing the objective of consolidating a system of hub airports, based around Barcelona and Madrid, from where most intercontinental traffic has to be developed, and the need for independent airport administration and the Autonomous Communities' participation in the system. An Air Transport Sector Plan will be drawn up to establish the execution of these and other objectives with a deadline fixed for 20125.

On the other hand, a subsidiary of AENA, Aena Desarrollo Internacional, S.A., a company with AENA as sole partner, is seeking to internationalize the parent company's activity. Through this company AENA is involved in the administration of airports in Columbia, Cuba, Mexico and the U.K.

As far as Barcelona is concerned, the development of new air routes is undertaken through the collaboration of diverse institutions, namely, the airport administration (AENA), local and regional administrations (the Catalonian Government and Barcelona Town Council (Generalitat de Catalunya and Ayuntamiento de Barcelona) and public corporations representing the business world; the Barcelona Chamber of Commerce (Cámara de Comercio de Barcelona).

In fact, the Barcelona Air Route Development Committee (BARDC), has been operative since the third quarter of 2005 and made up of the institutions and bodies mentioned in the preceding paragraph.

BARDC has three basic functions:

a) To identify through market studies the economically viable air routes to be developed from Barcelona airport, with emphasis on long haul flights;

b) Propose the establishment of routes identified in the above mentioned point to the airline companies;

c) Once a new route has been decided upon and launched, it collaborates with the airlines to promote and make public the new services.

From 2005 on, BARDC's activities have achieved the following results:

Destination	Airline	Frequency	Beginning	Ending
Philadelphia (USA)	US AIRWAYS	1 daily	11May06	28oct06
Buenos Aires (Argentina)	AEROLINEAS ARGENTINAS	2 weekly	07Oct05	All year round
	AIR MADRID	2 weekly	29Oct05	All year round
Santiago de Chile (Chile)	AIR MADRID	1 weekly	27Oct05	All year round
Bogotá/Cartagena de Indias (COLOMBIA)	AIR MADRID	1 weekly	30Oct05	All year round
Quito/Guayaquil (ECUADOR)	AIR MADRID	1 weekly	22Feb006	All year round

5 Plan Estratégico de Infraestructuras y Transporte; Ministerio de Fomento, Sercretaria de Estado de Infraestructuras y Planificación; dicienmbre 2004. (Strategic Plan of Infrastructures and Transport; Ministry of Public Works, Secretary of State for Infrastructures and Planning; December 2004)

Fortaleza (BRASIL)	AIR MADRID	1 weekly		All year round
Newark-New York (USA)	Continental Airlines	1 daily	18May06	All year round
Tallinn	Estonian Air	4 weekly	15May06	All year round
Singapore	Singapore Airlines	3 weekly	July06	All year round

In the Stockholm Arlanda Airport Region, LFV have been working closely with a number of public sector stakeholders, such as Stockholm Business Region, Invest in Sweden Agency, Stockholm Visitors Board and Visit Sweden on the Stockholm Access project. This project specifically focuses on the development of economically advantageous routes for the Region through partnership working to develop the offer to airlines. So far this project has had a number of important successes, including the development of considerable capacity in the key German markets and the recent development of the Kuala Lumpur, Stockholm, New York service.

Synergies amd issues examined in the two studies

Both studies have as a global aim to define an action plan to promote economic development around their respective airports. However, as far as Stockholm is concerned, this is based on capturing greater economic benefits across a wide range of activities through the more effective use of Stockholm Arlanda Airport as a regional economic driver, while in the Viladecans' study the basis on which the economic development plan is to be built is only indirectly tied to air transport, with more emphasis on the aerospace industry.

The challenge for the Stockholm Arlanda airport region is essentially to establish a "virtuous circle" of growth between the growth of the airport and the economic growth in its area of influence by creating the best possible conditions for business development linked to the services that the airport provides. At this early stage, the project has sought to examine the areas in which the public sector partners involved in the STRAIR project can work with the Airport Company and other private sector organizations to better understand the needs of business in relation to the airport and the areas where it can influence activity and assist in supporting this development.

The Viladecans' proposal also follows this broad model of economic development through partnership working, going even further at this stage in seeking to foster strategic collaboration between the private and public sectors.

The Viladecans' project is encapsulated in a "governing body" defined as a forum where public decision making is shared by all the different public and private groups involved in the project. The governance and driving force for the work around Stockholm is an area to be examined in the next phase of the Viladecans Project.

In fact, the project to establish the Catalan Aerospace and Mobility Park in Viladecans started in 2003, with an agreement between the Generalitat de Catalunya (the Catalonian Government), el

Ayuntamiento de Viladecans (the Viladecans Town Council) and the Cámara de Comercio de Barcelona (Barcelona Chamber of Commerce), whose aim was a joint study of the suitability of the proposal and the presentation of said approved proposal by a technically based Committee to the government bodies and institutions implicated in the signing of said Agreement. This initial course was reinforced by information drawn from international experience in the development of clusters; that it is an almost unattainable goal to achieve without the cooperation of both private and public sectors.

Both studies look at the use of land. As far as Stockholm is concerned this is in relation to the availability of land for future airport and business development at a broad strategic level, while for Viladecans land purchase costs are analysed. It gives some ideas and proposals for overcoming the problems arising to carry out the project.

Both studies end up proposing some action strategies

For Stockholm, a broad outline strategy for further development is set out. Initially it establishes a series of cross-cutting themes for stakeholders in the Airport region to build upon:

1) Improving partnership working between stakeholders;

2) Defining a shared "vision" for the Arlanda Airport Region;

3) “Selling” the Arlanda Airport Region in international markets;

4) “Selling” the benefits to be had from airport expansion to local communities and politicians;

5) Involving the companies connected with airport activity in economic development;

6) Extending the responsibility for air route development.

The strategy goes on to identify a series of actions in relation to four specific themes or “drivers for success”:

1) Foreign investment and international trade;
2) Tourism and marketing;
3) Employment and training;
4) Logistics and air freight.

Regarding the Viladecans study, there are some industrial policy recommendations, based on initial observations that the location of aeronautic industry activity, especially in the final stage of aeroplane manufacture, tends to be centralised in a few places at worldwide level. Business activity providers, on the other hand, tend towards a certain international dispersion following, nevertheless, sound economic criteria.

This industry's features explain why it is considered to be an important driving force for regional economic growth. The debate continues to range between the affirmation that it wouldn't be viable to try and build an activity sector against market tendencies, to the observation that the location of an aerospace cluster in Viladecans, close to Barcelona Airport is feasible; because it follows the line of market location criteria, providing there is a real public – private collaboration project supporting it.

Setting out from this position, the study ends up suggesting the following lines of action:

1) A shared definition of a growth model for the aerospace sector in Catalonia;

2) The stimulation for geographical concentration of these activities in the Catalan Aerospace and Mobility Industry Park in Viladecans;

3) Support for industrial sector activities;

4) Coordination of business organization activities in the development phase of the aerospace cluster;

5) Establishment of follow-up procedures and assessment of results obtained from developing the cluster, so as to continue directing the activities assigned for its promotion.

Future Collaboration

From the similarities found between the airport regions of Stockholm and Barcelona and the complementarity of the studies carried out on how to foster economic development in the Arlanda airport region and how to manage the establishment and development of an aerospace industry cluster in Viladecans, it is our belief that there is common ground where the collaboration between Stockholm and Barcelona and their respective airport regions is not only feasible but could, in fact, be advantageous to both.

Obviously this relationship will need to be worked upon and is dependent on a range of factors, however we feel that through the work already undertaken that one of the key aims of the STRAIR project has been achieved, the exploration of the possibilities for collaboration between different airport regions within the member states of the European Union.

In relation to the future collaboration between our two regions, we would like to point out two particular areas of activity:

- the experience gained in the Stockholm region, in its wider sense, with regard to the development of the aerospace industry sector close to some technology parks as well as the public policies followed for their development, could be of great use for the development of the Catalan Aerospace and Mobility Park in Viladecans, and certainly through the exchange of experiences, mutual interest business collaboration projects could emerge;

- from the Viladecans/Barcelona perspective, the Barcelona airport region could furnish Arlanda with the knowledge and experience gained in relation to a number of issues raised in the scoping report, particularly around international marketing, the development of coherent business and tourism products and activities in relation to supporting the development of new air services.

The work to be undertaken from now on, based on the studies presented, will be the decisive factor in determining the extent to which the Stockholm Arlanda Airport and Viladecans/Barcelona Airport regions can benefit from each others experiences.

Barcelona, 12th of May 2006

MEASURES FOR THE ENCOURAGEMENT OF AN AEROSPACE CLUSTER IN THE BARCELONA AIRPORT AREA

1. INTRODUCTION

The document study has been carried out together with the project development of the aerospace park in Catalonia, in the industrial area of Can Alemany, located in Viladecans: as background information immediate studies of "Feasibility Study about a Catalan Aerospace Park"[1] and "Study on an industrial park specializing in the aviation and mobility industry"[2] ordered by the Viladecans City Council and carried out by GPA. The study conclusions already made, point out Viladecans as the perfect place to take in an aerospace park and confirm, that given the lack in size of the aerospace industry in Catalonia, the success of the project development is conditioned upon the support given by: the administrations, in charge of territory planning, industry, business and financial community as well as the university.

The aerospace industry is a global economy sector, due to the low cost in transport, but with a low and very important economic regional stimulation. This supposes a strategic sector, which generates very qualified job positions and stimulates research, development and innovation of the whole economy. In a few years Catalonia, has increased in a very important way its participation in the Spanish aerospace sector, going from 0.9 to a 4 percent. The sector revenue per employee was 113,209 EUR (2004), higher than the average in other industrial sectors.

Betting for the aerospace sector supposes a strategic cluster; France with Toulouse and Burdeos, the United Kingdom with the Midlands, Germany with Hamburg, Spain with Madrid, Seville and Vitoria, important cities references focused on the territory concentration of companies in the same sector. The existence of a cluster also makes possible the creation of possible common services such as applied research, testing laboratories, and the direct exchanges between the university and company, also contributing to a cooperative competition generation between companies, very necessary and essential in this particular sector.

The implant of the aerospace sector doesn't suppose as many costs as in other sectors. Due to this high tech level sector, usually located close to urban areas, is known for having very high prices.

Nonetheless, we have to point out, that the aerospace sector, at a long term, gives more value to land rather than any other sectors.
Besides the consortium which has to be created, for the set up of all development park activities; urban wise as well as trade's wise , it is very important to have a favourable industrial policy which will allow to save some of the barriers in the creation of a cluster, specially when balancing out the financial effort of companies due to the moving into the park as will be seen in the 57.8 millions Euros, without including the specific costs deriving from the moving of equipment and machinery according to studies carried out.

The existence of a cluster tries to replace, throughout a company concentration, the power effect of a great company can generate in its surroundings due to its own existence and to the corresponding subcontracting activity. We do not intend to take away importance to the

existence of a company of these characteristics since these great aerospace poles have a great manufacturer which nurtures them. This is why industrial policy should help small and medium sized companies; and at the same time, attract those companies or groups of companies capable of generating important workloads for Catalan companies which have projects contributing to the development and consolidation of the sector. Taking into consideration that for regional location, the big concentration centres of aeroplanes in the south of France could almost be considered motors of the Catalan aerospace industry.

The aerospace and air transport industry are financial activities which support each other resulting in a high interest of closeness and proximity in the same area of a big airport.

In this sense the study project of the aerospace park in Catalonia in the Barcelona area has had passenger traffic of over 27 million people in 2005, providing criteria and highlights which can be of interest to the European community framework. This is the reason why we consider the handling of this Framework should be through the Strair program.

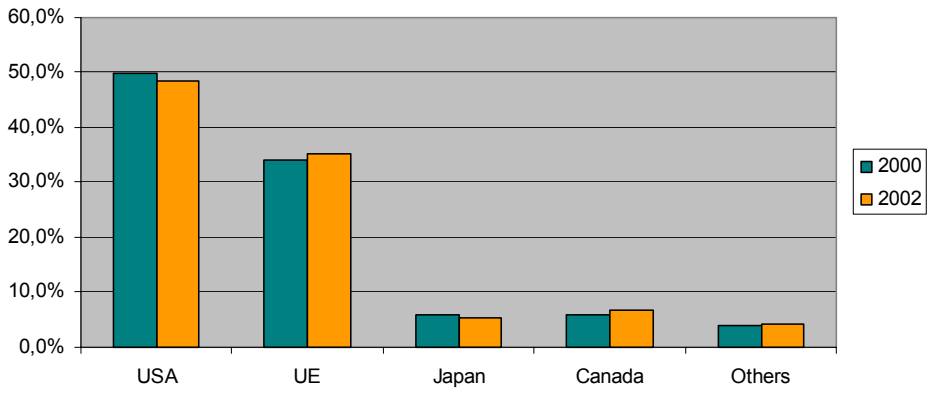
2. EVALUATION OF TRENDS IN THE AEROSPACE INTERNATIONAL SECTOR

The Aerospace industry is one of the most strategic and profitable sectors in the economy. It is characterized by a high added value, as well as strong R+D investment. Production is concentrated in the USA, due to very low transport costs; suppliers exist all over the world. Aerospace production is mainly located in the US, Europe, Canada and Japan. The main companies in the commercial aircraft segment are Boeing, Airbus, Embraer and Bombardier, and in the military segment, Lockheed Martin Corporation, Boeing, Bae Systems, Raytheon Company, Northrop-Grumman, General Dynamics and EADS.

2.1.World market share by country

The global market is estimated at 212 billion Euros, and according to the 2002 official data of AECMA (European Aerospace Association), the industry has 1.15 million employees.

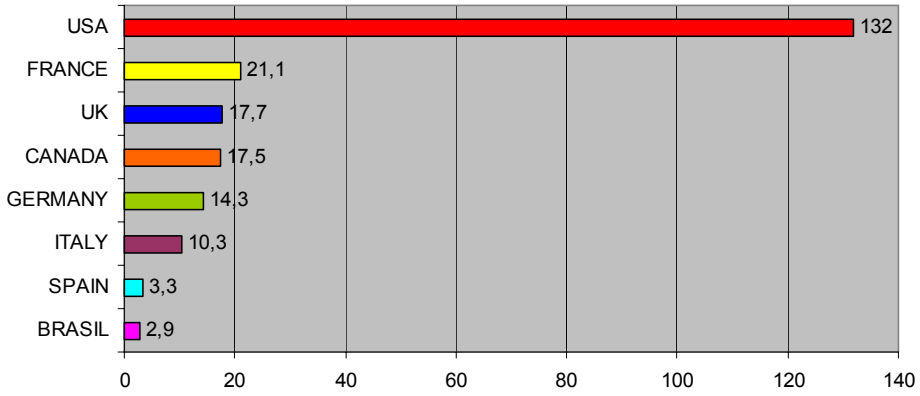
World market share by country (in revenue terms)



Source: AECMA (2002)

2.2. Revenues in main countries

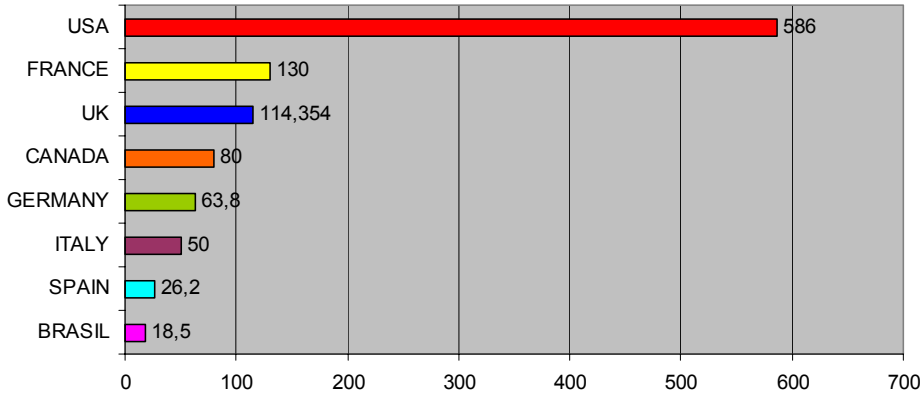
Revenue comparison by country, 2004. (billion EUR)



Source: GPA-Barcelona Chamber of Commerce

2.3. Employment by main countries

Employment Comparison by Country in 2004 (employees, in thousands)



Source: GPA-Barcelona Chamber of Commerce

Four different periods can be established in the growth of the aerospace industry:

- The first, **from the end of the second world war to the 60s**; where the US industry predominated.

- The second, **from the 60s to the 70s**, with the development of a European industry, with Airbus as a result.

- The third, **from the 80s to the 90s**, was a period of growing international cooperation between US and European companies, also including mergers and acquisitions which strengthened financial investment capabilities in order to develop and manufacture new products

- The fourth, **from the 90s to the present**, is a period of production outsourcing due to high costs, in aerospace industry. Mergers have increased rapidly with a reduction in the number of companies; this began in the US, and Europe followed. The result is the development of large international companies. In the US, McDonnell Douglas was taken over by Boeing and in Europe, the Economic Interest Group of the Airbus consortium, comprising French company Aérospatiale Matra S.A., German company DaimlerChrysler Aerospace AG, Spanish company CASA and British company BAE Systems (British Aerospace), also gave rise to EADS-European Aeronautic, Defense and Space Company, except for British Aerospace.
  For years the aviation and aerospace industry had a yearly 5% growth rate, which stopped after September 11, but has now gone back to normal. For years the aviation and aerospace industry had a yearly 5% growth rate, which stopped after September 11, but has now gone back to normal.

Where future perspectives are concerned, leading contractors such as Boeing and Airbus forecast that passenger traffic growth will average 4·5 % per year, and cargo traffic 6.2 and 7%. The global fleet will have 35,300 aircrafts in 2024, more than twice the present number. As a result, growth forecasts remain encouraging.

The aviation and aerospace industry as a key technology industry in the next century: Every year, some 1.7 billion passengers are carried by passenger aircraft. They expect air transport to meet their needs through ever cheaper, safer and more efficient aircraft.

According to EU estimates, air traffic volume will triple by 2020, and new flight guidance systems, improved infrastructures and a new generation of aircraft and engines will have to be developed in response to the public's demands with regard to safety and environment.

Thanks to systematic research into aerodynamics, materials, system technologies and incorporation into aircraft design, the industry has been more successful in reducing the burden on the environment. Fuel consumption and harmful emissions have been halved. Today, an aircraft requires less than 4 liters of aviation fuel to fly a passenger 100 km, as against over 10 liters just 30 years ago. The goal must be to reduce fuel consumption and emissions even further.

The forecast 5% average annual growth in passenger traffic and 7% growth in airfreight

require current infrastructures to be improved.

In the military sector, one key area is information technology, with new capabilities for reconnaissance, communications and navigation, and for data transmission

The current trend is to use civil technology in the military sector.

2.4. Aerospace Industry by main countries

USA

The Aerospace industry in the States receives strong government support. The military budget was US $ 400 billions in 2004, the largest in the world. Therefore, the ups and downs of international politics affect company development considerably.

The American market has high access barriers, with strong government protectionism for US companies. The aeronautics industry employs twice as many people and has twice the revenues of its European counterpart. R+D investment is similar in both markets, but it comes from different sources; private investment is higher in Europe, whereas government support is extremely significant in the US.

European companies, especially British ones, have often tried to buy or subcontract small American companies, but US defense constraints are very difficult, and technology transfers between companies are restricted to certain countries.

In 2004 American aerospace industry had a turnover of US $ 161 billion, 8% higher than the previous year. It generated US $ 10 billion, in profits the highest in the last five years.

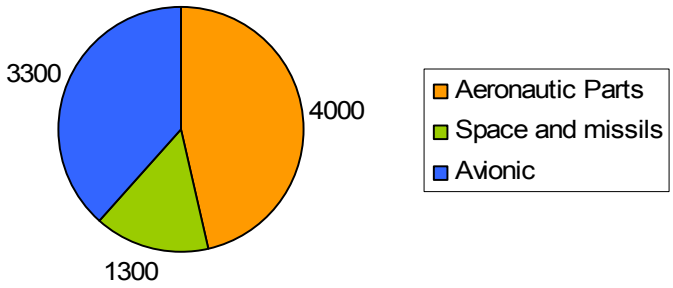
In civil aviation, commercial jets production decreased slightly (1.1%) while deliveries increased in general aviation (up 100 from the previous year), with a total turnover of 6 billion. Helicopter sales also rose considerably, from US $ 366 to 509 million (264 aircraft delivered over the year). In the military field, aircraft sales, motors, parts and services increased by 15%, namely 46 billon dollars.

The Unites States is also very interested in the missile production, where sales went up 10% and reached the highest level (with inflation adjustment) in the last 12 years.

The space sector increased its turnover by 2 billion dollars from 38 billion sales in 2003. NASA as others non-governmental agencies reaped 600 millions dollars in profits.[3]

Where employment is concerned, a five-year declining trend was halted in 2004, with the current total standing at 583,000 employees.

Increase Employees Distribution in 2004



Source: AIA (Aerospace Industries Association) Executive Report 2004

United Kingdom

The U.K aerospace industry generated in U.K £ 17.710 billion in sales in 2004 –up 1.6 percent from to the previous year. The reason of this increase was public expenditure in the civil and defense sector. Defense was up 8.7 percent compared to the previous year. Exports accounted for 65 %, operating profit margin averaged 4.9% and the trade balance was +£3.34 billion.

R+D expenditure decreased from 12.3% on revenues to 11% compared to 2003. The following table shows the turnover by industrial sector:

British sector turnover in million pounds

Industrial Sector

		Aircraft and parts	Motors	Equipment	TOTAL
Segments	Aeronautic	7,677	4,783	4,017	16,477
	Missiles	645	4	164	813
	Space	402	0	25	427
TOTAL		8,724	7,787	4,207	17,717

Source: SBAC (Society of British Aerospace Companies) - Highlights of UK Aerospace Facts & Figures 2004

Direct employment covered a total of 114,354 jobs, 6% down from the previous year. With about 140,000 jobs indirectly related to the aerospace industry, there are a total of 255,000 people working in the country.

British employment by sector, 2004

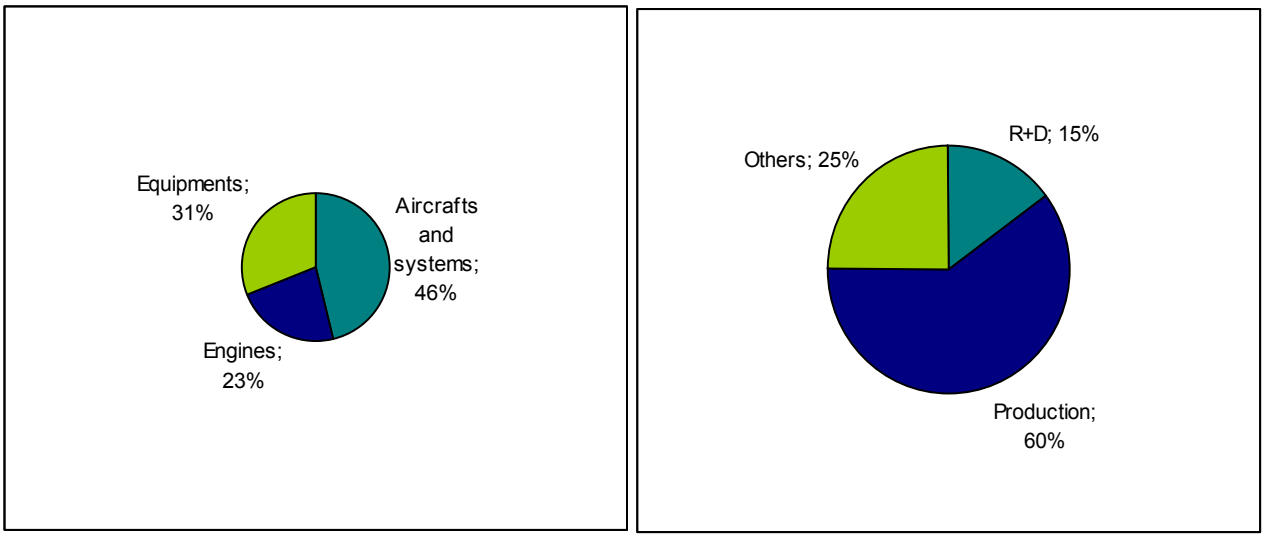


Fig.: Employment according to activity (2004)

Source: SBAC (society of British Aerospace Companies) Highlights of UK Aerospace Facts & Figures 2004

The main centers of the European industry are France, the United Kingdom, and Germany.

The U.K. aerospace industry with more than 3.000 companies, most of them members of several British clusters and associations, concentrates most of the European activity.

The most representative British entities are the following:

UK Aerospace Forum (UKAeF) assembles all regional and national associations. WEAF, West of England aerospace Forum SBAC, Society British Aerospace Companies NWAA, North West Aerospace Alliance NIAC, North Ireland Aerospace Consortium FAC Farnborough Aerospace Consortium SAF Scottish Aerospace Forum Midland Aerospace

Comparative revenue, 2004 (Millions of pounds)

Company	Revenues	
	2004	2003
BAE Systems Plc	13,479	12,572
Rolls-Royce Plc	5,939	4,092
GKN Plc	569	1,549
Smiths Group Plc	2,678	2,629
Cobham Plc	983	833
Meggitt Plc	479,2	399
Ultra Electronics Plc	319,7	284
TOTAL	**24,447**	**22,358**

Source: SBAC (Society of British Aerospace Companies) - Highlights of UK Aerospace Facts & Figures 2004

Farnborough holds an International Aerospace Fair every two years, it is one of the most important aerospace international exhibition.

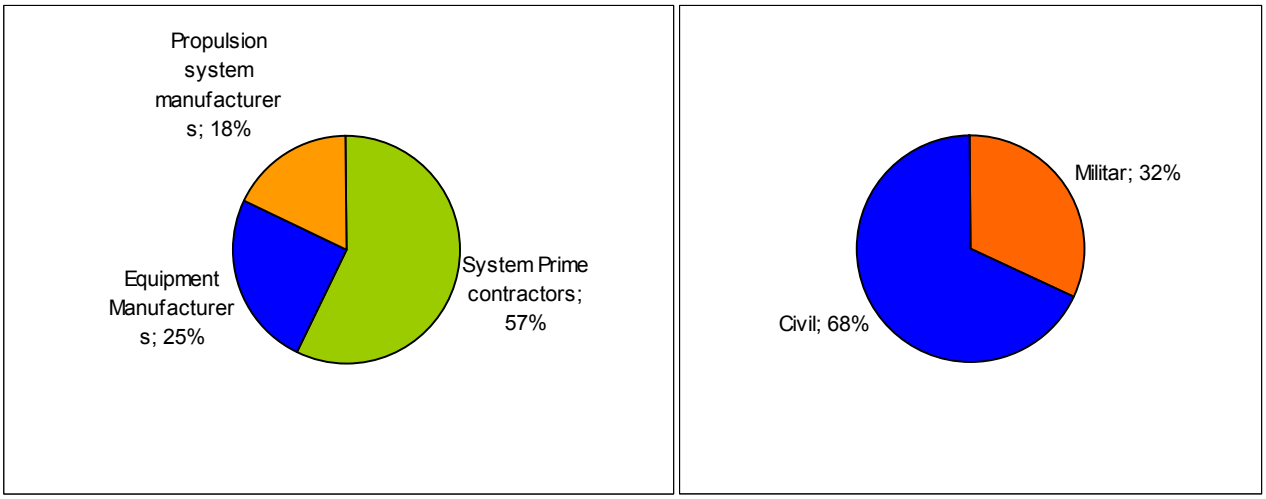
France

France is traditionally the centre of the European aerospace industry; demonstrated by its considerable experience and the broad range of sector activities. Toulouse is the site of AIRBUS headquarters, where assembly of almost all Airbus models is carried out. The aerospace industry in France is manly located in six regions, listed here by importance: Île de France, Midi Pyrénées, Aquitaine, Provence - Alpes - Côte d'Azur, Pays de la Loire and Rhône·Alpes.

In 2004 total turnover was EUR 21.1 billion, 4.6 from government contracts, 0.9 from private French contracts and 15.6 from direct exports.

Total turnover shows positive performance, 6% up from the previous year, distributed as follows:

France, revenues by activity, 2004



Source: GIFAS (Groupement des Industries Françaises Aéronautiques et Spatiales) Chiffres d'Affaires 2004

The 18.1% share of total revenues are invested in R+D.

Industrial activity can be analyzed in different sectors[5]:

In the **civil sector**, AIRBUS is the worldwide leader in aircraft orders as well as in the aircraft deliveries. The most important event in 2005 was the start production of the A380. The first sections arrived in April 2004, in Toulouse. AIRBUS has 57% of the market for commercial aircraft with more than 100 seats.

In regional aircraft, ATR seems to be recovering from its crisis and has started to deliver new aircraft. Business aircraft registered very dynamic growth, with 69 Falcon orders and 63 deliveries. Falcon 900DX, which will replace the Falcon 900C, was a major event.

In the **military sector**:

The A400M is in the final design phase. The production of the first fuselage elements started in 2005 with a contract signed for the manufacture of 180 units: 50 of them are for France, with a value of 19.7 billons EUR.

At the industrial level Dassault Aviation and EADS have signed an agreement for the development of a subsidiary that becomes a major company in the military aircraft segment.

Engine deliveries increased (728 engines CMF56 against 102 in 2003).

In the military field, development of the TP400, selected by EADS as the engine for the A400M, got past the significant phases.

Turbomeca was chosen by Oman for their NH90 and has increased deliveries of engines, from 672 in 2003 to 682. Spain selected the MTR390 engine for the Tigre Helicopter.

In the **space sector** revenues increased 6 percent to 2.9 billion EUR. ALCATEL SPACE received several export orders: three communication satellites (Chinasat 9, Galaxy 17 for PanamSat and World Sat 3) and one weather satellite.

EADS Space is going to produce 30 Ariane 5s and the ATV automatic transport vehicle. With three subsidiaries -EADS Astrium, EADS Space Transportation and EADS Space Services-the company consolidated its role as the European space industry leader.

Finally, in the launcher sector Arianespace completed three successful flights of the Ariane 5 "generic". It obtained 12 contracts for 40 satellites, 35 of which are Ariane models.
In the **helicopters sector,** civil as well military:

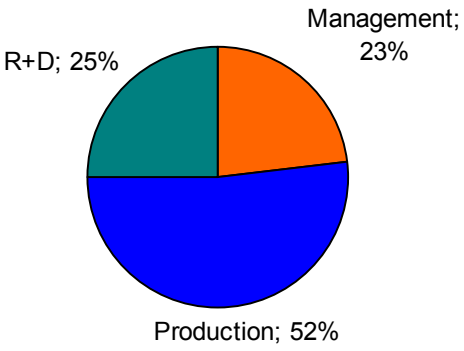
Eurocopter obtained 332 orders and made 279 deliveries for civil as well as for military use in 2004, and was able to keep its number one worldwide position in 2004, with 53 percent of the market.[6]

2004 was the first successful year for the NH90 outside Europe (20 units for Oman and 12 for Australia), thus reconfirming it as the reference in tactic helicopters, with 431 orders so far.

In terms of employment, the whole French aerospace industry has 130,000 direct employees, 118,000 are working for the aeronautical sector, and 12,000 are defense and security electronic employees.

According to the activity aerospace employment can be divided as follows:

French Aerospace Industry employment by activity, 2004



Source: GIFAS (Groupement des Industries Françaises Aéronautiques et Spatiales) Chiffres d'Affaires

Every two years in Le Bourget (Paris) is held the first aerospace industry fair in the world with more than 1.900 exhibitors and 480.000 visitors.

Germany

Germany and France are among the most important European countries; especially due to the AIRBUS assembly plants installed in their territories.

Although in recent years the German economy has reduced its growth rate, and the aerospace industry with it, the government is making an effort and trying to have a positive impact in the military aircraft business, with several contracts signed on behalf of the German military forces. Heads of system integration are thus encouraged to give small German suppliers a chance.
The aerospace industry acts as Germany's technological driving force. It comprises practically all the advanced technologies in the age of information: electronics, robotics and technical standards development.

In 2004 the sector had 14,272 million euros in sales and employed 63,782 people. Civil aeronautics accounted for 65.1 percent of total turnover, military aeronautics for 22.9 percent, and space exploration 12 percent.[7]

German industry is mainly located in Hamburg, Bremen, Berlin and Munich. There are two large associations or clusters: Hanse in Hamburg and BBAA (Berlin·Brandenburg Aerospace Alliance).

German military forces invested in units of the A310 MRTT (Multi Role Tanker Transport), and so did the Canadian.

In civil aviation, the number of passengers and the volume of cargo increased; therefore there is a highly optimistic strong growth trend. In 2004 the air cargo transported was almost three million tons, a more than 14% increase compared to the previous year.

Salient projects include the launch of two helicopter programs, the Tigre and the NH90, as well as Eurofighter participation, where over 60% of the equipment and engines are manufactured in Germany.

Regarding the civil sector research, the LuFo I and LuFo II Programs of Aeronautical Research return Germany to its leadership position in technology.[8]

It's well worth remembering the share of German participation in AIRBUS programs, with more than 25% in the A-380. In other models, section 19 of the aircraft was made of metallic materials and ordered from the German factory at Stade, close to Hamburg, another of the important AIRBUS locations, but in the present case the section was made of carbon fiber and production adjudicated to the plant in Getafe, Madrid.[9]

Germany should thus be considered one of the major European powers in the whole aerospace sector as well as in EADS and AIRBUS; German participation in both consortia is significant, and German representation in management is quite high.

Berlin holds the ILA, International Aerospace Fair, every two years, one of the most important fairs in the world, with more than 1,000 exhibitors and 100,000 professional visitors.[10]

Italy

The experience and quality demonstrated by the Italian aerospace system over the years has enabled it to remain independent and to develop a distinctive design and production. This allows for very flexible policies to establish alliances with the rest of European countries and especially, under international programs, with American initiatives.

The aeronautical industry is, beyond doubt, one of the most important sectors in the Italian economy in terms of revenue, technological innovation, and benefits to other sectors.

In 2004, 50,000 people were employed in this industry, with 38,000 in the aeronautical sector. Revenues reached 10,300 million euros (aeronautics, space and defense). With this figure, Italy's aerospace industry ranks fourth in Europe and seventh worldwide.

The Italian industry is a world leader in helicopters and training aircraft, with particularly

high quality in the ATM field (Air Traffic Management), defense communications and space systems.

Special consideration must be given to a large number of highly specialized aeronautical segments as engines and engine subsystems, avionics and defense electronics. The Italian aerospace industry has the capacity to supply all needs of the regional engine market, military transport aircraft, general and business aviation.[11]

Italian aerospace SMEs are very technologically specialized. They supply components, equipment and services to the main contractors, and in this way the big companies, through decentralization of production, have reached a very high competitive level, also assisted by the government's significant investment activity intended to relaunch the national aeronautical sector.[12]

The most important clusters in the country are Naples and Brindisi.[13]

Naples, Campania:

The following companies are located:

Atitech: 100% owned by Alitalia. Aircraft maintenance.
Alenia Aeronautica:Finmeccanica Group. Aerostructures and parts of fuselage assembly for military as well as civil aircraft programs.
Avio (Fiat Avio): Manufacturing of motor components, maintenance and checking.
Magnaghi Aeronautica: Aeronautical components such as landing gears, oil tanks, and engine components.
Officine Aeronavali: Finmeccanica group, aircraft modification, and MRO services.

OMA Sud: Parts and structure assembly for aerospace applications.
Tecnam: Construction and assembly of structural components for commercial aviation, design and maintenance of prototypes and production of light and ultralight aircraft.
Vulcanair: Aircraft design for general aviation.

Brindisi, Apulia:

The most representative companies are the following:

Avio, Avioman, Gse: Prototyping and CAD/CAM Augusta-Westland, Avioman, Gse, Salver: Fabrication Atitech, Officine Aeronavali Venecia, Avioman, Gse, Ias, Immovil: Maintenance Alenia Aeronautica, Avioman, Gse, Salver: Assembly Avio, Avioman, Gse: Precision Mechanics Augusta-Westland, Processi Speciali: Surface Treatments Augusta-Westland, Avioman, Gse, Processi Speciali: Heat Treatment Atitech, Giannuzzi: Interiors Alenia Aeronautica: Composite Materials

Italy participates in European and American risk·sharing projects in the military and civil sectors, including the Eurofighter, the new JSF, and the EH101 and NH9O helicopters, several missile and space programs, as well as the Galileo project.14

Brazil

Aerospace revenues in 2004 were 3.5 billion US dollars, mainly from aeronautical activities and from EMBRAER (Empresa Brasileira Aeronautica S.A.).

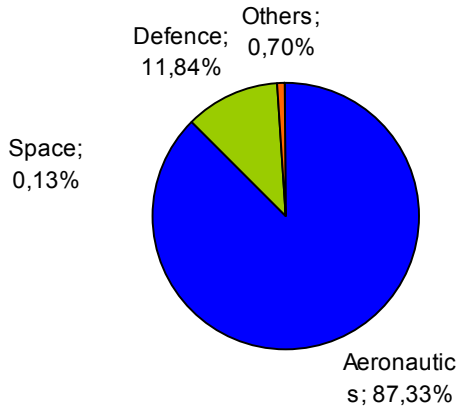
The sector employs 18,500 people, 14,658 (80%) of which are working for EMBRAER.

Other aeronautical companies are:

Grup De Elebra/NORCAL: Electronics
AVIBRAS: Missiles
Aeroeletrônica: Electronics
CENIC: Composites
TECNASA: Electronics.
Mectron: Defense systems
Digicon: Transductors, precision mechanics

In addition to aircraft, Brazil is very active in the development of satellites and missiles. The country has its own launch base in Alcántara, on the Atlantic coast, 240 km south of the Equator.
Although the space industry is very small in size, there is a group of government institutions: INPE (Instituto Nacional de Pesquisas Espaciais) and the AEB (Agência Espacial Brasileira), which coordinate all space activities. Among these we can emphasize the MECB (Mission Espacial Completa Brasileira) established in 1979 with the purpose of programming some satellite launches into low orbits.

Revenues of the the Aerospace Industry in Brazil by sectors



Source: ABAG (Associação Brasileira da Aviação Geral)

Most aerospace companies point out the difficulties caused by the government's failure to maintain a short - and long-term steady flow of orders to offset their industrial risk. Reduced financial risks and chain production are very important for Embraer. The technological potential of these companies is enormous, but they are not viable without government help.

The Defense Ministry of Brazil encourages investments which enable the development of high technology, especially in military equipment. This is a way to implement a trade, industrial and technological compensation policy (offset).

Canada

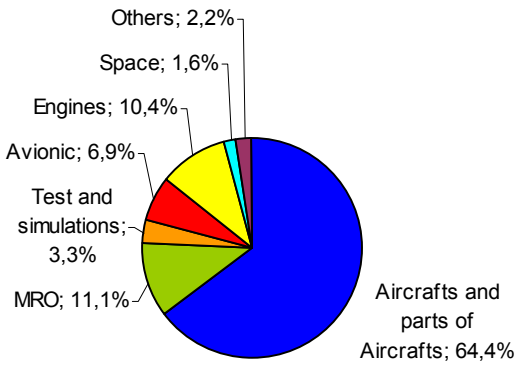
Canadian firms are global market leaders in regional aircraft, business jets, commercial helicopters, small gas turbine engines, flight simulation, landing gear, and space applications. In 2002, Canada achieved a great success with the carbon fiber robot arm placed in the International Space Station, the first time one of the critical shuttle subsystems wasn't manufactured in the US. It was made by the **Space Robotics**
[15]

Division of Spar Aerospace.

Aerospace revenues[16] in 2004 were US $ 21.3 billion, 16.0 of which are export operations: in other words, 73% of the total. Canada's aerospace industry comprises more than 400 firms all over the country, employing a total of 80,000 people, and R&D expenditure is US $1 billion. Quebec concentrates 62% of aerospace activity in Canada, with more than 48,000 jobs. Since 1990, Canadian aerospace industry sales have more than doubled, reaching US $ 22 billion in 2002.

Subsystems revenues are:

Canadian Aerospace Industry Revenues by sector, 2004



Source: AIAC (Aerospace Industries Association of Canada) Facts & Figures 2004

In 2003 investment in R&D was 78%, of which 11.2% was from military sources and 88.8% from civil sectors.

3. DESCRIPTION OF THE SECTOR; IDENTIFYING COSTUMERS BOTH INTERNAL AND EXTERNAL

The sector can be divided into the following segments:

According o the industry
Systems and structures
Motors
Equipment

According to the final product
Aircraft
Missiles
Space
Airport Equipment

3.1. Ranking of the main aerospace companies:

COMPANY RANKING (not inc. powering)	2004 revenues (EUR billions)	Country
1. Boeing	43	USA
2. EADS (Airbus 20)	32	ES+FR+DE
3. Lockheed Martin Co.	29.3	USA
4. Northrop-Grumman	24.9	USA
5. BAE Systems	17.7	UK
6. Raytheon Company	16.9	USA
7. Bombardier	13.1	CA
8. Thales Avionics	10.3	FR
9. Dassault	3.4	FR
10. Embraer	1.6	BR

Boeing (USA)

This group is the result of the merger of the two largest American aerospace companies. BOEING is, together with EADS, the no. 1 aircraft manufacturing company. Its headquarters are in Chicago, even though its main factory is located in Seattle.
According to April 2005 data, the company has 160,000 employees. Its revenues in 2004 were US $ 52.5 billion, a 4% increase compared to the previous year.[17] Its defense division business, much bolstered after the acquisition of MD, which was the stronger in this

area, grew 11%, amounting to 58% (more than half) of total group revenues.

With 285 aircrafts delivered in 2004, the civil aircraft division lost its leadership to Airbus, which delivered 320. This trend seems to continue with the order data of the first months of 2005, where Airbus had received 123 formal orders against Boeing's 44.

Its new 787 "Dreamliner" aircraft is a very ambitious commercial project, which they expect to be very successful.

EADS (European Union)

EADS, European Aeronautic Defense and Space Company, is the no. 1 European group. It is the result of the first European merger, between the German DASA, the French MATRA Aérospatiale, and the Spanish CASA (Construcciones Aeronáuticas S.A.). It is the leader consortium worldwide in the aerospace industry; in the civil as well as in the military sector.

About 110,600 people work in the European industry and revenues in 2004 increased by EUR 32 billion.

EADS has an 80% share in Airbus, a 37.5% share in MBDA, the second biggest missiles manufacturer in the market, 100% of EUROCOPTER, the second biggest helicopter supplier in the world, where EADS CASA (Spanish company) took a 5% stake at the end of 2003, after a capital increase of 570 million, thus becoming entitled to appoint a director to the board. EADS is also the largest shareholder of the Eurofighter consortium and the main contractor in the Ariane launcher, as well as the Tigre, and it is the largest industrial partner for the European navigation system Galileo.

Airbus (European Union)

It is one of the two leading companies in the more than 100 seats commercial aircraft sector. It was created in 1970 in Toulouse (France) and it is a European – French, English, Spanish, and German – consortium. It has more than 1500 companies in 30 countries.

The most important ones are located in:
- Bremen, Hamburg, and Munich, in Germany.
- Chester in the United Kingdom
- Madrid and Seville in Spain
- Amsterdam in the Netherlands

- Gosselles in Belgium
- Meaulte, Nantes, Saint Nazaire and Toulouse in France

Thanks to these different locations in several countries, AIRBUS has stood up to Boeing. Since 2001 its shares are held by EADS (80%) and BAE Systems (20%) and its revenue in

2004 was 20 billion EUR, with 53,000 employees.

Increased aircraft deliveries were a good example of growth: the figure was 320 in 2004, following 305 in 2003.

Lockheed Martin Corporation (USA)

It is the no.1 military aircraft company in the world. It was created in 1995 after the merging of two leading companies in the technology sector, LOCKHEED Corporation and MARTIN MARIETTA Corporation.

It is located in Bethesda, Maryland, and has 130,000 employees all over the world. Its main activity is the design, development and integration of advanced technology systems. They are also weapon manufacturers for the US Defense Department and suppliers of the F·16[18] aircraft.

At the end of 1992, the aircraft and missile manufacturer Lockheed bought out General Dynamics, which was also a very powerful company in the sector. In 1995, an important merger took place with Martin Marietta, a "merger of equals". A year later, the merged company acquired an important group of companies: Loral, Ford Aerospace, LTV Missiles, IBM·Federal Systems and Unisys. In the year 2000, following its trend of the last few years of getting rid of non·profitable companies, the systems control and electronic system divisions were sold to BAE SYSTEMS.

The star product Lockheed Martin would like to introduce in the European market is the F·35 Joint Strike Fighter (JSF).

BAE Systems (United Kingdom)

BAE Systems is the result of the merger between British Aerospace and Marconi. A new British company was thus born, oriented towards aviation as well as electronic defense. The company designs, manufactures and provides support to military aviation, the nautical sector, combat vehicles, radars, communications, electronics and guided weapons, through its three independent divisions: Air Systems, Land Systems and Sea.

In the aviation sector, the company plays a key role in projects like the Eurofighter and the Joint Strike Fighter.
The aviation division has 10,500 people, while the overall global job number is 90,000. The main projects are Typhoon, Nimrod, JSF and Hawk.

With revenues at almost 14 billon pounds, BAE Systems is one of the world's leaders in civil and military aviation.[19] The company has a 20% stake in AIRBUS and a 33% share in the Eurofighter.[20]

Raytheon Company (United Kingdom)

At the beginning of the 80s, Raytheon acquired Beech Aircraft, and didn't buy any other company until the 90s. Other companies in the sector were then acquired: BAE Business Jets (1993), TI-Defense (1996), Hughes Aerospace & Defense (1996) and AlliedSignal's Comunication Systems (1998). In the last years it has sold off some of its companies, like Ceradapids Inc. (1999). In 2000, it got rid of its air simulator business and other optic systems. Raytheon has in Texas Instruments one of its best partners. It is a defense, electronics and space leader in the aviation business as well as special missions. Its headquarters are in Lexington, MA, and it has a staff of 79,000 employees, with revenues of US $ 20.2 billion in 2004.

Northrop-Grumman (USA)

This great company began to build up in 1992, when the aircraft manufacturer Northrop Corporation acquired 49% of Vought Aircraft. In the 90's, its market strategy changed in order to expand into electronic defense systems. For this reason, it acquired Grumman Corporation in 1994, a very important electronic systems company; it then acquired Westinghouse's Electronics Systems Group in 1996, considerably increasing its resources. In 1997, it acquired Logicon Inc., a leader in defense information technology. In 2000, it acquired several small companies (Navia Aviation AS, Comptek Research, Sterling Software), which made the group of companies stronger in the market.

Its activities comprise missiles, radar and defense systems, ship construction – both nuclear and non-nuclear –, satellites, space systems and chemical biodetection systems. The international American military services are its main customers. Company headquarters are in Los Angeles, and employees number 125,000 in 25 different countries.

Company revenues in 2004 were US $ 30,000 million.

Bombardier (Canadá)

The Canadian company Bombardier Inc. is one of the world's largest manufacturers of aircraft. They are world leaders in the regional aircraft and "business jet" segment.
Its revenues in 2004 were US $ 15.8 billion in 2004, with a staff of 27,100 employees after a downsizing operation. Bombardier competed with Embraer until recently for leadership in the regional aircraft and less-than-100-seat jet aircraft segments.[21]

Embraer (Brazil)

A Brazilian company, which shares global leadership in regional and corporate aviation with Bombardier. It directly employs 16.500 employees and indirectly employs another 3,000. Its revenues are US $ 2 billion.[22]

3.2. The Spanish aerospace industry

Its main characteristics are:

- Specialization in aero structures, propulsion, capital goods and production processes.
- It provides 0.4 % of Spanish GDP.
- 14% growth in the period 1997-2004.
- 92 % of companies are SMEs.
- Revenues of Eur. 3.309 billion.
- Employment: 26,207.
- Export: 72% of revenues
- R&D investment: 16 % of revenues

3.3. Catalan companies: the first target companies in the cluster.

The main project of the Aerospace Industry Sector in Catalonia is the development of a cluster in a site near the Barcelona Airport: The Catalonia Aerospace Park.

The cluster chiefly targets Catalan aerospace companies, most of which are SMEs. The majority are members of BAIE, the Catalan Aerospace Association. The aerospace sector includes private companies, universities, research centers, public administrations and financial institutions. The Barcelona Chamber of Commerce is one of the leading organizations in the development of this sector.

One of the most relevant characteristics of the Catalan aerospace sector is its highly significant participation in the space sector; while the European aerospace sector is split into 91% aeronautics and 9% space, the Catalan sector split raises the share of space up to a very significant 22%.

The different industrial and technological capabilities offered by Catalan aerospace companies to the main aerospace contractors are the following:

- From avionics and on-board electronic equipment to metal machining and thermal treatments, as well as tooling
- From aircraft interior design, mock-ups and textiles manufacturing to biological sample refrigerators for the international space station
- From design, engineering and manufacturing to communication systems and

onboard antennas
- From life sciences applied to manned space flights and balloon flights to airport boarding bridges.
- R&D capabilities, numerical methods, light metal alloys and composites technology also fall within the capabilities of the catalan sector.

3.4. Aerospace Programs: Main Contractors

Catalan companies are becoming strategic suppliers to the big players in the Spanish and European aerospace arena, participating in programs like the A-380, A400M and Boeing 787 and A-350.

The Technological Centre for Aeronautics & Space (CTAE), founded in 2004 with the full support of the Catalan Autonomous Government, and with the collaboration of all local aerospace companies, is one potential customer for the Aerospace Park.

GALILEO is also another point of extreme interest in the development of the aerospace cluster in Catalonia for the next few years.

AERONAUTICS:

Actuators & Hydraulic Systems

- ATOS ORIGIN, S.A.E
- CADTECH IBERICA, S.L
- EDV Ferroviaria, Aeronáutica y Automoción, SL.
- IDOM Ingeniería y Sistemas, S.A.
- NTE
- SENER Ingeniería y Sistemas, S.A.

Air Traffic Management & Navigation Aids

- GTD Ingeniería de Sistemas y Software, S.A.
- INDRA Espacio
- UPC (Polythecnic University of Catalonia)

Avionics

- GTD Ingeniería de Sistemas y Software, S.A.
- INDRA Espacio

Boarding Bridges

- TEAM (Tecnología Europea Aplicada al Movimiento, S.L.)

Cabin interiors

- AMC (Aeromaintenance Consulting, S.L.)
- Diseño industrial ITALDESIGN, S.L.
- FAINSA
- PRAE TRADE
- RÜCKER LYPSA, S.L.

Cabling & wiring

- TISMI, S.L.

Civil Infrastructures

- ABERTIS Infraestructuras

Communications Equipment

- ATOS ORIGIN, S.A.E.
- COMPASS Ingeniería y Sistemas, S.A.
- GTD Ingeniería de Sistemas y Software, S.A.
- INDRA Espacio
- MIER Comunicaciones, S.A.
- RÜCKER LYPSA, S.L.
- SENER Ingeniería y Sistemas, S.A.
- UPC (Polythecnic University of Catalonia)

Consulting Services

- AMC (Aeromaintenance Consulting, S.L.)
- ATOS ORIGIN, S.A.E
- CADTECH IBERICA, S.L
- GPA (Gestió i Promoció Aeroportuaria)

- IDOM Ingeniería y Sistemas, S.A.
- IEEC (Institut d'Estudis Espacials de Catalunya)
- INDRA Espacio
- STARLAB Barcelona, S.L.

Design & Development

- CADTECH IBERICA, S.L
- CIMSA Ingeniería de Sistemas, S.A.
- GTD Ingeniería de Sistemas y Software, S.A.
- IDD (Integral Design & Development)
- IDOM Ingeniería y Sistemas, S.A.
- INDRA Espacio
- NTE
- PROCON Systems
- RDI (Rubí Disseny Industrial, S.L.)
- SENER Ingeniería y Sistemas, S.A.
- ULTRAMAGIC, S.A.

Detail Engineering

- INGENIA

Electrical & Magnetic Systems

- CADTECH IBERICA, S.L
- PRAE TRADE
- RÜCKER LYPSA, S.L.
- SENER Ingeniería y Sistemas, S.A.
- SERRA Aeronautics
- SÒLID Enginyeria, S.L.
- TMS ARITEX CADING, S.A.

Electronics & Instrumentation

- ATOS ORIGIN
- CROUZET Automatismes, S.A.S.
- GTD Ingeniería de Sistemas y Software, S.A.
- INDRA Espacio
- MIER Comunicaciones, S.A.
- NTE
- SENER Ingeniería y Sistemas, S.A.
- SÒLID Enginyeria, S.L.

- STARLAB Barcelona, S.L.
- UB (Barcelona University)
- UPC (Polythecnic University of Catalonia)

Independent Software Verification

- NTE

In-flight Entertainment Hardware

- GTD Ingeniería de Sistemas y Software, S.A.
- RÜCKER LYPSA, S.L.

In-flight Entertainment Software

- RÜCKER LYPSA, S.L.

Light Alloys Production & Research

- CDAL (Light Alloys And Surface Treatment Design Centre)
- MESIMA

Logistics

- BAX GLOBAL, S.A.
- CILSA (Centre Intermodal de Logística, S.A.)

Machining

- ARIBER, S.L.
- GUTMAR, S.A.
- TALLERS FIESTAS, S.L.
- TTM (Telstar Tecnología Mecánica, S.L.)

Man-machines Interfaces

- CROUZET Automatismes, S.A.S.
- IDOM Ingeniería y Sistemas, S.A.
- INDRA Espacio
- PROMAUT
- RÜCKER LYPSA, S.L.
- SENER Ingeniería y Sistemas, S.A.

Mechanical Engineering

- ASM DIMANTEC Ingeniería, S.A.
- CADTECH IBERICA, S.L
- Diseño Industrial ITALDESIGN, S·L·
- EDAG Engineering + Design, S.A.U.
- EDV Ferroviaria, Aeronáutica y Automoción, S.L.
- EPSA (Engineering Prototyping, S.A.)
- IDD (Integral Design & Development)
- IDOM Ingeniería y Sistemas, S.A.
- PRAE TRADE
- RÜCKER LYPSA, S.L.
- SENER Ingeniería y Sistemas, S.A.
- SERRA Aeronautics
- TMS ARITEX CADING, S.A.

Metallic Aerostructures Manufacturing

- MESIMA

Mock-up & Prototyping

- Diseño Industrial ITALDESIGN, S·L·
- EDAG Engineering + Design, S.A.U.
- EPSA (Engineering Prototyping, S.A.)
- FAINSA
- NTE
- QUANTECH ATZ
- RDI (Rubí Disseny Industrial, S.L.)
- RÜCKER LYPSA, S.L.
- SENER Ingeniería y Sistemas, S.A.
- SÒLID Enginyeria, S.L.
- TMS ARITEX CADING, S.A.
- UPC (Polythecnic University of Catalonia)

Research & Development

- CDAL (Light Alloys And Surface Treatment Design Centre)
- CIMNE (International Center for Numerical Methods in Engineering)
- COMPASS Ingeniería y Sistemas, S.A.
- INDRA Espacio
- MIER Comunicaciones, S.A.
- RÜCKER LYPSA, S.L.

- SENER Ingeniería y Sistemas, S.A.
- UAB (Autonomous University of Barcelona)

- UB (Barcelona University)
- UPC (Polythecnic University of Catalonia)

Robotics, Automation & Production Systems

- ABGAM (Group Segula Technologies)
- ASM DIMANTEC Ingeniería, S.A.
- CADTECH IBERICA, S.L
- GTD Ingeniería de Sistemas y Software, S.A.
- IDOM Ingeniería y Sistemas, S.A.
- PROCON Systems
- PROMAUT
- SERRA Aeronautics
- TMS ARITEX CADING, S.A.
- UPC (Polythecnic University of Catalonia)

Simulation & Training Systems

- ABGAM (Group Segula Technologies)
- CADTECH IBERICA, S.L
- IEEC (Institut d'Estudis Espacials de Catalunya)
- PROMAUT
- QUANTECH ATZ
- SENER Ingeniería y Sistemas, S.A.

Structural Elements Calculation

- ABGAM (Group Segula Technologies)
- ASM DIMANTEC Ingeniería, S.A.
- CADTECH IBERICA, S.L
- CIMNE (International Center for Numerical Methods in Engineering)
- CIEFMA (Centre d'Integritat Estructural i Fiabilitat dels Materials)
- CIMSA Ingeniería de Sistemas, S.A.
- COMPASS Ingeniería y Sistemas, S.A.
- CPT-EDM (Centre de Projecció Térmica·Enginyeria de Materials)
- Diseño Industrial ITALDESIGN, S·L·
- EDAG Engineering + Design, S.A.U.
- EDV Ferroviaria, Aeronáutica y Automoción, S.L.
- EPSA (Engineering Prototyping, S.A.)
- GTD Ingeniería de Sistemas y Software, S.A.
- IDD (Integral Design & Development)
- IDOM Ingeniería y Sistemas, S.A.

- INGENIA
- MIER Comunicaciones, S.A.

- NTE
- QUANTECH ATZ
- RDI (Rubí Disseny Industrial, S.L.)
- RÜCKER LYPSA, S.L.
- SENER Ingeniería y Sistemas, S.A.
- SÒLID Enginyeria, S.L.
- TMS ARITEX CADING, S.A.
- UPC (Polythecnic University of Catalonia)

Systems Engineering

- CADTECH IBERICA, S.L
- CIMSA Ingeniería de Sistemas, S.A.
- GTD Ingeniería de Sistemas y Software, S.A.
- IDOM Ingeniería y Sistemas, S.A.
- IEEC (Institut d'Estudis Espacials de Catalunya)
- INDRA Espacio
- MIER Comunicaciones, S.A.
- NTE
- PROCON Systems
- SENER Ingeniería y Sistemas, S.A.

Telecommunications & Broadcasting

- MIER Comunicaciones, S.A.

Testing & Certification

- CIEFMA (Centre d'Integritat Estructural i Fiabilitat dels Materials)
- CPT-EDM (Centre de Projecció Térmica-Enginyeria de Materials)
- Industrial NEOTEX, S.A.
- SÒLID Enginyeria, S.L.

Textiles

- Industrial NEOTEX, S.A.
- Thermal Treatments & Special Processes
- ASM DIMANTEC Ingeniería, S.A.
- CPT-EDM (Centre de Projecció Térmica-Enginyeria de Materials)
- ELHCO (Electroless Hard Coat, S.A.)
- MESIMA

- S.A. METALOGRÁFICA
- TTC (Tratamientos Térmicos Carreras, S.A. Grup TTC)

Tooling

- ARIBER, S.L.
- EDAG Engineering + Design, S.A.U.
- EDV Ferroviaria, Aeronáutica y Automoción, S.L.
- EPSA (Engineering Prototyping, S.A.)
- GUTMAR
- RDI (Rubí Disseny Industrial, S.L.)
- SERRA Aeronautics
- SÒLID Enginyeria, S.L.
- TMS ARITEX CADING, S.A.

SPACE:

Avionics

- MIER Comunicaciones, S.A.
- S.A. METALOGRÁFICA

Data Mining & Processing

- IEEC (Institut d'Estudis Espacials de Catalunya)
- UAB (Autonomous University of Barcelona)

Earth Observation

- ALTAMIRA Information, S.l.
- IEEC (Institut d'Estudis Espacials de Catalunya)
- MIER Comunicaciones, S.A.
- STARLAB Barcelona, S.L.
- UPC (Polythecnic University of Catalonia)

Galileo/GNSS

- GTD Ingeniería de Sistemas y Software, S.A.
- IEEC (Institut d'Estudis Espacials de Catalunya)
- INDRA Espacio
- STARLAB Barcelona, S.L.

Inflatable Space Structures

- CIMNE (International Centre for Numerical Methods in Engineering)

Life Sciences & Recycling Technology

- CAR (Centre d'Alt Rendiment de Sant Cugat)
- NTE
- STARLAB Barcelona, S.L.
- UAB (Autonomous University of Barcelona)

On-Board Hardware & Software

- GTD Ingeniería de Sistemas y Software, S.A.
- MIER Comunicaciones, S.A.
- NTE
- STARLAB Barcelona, S.L.

Research & Development

- ALTAMIRA Information, S.L.
- GTD Ingeniería de Sistemas y Software, S.A.
- IEEC (Institut d'Estudis Espacials de Catalunya)
- MIER Comunicaciones, S.A.
- NTE
- STARLAB Barcelona, S.L.
- UAB (Autonomous University of Barcelona)
- UB (Barcelona University)
- UPC (Polythecnic University of Catalonia)

Satellite Sensors

- IEEC (Institut d'Estudis Espacials de Catalunya)
- MIER Comunicaciones, S.A.
- STARLAB Barcelona, S.L.

AVIATION:

Balloons

- ULTRAMÀGIC, S.A.

Maintenance, Repair & Overhaul

- AEROEMPORDÀ, S.L.
- ULM & VLA Assembly
- AEROEMPORDÀ, S.L.

4. DETERMINATION OF TARGET CUSTOMER COMPANIES IN THE CATALONIA AEROSPACE PARK: WEAKNESSES AND STRENGTHS

With a selection of 43 companies involved in the aerospace sector, we have carried out a study of potential demand from likely users and tenants. The method used consisted in personal interviews to a sample of companies, based on a standard questionnaire.

The response rate was as follows:

- of 20 companies interviewed, 3 were not interested and 17 expressed a possible interest.

Most of the interviewed companies – especially the ones that didn't know about the project – appreciated the benefits of sharing a common space with companies working within the same industrial sector.

The conclusions from the questionnaires and the corresponding interviews to the 17 companies fall within the following topics:

A) Park infrastuctures and area of influence.
B) Specific space requirements.
C) Benefits and advantages of the Park.
D) Lease/ownership arrangements and pricing.
E) Economic efforts of the companies.

A) PARK INFRASTRUCTURES AND AREA OF INFLUENCE.

One of the most common company requirements, in order to avoid a possible loss of personnel and higher moving costs, is the promotion and improvement of the public transport system (bus and train).

Parking needs were also raised, for employees who don´t want to use the public transport system.

The following services were highlighted:

- Business Center
- Training Center and Job Exchange
- Investment Center
- Shared facilities for event visits.

B) SPECIFIC SPACE REQUIREMENTS.

In most cases, the companies require more space than they currently have; depending on the company, up to 104,000 square meters, including industrial space for production (100,000 meters) and offices for services (4,000 meters), in each case.

In most cases, companies require computer technology, telecommunications, energy utilities, and advanced security. These are services which can, on the one hand, provide a solution for their technical requirements, and on the other, project a technology image, which the park has to give.

Additionally, in most cases, companies prefer to have turnkey facilities, giving a common image of the centre.

C) BENEFITS AND ADVANTAGES OF THE PARK

Most companies think that the park is a good opportunity to find synergies among companies in the same sector or sector·related ones.

Companies suggest that a common image of the park could be very convenient for the customers; whether local or international.

The development of projects with the involvement of several Catalan aerospace companies is a frequent occurrence, so companies in this sector require more shared spaces to work in, as well as availability of other necessary resources (e.g., human resources). This is one of the arguments in favour of the creation of the park, often raised by the companies during the interviews.

The location of the Viladecans Aerospace Project, close to the airport is a clear advantage at a business level.

D) BUY/LEASE ARRANGEMENTS AND PRICE

All companies are very sensitive to the rental or sales price of the park. The cost of moving is in some cases considerable, because most of the companies have already moved in recent years. Besides, the investments made in new facilities have been very high; therefore the benefits of yet another move must be balanced against the high increased cost and the replacement of non·removable equipment.

Concerning property status, most companies think of purchasing as an investment, but in fact 90% of the companies have leases. This is the reason why administrative concessions and leases are also potential alternatives.
In some cases, the removal can be offset by the possibility of having twice the companies' present space at an attractive price.

Some companies have received offers from other aerospace parks, such as the aerospace park

in Seville. In this specific case, the companies would receive important aid from the Autonomous Government of Andalucia and the European Regional Fund if they decide to move there.

According to real estate experts, Barcelona industrial warehouses no smaller than 2,000 m² have a rental price of 6 €/m²/month. The market prices for service companies in OUT zones are 11.5 €/m²/month and 12 €/m²/month as a final sales price. Rentals in technology centers are between 9.5 and 10 €/m²/month.

WEAKNESSES AND STRENGTHS

Strengths	Weaknesses
Proximity to the airport	No cluster tradition
Proximity to the urban area of Barcelona	Incomplete industrial segmentation
Good accessibility	Few aerospace companies
Polytechnic University	
Aerospace Technology Centre	

5. IDENTIFICATION OF OTHER STAKEHOLDERS IN THE CLUSTER POJECT

The community of Viladecans, with 60,000 inhabitants, 55 % active workers, plays a special role in the development of this project.

Historycally, it has been a community oriented to traditional industrial activities, which have lost relative importance to service activities, where employment is up to more than 73.5% from 1996. Today the town wants to secure a place in the Knowledge Society with initiatives such as the Fundació Ciudad de Viladecans, the Millennium program, and the Bitágoras Centre in the Can Calderon Business Park.

Viladecans has experienced a gradual change in the number of companies and employees in the industrial and services sector. In the period between 1996 and 2004, employment increased by 63.6%, and the number of companies by 26.2 %.

Companies and jobs according to economic sector.

Companies					
	1996		2004		Variation
	Number	%	Number	%	%
Agriculture	2	0.2	0	0	-100
Industry	251	20.3	218	14	-13.1
Construction	207	16.8	346	22.2	67.1
Services	775	62.8	994	63.8	28.3
Total	1,235	100	1,558	100	26.2

Jobs					
	1996		2004		Variation
	Number	%	Number	%	%
Agriculture	2	0.2	0	0	-100
Industry	1,893	26.4	2,627	22.4	38.8
Construction	1,190	16.6	2,015	17.2	69.3
Services	4,092	57	7,100	60.5	73.5
Total	7,177	100	11,742	100	63.6

The number of industrial companies dropped by 13.1%, and the number of employees in the sector grew by 38.8%. In the construction sector, the number of companies is up by 67.1% and the number of employees by 69.3%. The number of companies in the service sector has increased 28.3% and the employees 73.5%.
In 2004 there were not any companies in the agricultural sector, even if there were some individual and family farms remaining.

The new establishment of a technological park or an industrial area in a town or close to it has consequences for the job market. We can estimate the following possible employment distribution according to the use areas in the park:

- Private ground in the Technology area: 95,940 m². At 30 m² per employee means 3,200 employees.

- Private ground in the Industrial and Mobility Area: 406,593 m² at 500 m² per employee = 800 employees.

6. IDENTIFICATION OF CATALONIA AEROSPACE PARK COMPETING LOCATIONS

In order to compare our proposal with other similar projects in Spain we can point out that the aerospace industry in Spain is mainly located in the Basque Country, Madrid and Andalusia. That is why we have proceeded to analyze the areas where the industry is currently located.

In general, technology parks are multidisciplinar in the field of high-quality or technological companies, with the exception of the two newly created parks of Carpetania in Madrid (Getafe) and Aerópolis (Seville), which, for the first time in Spain, are specialized parks in the aerospace sector and seek to follow the European model of Toulouse.

Analyzed Aspects in Industrial Aerospace Areas

The main aspects studied in other aerospace projects are ownership/lease arrangements, management entity, plot size, common services, security, telephone systems, transport, special and advanced services, as well as public financial support.

Diagnosis

- The aeronautical and space industry is undergoing a period of transformation and restructuring.
- Today's European aerospace sector is involved in large·scale programs which require huge economic investments in R&D and innovation. Therefore, public financial support is absolutely necessary.
- In Spain, the Basque Country, Madrid and Andalusia are the neuralgic centers of the aerospace industry; the Cluster functions as a catalyze, triggering synergies and driving the sector.

- The main aerospace concentrations or locations for aerospace companies are the following:

Industrial Areas where the main contractors, such as AIRBUS and EADS CASA are located, in Seville, Cadiz, Madrid and Toledo.

Technology Parks for the big subcontractor companies and ancillary industry with a high level of R&D, such as Gamesa and ITP (Industria de Turbo Propulsores), which require highly specialized services like Aerospace Research Centers or an aerospace cluster, incubator companies, R&D consultancy and coordination centers, and innovation programs

like Acropolis (Seville), Parque Tecnológico de Álava, and Zamudio in Bilbao.

Business Parks for the big aerospace industrial companies which want to have their ancillary industry close by and do not require an external management entity to develop specialized services. Models include Carpetania (Madrid) or Tres Cantos (Madrid)

Conclusions:

I. The owning entity, whether a development consortium or a single owner, has a public origin.

II. The management entity is set up in order to develop services according to one of the following modalities:

- A Public Limited Company (Sociedad Anónima): a permanent entity which offers specialized and common services; park tenants are not involved in managing the park (e.g., Zamudio, whose management entity has a staff of 12)

- A Public Limited Company in the process of becoming a Collaborating Urban Development Conservation Entity, which is an entity created for the conservation and maintenance of the grounds, general facilities and utility installations (e.g. PT Álava, whose management entity has a staff of 4).

- An Owner Community, such as the Technology Park of Tres Cantos in Madrid, which lacks advanced services and is subject to the Civil Code. IMADE, the Development Institute in Madrid, currently wants to introduce a management entity which can offer advantageous services.

III. The main lease/ownership arrangements:

- Plot sale
- Office rental (when the park owns the buildings, and can provide a company incubator service)
- Sales though public tender (expensive).
- The size of the parks ranges from 1,000,000 m2 in the cases of Zamudio, Álava and Carpetania, and 272,000 to 580,000 m2 for parks like Aerópolis in Seville, Technology Park in Getafe Sur and Technology Park in Tres Cantos (Madrid).
- Concerning plot size, there is a range between 1,100 and 30,000 m2 with possibilities for expansion, and a built-to-plot area ratio between 50 and 60 %.

IV. The common services are the following:

- Gas and electricity
- Water-related: drinking water, regular water, water treatment, distilled water, firefighting water.

- Common areas management: infrastructures maintenance, street cleaning, traffic control, gardening.
- Environment: purified water, sewage water, waste collection point.
- The parks generally offer common services; with the sole exception of purified water.
- The parks do not offer electricity from renewable sources, but some of the companies located in the parks use this kind of energy supply.

- **Security arrangements and telephone systems:**

Security arrangements are different depending on the parks: Aerópolis and PTM Tres Cantos are closed areas, and have an entry control; the parks of Álava, Cartuja, Carpetania and Parque Equipado de Getafe Sur are also closed areas, with no entry control but with active 24·hour security, with CCTV inside the buildings, alarm control and access cards for park tenants ; Zamudio is an open area park, absolutely integrated in the town of Zamudio, with no entry control but with CCTV and access control in the building property of the park.

We have to point out the data transmission network in Álava and Zamudio.They use ATM communication technology, which works like a local network and enables videoconferencing and voice and multimedia applications, as well as Ethernet access.

- **Transport:**

Private vehicles are the most common form of transport, with far less use of public transport. Company transportation exists, but is not very widely used. Carpetania Park in Madrid will have a train stop inside the park and a shuttle for the employees.

Car Parking is a difficult aspect in the development of the parks already studied. Aeropolis in Seville will organize a common parking area for the visitors outside the park. Underground parking facilities are available.

Public transport is not a consideration in park location decisions, and park management does not define a Transportation Plan.

V. Special and advanced services:

- **Business centre**

Álava, Zamudio and Aerópolis offer buildings with main services like meeting rooms and conference rooms with modern imaging technology and communications. The rooms have the usual tools video and communication tools (slide projectors and video projectors) as well as the latest technologies for video presentations and videoconferencing. They have a sound system with loudspeakers, simultaneous interpretation facilities, data transmission, an auditorium, and conference and exhibition rooms.

- **Business incubator**

Zamudio, Álava, Aerópolis, Cartuja and PTM Tres Cantos have business incubators, but only Aerópolis is specific for aerospace companies. Aeropolis is the only park which has an aerospace observatory and an aeronautical networking service.

- Hotels, restaurants, health care, sport centers, nurseries, golf, tennis, office common services.

The services are provided by other organizations in the surroundings.

VI. Concerning pricing and financial support, the results according to the data provided by the parks for developed plots are the following:

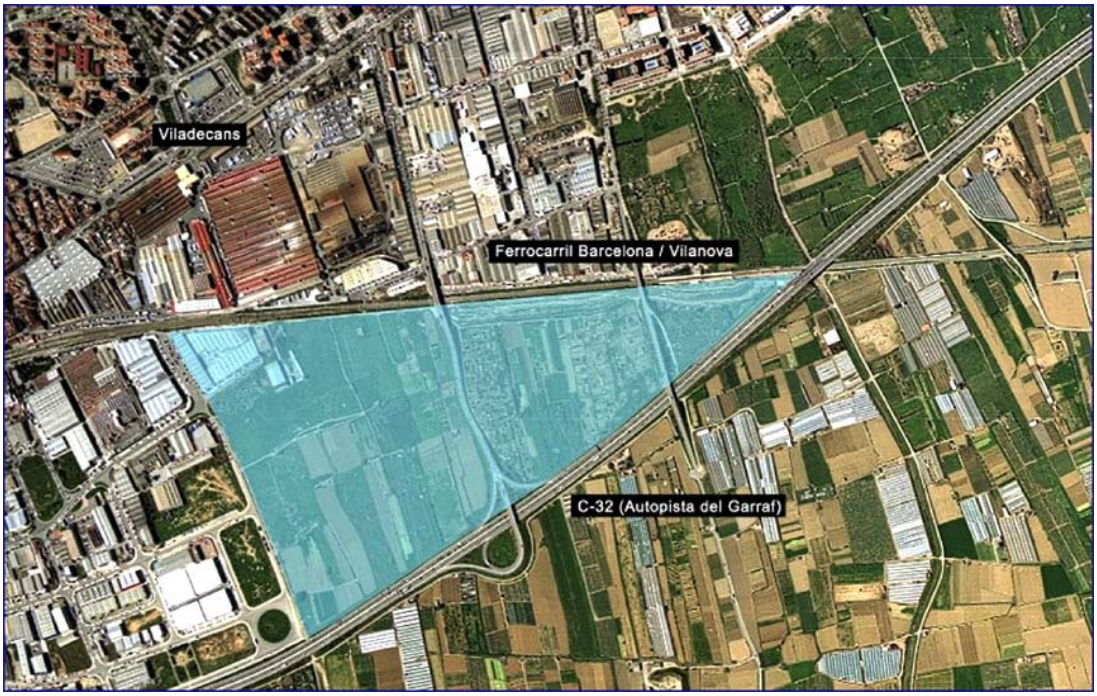
Álava	110	EUR/m² Sale prices
Zamudio	285	
Aerópolis	204 (with a 65% subsidy)	
Carpetania	257.14	

With the exception of Aerópolis, parks say that companies do not receive financial support for their establishment in the park, but they also state that they feel free to apply commercial admission criteria. Therefore we feel that list prices are for guidance only, and can be lower in the case of new parks.

7. APRAISAL OF THE LAND AND / OR UTILITIES COST THAT MAKES THIS OPERATION ATTRACTIVE FOR THE COMPANIES

The land under consideration totals 535,512 m². This corresponds to Phase II of the Business Park in Viladecans; this is the area where the Aerospace and Mobility Park will be developed. It is located in the western end of the industrial area in the town of Viladecans.

The land is triangular shaped and its topography is flat. The C·32 motorway to the South and railway line to the North constitute its boundaries. At present, the use of the land is mainly agricultural, with several farmers growing different types of crops.



The development of Phase II has the following objectives concerning uses:

1. Productive Area
· Aerospatial Area
· Specialized added value industry and aerospace
· Complementary Area to the airport.

2. Technology Area
· R&D
· Services and Equipment for the aerospace industry.
· University Teaching Centre devoted to the study of aerospace and mobility material.

3. Transport Area
· Regional links

The Project's development of Phase II will provide 4,000 new jobs.

APPROXIMATE VALUE CRITERIA

In order to estimate its value, we have taken the stance of a developer who is going to develop land with new buildings which will then be sold, as well as the stance of an investor who is considering the option of investing in buying land and erecting buildings for subsequent rental. While there is a great difference in the corporate strategy involved in these two positions, both react equally to the rental and value creation criteria under which the real estate has been valued.

From the perspective of the tenant, we have considered the sustainability of the developed estate through the final sales or rental prices of the buildings.

The methods applied for land valuation, according to value creation and profitability criteria are the following:

DEDUCTIVE METHOD

According to this method, the value of the built property is estimated. From this income we deduct the developer's margin, sales charges and direct and indirect building costs. The difference is the value of the land once it has been developed for building.

RESIDUAL METHOD

Under this method we obtain an indicator of land value resulting from the net operating income the property is capable of generating. This is done through the rental of several spaces minus operative costs.

This operating income is the return on capital used, in other words, on the active parts of the property (land plus building).

Deducting the net operative income from the return that can be demanded on the depreciable asset, meaning the buildings, we obtain the difference, that is, the land. By discounting the flow of land at a risk-calculated discount rate, we obtain an indication of the value of the land once it has been developed for building.

8. APRAISAL OF THE FINANCIAL FEASIBILITY OF THE CATALONIA AEROSPACE PARK PROJECT AND GENERAL CONCLUSIONS

Given the enormous financial effort of the target companies due to the cost of moving and the fact that up to 90% of interviewed companies are renting their present facilities, the financial analysis of the whole project has been made according to the following premises:

- Ownership status: Rental
- Lease period: 20 years
- Alternatives:
- Scenario A. Market-price rentals
- Scenario B. Rental conditions according to company efforts
- Scenario C. Zero-Internal Rate of Return (IRR) for 20 years

8.1. Scenario A:

Market-price rentals. IRR: 10.12 %

Advantages	Disadvantages
Higher IRR. No financial support, cumulative flows will be positive after 2022	Still requires encouragement for target companies to move
Offers a current vision of reference prices in industrial and office services	It will be harder for companies to be interested in the park location
Determines the profit on the whole project	Fails to take into account the main requirement for companies, especially industrial ones, which consider pricing in moving decisions

8.2. Scenario B:

Rental conditions according to company efforts. IRR: 5.86 %

Advantages	Disadvantages
The most realistic, considering the needs of the interviewed companies	Realistically open to objection from the Administration owning
Offers an IRR between 5% and 6%	Significant initial investment with slow return payments
More feasibility given he whole project situation	Overall net profit, but total income lower than expected

This IRR is above 5 % of share capital, the minimum return recommended by the European Union in cost-benefit analysis for public projects.

8.3. Scenario C:

Zero-IRR for 20 years. IRR: 0 %

The purpose of this scenario is for comparison with the other two, and at the same time to provide break-even prices as a benchmark for the other two, using industrial policy criteria.

Advantages	Disadvantages
It acts as a main frame of reference to calculate IRR=0	Unrealistic scenario, far from market circumstances
Provides the maximum hypothetical reduction of project return	Significant initial investment with long-term return payments
With no external financial support, IRR is positive, almost 2%	Net loss

8.4. The study's main conclusion is that the project is financially viable.

- The size of the Aerospace and Mobility Park is 535,512 m2, located between the medium and small Technology Park segments. This means we can forecast short-term marketing success for the whole estate.
- In more modern office services, we find buildings and business parks whose purpose is to fulfill financial activities strengthened by an investment in R&D and in IT. Size varies according to composition from single unit, minimum 3,000 m2, to park offices of up to 60,000 m2. This sector includes most of the financial investment companies, acquiring buildings for possible future rental investment.
- By comparison, the Aerospace Park can offer serviced office spaces in the 1,500·2,000 m2 range, and industrial space in the 5,000·8,000 m2 range.
- There is very low land availability, limited to the New Business Park with a rough size of 1,100,000 m2.
- In general, the establishment of Technology Parks with multisectoral activity in communities and provinces without a large concentration of industrial areas is due to policy measures with short -to medium- term viability rather than to economic decisions supported by long·term investment. Therefore, government support is very important, but it cannot be the only factor: communication networks and a large concentration of industrial areas are also necessary factors for the successful development of a Technology Park. The region of Baix Llobregat fulfills these requirements and safeguards this investment.
- In particular, the creation in the last few years of specialized or semi-specialized parks, such as the parks in Seville and Murcia, is due on the one hand to the company concentration and reorganization trend, with a very high R+D level, and on the other to the need for clustered small and medium-sized companies to become strategic suppliers of the main companies in the sector.

- The difference in the price of land in Parks belonging to Regions with a low concentration of industrial areas, compared to others like Catalonia, arises from their need to attract investment. But the Aerospace Park offers substantial advantages such as:

  1. Highway, road, rail, underground access, as good as in the best location in Barcelona.
  2. Location, with the aforementioned transport network, close to the town of Viladecans and Barcelona.
  3. Closeness to Barcelona International Airport, no more than 5 km away, with no need to enter or cross the city, thus saving a lot of time.
  4. Proximity to the Higher Polytechnic University School in Castelldefells, where the first class of Technical Aeronautical Engineers specialized in aeronavegation graduated in 2005.
  5. Availability of land (for Productive, Technological, and Mobility purposes) in a single area in the entire region allows for more flexible and faster trading, offering a range of landholding modes to the same customer in the same location and place.

- The quality of the aerospace park's location is based on the large concentration of industrial areas in Barcelona supporting the objective of stopping the flight from industrial areas through R&D&I and IT companies in the Technology Parks.
- The implementation of the Viladecans Project is, on the one hand, an element of balance because of investment diversification in alternative sectors, and on the other, a qualitative enrichment of business activities due to the high R&D level of the aerospace sector.

9. RECOMMENDATIONS FOR CLUSTER DEVELOPMENT MEASURES

So far, the industrial environment both international and regional has been discussed and the economic and financial feasibility has also been considered, but what is the course of action to be taken to "make things happen"? Who is supposed to have a leading role in that process? In this section some hints are provided for a set of guidelines to be established in due course.

9.1. Are the market forces enough?

In the economics of the aerospace industry there is a driving force towards the concentration of the demand side, be that aircraft builders or space agencies, and another driving force leading to the spreading of the suppliers throughout the World, since transport costs are almost irrelevant in this industry whereas technological skills need to be used wherever they are.

This and the fact that the aerospace industry has important positive externalities explain why this industry is regarded as a very important driver of local and regional economic growth.

Therefore it is quite relevant the question of what is the most appropriate industrial policy to stimulate this activity in an economic region where the weight of this industry is by no means what should be, regarding the industrial tradition of this regional economy and the weight of the whole industrial sector in it.

This is precisely the case in Catalonia where in spite of the technological environment of the region and the important weight in its economy of other industrial sectors requiring similar skills, the presence of aerospace industry is unexpectedly low: Catalonia's industry is 25,2 % of Spanish Industry in terms of revenue and 24,3 % in terms of employment (2003) but the aerospace sector accounts only for 4 % of the whole Spanish aerospace industry.

When trying to answer this question, the first axiom to be kept in mind for an Industrial Policy to be effective, respectful with competition regulations and not costly for the taxpayers is that the intervention has to reinforce market trends, not try to go against the stream.

Therefore, one must ask oneself what are the forces driving the localization decisions of new industrial investments in the region.

9.2. Several explanations to the location decisions

Why do the economic activity concentrate in some geographic regions instead of spreading all over a region or a nation? Economic theory provides several explanations to that. And the alternative answers to that question are relevant to any organization having thee goal to stimulate industrial or economic activity in a region. Some approaches of the "new economic geography" emphasize transport costs, economic stability or other factors to start some industrial activities in a given region and the attractiveness of this implantation to other companies of the same industry once it has reached some critical size[23].

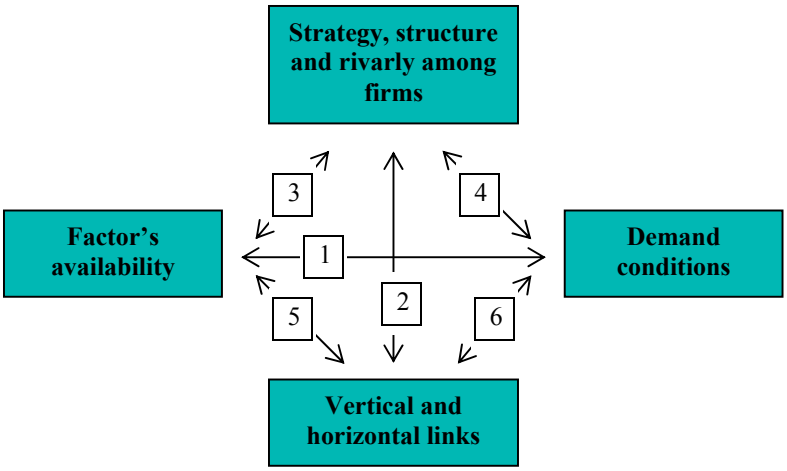
Former explanations stressed the importance of "backward" and "forward" links and some thresholds triggering the investment of a given company "backwards" or "forwards"[24].

There is also another kind of explanation, not denying the importance of the two previous explanations but giving a much wider framework to analyze the very complex phenomena underling localization decisions. This is the "cluster theory" put forward by Porter in the nineties of last Century. This is a much useful tool since gives much room for an intervention to complement market forces.

Following Porter, a cluster is defined as "geographic concentration of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example universities, standards agencies, and trade associations) in particular fields that compete but also co-operate" (Porter, 1998)[25]. Two characteristics of this definition are to be stressed: the companies in the cluster have close vertical and horizontal links among them and they are physically close one another.

To illustrate the relationships between factors determining the competitive advantages of clusters, Porter uses the following "diamond":

Figure X. - Determinants of Economic Competitive Advantages



Some examples of how the "diamond" works are the following ones:

1. The requirements of the demand stimulate the creation of new factors specially designed to meet them and drive new investment towards its production.
2. The rivalry among companies stimulates the upsurge of new suppliers and new co-operation links with related industries, specialized to meet the requirements of the industry.
3. The creation of new factors is also stimulated by the rivalry among firms.
4. Rivalry stimulates the demand side in the market.
5. Links with other industries also stimulate the improvement of factor supply
6. A strong demand fosters growth in related industries.

This model is very suggestive, since gives many opportunities to intervene on behalf of public interest to stimulate the performance of those industries rendering positive externalities to a region or community.

As shown in the following section, it seems this model, is relevant, in practical terms, for the purpose of the present study: the aerospace sector in Catalonia.

9.3. Empirical evidence suggests Michel Porter's model is suitable for analyzing the case in Catalonia

It has to be assessed if this model is fit to understand the potential capabilities of the Catalan aerospace industry to grow and the ways to stimulate a change of scale in its activity.

In a recent project carried out by a team of the Applied Economics Department of the Universitat Autònoma de Barcelona (Matas & Roig; 2004)26, the externalities in the region were taken into account to explain the investment decisions in Catalonia, on a sectorial level, following the main trends in research brought about by the Economic Geography.

The study uses the municipal distribution by number of new investments in the five sectors defined by the Organization for Economic Co-operation and Development (OECD) is as follows:

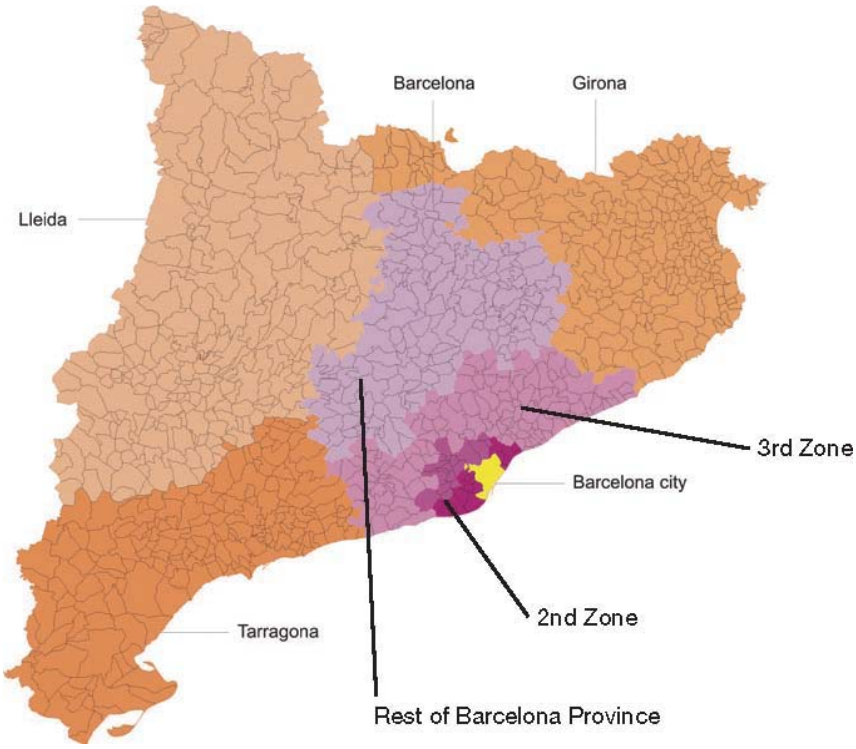
I. Intensive in natural resources.
II. Intensive in labor.
III. Intensive in scale economies.
IV. Intensive in product differentiation
V. Intensive in R+D.

There have been considered five geographical "concentric zones" (see map 1)

- Barcelona city
- "First Concentric zone" (around Barcelona), with 10 municipalities.
- "Second Concentric zone", with 23 municipalities
- "Third Concentric zone", including 128 municipalities (among them the great industrial areas of Vilanova I la Geltrú, Martorell, Terrassa, Sabadell, Granollers and Mataró.
- The rest of Barcelona Province, with 145 municipalities.

- Girona Province
- Lleida Province.
- Tarragona Province.

Map 1. Catalan geographical areas considered by Matas & Roig (2004)



Analyzing employment and new investment (by number) over the period 1986 – 2000, a first set of conclusions was as follows:

1) Barcelona, the "First zone" and Tarragona heavily concentrate employment and investments in the Group V, those industries intensive in R+D, but only Barcelona has increased the weight of these sectors during this period of time.

2) Group IV, intensive in product differentiation concentrates in "First and Second zones".

3) Group III, intensive in economies of scale is moving to the "Second and Third zones".

4) Group II, labour intensive, traditionally concentrates in the "Third zone" and in the rest of Barcelona Province.

5) Group I, intensive in natural resources, is found mainly in provinces other than Barcelona.

After this first analysis, the study, using econometric models and panel data for the period 1986 (year of the Spanish entry to ECC) to 2000, estimates the significance of several variables in the decision making of new investments in Catalonia in several industries, coming up with the following results, regarding the R+D intensive sectors.

1) R+D sectors are the most sensitive to the availability of high education personnel.

2) Therefore, companies heavily using human capital tend to locate in areas abundant in this factor. In Catalonia that means the metropolitan region of Barcelona.

3) R+D sectors are the ones to benefit most by "urban economies", but they do not seem to react significantly to specialization in the same sectors (as measured by the proportion of employment in the same sector on the total employment).

4) R+D sectors are the most sensitive to the availability of advanced services.

5) R+D sectors prefer locations near main roads, even if they are other industries more sensitive to this variable.

The elasticties of new investments regarding several variables are as follows:

- Availability of high educated personnel: 1.997
- Density of industrial employment: 1.234
- Availability of advanced services: 1.055
- Travel time to a main road: -0.196
- Employment in the same industry: 0.100

The size and signs of these elasticities fit what is expected.

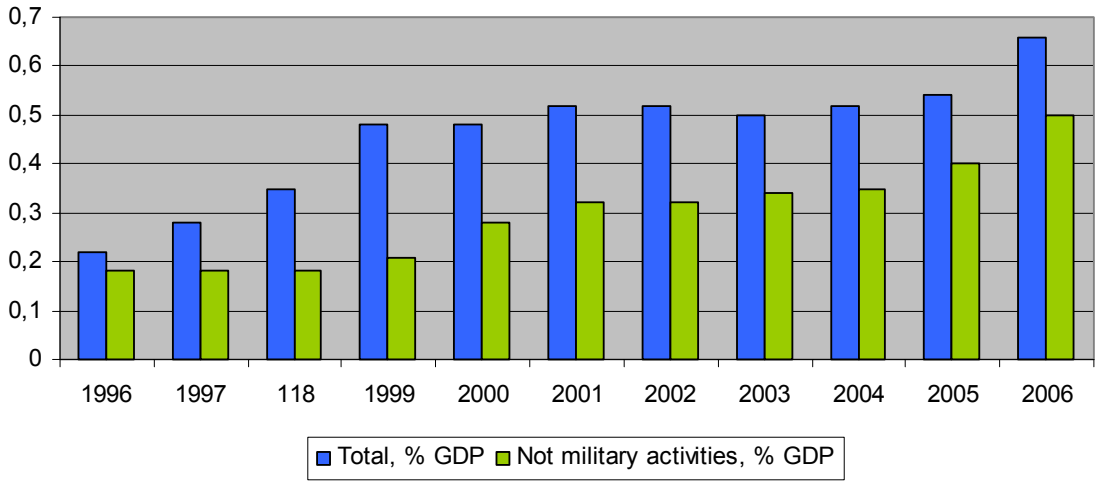
All this evidence gives support to the use of Porter's model to analyze the ways to help the birth of an aerospace cluster in Catalonia.

9.4. Framework of Industrial Policy in Spain and Catalonia

The present Spanish Industrial Policy and the guidelines for its development in the short and medium terms give a very important role to research and development.

The public spending in R+D in Spain has increased from 0.24 % of GDP in 1996 to 0.68 % in 2006 (budget provision), and the public spending in innovations has grown from 0.18 % of GDP in 1996 to 0.50 % in 2006 (budget provision), as seen in the following chart.

R+D and innovation Spending in Spain, 1996-2006 (in terms of precentage of GDP)



Source: Spanish Economy Ministry and Barcelona Chamber of Commerce

The guidelines for the coming years is to reach 2 % of GDP allocated to R+D in 2010, and boost the private spending in this field to reach the 55 % of the total spending for the same year[27].

Another strategic objective is to foster the private initiative for starting new companies, especially in those industries intensive in technology.

Nevertheless, Spanish policy is not oriented towards the development of industrial clusters, in comparison to policies in other European Union Member States, like the United Kingdom and France, where the Industrial Policy is highly organized around the concept of cluster[28].

In Catalonia, the Generalitat de Catalunya (the regional government) is very much oriented towards boosting industrial activity, especially in high-tech activities. Its Industrial Policy is not specifically aimed to cluster development, either there are some specific measures clearly useful for this objective[29].

The following chart depicts the main agents of the regional Industrial Policy.

INDUSTRIAL POLICY OF THE AUTONOMOUS GOVERNMENT OF CATALONIA CONCERNING THE AEROSPACE SECTOR				
Administration Entities	**1.1 Department of Labour and Industry**	**1.2 Department of University, Research and Information Society**	**1.3 Department of Territorial Policy and Public works**	**1.4 Department of Commerce, Tourism and Consumption**
	1.5 Secretary of Industry	1.6 Research General directorate		
Autonomous Entities	2.1 Innovation and Business Development Centre (CIDEM)	2.2 Know-How Transfer Agency	2.3 Land Institute (INCASOL)	2.4 Commercial Promotion Consortium (COPCA)
Specialized Agencies	3.1 Innovation Technologies Support Network (XIT)			
	3.2 Technology Centres Network (XCT)			
	3.3 Technologies Spread Centres Network (XCDT)			
	3.4 Catalan Investment Centre			
Private-Public Partnership Entities	4.1 Industrial Prospective Observatory	Research and Development Council		
Planned Actions 2006-2007	Aeronautic and Space Technology Centre (CTAE)			
	The powering of Scientific and Technology Parks close to Universities in the Aeronautical, Biotechnology, Renewable Energy Sectors			Internationalization of Strategic Clusters

9.5. Developing the cluster

At present the strategy of encouraging the development of aerospace industry in Catalonia has not been specifically oriented to the development of a cluster in Porter's sense, for which is required a "geographic concentration", as stated above.

A long way has been covered during the last years, in terms of stimulating networking, developing supply chains, creating pubic – private initiatives to co-ordinate joint actions for the industry, increasing the relationship between companies and Universities, and many other actions that have proved to be quite effective.

Nevertheless, probably a cluster approach is the most adequate to provoke the required impulse to get a real change in the scale and size of the industry.

Needless to say that this entails some degree of risk for all agents involved, be that private or public, but at present stage, there is a strong motivation in Catalonia to go in that direction in the private sector as well in the public sector, trade associations, chambers of commerce and other institutions.

The specific measures or actions to be taken to help this process start could be grouped in four categories:

a) Defining the regional growth model for aerospace industry.
b) Stimulating geographic concentration.
c) Enhancing the performance of industry.
d) Readjusting the industry organizations for the coming phase.
e) Monitoring the progress.

In what follows some hints are suggested for the work to be done in each one of these categories.

a) Defining the regional growth model for aerospace industry.

It is very important to define strategic objectives widely accepted at regional level that should be clearly stated and widely and well publicized.

A critic objective probably should be how to cope with the structural lack of a big contractor of the aerospace industry in the region, since most of the Catalan companies in this industry are mainly specialized in supplying components or providing services for main contractors of Airbus, Boeing or the European Space Agency, but there is not a big company in the region to be able to become, by itself, one of those main contractors.
To surmount this handicap, three different actions could be attempted (being not excluding one another):

I.Reach some strategic agreements with the companies in Toulouse, in the framework of the Euro Mediterranean Region project launched by Aragón, Balearic Islands, Catalonia, Languedoc Roussillon and Midi-Pyrinees.
II. Creating a public – private investing company aimed to take stakes in big contractors in the industry.
III. Attracting an MRO (maintenance, repair and overhaul) company to be established in Barcelona Airport.

b) Stimulating geographic concentration.

I. Investing in the infrastructure of the Aerospace Parc on behalf of the public sector.
II. Financing the cost of moving of present companies to the Aerospace Park in Viladecans (cost not yet paied off of non-removable industrial equipments and general moving costs).
III. Commercializing the park site in favorable terms to the first companies moving there.

c) Enhancing the performance of industry

This could be done through specific support schemes, like the ones suggested below:

I. Financing Plan: Providing companies with long term financing, in a sharing risk approach.
II. Commercial Action Plan for the promotion of the cluster and its companies abroad.
III. Networking Plan: stimulating the creation of joint ventures and strategic agreements among Catalan companies, to reach the size and have the right access to knowledge to jointly bid for great projects.
IV. Access Plan; to help companies in other sectors to overcome the great entry barriers to the aerospace industry (namely car industry companies).
V. Quality Factor's Plan: e.g. increasing human capital availability, helping the flow of information (for instance, establishing the "cluster's portal",…).

d) Readjusting the industry organizations for the coming phase

In this new phase of building the cluster, there will be several main organizations, of all the Administration agencies:

I. Aerospace Park Consortium
II. Barcelona Aeronàutica i de l'Espai (BAIE: Barcelona Aerospace Organization)
III. Aerospace Centre for Technology Transfer (CTAE)
IV.Barcelona Chamber of Commerce

e) Monitoring the progress

A set of indicators should be established, both quantitative and qualitative and the performance should be assessed regularly.

10. MANAGEMENT RECOMMENDATIONS AND POSSIBLE CONSORTIUMS

According to some reports that we have carried out like the Benchmarking about Aerospace Parks or Industrial areas related to the aerospace industry, where we have analyzed their different locations and services, of such kind of high level industrial areas in Spain, France and England, we have also studied the management modalities of the parks and we can determinate that most of them have a management autonomus entity.

The public limited company is the most common society form used, and we think that the advantages are the following:

- A unique image to the third parties.
- The actuation of all public entities integrated can be speed up because the decision making delegation in the public limited company.
- For third parties, public as well as private entities, this kind of society is identified easier and give safety, stability, and permanence.
- It provides the performance of public entities throught a new public limited company, due to its developed, usual, known reglamentation in the trade as well as in the business context.
- The participations of the partners are very clearly determinated, as well as the responsabilites.
- It makes easier the contracting of the park, because its is not necessary to apply the public administrative normative, but the private, with same few restrictions (publicity and competition)
- The society can be instrumental; the shares can be contracted by means of third parties. A society constitution is not synonymous of “structure creation”

MODEL A CONSORTIUM OWNER	MODEL B TITULAR CONSORTIUM AND TEMPORARY RIGHTS MANAGER	MODEL C REGULATING CONSORTIUM
· INCASOL and Viladecans City make a contribution to the consortium, in land and money. After that the Consortium rents or gives the surface rights or administrative concessions of the lands.	· INCASOL gives the Consortium a partial right of the land. · The Consortium is an administration concession or a "superficiality"; which when the time comes, will give the rights to industries, who want to establish themselves in this industrial area.	· INCASOL does not give the land to the consortium but forces them to sell to who they think would be a possible part of the industrial area, always subject to conditions which have been previously established. · The Consortium regulates the activity.
AVANTATGES	**AVANTATGES**	**AVANTATGES**
I. For the employer, potential costumer, the investiment is lower, because they don´t buy the ground, and the construction is the only cost. II. The consortium has complete control (this is very important because there is a will of regulating the type of activity which has to be carried out the consortium).	I. For the employer, potential costumer, the investiment is lower, because they don´t buy the land, and the construction is the only cost II. The INCASOL does not want to get rid of the land ownership. III. The Consortium maintains a very important control because it rents the industrial land propriety.	I. INCASOL does not immobilize the land and makes plus values. II. Companies prefer to buy property rather than have temporary rights.
DISADVANTAGES	**DISADVANTAGES**	**DISADVANTAGES**
I. For INCASOL: there are no plus values. II. Companies very often want to have property land rights (not a temporary rights)	I. INCASOL does not want to have plus values (while in model A this is a definite inconvenience, but in this case it is a temporary situation, even if it is at a long term) II. Very often industries want to have ground rights (not temporary rights).	I. It can increase the cost of the industry because of a price up date, construction charges, etc. II. The Consortium loses absolute control. III. For the industries the investment is higher they have to buy the propriety. IV. It is make appropriate for real estate operations rather than for an industrial policy act.

Footnotes

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