

**Instituto Superior de Ciências do Trabalho e da Empresa**



## **STRATEGIC VARIABLES FOR NATIONAL AIR TRANSPORT**

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## 1. ABSTRACT

Air Transport allowed over time, to reduce distances, eliminate borders, increase mobility and contribute to a new model of society as we know today. These are some of the reasons why in recent years, there were times of growth, development and higher demand, strengthening its role in a society increasingly globalized.

While environmental costs caused by air transport are often highlighted, very little is said about its benefits. Broadly speaking it can be said that aviation contributes to worldwide trade by opening access to several markets, for investment through internationalization and access to new resources and skills in order to stimulate productivity and encourage competition as well as tourism.

Its importance should not therefore be questioned or neglected. On the contrary, the preparation of its future should be a constant concern by analyzing the main challenges for the sector and for all others involved. There are many paths to choose and several variables that must be taken into account. This study aims to analyze the main variables, to present perspectives, alert to emerging opportunities and external adverse factors, and to identify some options that can better serve Air Transport in Portugal.

The purpose of this dissertation is also to highlight the weaknesses of this sector in Portugal and the need to consider a medium/long-term vision and a strategy for such an important sector for the Portuguese economy and society.

**Keywords:** Air Transport, Infrastructures, Airlines, Strategic Positioning

**JEL Classification Codes:** Business Economics (M20), Other special topics (Z19).

## RESUMO

O Transporte Aéreo permitiu ao longo dos tempos, reduzir distâncias, eliminar fronteiras e contribuir para o modelo de sociedade em que hoje vivemos, sendo estas algumas das causas pelas quais tem vivido nos últimos anos, tempos de grande expansão e procura, não só a nível de turismo como também em termos de viagens em negócios, reforçando ainda mais o seu papel numa sociedade cada vez mais globalizada.

A sua importância não deve por isso ser posta em causa ou negligenciada, devendo ser uma preocupação constante a preparação do seu futuro analisando quais os desafios que se colocam ao sector e a todos os que o constroem. Existem diversos caminhos que podem ser escolhidos e várias variáveis a ter em conta. Este estudo tem como objectivo analisar essas variáveis e identificar caminhos que possam melhor servir o transporte aéreo Português.

Enquanto os custos em termos ambientais provocados pelo transporte aéreo estão bem documentados, muito pouco é dito acerca dos seus benefícios. Em traços gerais pode dizer-se que a aviação contribui para as trocas comerciais abrindo acesso a diversos mercados, para o investimento através da internacionalização e do acesso a novos recursos e competências, para a produtividade estimulando a competição e para o turismo através da facilidade de unir viajantes e regiões.

Este projecto ambiciona também alertar as fragilidades do sector em Portugal e a necessidade de pensar a médio longo prazo uma visão e uma estratégia para uma área de negócio tão importante para a economia e para a sociedade Portuguesa.

**Palavras – Chave:** Transporte Aéreo, Infra-estruturas aeroportuárias, Companhias Aéreas, Posicionamento Estratégico

**JEL Sistema de Classificação:** Business Economics (M20), Other special topics (Z19).



## 2. SUMÁRIO EXECUTIVO

Ao longo do tempo, diversos acontecimentos e adversidades têm vindo a influenciar o meio envolvente da indústria da aviação, determinando assim os crescimentos de procura do transporte aéreo a nível mundial.

Os benefícios deste sector são inegáveis mas existe todo um leque de temas que gravitam à sua volta e que merecem algum destaque. Este projecto foi idealizado com o objectivo de realizar e desenvolver e caraterizar as principais variáveis que afectam este sector e que muitas vezes não são devidamente realçadas.

Para um melhor enquadramento do sector procedeu-se a um diagnóstico exaustivo da situação actual do Transporte Aéreo e identificação dos principais problemas, partindo de uma abordagem global para uma mais particular, que é a realidade de Portugal.

Este diagnóstico foi dividido em quatro grandes pontos:

- **Contexto** onde se aborda a importância do Transporte Aéreo e o posicionamento de Portugal
- **Serviço** abrangendo os principais segmentos da mobilidade, da relação biunívoca entre o Turismo e a aviação, da definição do conceito de hub dando não só exemplos internacionais como apresentando também o hub nacional, e do negócio da carga aérea que se tem desenvolvido nos últimos anos sendo que em Portugal a sua incidência é maioritariamente em Lisboa e no Porto.
- **Operadores** através da descrição das companhias aéreas, evidenciando as principais diferenças entre as companhias tradicionais e as LCC, de uma análise detalhada aos vários aeroportos nacionais não só em termos de constrangimentos onde Lisboa se destaca por estar próximo de atingir a capacidade máxima, mas também do posicionamento estratégico de cada um, passando por uma identificação dos seus operadores centrais e graus de satisfação dos clientes em relação às diferentes infra-estruturas, procedendo depois a um enquadramento dos Serviços de Tráfego Aéreo e a sua importância na gestão do espaço aéreo.
- **Matérias Transversais** abrangendo questões relacionadas com o ambiente e com as alterações climáticas, com a segurança e safety alertando para eventuais condicionamentos das diferentes infra-estruturas nacionais e também para os problemas que podem resultar de ter o aeroporto principal do país no centro da cidade junto a densas áreas urbanas e estradas muito movimentadas, e finalmente uma caracterização da estrutura de propriedade.

Após este diagnóstico, procedeu-se a uma análise das perspectivas futuras para a aviação em termos de procura, quais os mercados emergentes, quais as regiões que se espera virem a registar os maiores crescimentos, quais os novos modelos de aviões e que capacidade podem oferecer, passando também pela Carga Aérea, pelo fuel e pelo congestionamento das infra estruturas aeroportuárias e os constrangimentos da gestão de tráfego aéreo.

Uma vez evidenciadas as principais tendências para a aviação, prosseguiu-se para a identificação de desafios e oportunidades que Portugal pode aproveitar e desenvolver, apresentando alguns exemplos de estratégias de sucesso adoptadas por outros países. Obviamente que existem sempre ameaças associadas mas essas devem ser encaradas como algo que pode contribuir para dinamizar e impulsionar a constante inovação que caracteriza este sector e a sua capacidade de resposta face a eventuais contrariedades.

Tendo tudo isto por base, chegou-se à parte dos cenários, em que são apresentados 2 caminhos possíveis para Portugal, um em que se aposta neste sector considerando-o estratégico para o país a vários níveis, e outro em que se mantém o status quo. Para cada um dos cenários foram evidenciados os diferentes impactos inerentes a cada opção.

Um último tema que também mereceu uma referência foi a complementariedade entre os diversos modos de transporte e os benefícios que daí podem advir.

Assim, tendo presente os benefícios inerentes, as perspectivas de crescimento, os mercados emergentes e o impacto que um sector estratégico como a aviação tem, não só de forma directa, como indirecta abrangendo diferentes sectores e áreas de actuação e acima de tudo a economia nacional e o posicionamento estratégico que o país quer ter, então não restam dúvidas que um caminho de aposta concertada deverá começar a ser trilhado.

A estratégia para o País tem de envolver as principais entidades ligadas ao sector, passando por aeroportos, companhias aéreas, turismo, ministérios, entre tantas outras que, sem nunca perder a sua individualidade, têm também de conciliar objectivos umas com as outras, unir esforços, delinear acções conjuntas. É o esforço de todo um País e dos seus intervenientes em prol do mesmo objectivo comum.

É certo que, numa perspectiva de curto prazo, a tendência é de centralizar a atenção nos custos de investimento, que podem atingir valores extremamente elevados, mas no médio-longo prazo que volume de receitas, de posicionamento e de conhecimento estaria o país a hipotecar?

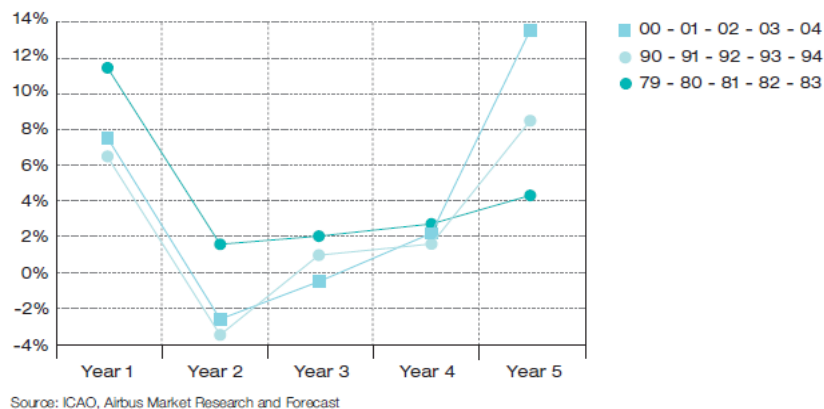
### 3. AIR TRANSPORT FORECASTS

This chapter is based on forecasts prepared by IATA, Airbus, Boeing and OPEP and its purpose is to make a framework of what will be world aviation in the coming years.

Despite the economic and financial crisis, it is predictable that emerging economies will continue to grow and benefit from air transport. Global liberalization is giving greater market access to airlines and a wider choice for passengers and cargo. Low-cost carriers will also continue to grow around the world, but particularly in Asia, while the traditional network airlines will take advantage of connectivity benefiting from higher demand on the important markets and new international travel consumers from the emerging countries.

There is no doubt that the financial turmoil of 2008 and the resulting downturn in the world economy has impacted passenger demand, frequencies and traffic growth in the short term. However, it is estimated a dilution of this effect over time. The airlines have to manage these periods proactively adapting to the new competition, oil fluctuations and financial crises, thus achieving efficiency and productivity gains in order to benefit from market recovery. It is not clear how severe the current cycle was, however previously cycles, whether caused by economic issues or by external factors such as terrorism, wars, pandemics, show that the deeper the recession, the stronger the recovery.

**Figure 1: Air Traffic growth (%)**



But any growth of passengers and frequencies will also be a challenge for the existing airport infrastructure and air traffic management. Using larger aircraft, with reduced costs per seat and CO2 emissions can be a solution for congestion. However, given the substantial investments and time requirements to carry out such developments, there is the possibility that not all the changes can be achieved and this may result in earlier fleet replacements, acquiring

new aircraft with higher capacity to absorb demand, reduce costs, improve efficiency and deal with environmental issues.

### **3.1. KEY FACTORS OF TRAFFIC GROWTH**

GDP is a variable with strong influence on demand growth and this was evident in the economic downturn. And so are exports, imports, unemployment, inflation, consumption and income. However, in some markets, classic econometric modeling is not sufficient to predict traffic growth and the use of hybrid models is required.

For instance, in Asia the development of Low Cost Carriers (LCC) started with the liberalization in each country and in the region. In Mexico a portion of air traffic growth depends on the number of people switching from the popular bus network to air transport, which is a consequence of lower airfares and better journey times. In the maturing LCC markets of North America and Western Europe, the LCC growth will depend on the number and size of new markets that still do not have operation. The growth in India is a good example, because although it is highly influenced by the economic, trade and population growth, it has also benefited from increased access to air transportation, either through new destinations or simply through greater affordability as a result of deregulation and competition.

Forecasts are based on economic variables, consumer behavior and expectations, liberalization processes, government policies, new routes to other markets, modal competition, continuous traffic stimulation by LCC, growing importance of emerging markets, development and growth of hubs in the Middle East, developments in domestic trade in China and India, influence of airport congestion, among others.

### **3.2. EMERGING MARKETS: THE MAJOR DRIVERS OF GROWTH**

Emerging countries have large populations, large resources and large markets. They are the world's fastest growing economies and therefore, becoming critical participants in major political, economic and social issues. The emergence of these countries is a result from the focus on cultural and educational development, foreign investment and domestic consumption. The BRIC's (Brazil, Russia, India and China) are the largest emerging markets.

These nations are already changing the reality of global economics and have the potential to become the most dominant economies in 2050.

**Figure 2: 2006-2010: highest traffic growth in emerging and large population regions**

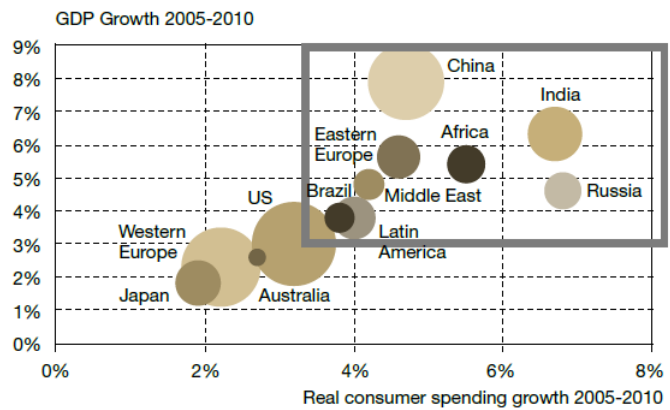
\*Asia excluding India and China

Expanding regions		Yearly traffic growth	5.4 billion people
	China	+10.8%	
	India	+9.8%	
	Eastern Europe	+9.7%	
	Middle East	+8.0%	
	CIS	+7.4%	
	Asia	+7.1%	
	Africa	+7.0%	
	Latin America	+6.2%	
Developed regions		Yearly traffic growth	1 billion people
	Australasia	+6.6%	
	Western Europe	+5.6%	
	Japan	+4.7%	
	North America	+4.1%	

**Figure 3: Emerging countries will drive the world economy**

Source: Global Insight, Airbus

Bubble size proportional to real Gross Domestic Product (GDP) at Purchasing Power Parity (PPP) in US\$ billion in 2010



More competitive air fares, the increase of number of services and reduction of travel times are the key factors of the transfer of users from other transport modes (buses and trains) to air transport. These markets are developing a large medium class providing many new customers for commercial aviation. But all this growth coincides with deregulation of the domestic market, which makes the BRIC countries to move along the curve of propensity to use air transport in a much more accelerated way. For example South Korea took 20 years to reach 0.5 trips per capita. China will take 5 years to reach that value.

In recent years, populations of countries like China and India have clearly demonstrated a strong propensity to fly. But even with the high growth that has been observed, there is still a huge potential to rise, as these nations and their population are benefiting from better living conditions and taking advantage from the benefits of air transport.

These are currently the largest emerging economies, but there are another 27 emerging or potentially emerging countries identified by the United Nations such as Indonesia, Malaysia, the Community of Independent States, Poland, Turkey, Mexico, Argentina, Chile, South Africa, Morocco and Egypt, among others. With a population that comprises about 3 billion people, these countries may be smaller individually, but are significant markets in economic terms and air transport potential.

The authorities of these countries recognize the benefits that aviation can offer to the economy and people, being therefore more open in creating conditions to sustain and develop

air transport. This support can appear in many forms, such as stimulating the economy through investment and consumption, creation or development of infrastructure and airports to meet the increasing domestic and international traffic (as in China and India with many projects), the signature or extension of bilateral agreements, deregulation and elimination of barriers, thus allowing greater access and choice for the passengers. Vietnam for example, has implemented many of these policies, including extending a bilateral agreement with the United States in 2008 and is currently seen as one of the fastest developing markets in Asia.

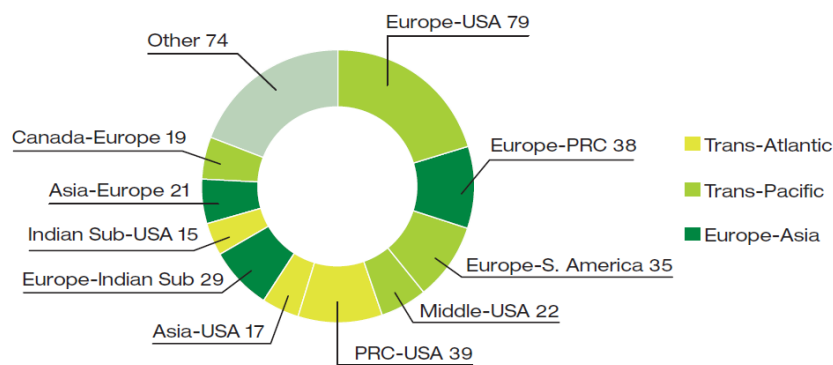
### **3.3. EXPANSION THROUGH NETWORK DEVELOPMENT AND STRONGER HUBS**

The strong growth of Intercontinental traffic is distributed through increased frequency and capacity on the existing network, particularly among the large hub cities, and also through the development of the network, creating new opportunities that include the opening of new routes. Expectations point out that this pattern of network evolution will continue, with the addition of new non-stop and longer-range services and the strengthening of existing services to and from the world's major hubs.

Many people live and work in mega cities and, therefore, wish to travel to and from those cities, either for leisure or for business. The number of services offered by large hub airports has developed to meet this demand. As nations develop economically and demographically, an increasing proportion of the population migrates to large urban centers and suburbs. By 2030 it is anticipated that 1.8 billion people around the world will have moved to vast urban networks where there are better prospects for jobs and higher wages. Currently, six cities worldwide have more than 15 million inhabitants. By 2025 it is estimated that this number will double, and that seven of them will be in the Asia-Pacific region.

But why are hubs a key factor to route networks? Mainly because it is where monetary value is concentrated. The traffic between hub cities on both sides of the Atlantic has doubled, regardless the addition of approximately 100 regular direct long-haul routes over the past 20 years, and because they also end up boosting the traffic connection, thus creating numerous synergies. Remarkably three quarters of these new routes involve a hub city on one or both sides of the Atlantic. The 3 main Long Haul flows are Transatlantic, Transpacific and Europe to Asia and are expected to continue a future sustained growth.

**Figure 4: Additional routes on the 3 main long-haul flows**

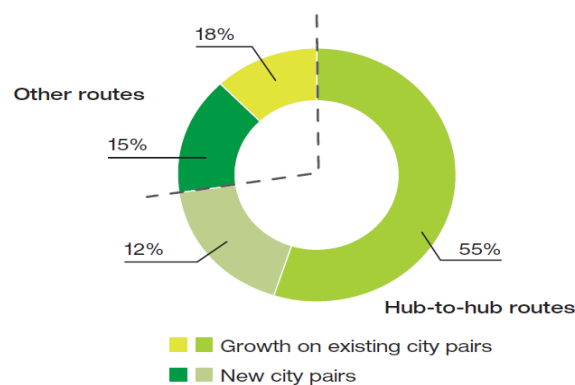


Source: Airbus

Between Europe and Asia, and taking into account the estimated growth of several Asian countries, it is expected to assist a huge market share increment of Middle East hubs, as its range of destinations is expanding and developing, taking the maximum advantage of the privileged geographical position to connect the two regions.

Hubs will continue to grow and strengthen, while new routes will continue to be launched as the rise of demand makes it economically feasible for airlines to open new city-pairs. This combination will allow the development of the Network hub concept of Traditional airlines.

**Figure 5: % of traffic on the trans-Pacific flows (2007-2020)**



Source: Airbus

### 3.4.GROWTH OF LCC

In Europe, LCC already carry about 1/3 of passenger's volume and will continue to act as a stimulus to increase air traffic in the future. Despite being heavily affected by the oil price, the LCC model in Europe has not lost importance and many airlines even strengthened its position. The economic crisis has brought some opportunities, with business traffic segment choosing to fly low-cost carriers as travel budgets become smaller

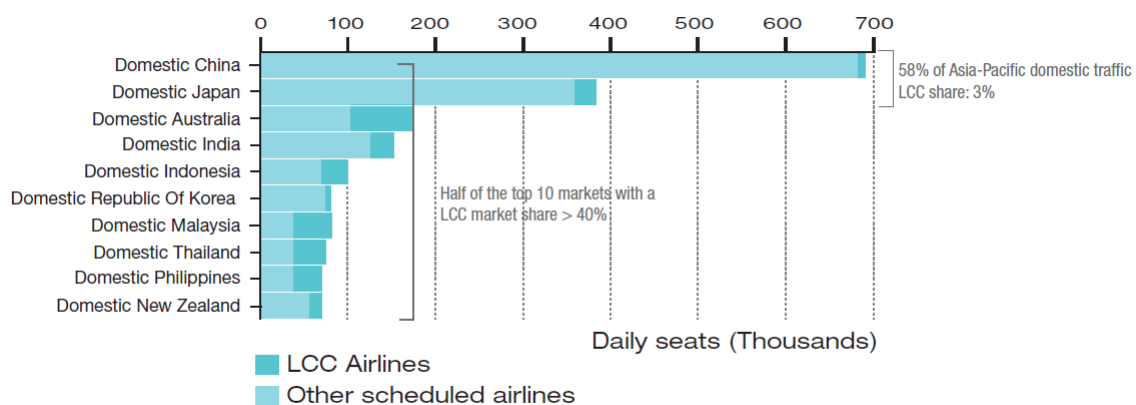
The major airlines are Easyjet and Ryanair, which have more than 40% of LCC market share increasing capacity by 21% between 2007 and 2008. LCC markets in U.S. and Europe are similar in size, but while in the U.S. 95% market share is held by 4 companies, in Europe is still largely fragmented, with 30 carriers splitting 60% of the traffic and increasing capacity by 3.6%.

In the long term, the possibility of mergers and acquisitions is high, which can result in a smaller number of companies but also in the creation of larger groups, allowing them to expand the networks and gain access to new markets, even long-haul.

Three quarters of LCC capacity are on intra European market, where many already exceed 50% market share. LCC European and U.S. markets are close to reach maturity, so we will be seeing a consolidation of frequencies and adjustments on number of aircraft.

In a very short time, LCC's in Asia has captured 14% of a regional market that is the same size as the domestic markets in North America or Europe. However, although similar in size, there are significant differences compared to more mature markets. In Asia, LCC has more than 40% market share in half of the top 10 domestic markets. However LCC are basically non-existent on the two largest domestic markets, Japan and China.

**Figure 6: Top 10 markets (95% of total domestic traffic)**

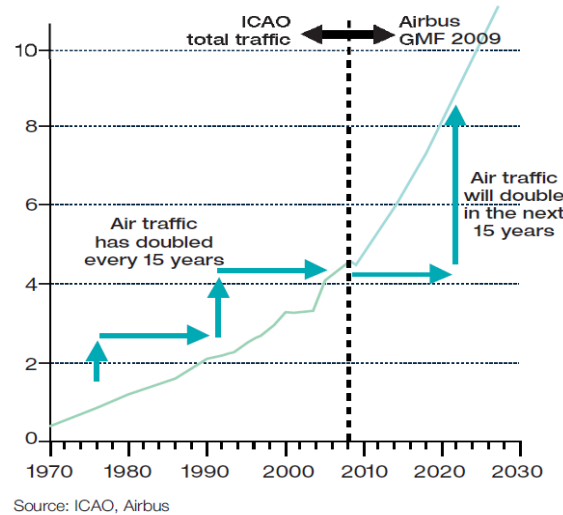


Source: Airbus

Deregulation in North America took place in 1978, its population is 290 million and there are about 10 LCC, in Europe it was in 1997, the population reaches 375 million and there are about 60 LCC, in Asia it happened rapidly and the population is 3.5 billion. So the potential growth of LCC is now heavily concentrated in Asia, and it is estimated that these companies benefit from significant economic expansion, liberalization and deregulation, continuing to grow in number of passengers, frequency and market share.

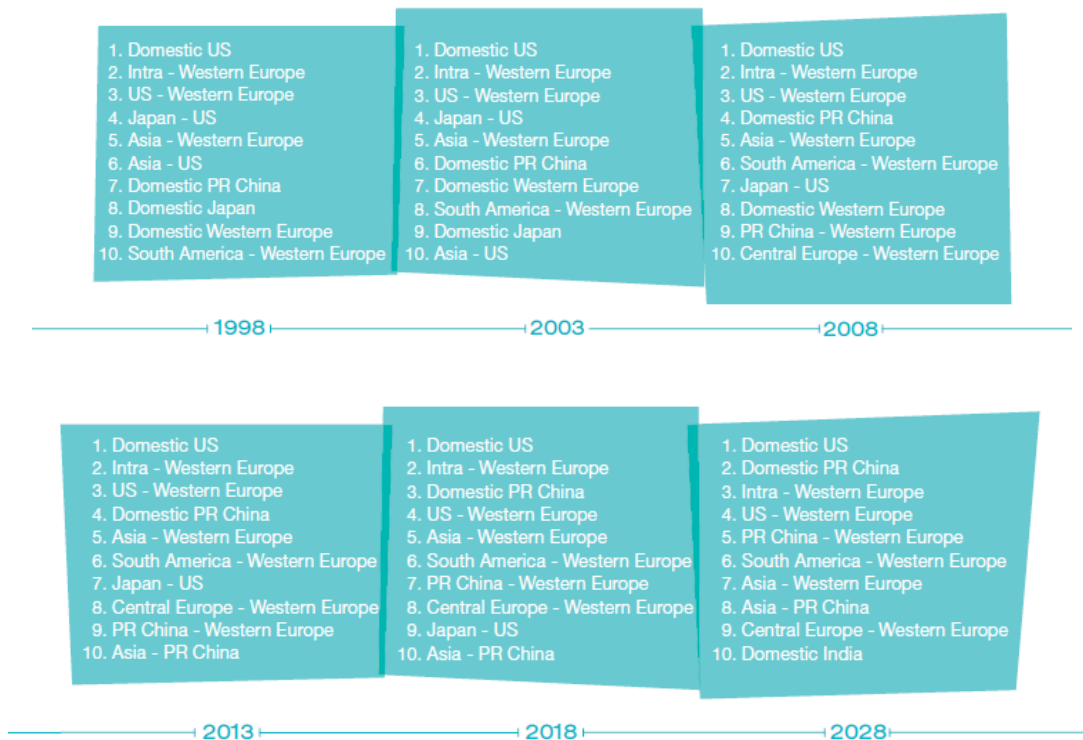


**Figure 7: World annual traffic – RPKs trillion**



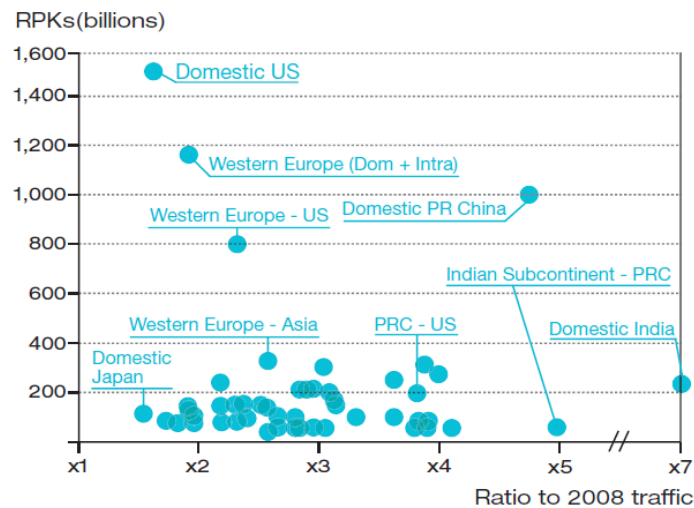
As a result of this environment, it is estimated that world's RPK (Revenue Passenger Kilometers) will grow at an annual average of 4.7% over the next 20 years. Among the largest submarkets, annual RPK growth on domestic India and China are expected to grow at an average of 10% and 7.9% respectively. This reflects optimistic long-term projections for economic growth in these countries, generating more wealth, and a growing tendency for their populations to travel by air, reaping the benefits of vastly reduced journey times with very competitive prices.

**Figure 8: History and forecast of world top ten traffic flow by RPK**



Nevertheless, despite high growth rates estimated for Asia, especially India and China, the U.S. domestic market will continue to be the largest in volume.

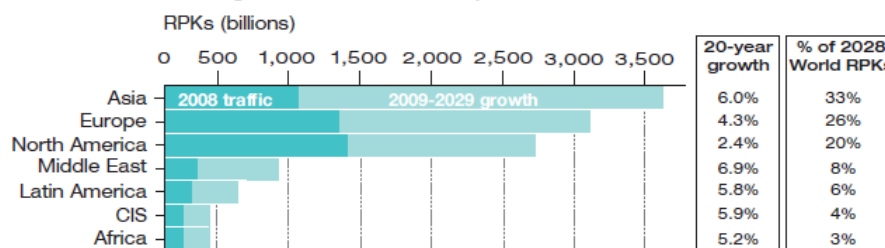
**Figure 9: Traffic volume in 2028**



Source: Airbus

U.S. and Europe are the most mature regions and that is why it is expected smaller growth rates. However, although lower, they have a quite significant expression given the high volume of traffic involved. Traffic concerning Middle East is estimated to expand rapidly with average annual growth of 6.9%, CIS (Commonwealth of Independent States) will generate a rate of 5.9% per annum, whereas Africa and Latin America will grow 5.2% and 5.8% respectively. But forecasts point to a new world leader, Asia.

**Figure 10: Traffic by airline domicile**

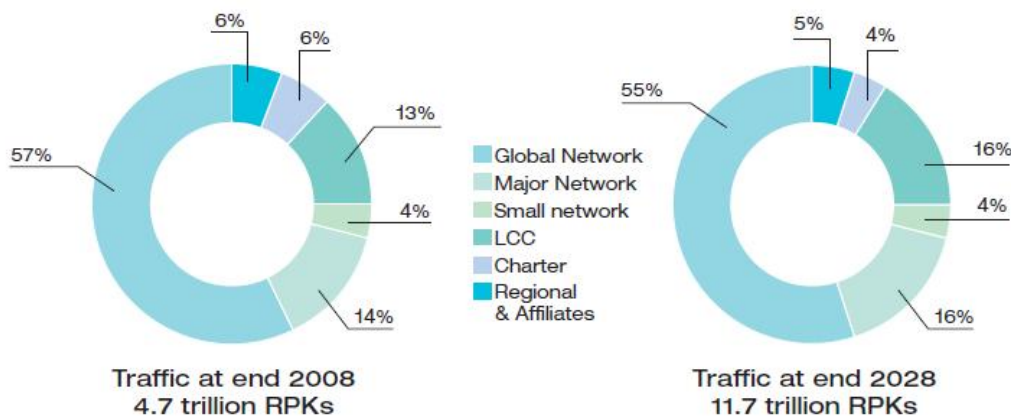


Source: Airbus

Middle East will have the highest percentage increment, taking into account the ambitions of the countries implicated, the quality of infrastructures and the positioning of their national carriers. Over the next 20 years this growth will result in an increase of market share achieving 8%.

In terms of airlines, the traditional network carriers will remain dominant with 75% market share (considering global, major and small airlines).

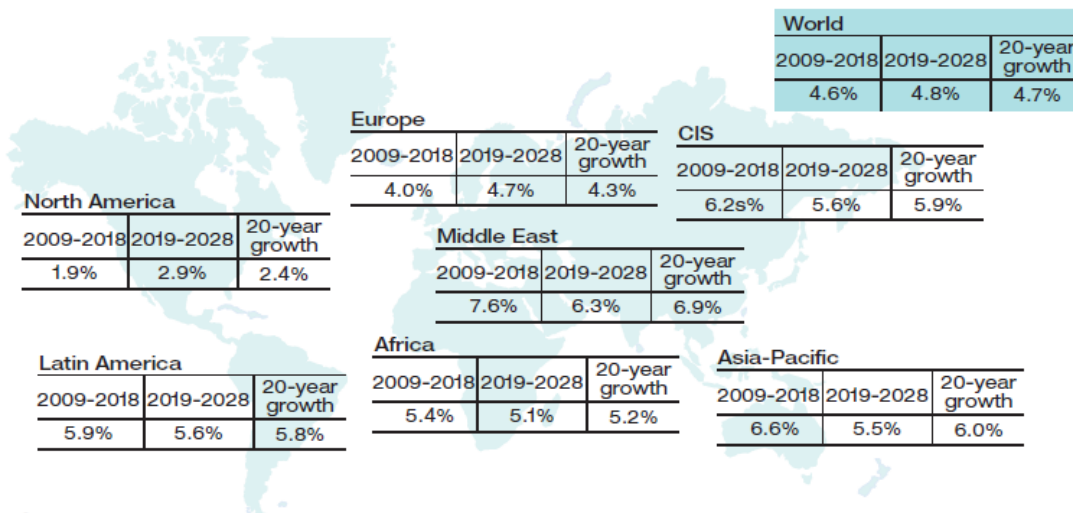
**Figure 11: Airline segmentation - world traffic evolution**



Source: Airbus

### 3.5. TRAFFIC ESTIMATES BY REGION

**Figure 12: Expected traffic growth worldwide and within regions:**



Source: Airbus

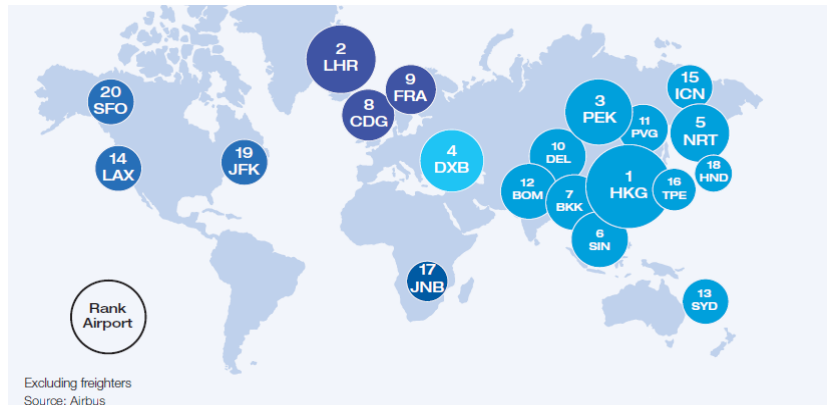
#### Asia-Pacific

We are in the presence of a new paradigm: already known as the “world’s producer”, the Asia- Pacific region will become the “world’s largest consumer”. This situation is created by a huge middle class emerge among the 3.5 billion habitants of this region, cultural changes, and new generations of consumers with other interests, and changes in lifestyle. The economies of several Asian countries will also benefit from the growth of the giant neighbors China and India, as well as from other smaller but fast growing economies, such as Vietnam.

Air transport will be strongly encouraged by this situation but also by the increase of regional co-operation and progressive air deregulation, expansion of new routes, either from traditional companies or LCC, in a market extremely price sensitive.

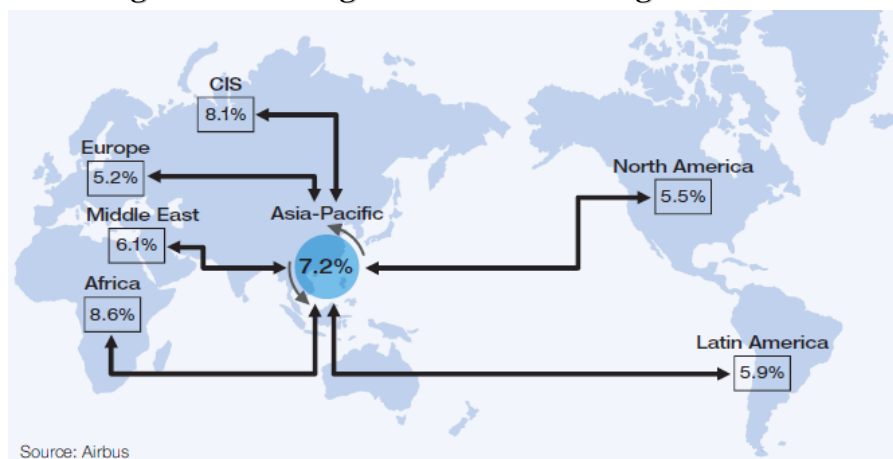
Larger aircraft can be seen as an option to meet anticipated demand for routes involving major hubs worldwide. Many of the A380 orders made by Asian carriers will operate between the major population centers.

**Figure 13: By 2028, 12 of the top 20 large aircraft airports will be in Asia-Pacific**



It is expected that this region will grow in total about 6.0%, well above the 4.7% forecast to the world, as well as all estimated growth among Asian countries and between Asia and different regions of the world, as stated in the following figure:

**Figure 14: RPKs growth: annual average 2009-2018**

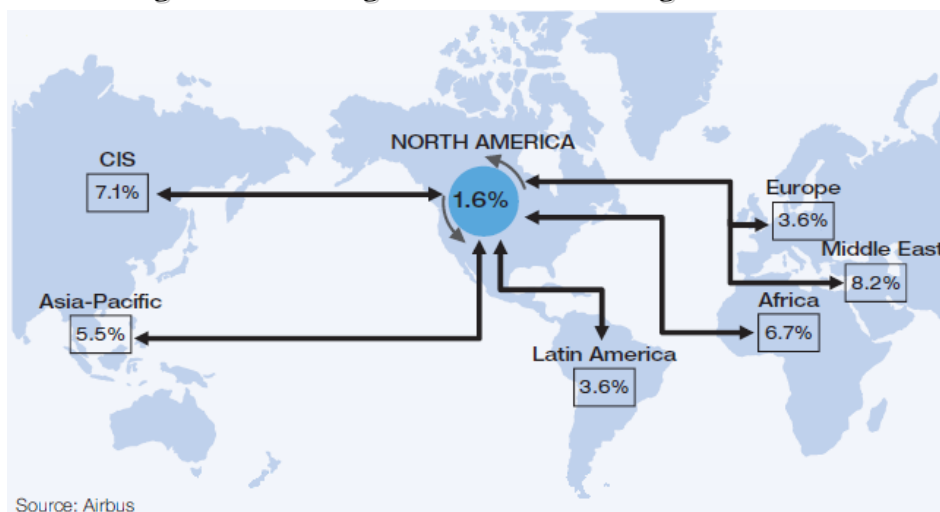


### North America

The U.S. market presents the highest level of maturation. And this reflects the lowest forecast in terms of annual growth below world average and other regions. However, due to the volume of traffic and the high propensity of the people to use air transport will remain an

extremely important market in the future. New markets and new international traffic flows are expected to increase at higher levels due to linkages with emerging and developing countries. Hence the RPK's to Asia-Pacific will grow by 5.5%, CIS (Commonwealth of Independent States) 7.1%, Africa 6.7% and the highest is to Middle East with 8.2%.

**Figure 15: RPKs growth: annual average 2009-2018**



This growth will be internationally driven by the leading U.S. airlines that continue to seek new opportunities outside domestic market but also by domestic carriers in the areas with strong expansion and development. These will benefit from the continuing growth opportunities in terms of tourism and trade that will consolidate over the coming years.

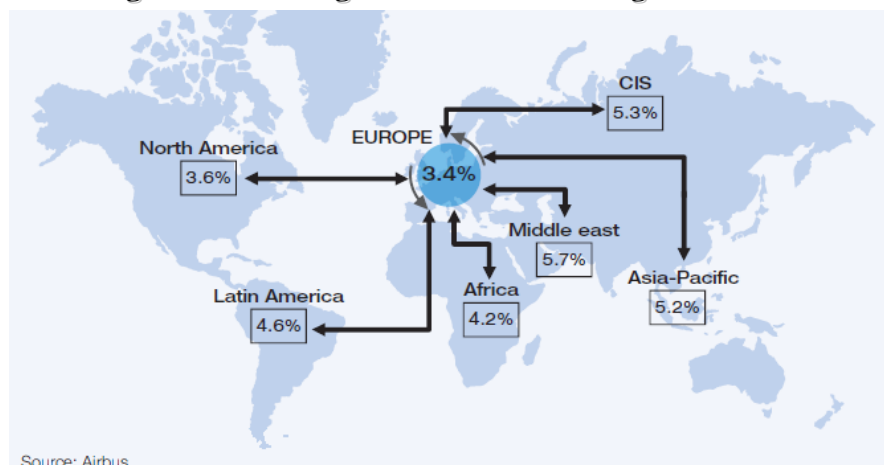
### Europe

As in other regions, European economic growth was severely impacted by the global economic downturn and financial crisis in late 2008. However, the projections indicate a gradual upturn in 2010 as the global economic activity picks up. It is hoped that the countries of Central Europe have a slightly higher performance with growth of around 4% between 2010 and 2012. From these countries stands out Croatia, Turkey, Bosnia and Macedonia as key drivers' of the economic recovery, providing growth and new opportunities. As already mentioned, greater liberalization is often a driver for aviation growth. In addition, higher competition, additional passenger choices and the start of new routes or markets stimulate greater efficiencies throughout the system as a whole.

In the European market there's been a strong development of LCC presence, namely in almost every market with high volume of passengers, and these have contributed to the consolidation of traffic growth mainly in the domestic and intra-European. Nevertheless, legacy carriers also play a key role not only through connections between various European

countries, but also in developing long-haul routes, boosting its entire network. Taking into account the forecasts for the coming years, this growth will be reasonably well distributed among major international flows, although growth between Europe and the Middle East, CIS, Asia-Pacific and Latin America will be the most significant.

**Figure 16: RPKs growth: annual average 2009-2018**



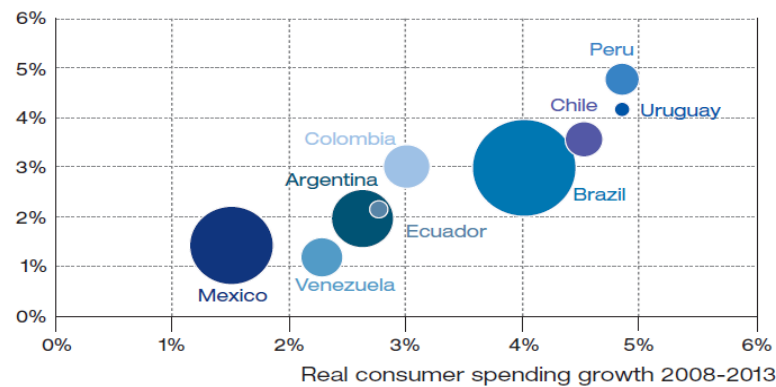
### Latin America

Latin America was not immune to the financial crisis, particularly given its strong economic connection with the U.S. due to the importance of commodities whose prices fell in line with the demand. However, according to IMF (International Monetary Fund), considering the very challenging external environment, most of these countries are dealing well with the economic storm compared to previous downturns and besides few exceptions, the long-term prospects for the Latin American economies remain positive. The weight of tourism in this region plays a crucial role with an average annual increase of 3.6% and the tourist income up to 6.8%.

This region is quite well positioned among other emerging regions in terms of key elements for aviation development. For example, GDP is expected to grow at an annual average of 3.6% and consumption spends by 4.1% until 2012. This growth exceeds many developed countries closely approaching Middle East, India and Russia values.

Some economies stand out, particularly Brazil, one of the BRIC nations, Chile, Peru, Uruguay and also Mexico, benefiting from the proximity to the U.S.

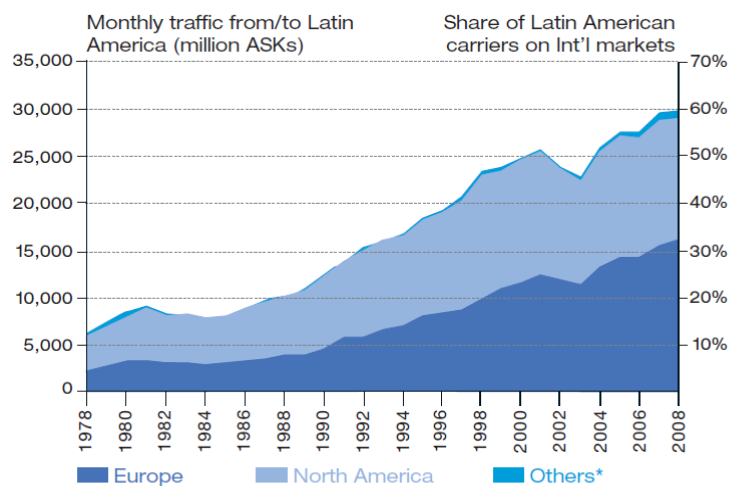
**Figure 17: GDP growth 2008-2013**



Bubble size proportional to real GDP at PPP (Purchasing Power Parity) in US\$billions in 2013  
 Source: Global Insight, Airbus

During the period from 2000 to 2008, Latin America grew 20% in terms of capacity offered, highlighting variation rates to emerging markets and also to Europe, where cultural connections and business remain strong. The U.S. officials warned for the need to expand and liberalize open skies agreements to stimulate traffic flows. Despite an increase of 20%, local carriers have been losing expression. The growth rates are a clear sign of these markets potential, a fact that has not escaped for the foreign airlines that have been gradually increasing and strengthen its presence.

**Figure 18: Traffic to/from latin America, evolution and market shares**



Source: September ASK traffic from OAG, Airbus \* Includes Asia-Pacific, Africa, Middle East & CIS

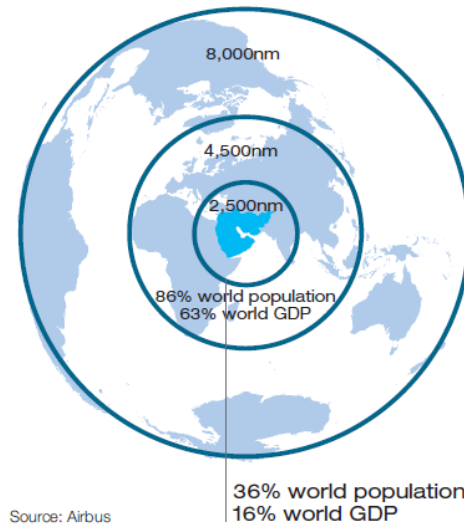
### Middle East

Middle East has gained a new positioning among Air Transport due to the investment that has been made to explore the geographical position, creating infrastructures to increase business, tourism and connection traffic. As the share of local investments increases, there is a huge potential for developing the region at all levels.

For the visitors, it is offered many attractions and astonishing hotels, for example Abu Dhabi has been investing massively in arts and culture, with plans to build "Saadiyat Island Complex" with a new Louvre museum and the Guggenheim.

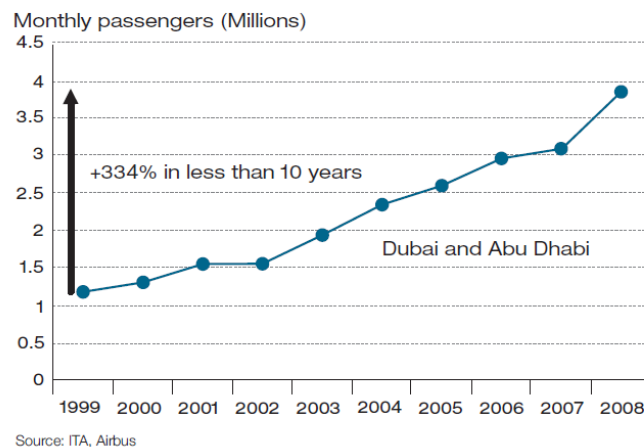
The location in the globe is ideal to position itself as a 6th freedom hub, because it is placed between major world regions, North America, Europe and Asia.

**Figure 19: Middle East Geographical location**



Even during industry downturn in 2008, the major airlines in the region have shown the strength of its strategy and unlike what happened in the world, have confirmed significant delivery commitments as a sign of their determination to expand, while others have delayed investments or implemented capacity reductions. Major hubs of this region are growing exponentially, having recorded a growth of 334% in passenger numbers in less than 10 years.

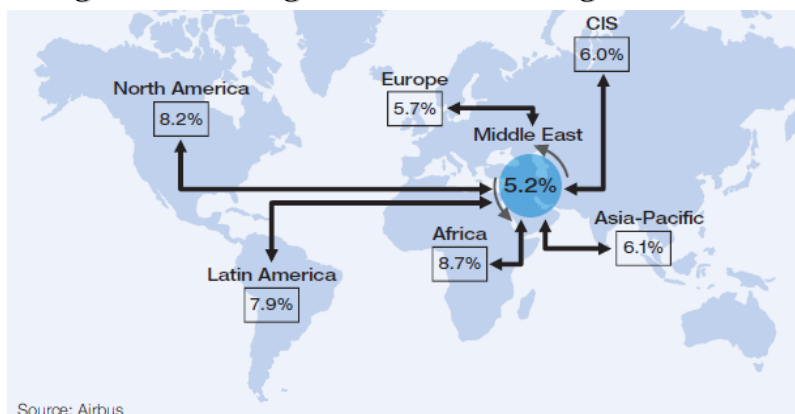
**Figure 20: Dubai and Abu Dhabi market evolution (1999-2008)**





It is expected a strong and sustained growth for all regions:

**Figure 21: RPKs growth: annual average 2009- 2018**



Annual growth is estimated to be above the expected for Asia. While domestic traffic and intra-regional rates will considerably grow, intercontinental traffic will raise even faster as new routes are launched by airlines increasing their network destinations and frequencies. Thus, larger aircraft with longer range will be added to the fleets of the major local carriers. It is expected a new era of passengers on air transport horizon:

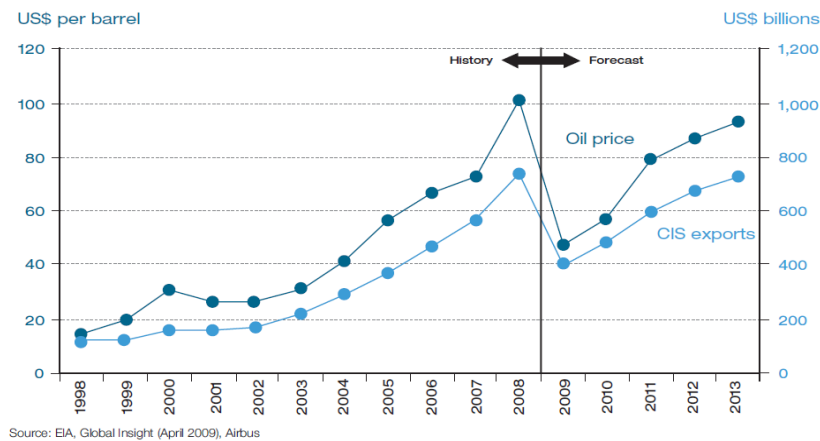
**Figure 22: New Air Travelers**



### Commonwealth of Independent States (CIS)

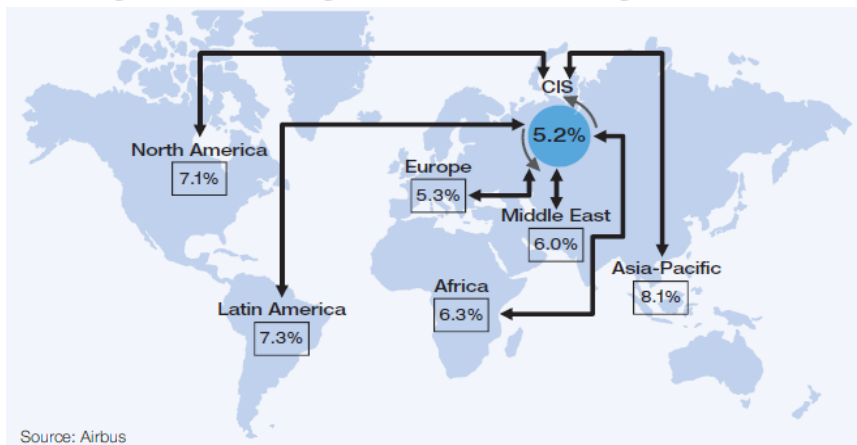
The increase of fuel prices, with the peak in July 2008, caused significant problems for airlines, but the economies of countries such as Russia, Kazakhstan and Ukraine, benefited from the high market prices for their commodity exports. Especially oil but also, different types of metals and raw materials.

**Figure 23: Oil Price and CIS Exports Evolution and Forecast**

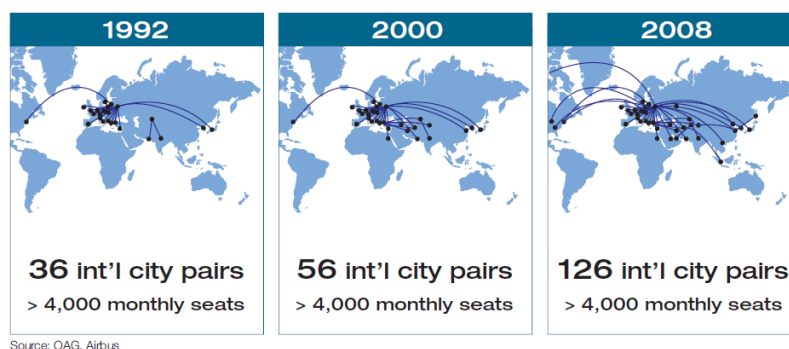


CIS is not expected to repeat the impressive performance of 2007 with 8.5%, and 8.4% in 2006. A reduction of the growth rate of the CIS economy is estimated and for the coming years it is expected an average growth of 5.5%, led by a reduction of the Russian economy but still above the world average forecast. As the world economy gradually recovers, the same will happen with the commodity prices, economic growth and demand for air transport in the region.

**Figure 24: RPKs growth: annual average 2009-2018**



**Figure 25: CIS city pairs growth**



Another factor relates to the fleet used by local airlines, with the Russian planes losing expression over the past years. In 1992 the number of aircraft represented 99%, registering a reduction to 90% in 2000 and to 44% in 2008. It is clearly an indication that the market has become more efficient through the introduction of new generation eco-efficient aircraft, which can operate with higher utilization levels than the replaced aircraft.

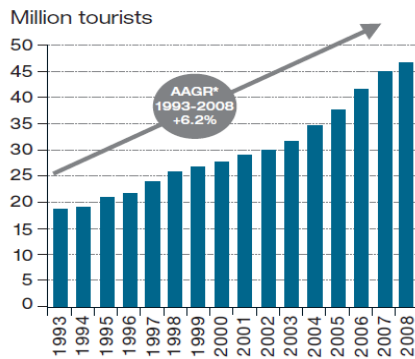
### **Africa**

With a population of 950 million people spread over 50 countries, Africa is the second largest continent in the world. The 30 million km<sup>2</sup> cover 20% of Earth total surface being the third largest after Asia and America. The high scale of this continent plus the geographical challenges indicate that neither the road nor the rail can be seen as an option, which makes the air transport the only realistic solution for connectivity and to support future growth.

This region has experienced strong growth derived from increased export revenues, rapid growth of foreign investment especially in the energy segment, expansion of the construction sector, improving the performance in terms of agriculture and tourism. It is estimated that Africa will grow at an annual average rate of 3.8% over the next 5 years, compared with 1.9% annual average worldwide, reaching the economies with higher performance in terms of growth.

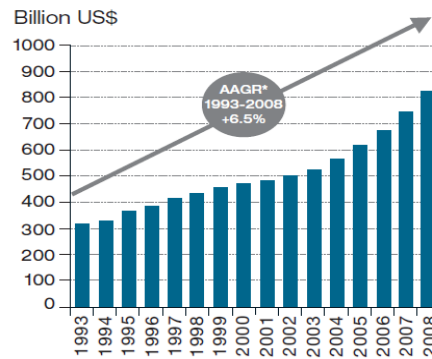
Since the end of colonial era, political instability has been one of the biggest constraints in the development of this region. Another aspect relates to the strong regulations in these countries, affecting negatively the opening of air links. However, over the years this has been reduced which led to a growth within the aviation sector with an impact on trade, and also in tourism. For example, Angola has experienced increases in capacity and hence exports and investment, and countries like Kenya, Tanzania, Namibia and South Africa have been betting on demand for eco-tourism. The 2010 soccer championship in South Africa can also help to put this country under the eyes of the world.

**Figure 26: African inbound Tourism**



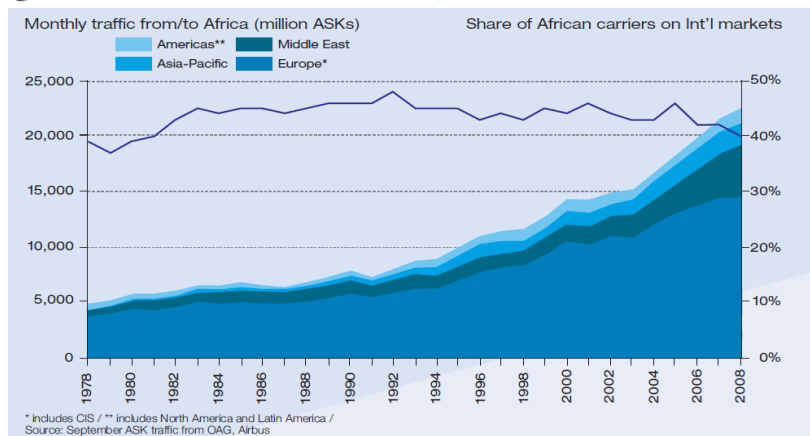
\* Average Annual Growth Rate  
Source: Global Insight, World Tourism Organization, Airbus

**Figure 27: African Trade**



With the increase of operation by foreign companies, the share of African carriers has been losing expression in international traffic and, the new offer resulted in an increment of 94% in available seat kilometer (ASK) between 1998 and 2008. The loss of market share from local airlines is greatly due to issues related with security and also because many of them are part of the so called blacklist being prohibited from flying to some countries in Europe and USA.

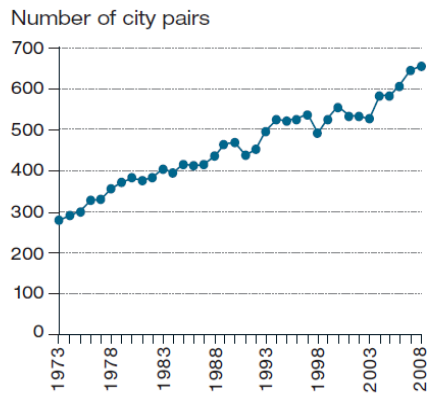
**Figure 28: Traffic to/from Africa, evolution and market shares**



\* Includes CIS / \*\* Includes North America and Latin America / Source: September ASK traffic from OAG, Airbus

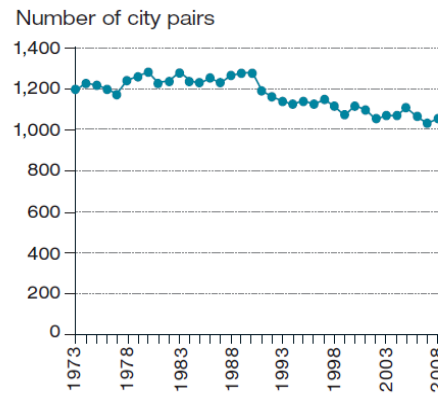
In this region the fleet should also be highlighted, at the end of 2008 there were still 100 "old generation" aircraft. A renewal of the fleet with higher number of seats could increase the competitiveness of local carriers. But this also can be applied to foreign airlines that when faced with limits regarding governmental authorization to increase frequencies, may use larger aircraft to fill operational gaps and meet demand needs.

**Figure 29: African international network development**



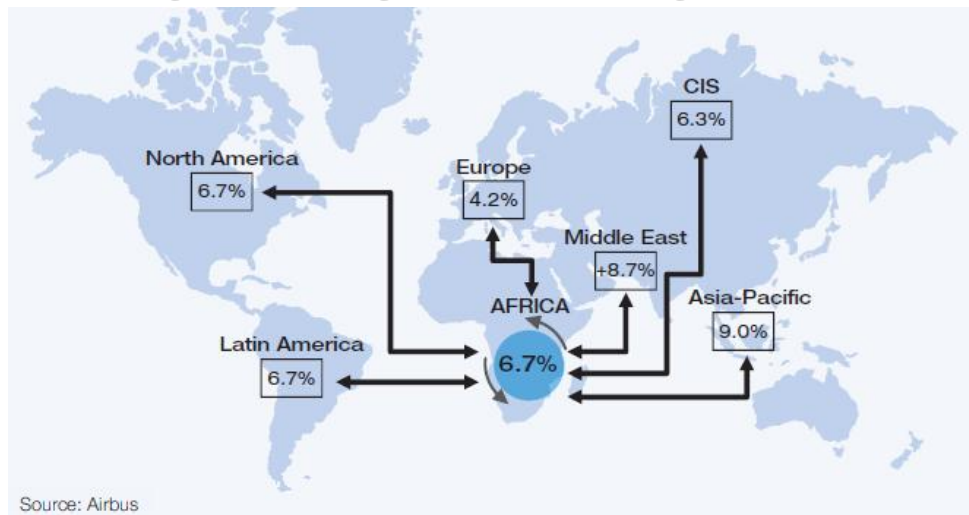
\* Intra-regional includes domestic  
Source: OAG, Airbus

**Figure 30: Africa intra-regional\* network development**



Still, taking into account the various constraints, the expected annual growth rates are above world average, especially to Asia and Middle East.

**Figure 31: RPKs growth: annual average 2009-2018**

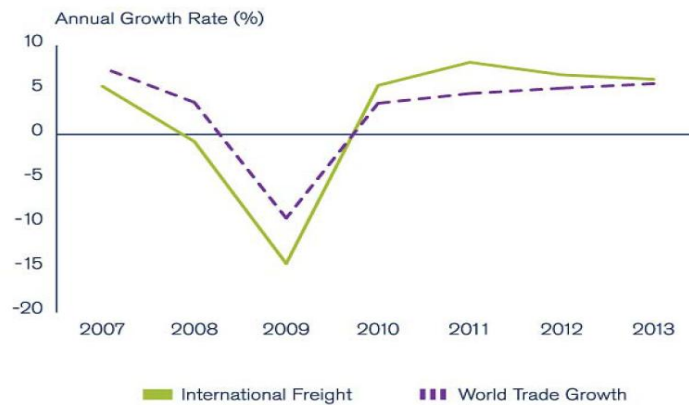


### 3.6. AIR CARGO

After years of steady growth, air cargo traffic has experienced a severe downturn linked to the global economic conditions, consumption slump and hence manufacturing demand. However, all forecasts point to a recovery of markets as economic fundamentals are expected to once again create a real demand for the transportation of goods, particularly by air as it offers the advantage of speed compared to other means of transport, which is crucial in perishable and high technology goods. On the other hand it is also the most secure method of transport for high value goods, assuming greater importance when transporting goods in regions of the

world where there are security threats, such as piracy and robberies, which have become a serious concern.

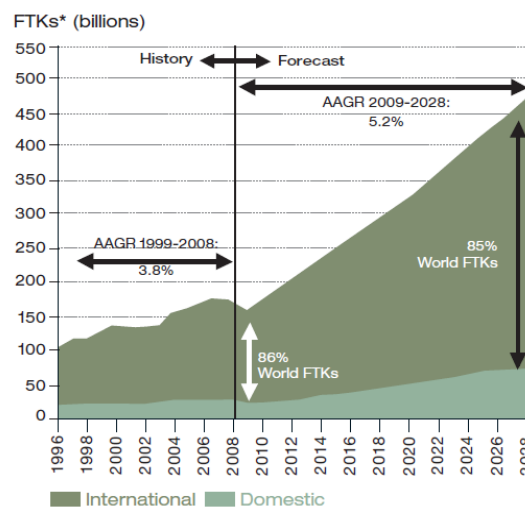
**Figure 32: Air Cargo, IATA Forecast**



Source: ICAO, IATA, EIU

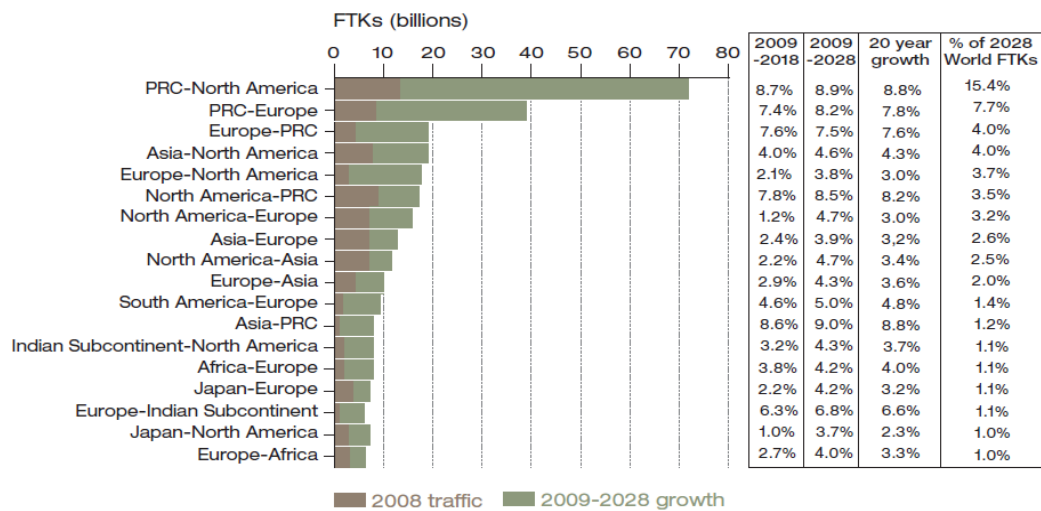
The price of fuel is a very important parameter in air cargo economics, even higher than the impact on passenger transport. Between 2005 and mid 2008, fuel prices increased exponentially leading to major changes in the global fleet, with many older types coming under pressure due to their inefficiency. The escalation of fuel also led to the application of fuel surcharges to help cover higher operational costs leading to a reduction in the use of air cargo. But as economies and different markets recover over the coming years, so will the demand for air cargo, particularly in emerging countries which are expected to have higher growth rates.

**Figure 33: Freight traffic to triple in 20 years**



Source: Airbus

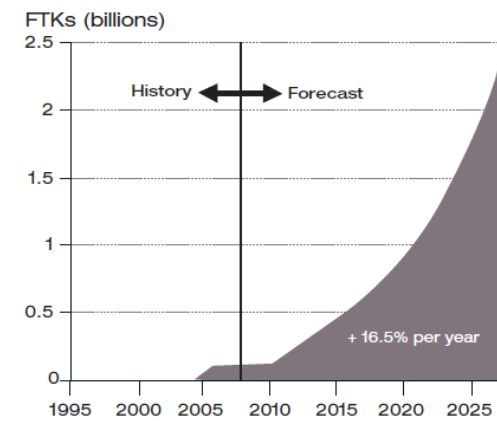
**Figure 34: PRC (China) markets dominate international traffic**



Source: Airbus

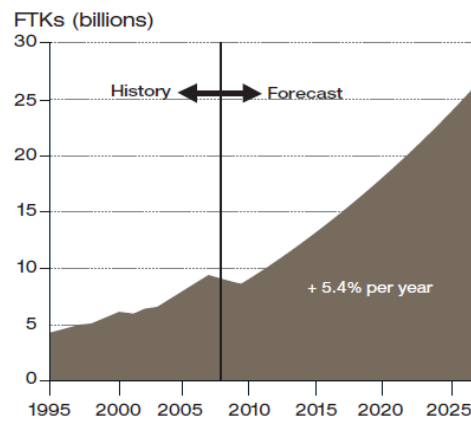
A huge development of domestic air freight in India to satisfy a growing middle-class population.

**Figure 35: India domestic express freight**



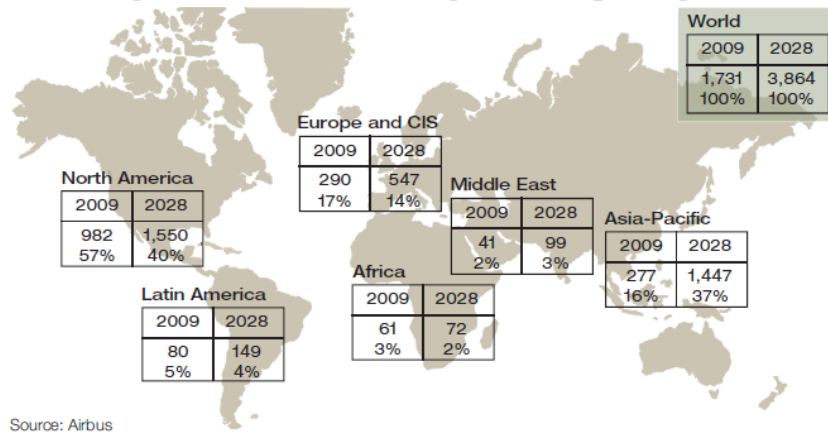
Source: Airbus

**Figure 36: India international freight**

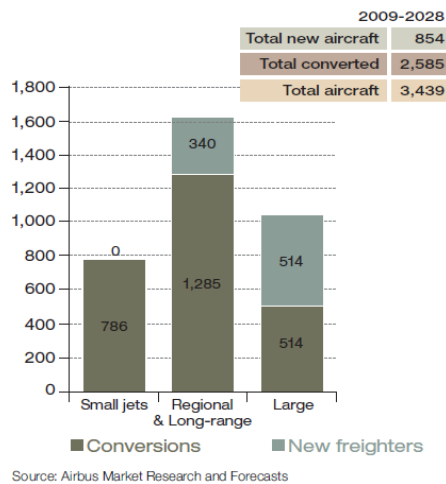


As already observed on passenger aircraft, it is also expected an increment of larger aircraft in the cargo fleet, since these planes are best suited for long distances. The Asia Pacific will be the most important region in terms of large freighters due to the need of transport the high tech products mainly to North America and Europe.

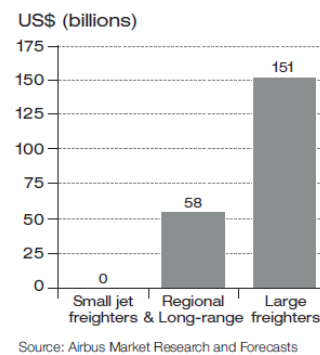
**Figure 37: 2009-2028 freighter fleet per region**



**Figure 38: 2009-2028 freighter demand**



**Figure 39: New deliveries**

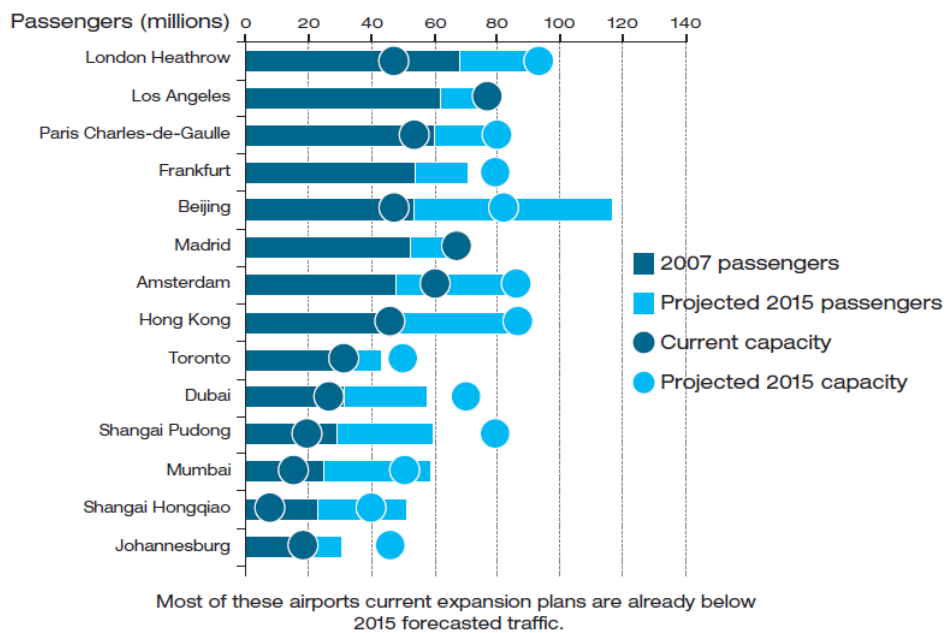


### 3.7. INCREASED DEMAND FOR AIR TRANSPORT CAN INCREASE CONGESTION

The increase in traffic that took place in the recent decades has not always been accompanied by infrastructure conditions and airport capacity. Despite the current industry downturn, traffic is expected to double again in the next 15 years, which means sufficient airport capacity is likely to remain an important issue for politicians, airlines and passengers.

Capacity-constrained airports are more likely to face delays and service breakdowns than other airports, as their facilities remain under constant pressure. More passengers without adequate capacity imply more passengers in waiting lines to check-in, for security screening and to collect luggage. Likewise, more aircraft have to share the same air space, gates, runway capacity and even parking, creating more congestion.



**Figure 40: Capacity vs. traffic**

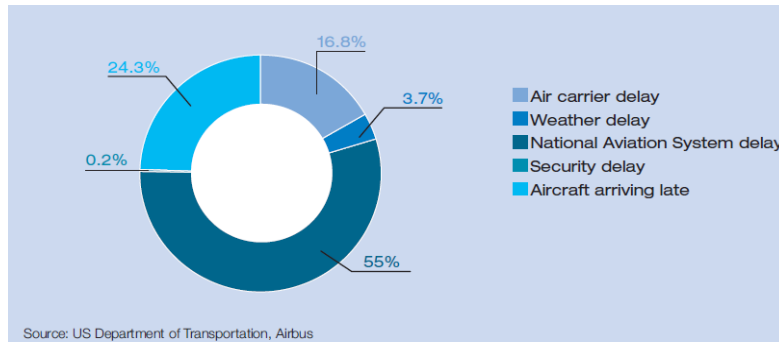
Source: ACI, Airbus

New terminals and new runways can facilitate the adaptation to the new reality but these solutions are not always fast or easy, facing many financial, environmental and political constraints, mostly in Europe and USA where the communities that live near airports may have a very active involvement.

For example at Heathrow, runways are already close to capacity limit for some years. In 2005, 25% of flights were delayed and 30% in 2007. In Asia, the airports in Hong Kong and Beijing are improving their infrastructure to accommodate traffic that is expected to grow at an impressive 7 to 8% per annum. However, despite the expansion, it is estimated that these airports will already be operating near capacity. But congestion does not always mean that the airport has reached its limit. What happens is that there are fluctuations throughout the day existing a high usage in peak hours and a descongestion in the off peak. JFK Airport in New York focuses half of its movements in 6h from the 21hours of airport operation.

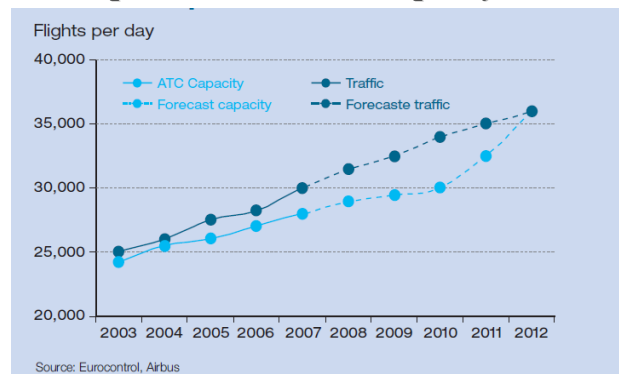
But airports are not the only ones that need improvement or expansion to accommodate growing demand. Air traffic management sometimes have difficulties in managing the increasing flows of aircraf leading to further delays, as can be seen in the example below:

**Figure 41: New York JFK airport Delays by cause in 2007**



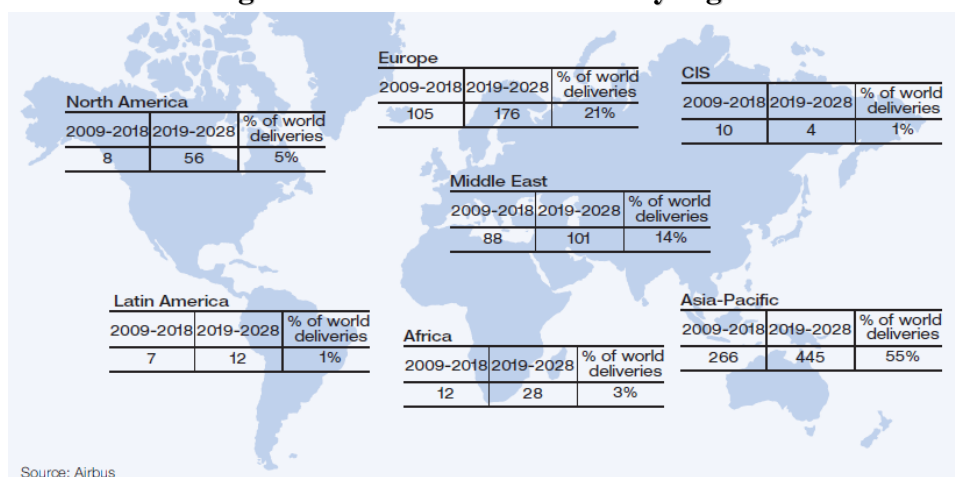
Fortunately, there are plans to modernise both European and American air traffic control systems. European SESAR and US NextGen programmes aim to introduce cutting-edge satellite-based navigation technologies, offering more precise flight tracking, enabling more aircraft flying in the same airspace and optimised flight paths. With air traffic controllers able to manage more aircraft at the same time, even in bad weather, these new generation air traffic control systems will offer quicker flights, less fuel burn and emissions, shorter routes and less congestion. This technology will complement the growth in airport infrastructure but all these developments take time to be implemented so that it is not expected that the requirements to meet demand will be accomplished before 2012.

**Figure 42: European traffic control capacity vs. traffic demand**



The use of larger aircraft may assume an important role by enabling to accommodate more traffic, limiting the number of movements and reduce CO2 emissions. It can also postpone the need for additional runways and expansion works. With the economic recovery, the oil price will rise which will highlight the consumption of different types of aircraft. The use of smaller aircraft to achieve high number of frequencies may not be sustainable for some airlines. The tendency to increase orders for VLA (Very Large Aircraft) has already begun:

**Figure 43: VLA new deliveries by region**



The lack of capacity at some of the world’s largest airports is helping to drive aircraft size upwards, with an increased average aircraft size in three quarters of the world’s top ten busiest airports in the last few years. The pressures and cost accrued as a result of congestion can mean that the others will have to follow the example.

### 3.8.FUEL

In the recent years, the main concern for airline industry has been the fuel prices since it represents the largest share of operating costs. This has been registering strong fluctuations reaching values above \$ 140 / b and going down to \$ 40 / b. The extreme volatility of these values makes it difficult to prepare forecasts and action plans.

**Figure 44: Jet Fuel and Crude oil price (\$/barrel)**



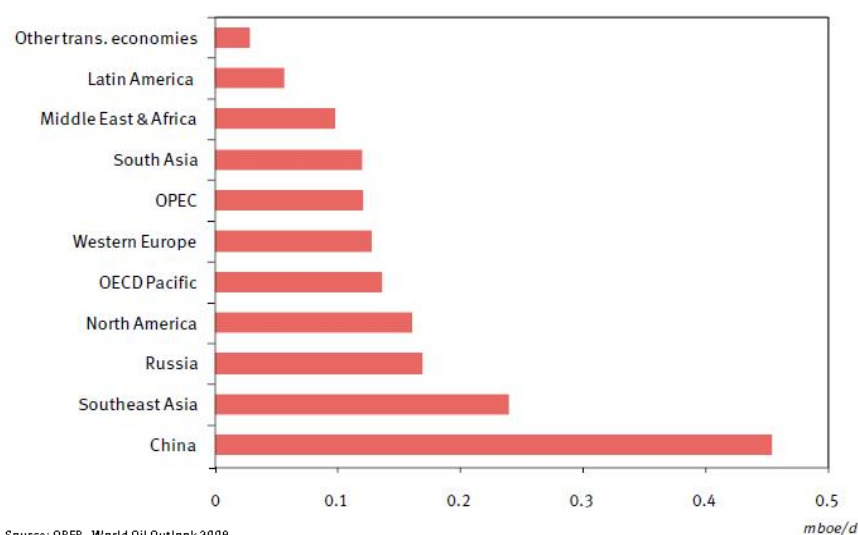
Source: Platts, RBS  
 In IATA Forecast 2008-2013

The economic growth expected for the various regions of the globe, taking into account the initial signs of recovery, combined with restrictions on oil supply, will impact the fuel price. Projections for 2010 indicate an average price of oil at \$ 72/b and jet fuel at \$ 86 / b (in 2009 was at \$ 72 / b). As a result, the fuel costs will be higher, thereby reducing airlines cash flows that must continue to seek ways to mitigate these effects.

Oil demand and availability will be important factors for the development of air transport, since they determine the price of fuel. It is estimated an increase of oil price, given that it is expected a higher increase in demand versus supply. However, according to EUROCONTROL Challenges of Air Transport 2030 (2008), there is no shortage, and it is believed that world's oil reserves for the next 80 years are greater than the estimates advanced.

Thus, increases in fuel prices affect negatively the growth of air traffic. And in scenery of exponential increases, air travel could again become seen as a luxury product, precisely the reverse of the democratization trend that has taken place. This increase would also affect considerably the LCC, who live primarily of leisure traffic and, in response to this escalation, might have to reduce capacity, as seen in 2008. Whatever price fuel reaches, the rapid increase turns out to have the ability to accelerate change and shifting priorities in this industry.

According to OPEC World Oil Outlook (2009) figures, aviation oil demand in 2008 was less than one-sixth of road transportation, accounting for no more than 6% of world demand. The OECD currently accounts for around two-thirds of world aviation oil demand, more than double that the oil consumed in developing countries. The US alone accounts for over one-third of world demand. Nevertheless, as with road transportation, the greatest percentage growth rates have been in Asian developing countries. Despite China witnessing the highest demand it should be noted that this growth has been from a very low base.

**Figure 45: Growth in aviation oil demand, 2007-2030**

While growth is expected in all regions, the expansion in developing countries will be around three times higher than the expected for OECD. As with the recent historical patterns, the fastest percentage growth is in China, with the country also witnessing the largest single increase in aviation oil demand at close to 0.5mboe/d. Despite this, by 2030 OECD countries will continue to account for a higher proportion of aviation oil demand than the developing countries.

**Figure 46: Oil demand in aviation**

	Levels				Growth
	2007	2010	2020	2030	2007-2030
North America	1.8	1.8	1.9	2.0	0.2
Western Europe	1.1	1.1	1.1	1.2	0.1
OECD Pacific	0.4	0.4	0.5	0.6	0.1
<b>OECD</b>	<b>3.3</b>	<b>3.3</b>	<b>3.5</b>	<b>3.8</b>	<b>0.4</b>
Latin America	0.2	0.2	0.2	0.2	0.1
Middle East & Africa	0.2	0.2	0.2	0.3	0.1
South Asia	0.1	0.1	0.2	0.2	0.1
Southeast Asia	0.4	0.4	0.5	0.7	0.2
China	0.2	0.3	0.5	0.7	0.5
OPEC	0.2	0.3	0.3	0.4	0.1
<b>DCs</b>	<b>1.4</b>	<b>1.5</b>	<b>2.0</b>	<b>2.5</b>	<b>1.1</b>
Russia	0.2	0.3	0.3	0.4	0.2
Other transition economies	0.1	0.1	0.1	0.1	0.0
<b>Transition economies</b>	<b>0.3</b>	<b>0.3</b>	<b>0.4</b>	<b>0.5</b>	<b>0.2</b>
<b>World</b>	<b>5.0</b>	<b>5.1</b>	<b>5.9</b>	<b>6.7</b>	<b>1.7</b>

Source: OPEC, World Oil Outlook 2009

Air transport has witnessed a boom period, driven by an increased demand for mobility, used for longer distances, expanding international trade and the resulting demand for faster modes of transport. Today, air transport for a growing number of individuals and businesses is no longer an aspiration, it is the norm. Nevertheless, it is of interest, and important, to place this

growth alongside demand for aviation fuel. What is evident is that the two have not followed the same path. The growth demand for fuel is below the percentage growth for passengers and freight, derived from huge efficiency gains and investments in the sector.

Looking ahead, the aviation industry can be expected to observe further efficiency and technology improvements. This includes the continued development and introduction of new materials, such as lighter composite materials, which may then result in new airplane designs that makes travel not only more efficient, but also more comfortable. Engine design is also expected to witness ongoing technological advancements and efficiency enhancements, such as through the use of ultra-high by-pass ratio engines for subsonic airplanes. And projects aimed at improving computer-based simulation systems, are anticipated to help reduce energy consumption and waste in the design process, lower test facility costs and reduce test flight hours.

These technological advances will also help to reduce the environmental footprint of aviation, although it should be noted that the sector contributes only marginally to greenhouse gas emissions. In fact, the aviation sector — domestic and international— accounts for no more than 2% of all global CO<sub>2</sub> emissions. Several practices have already been taken into operational terms for greater fuel savings, as the continuous descent approach, the continuous climb, taxi to the runway and for parking using minimal power and in some situations with only one engine/two engines, increase performance of direct routes to reduce flight times, among others.

What is clear, however, is that the anticipated aviation fuel intensity improvements will only partially compensate for the increase in traffic, and thus aviation oil demand will continue to grow. Firstly because kerosene is the reference fuel for aviation given its physical and thermodynamic characteristics. There have been recent efforts to develop alternative fuels, such as South Africa's SASOL semi-synthetic aviation fuel, a 50-50 blend of petroleum derived and synthetic kerosene, Virgin has also recently flown an aircraft using bio fuels, and the US has put together the Commercial Aviation Alternative Fuel Initiative, Air New Zealand and Continental made successful tests that have used algae bio fuels in some engines (Continental B777 and Air New Zealand B747). However, in addition to cost competitiveness, any alternative fuel has to be compatible with kerosene and satisfy very stringent safety and operational conditions.

Thus, kerosene is expected to remain the primary aviation fuel for the foreseeable future. And secondly, due to the role of emerging economies, such as China and India, whose populations are becoming more upwardly mobile and an increasing factor in aviation traffic and aviation fuel growth. At the same time, it should be remembered that in 2008 OECD countries still accounted for about 66% of total aviation fuel consumption. Mapping the per capita air travel against the per capita GDP by country confirms the fact that there is a huge potential for air traffic growth in developing and emerging economies.

The latter group is not only witnessing faster air transport growth than the mature often saturated, but they also represent a much larger share of the world's population. Over the period from 2000–2007, OPEC Member Countries witnessed a passenger traffic growth rate of 21.5%, China 17.1% and Russia 16.1%. These developments also underline the major role played by economic growth in the expansion of the aviation sector. From an individual perspective, changes in personal income can have a significant impact on the level of consumer purchasing power and the propensity to spend. And from a business standpoint, a better economic situation can obviously increase the demand for both air freight transportation and business travel. It is clear that air traffic is increasing in response to higher per capita income in all regions.

It is also expected to begin emerging political or financial restrictions for the use of fossil fuels. In aviation takes on average between 5 to 10 years to develop new aircraft models which have an average lifespan of 30 to 50 years. In this sense, it is expected that no strong technological advancement arises for developing a new technology from manufacturers in order to exponentially increase the efficiency and drastically reduce fuel consumption for the next 20 years. It will be something more gradual.

Summarizing, it is expected an increase in air traffic to all regions with greater emphasis on extra demand from emerging economies, some technology advances and improvements in addition and also airlines reaction in order to further develop and implement practices to reduce costs. This combination will result in a moderate growth in demand for fuel, because, as already mentioned, this was not statistically accompanying increases in traffic in the same proportion, due to efficiency gains arising from the actions of airlines and manufacturers.

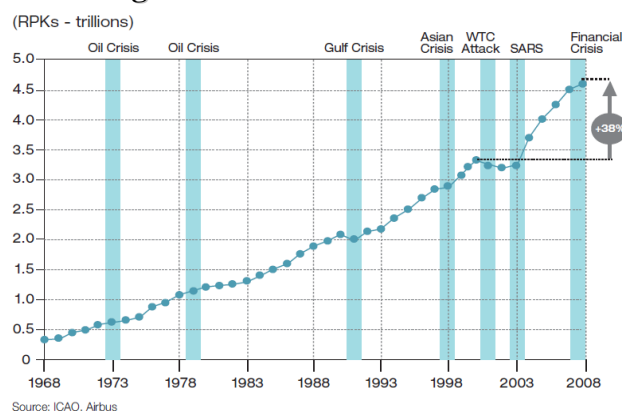
The outlook, however, has a number of downside risks. This includes the role of saturation levels, especially in the West European and North American market, further congestion and infrastructural restrictions in China, India and the OECD Pacific, fuel price volatility,

economic crises and tighter regulations, among others. Nevertheless, there is evidence that these adverse factors have a positive effect as it increases positive reaction and measures to new realities to meet continuing increases in demand.

With several oil crises, financial downturns, terrorist attacks, pandemics, restrictions and infrastructure congestion, air transport has always grown and will continue to grow. And even with the rise of oil which amounted to \$ 140USD per barrel, airlines have found themselves under pressure to reduce costs and profits and many of them showed increases in passengers. The price of fuel will always have impact on aviation, but projections of IATA, Airbus and Boeing for aviation growth as well as the ones from OPEP all point out to a traffic growth and increase of new aircraft orders even in the perspective of fuel price increase.

Air transport has suffered repeated crisis in various ways, but has become more strong and overcome adversity, as evidenced in the following chart:

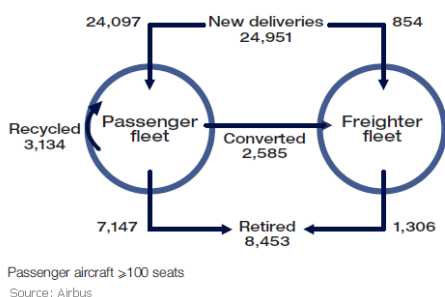
**Figure 47: World annual traffic**



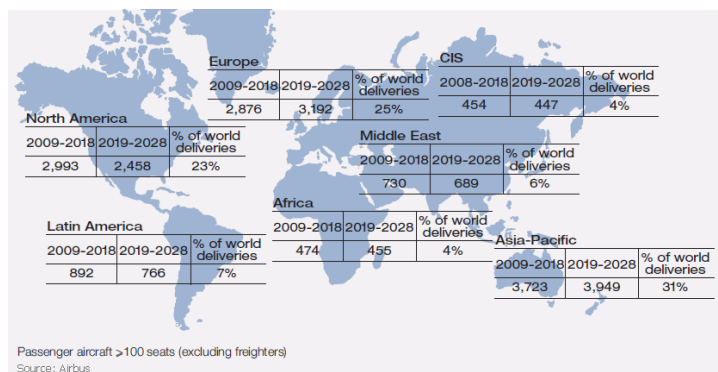
Apart from high demand estimates, forecasts for new aircraft orders from companies confirms the prospects for air transport growth regarding passengers and cargo to all parts of the globe, as shown below:



**Figure 48: New passenger and freighter aircraft demand 2009-2028**



**Figure 49: Total new deliveries by region**



It is then up to manufacturers and airlines to adapt and continue their persistent search to find new solutions at different levels in order to take full advantage of worldwide expected growth in support to the entire aviation industry.

#### 4. CONTRIBUTIONS FOR A STRATEGIC THINKING IN PORTUGAL

After analyzing the key variables of air transport and the perspectives for the aviation future, in this chapter shall be undertaken the main challenges and opportunities as well as some threats. Then, some scenarios will be proposed whose choice is dependent on the position that Portugal wants to have towards air transport.

##### 4.1. CHALLENGES AND OPPORTUNITIES

Portugal, like all the other countries, will be exposed to air traffic growth which according to IATA Airline Industry Forecast (2009) will be in average, 4.7% worldwide and 3.5% in Portugal per year from 2011. The growth in air transport is dependent on the economic performance of nations, growing on average two times the GDP, but it is also true that the air travel is increasingly driven by several external factors, positive or negative, being one of the sectors that suffers the most influence of these.

If we examine the Portuguese situation we can verify that in the recent years the Gross Domestic Product grew 0.3% (2004-2009), but the growth of air transport was 3.9%. Another interesting finding is related to the volume of the external sales by the national airline,

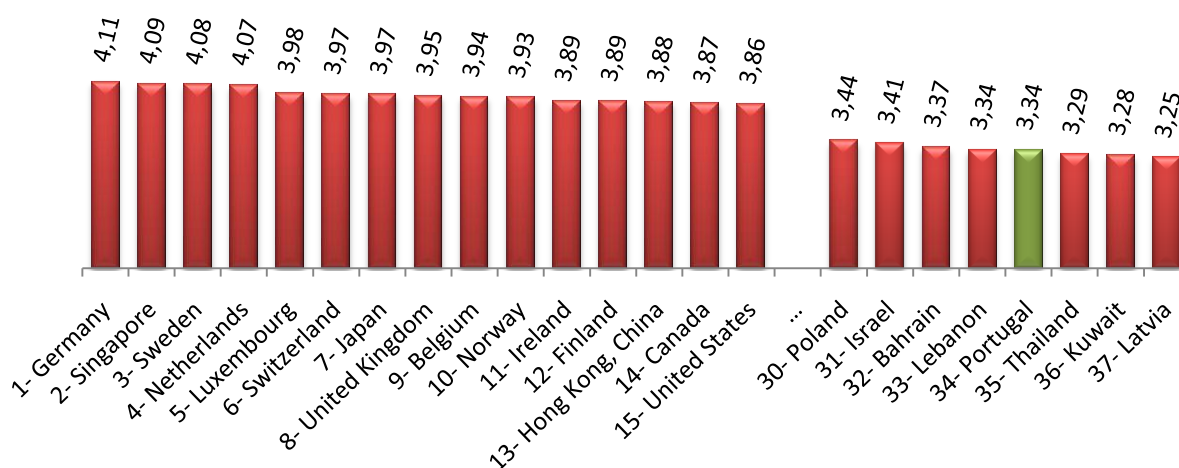
registering in 2008 the value of 1,517 million Euros, about 64% of total sales, reinforcing the position among the top Portuguese exporters.

Thus, we can see that the nationality of the passengers that use air transportation is very wide, especially when compared with other modes of transport. Even in a rail connection between two countries, the most present nationalities are the ones of the countries involved having less diversity than air transport. This latest is composed with traffic generated at the origin and destination, but it also includes the contribution of the all network through hub effect.

The success of air transport is not only depending on its own country. It is certain that the countries with better economic performance and a strong export industry have higher volumes of cargo and passengers, but what can make the difference is the placement that the country wants to have in this sector and what strategy wants to implement.

Some countries, not being great economic powers like the United States, China, Japan, England or Germany, have the best airlines in the world and very efficient airports with high volumes of passengers and cargo. These are considered strategic elements of extreme importance not only for these countries and for the regions where they operate but also for the role they play in terms of passenger transfers and as logistic hubs.

**Figure 50: LPI - Logistics Performance Index**



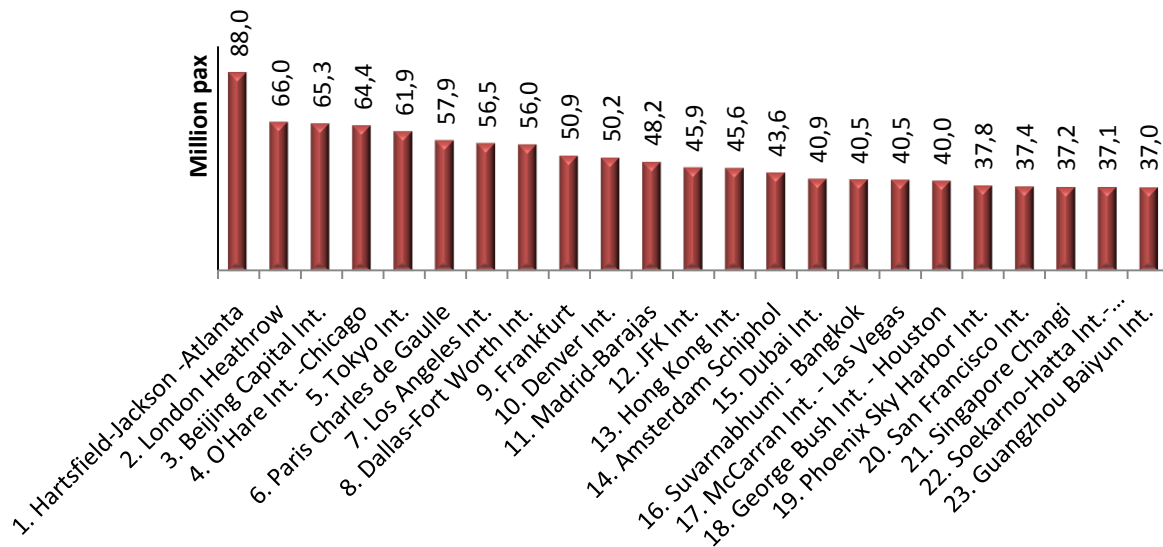
Source: World Bank

**a) Singapore**

With approximately five million habitants, this country has an economy based on exports being an important business center in the Southeast Asia, but it is primarily a logistics and passengers platform where the major international airlines do stopovers between Europe and

Asia (e.g. Kangaroo route: Australia to UK) and where the flag carrier - Singapore Airlines, considered one of the best companies in the world - acts as the main distribution center of passengers and cargo. This is an interesting case of how an appropriate strategy to the geographical position, creating the necessary infrastructure - the seaport (the second busiest in the world) and the airport (see graph)-, has allowed the country to succeed and position as one of the most important players in logistics and aviation.

**Figure 51: World's busiest airports by Passenger traffic – 2009\***

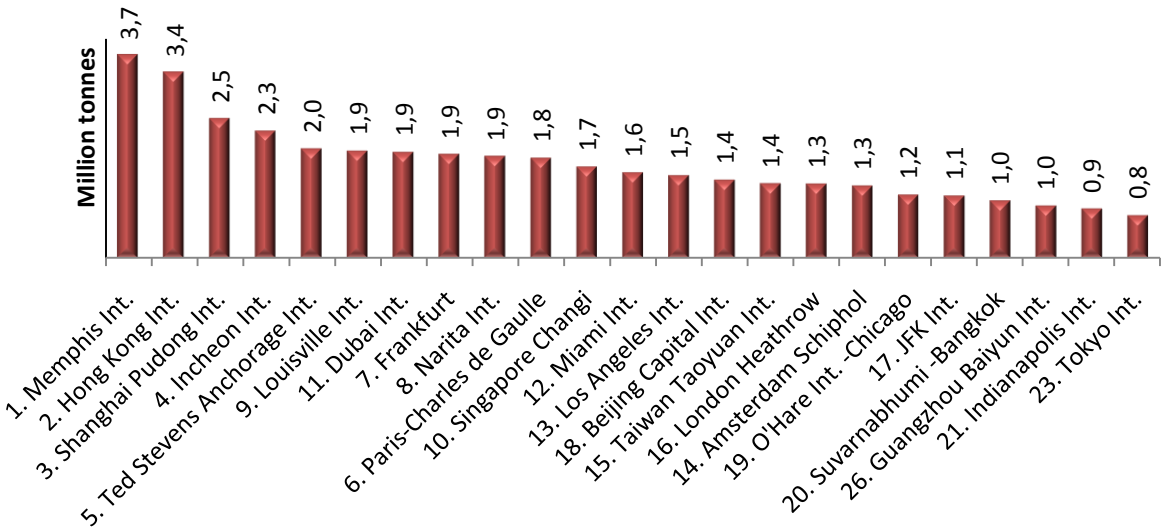


\* preliminary

Source: Airports Council International

It can be argued that Singapore presents a high economic growth that allowed to create the necessary conditions for this position, and being a strong economy, even in a small country, has the appropriate size and quality of air transport. But, are these the only factors, or is there a plan or a strategy to position the country and its infrastructures as a major platform of world aviation? Does a country of this size need to have an airport which handles 37.2 million passengers and 1.7 million tons of cargo, an airline with 120 aircraft and 59 purchase orders (first operator of the A380) or is it taking advantage of the external market opportunities? Is the strategy for air transport independent from the development strategy of the country or is it intentionally a strong part of it?

Figure 52: World's busiest airports by Cargo traffic – 2009\*



\* preliminary  
Source: Airports Council International

b) Dubai

The strategy for air transport is clear: in addition to serve the needs for air transport of the emirate, the objective is to position as a global hub for the transfer of passengers between East and West benefiting from its geographical position and managing to fly non-stop to any part of the world.

Figure 53: Emirates Route Map



Although trying to shift the dependence of oil and investing in Premium tourism and in business traffic, Dubai still does not have the same importance or visibility than Paris, London, New York or Rome in terms of preference as a destination to visit. So, in this case there is still not a natural attraction in traveling to Dubai. In terms of domestic market the population of about 2 million, besides the concentration of wealth in particular cases, does not have a very strong purchasing power.











So what is the explanation for the need of the largest airport in the world, which will be open next year, with capacity for 100 million passengers, taking into account that the current airport already has capacity for 50 million passengers? Why is Emirates Airlines the company with more orders for the A380 (58) when it has a fleet of 120 wide-body aircraft? Noting that, Emirates fleet was chosen with the objective of having the planes with the largest possible range, allowing this way to serve the majority of world cities non-stop departing from Dubai.

What we can verify is that, although the infrastructure is extremely important, it is also necessary a good connection between the airport and the flag carrier so that the strategy can achieve the desired effect. There must be a very strong link between the airport and the airline in order to reach common objectives and to align the strategy of the two entities.

But, what is necessary for a passenger to choose a certain hub over the others historically established like Frankfurt, Heathrow or Charles de Gaulle? Here the airline assumes a central role. Not only by serving various parts of the globe presenting a wide range of routes, often not operated by other companies, but also for the quality standards. By offering this, the passenger tends to choose this airline making the transfer in Dubai and not elsewhere.

And how is Dubai gaining such notoriety? Emirates Airlines has been positioning as a quality brand, based on a diverse range of destinations, with standards of excellence, schedule regularity and a strong image as an efficient company. By doing this, the airline gained visibility and the passengers became frequent flyers. Thus, Emirates achieved a very high standard and gained recognition as one of the best companies in the world – Skytrax Award. When passengers select Emirates as the company to fly, they start to use Dubai International Airport as a transfer point. And, with all the appropriate conditions for this purpose, this airport is now one of the main hubs of the world and will continue to assume even greater importance.

Figure 54: World's busiest airports by International passenger Traffic

	2009*		Ranking Change				Ranking position
	International Pax	Var.	2009	2008	2007	2006	2005
1.  London Heathrow Airport	60.651.349	▼ 1,1%	—	—	—	—	1.
2.  Paris-Charles de Gaulle Airport	53.012.513	▼ 5,0%	—	—	—	—	2.
3.  Hong Kong International Airport	44.984.571	▼ 4,6%	▲1	▲1	—	—	5.
4.  Frankfurt Airport	44.520.661	▼ 4,7%	▲1	▼1	—	▼1	3.
5.  Amsterdam Airport Schiphol	43.519.833	▼ 8,1%	▼2	—	—	▲1	4.
6.  Dubai International Airport	40.104.149	▲ 9,6%	—	▲ 2	▲ 2	▲ 1	11.
7.  Singapore Changi Airport	36.088.996	▼ 0,5%	—	▼1	▲1	▼1	6.
8.  Narita International Airport	30.894.531	▼ 4,4%	—	▼1	▼1	▲2	8.
9.  Barajas Airport	29.184.360	▼ 3,2%	▲1	▲ 2	—	—	12.
10.  Suvarnabhumi - Bangkok	28.834.668	▼ 4,2%	▲?				

\* preliminary.

Source: AIRPORTS COUNCIL INTERNATIONAL

### c) Netherlands

With a population of approximately 16.5 million habitants, a GDP per capita higher than Portugal and previous examples, and a central geographical position within Europe, this country was able to take advantage and create a set of infrastructures positioning as a major logistic center in the world and a key platform of passengers from Europe to Asia and to the United States.

We can argue that its geographical location is privileged and that few countries had such favorable conditions for this position. This being true, Belgium also has very advantageous circumstances, both in terms of proximity to the sea, or in terms of centrality in Europe, but has not achieved the importance that Netherlands has. If in terms of maritime infrastructure Belgium plays an important role, that does not happen in terms of air transport, where the Brussels airport or Brussels Airlines do not have by far the importance of Royal Dutch Airlines (KLM) and Amsterdam Schipol Airport, not only in European terms, but also globally.

The truth is that many of us have heard of KLM and we know what it is, but the same is not true with Brussels Airlines. Likewise, when we think on a connecting flight to a destination that is not served from Lisbon, we automatically think in London, Frankfurt, Paris or Amsterdam, but we do not think in Brussels.

Observing the world airport rankings of passenger movements, we can see that Amsterdam airport, not only is in 14<sup>th</sup> place, as well as it is the smallest country among the first twenty. One can think that Schipol airport is too big for the country it serves, but the truth is that it is

perfectly appropriate because the demand exists and the airport serves not only a city, and a country, but also a region, and when considering long-haul flights, it serves the European continent.

In this case, the role of the flag carrier is as well essential. Not only through the importance of exports (e.g. flowers), but also by the availability of flights departing from Amsterdam and the quality recognition. When one thinks of KLM, imagine a large company and associate it to a number of other major airlines such as Lufthansa, British Airways or Air France. But being far from having such a large number of aircrafts as their counterparts, the quality is acknowledged, and the perception of the market is of a company with similar operability and efficiency standards. KLM Brand Awareness is much higher compared to other airlines, like Swiss, Brussels Airlines, Austrian Airlines, TAP Portugal, and even from other larger companies like Iberia, Alitalia and Scandinavian Airlines (SAS).

The link between the airport and the flag carrier is essential for a real global positioning and success. Without KLM, the importance of Amsterdam would not be so high, the same way with Frankfurt without Lufthansa, Charles de Gaulle without Air France, Heathrow without British Airways, Barajas without Iberia, Dubai without Emirates, Changi without Singapore Airlines and even Lisbon without TAP Portugal.

After analyzing these examples, we can verify that, what could be considered at the beginning as weaknesses and threats, such as geographic location, the size of the country and others, are transformed into strengths and opportunities. For that, the definition of objectives and the development of an appropriate strategy are essential. Before the hub in Dubai, how many people would think to make the flight transfer through that airport? If the central geographic location is a key factor, why Belgium has failed to achieve what Netherlands has reached?

Likewise the location of Portugal, being peripheral to the center of Europe and thus necessitating air transport to move efficiently within the continent, can generate an opportunity to create a logistics platform and an interesting gateway from Europe to other parts of the world. These capabilities can be leveraged not only in terms of maritime transport but also in terms of air transport. The interrelation of the various modes can allow a stronger development of the country capabilities.

In the case of goods transportation, the two modes of transport work as a complement, because the type of products that use the sea is not the same that uses air transport or rail. Considering air transport, the most important variables are the value of the cargo and the

speed of product delivery. Whether Portugal intends to maximize one type of companies focused on technology (e.g. computers, micro-chips, etc.) or to create a major logistics hub, in any case the needs of air freight will be significantly higher.

In terms of passengers, the perspectives stated in the previous chapter indicate a continuous growth. In Europe and in the United States with moderate rates, but in Asia and other developing countries, like Mexico and Brazil, with an impressive expansion.

Portugal can be an important hub of Europe, taking advantage of the operational constraints that the main airports in central Europe are starting to have, the increased demand for air transport, as well as enhancing relations with Portuguese-speaking countries that present significant levels of economical growth with particular emphasis on Brazil.

Given that, these countries want to develop their own air transport and do not want to be dependent of others, one can also verify that all countries that had an expressive colonial structure, today also have a high number of flights to these countries being considered as a reference of air transport between Europe and the former colonies. British Airways remains a reference for flights to Australia, Canada, United States, South Africa and India, Iberia remains the main link between Europe and Mexico, Argentina, Colombia, Paraguay, etc. In the same way TAP Portugal which holds an important position on routes between Europe and the Portuguese-speaking countries, recently received the award for best airline in the world to South America.

This situation is not due to the fact that there are no other airlines with capacity in these countries, if that can happen in countries like Angola, Mozambique, Venezuela and Paraguay, the same does not happen in other countries where American Airlines, Air Canada, Qantas, Air India, Jet Airways, Aeromexico, Mexicana, TAM or Avianca, are large companies and with great expression on the world market.

We can observe that, not only there are market opportunities, as these can be increasing, particularly in countries that are now in the route of development, where even though there are emerging several airlines, their first priority is to serve the domestic market, where many end up staying focused, not developing the international and not exploring new markets, mainly because the international market needs more financial resources and for that the company's reputation is far more important. And in this case, airlines with more experience, international recognition and with a reputation of quality of service and safety have a huge advantage. If these airlines are able to maintain high quality standards, continue to innovate



and become more competitive and with more optimized cost structures, its viability is practically guaranteed.

#### **d) Competition with Madrid**

The possible competition that Madrid can make to Lisbon is a point that has raised many questions, either by historical relationships, or to justify the no need for an airport outside the city center or not to build a high speed line because it will remove the traffic that could land in Lisbon and will do so in Madrid, among many others.

But the truth is that Lisbon has long ceased to be a competitor. Madrid for its development and expansion now is competing with the major European hubs like London, Paris, Amsterdam or Frankfurt. With 50,846,104 passengers in 2008, is the 4<sup>th</sup> European airport, compared with 13,603,620 passengers in Lisbon, which occupies the 30<sup>th</sup> position in Europe. Several factors contributed to this situation, but essentially the lack of investment and commitment in air transport, with the successive delays and lack of strategy, resulted that nowadays Lisbon is competing with Malaga, Gran Canaria and Alicante, very far from Madrid, Barcelona and even Palma de Mallorca.

But despite the current situation, there are good opportunities that Lisbon can benefit and strengthen its position in the European and global air transport. In a scenario of higher equality with Madrid, the competition will be mainly on attracting foreign airlines to fly to Madrid instead of Lisbon, and for that the conditions that each airport has to offer have a major role. But if there is in each airport an airline with a strong market position this phenomenon is strongly attenuated.

Looking at the examples of Iberia and TAP Portugal, we find a very interesting conclusion: each airline has a strong position on some routes, particularly for the ex-colonies, but very few are the routes where they compete directly with each other. Competition exists only in destinations where the other major airlines are also present, such as New York, Caracas, Sao Paulo and Johannesburg, conserving the niche markets and the important role of connecting Europe with those countries.

Lisbon and Madrid can clearly coexist with a strong global position, because the operation is much more complementary than directly competitive. Both can take advantage of good international relations that they hold and the saturation of the various European airports to position themselves as two major gateways of Europe.

As we have seen in chapter two, emerging economies will contribute to a higher growth of air transport, including the regions of Asia and the Middle East where China and India will be the main drivers, which is justified by the increase of disposable income and the high number of population. This point is particularly important because Portugal does not have any direct connection to any of these markets, in other words, Portugal is not present in the markets that constitute the biggest growth opportunities for the next twenty years and has no investment plans for the near future.

The increase in tourism and economic relations would benefit with the existence of direct routes to some of these markets, leading to an expansion of the range of destinations and a global positioning of the Portuguese airport infrastructure, serving the four corners of the world. The presence in Asian markets seems to be a priority for several countries in the world, in order to expand their economic relations and enhancing foreign relations with countries that currently have higher economic growth. Therefore Portugal should also identify what type of position wants to have and what benefits can have by developing the international relations with these regions of the planet.

It is therefore crucial to realize that despite the current situation, characterized by several weaknesses and gaps in terms of objectives and strategy, there are still many opportunities and challenges that can be explored by Portugal. The examples above are illustrative of the importance of a strategic definition that, in many cases, can transform weakness into strengths and opportunities.

It is true that the import of development models should not always be done because the realities are different and each country should develop its own model. But it is especially important that Portugal consider the weaknesses as challenges and opportunities, creating strong objectives and an appropriate strategy in order to have a clear definition of what direction should be followed.

But as in any sector, any option taken has opportunities and challenges but is always subject to external threats that can distort and change forecasts previously advanced.

## **4.2. THREATS**

### **1 – New Lisbon airport is canceled**

As main threat comes inevitably the non-construction of the new Lisbon airport. In this reality the future will be a constant challenge, because the main airport of the country will remain with all its constraints and weaknesses. Despite having global airlines or joint strategies, there will be no capacity to reach the demand growth for the coming years, affecting aviation industry, tourism, trade, investment, exports, GDP and overall the financial and positioning of the country itself.

### **2 – Privatization Processes**

These processes may also have negative effects. Considering the privatization of ANA Airports, it is important to note that private management can disregard the national interest, the concerns of regions and cities where the airports are based and the interests of the major players of each infrastructure.

In Portugal there is only one owner and one airport per city. In a sector with these characteristics and especially where the competition per city is reduced, the interests of the country might lose importance when the main objective is only to obtain profit.

In PEC (Stability and Growth Plan) is also foreseen the privatization of TAP Portugal to proceed the capitalization that governments are not allowed by imposition of the European Union since 2000. Also in this case, the interest of private companies may not be aligned with national concerns. By opening to private capital two types of interests can arise: the companies whose area of competence is not linked to aviation such as banks, insurance, hospitality, construction, among others and business aviation, such as airports and airline carriers.

Regarding foreign investors, they might not be aware of the current situation and the needs of Air Transport in Portugal. The non-aviation companies, except those related to tourism where there is already knowledge of the aviation industry, have no expertise in this sector. This implies that there must be an adjustment and clarification phase leading to a slower process. However, these companies can bring some innovation, since they do not have preconceived ideas introducing a new strategic vision and greater flexibility to develop current and additional markets with a strong focus on Lisbon's hub.

With regard to aviation businesses there is a higher knowledge about the sector, with more synergies, with global alliances having particular relevance and that may result in a broader view of potential opportunities for the airline. However, it might outcome a reduction on TAP's position in its diverse markets, as there may be a deviation to the hub of the airline that enters with the capital. There may be more pressure to serve primarily the hub system of the new owner and not the key markets of TAP, which could mean a weaker and less autonomous positioning.

### **3 - Increase of Fuel Price**

The increase of fuel price will always be a threat in this sector given the percentage it represents in the airlines cost structure. New alternative sources can be developed, but not in the coming years. The airlines will have to find a strategy to mitigate these effects.

### **4 - Environmental/Climate Impact**

Air traffic growth presents not just one but several simultaneous environmental challenges, including difficult trade-offs not only between growth and environmental impact, but also between carbon dioxide (CO<sub>2</sub>) emissions, noise and local air quality. Legislative attention is focused on CO<sub>2</sub> emissions but there are also the non-CO<sub>2</sub> effects on Climate Change.

Specifically at airports, the environmental impacts arising from aviation have the capacity to constrain operational capacity when noise or emissions exceed regulatory limits or tolerance criteria within surrounding communities.

Climate change will affect demand for travel, threaten infrastructures and create additional difficulties regarding aircraft operations. The extent of change can take place through the rise of sea level, the increase of temperatures causing global warming, the lack of water resources and the extreme weather events that are likely to occur more frequently and may also be more severe.

### **5 - Congestion**

According to EUROCONTROL, by 2030 several airports will be operating at full capacity, eight hours a day, every day of the year. The network will be challenged because more and more segments are expected to reach maximum capacity and delay-causing effects may become more likely. To attenuate these effects some measures can be adopted such as: the use of alternative airports to reduce un-accommodated demand, the use of larger aircrafts to

reduce daily frequencies, explore air traffic management efficiency or schedule smoothing by moving flights to off-peak periods of the day where more capacity is available.

## **6 - Loss of competitiveness**

No airline has guaranteed markets since they are always subject to new competition.

The Open Skies are bilateral agreements with liberalization of international aviation rules for minimizing state intervention and they can act as a threat but at the same time as an opportunity.

The LCC have been registering high growth in the medium haul routes. Still no presence in intercontinental routes, but this can become a reality affecting the markets traditionally operated by legacy.

On the other hand we are witnessing heavy investments in terms of aircraft orders, for example the case of TAM from Brazil, which will be part of Star Alliance later this year, increasing its network to many European destinations thereby weakening the Lisbon hub as the preferred entry to South America.

Another factor that should be highlighted is the eventual reduction of regulatory barriers in African countries, other crucial continent for Portugal.

## **7 - Terrorism / Pandemics / Natural Phenomena**

All these phenomena can occur without any notice. Aviation will always be exposed to these threats. The case of 9/11, H1N1 virus has created huge difficulties as well as the Eyjafjallajökull volcano in Iceland. The impact of the volcanic ash provoked the closure of the European skies for several days, resulting in a chaos throughout European aviation highlighting the importance of air transportation and the lack of responsiveness of other means of transport. But even if this capability exists, the efficiency and speed of air transport cannot be exceeded by any other means of transport. Comparing a journey between Lisbon and Paris, it will take 2 hours and 30 minutes by airplane, 20 hours by train and 27 hours by bus.

After analyzing the prospects for future growth, challenges, opportunities and threats, two scenarios will be presented for the National Air Transportation.

### **4.3. STRATEGIC POSITIONNING**

#### **4.3.1. SCENARIO 1 - PORTUGAL CONSIDERS AIR TRANSPORT A STRATEGIC SECTOR**

In this scenario Portugal decides to invest in air transport and position itself as a global player in passenger transport, logistics, maintenance and engineering, taking advantage of the projected growth and the challenges and opportunities of an extreme dynamic sector. The experience of more than 65 years of aviation in Portugal is a key factor for the development of the sector and, if combined with an appropriate strategy and adequate infrastructures, can bring significant advantages and economic development.

##### **4.3.1.1. KEY FACTORS**

An investment in air transport should not be merely in infrastructures. It is particularly necessary the development and implementation of a joint strategy, well articulated and taking into account the various entities of the sector. The strategy for the national airlines should be considered in the development plan of the infrastructures and cannot be seen as a separate matter, on the contrary, both should be seen as fundamental to each other and should be together developed and aligned with the objectives of the Country.

In order to integrate all these components, the synergies and create a continuous and coherent plan, the country has to define the positioning that wants to have in the world. Meaning, the kind of tourism, the type of airlines, the international relations and with which countries, the type of exports (more based on quality products than in quantity, creating clusters of small size but with high quality such as clothing, wine, cheese, art and many others), the level of trade, the level of investment, if it wants to be a logistics platform (inserted between the main sea and air routes of the major markets), if intends to position itself as the leading country of the EU in international relations with Africa and South America (Brazil), or to enhance the Atlantic coast and develop relationships with U.S. and Canada, if wants to build important relations with the new emerging markets that are expected to grow at very impressive rates like the Middle East, India and China, or if the wants to take advantage of cultural aspects to enhance the international relations with North Africa, among many others.

It is not necessary to think of a great positioning, the objectives can be more appropriate to the size of the country, taking advantage of quality tourism, national products, gastronomy, wines and focus primarily on quality rather than quantity volumes like India and China do.

In the definition of this strategy, air transport plays a central role. But for a concerted and well delineated investment, there are several aspects that must be safeguarded and that goes through aligning a joint strategy, adequate infrastructures and global airlines.

#### **4.3.1.1.1. JOINT STRATEGY**

In setting targets, all the entities have to be involved in order to articulate the national interests. Not only aviation authorities such as ANA Airports, INAC, NAV, airlines, handling, maintenance and engineering, among others, but also the beneficiaries of the sector such as Tourism of Portugal, Business Associations, AIP, Ministries, SEF and many others, must select common and compatible goals. What is the use of a new infrastructure if the different entities go in opposite ways? The needs and interests of each entity must be related and must converge to the same strategy. That does not mean that each entity should not have individual objectives, but these can coexist in addition to the common objectives.

A strategy for Air Transport depends greatly on the national strategic positioning and the objectives of each of the direct and indirect stakeholders in the aviation sector. If the government enhances international relations with other countries resulting in an increment of trade, this situation can result in an increase of the number of flights or in the creation of an air route and consequently in an increase of tourism between the two countries, new investments, more exports, new dynamics and so on. For example, the case of Brazil, Angola, Russia, and Poland where exists several Portuguese companies.

In short, it is necessary that the various entities communicate with each other in a dynamic and constructive way, outlining clear objectives for the short, medium and long term, reducing delays, bureaucracy and inefficiency, leveraging the benefits of air transport in order to support the development of the country.

#### **4.3.1.1.2. INFRASTRUCTURES**

As already mentioned, of all the national infrastructures, Lisbon airport is the one that presents the larger constraints. An investment on the aviation sector should be accompanied by the construction of a new airport with improved levels of efficiency, greater capacity for accommodation of traffic and enabling the hub system. An airport infrastructure should be part of the solution and not be seen as an obstacle for the air transport industry and its related entities.

According to NAER Lisbon Airport Reference Master Plan (2009), on the opening day the new Lisbon airport will have a capacity of 22 million passengers and 163,000 tons of cargo, to an expected demand of 19 million passengers and 139,018 tons of cargo.

This infrastructure will be very important in order to accommodate with quality and efficiency the expected demand that the current airport cannot provide after reaching 17 million passengers, and would resolve almost all the constraints of the current airport identified in the chapter “Current situation diagnosis and Problem identification”. Also, the attractiveness of the infrastructure will be much higher allowing better operational competence, creating conditions for better and bigger investments of the operators.

In Infrastructures of new generation or that suffered significant improvements, there have always been significant investments by operators, especially airlines who develop new routes and different markets, allowing an increase of traffic volumes, optimizing the use of the infrastructure and allowing better operational results. It is therefore very likely that this new airport will not only accommodate the expected demand in a much more efficient way, but also maximize in a large-scale the interest from other airlines.

With this, Lisbon can have a different positioning serve a broader range of segments and not be so dependent of city breaks and tourism, creating better conditions to capture more business and conferences traffic. According to IATA Global Airport Monitor (2001), the quality of an airport infrastructure is a key factor when choosing a location for conferences and business as well as for investments of enterprises in a particular region, creating greater attractiveness to foreign direct investment and domestic enterprises.

### **4.3.1.1.3. AIRLINES**

For a comprehensive investment on the aviation sector it is of particular relevance the existence of airlines with a strong presence in key markets of tourism identified in the National Strategic Plan for Tourism – PENT (2007):

**Strategic Markets** – Portugal, United Kingdom, Spain, Germany and France

**Markets to develop / consolidate** - Scandinavia, Italy, USA, Japan, Brazil, Holland, Ireland and Belgium

**Diversification Markets** – Austria, Switzerland, Russia, Canada, Poland, Czech Republic, Hungary and China

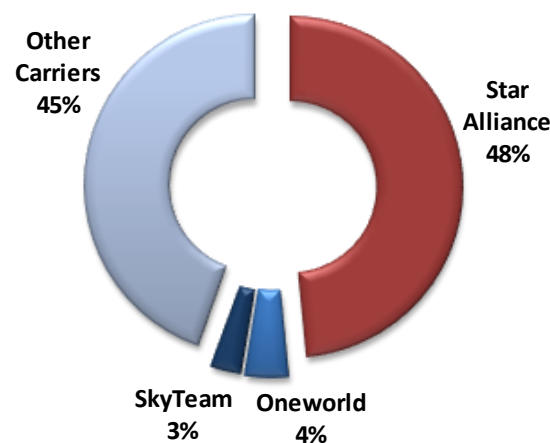


For this, it is necessary a global positioning provided by a legacy carrier, which operates to the major airports, with medium and long haul operation allowing a strong complement of the network, with a component of traffic point to point and connection taking advantage of the hub system to leverage the largest number of transfer passengers for domestic or international flights, with appropriate schedules for the different types of segments, with a strong presence in foreign markets and a good sales force creating an international reputation and developing complementary businesses such as cargo and maintenance.

Until now, TAP Portugal has assumed this role, having been awarded as the leading European company for South America and Africa using the hub system in Lisbon airport and being one of the major national exporters.

In terms of global alliances the one with the biggest presence is STAR Alliance with 48% share in total national airports, benefiting from a strong presence in the Iberian Peninsula and from the number of flights to Brazil and Africa:

**Figure 55: Star Alliance Share in the Portuguese Airports**



Source: ANA -Aeroportos de Portugal

In this scenario, the legacy carrier has the conditions to expand, not only in terms of diversification and extension of the number of destinations taking advantage of the growth estimates, developing the hub system and increasing the attractiveness of Portugal, but also in the number of aircraft and complementary businesses.

But there is also a whole range of national companies that can benefit from this bet. The case of SATA that can further develop its growth strategy, investing in new European and long-haul destinations in order to explore new opportunities, new markets and enhance traffic flows. Airlines like EuroAtlantic, White, and others will have access to an infrastructure able to improve their service conditions and to extend the range of destinations.

Regarding foreign airlines, the new Lisbon airport will become much more appealing, so it will be part of the marketing strategy to attract new routes and new airlines. For this reason, it is expected not only new entries but also an increase of operation by the airlines already present. The presence of the STAR Alliance may potentiate the increase or creation of new flights by its members improving this way the results of the carriers and overall the alliance.

And in a scenario where the country decides to invest in air transport, why not consider a joint strategy for the national airlines? This could create a strong complementarity of services with beneficial effects for the country, tourism, exports, etc. Why not create synergies and enhance the hub system? Why not adopt a strategy with complement of destinations to improve the connecting traffic?

The national airlines could have higher gains if they operate with the same objectives, each one with its own specialization. TAP could take advantage of its size, its brand awareness, its sales force in several markets, its strength as a global alliance member, and its hub by developing the combination between European and intercontinental destinations. SATA could focus on Madeira and Azores, serving not only the inter-island links but also ensuring all connections to the continent and increasing the range of international destinations from the islands, either by developing or opening direct destinations, either by feeding European and long haul flights operated by the main national airline.

The impact could reach not only the airlines, but also the national infrastructures, tourism and all entities involved in the sector, and in the end the economy of the country. The aim would be to leverage the maximum revenue, destinations, aircraft occupancy rates, marketing, sales force and average utilization of the fleet.

#### **4.3.1.1.4. NEW TECHNOLOGIES**

The use of new technologies in order to achieve maximum operational efficiency is of great importance as it will reduce operating costs, increase competence, reduce environmental impacts and improve security/safety. The development of new technologies in terms of aircraft, safety systems, and airspace management will be an important factor to increment efficiency levels. And the benefits will be for airlines, for airports, air navigation and many others.

#### **4.3.1.2. IMPACTS**

With joint strategies, appropriate infrastructures, aligned airlines and the use of new technologies, the impacts can be highly positive reaching not only the aviation sector, taking

advantage of the forecast demand for passengers and cargo worldwide, increasing the attractiveness for foreign and domestic companies, but will also leverage the tourism sector, assure the proximity to the Portuguese-speaking countries and immigrant communities, increase exports, trade, investment, GDP, employment and overall the national economy.

But here the construction of the new Lisbon airport is of particular relevance. With no constraints, the attractiveness will be superior and the positioning of Lisbon can provide a completely different visibility and positioning.

**Figure 56: Portela vs. New Lisbon Airport**

	Portela Max. Capacity	New Lisbon Airport	
		Opening Day	2050
Runway (mov peak hour)	40	55	83
Stands (#)	57/64	75	113
Terminal (thousand pax peak hour)	4	5	13
Terminal cap (million pax)	17	22	44
Gates (#)	47	81	108
Bridges (#)	20	58	91
Cargo Terminal (ton/yr)	100.000	133.000	405.000

Source: ANA – Aeroportos de Portugal

Compared to Portela airport, the improvements are visible as from the opening day and the infrastructure can be expanded in a modular way depending on the demand growth. In 2050, the terminal capacity can accomplish 44 million passengers (starting with 22 million), the number of jetways can reach 91 (currently 20, and 58 in the opening day), the parking stands will no longer be a problem, the peak periods will be safeguarded by allowing an increase of frequencies by operators at the most convenient hours better suited to feed the long-haul flights enhancing the hub effect. Additionally the capacity estimated for the new cargo terminal will boost and develop this business.

However, it should be noted that the national airlines might suffer from additional competition, mainly in the European sector, due to a greater availability of slots at the most convenient hours not only for international legacy carriers but also for an even stronger presence of LCC carriers.

The greatest impact for passengers will be in terms of comfort and for airlines in terms of efficiency. As Portela is becoming saturated, the greater the probability of inefficiency in terms of delays, baggage handling, and so on. With the increase of passengers volume, it will become more difficult to respond to the various needs. Even with higher investments in the

current infrastructure, it can never have the efficiency levels of an airport planned from scratch, built to meet the needs of the stakeholders. We cannot compare an infrastructure which has been expanded within the possibilities to face the current demand with an infrastructure that is fully designed to serve the passengers, the airlines, to work as a hub and to be gradually extended in a modular way according to the demand needs.

**Figure 57: New Lisbon Airport Project Plan**



Source: NAER – Presentation to IATA, June 8<sup>th</sup> 2009

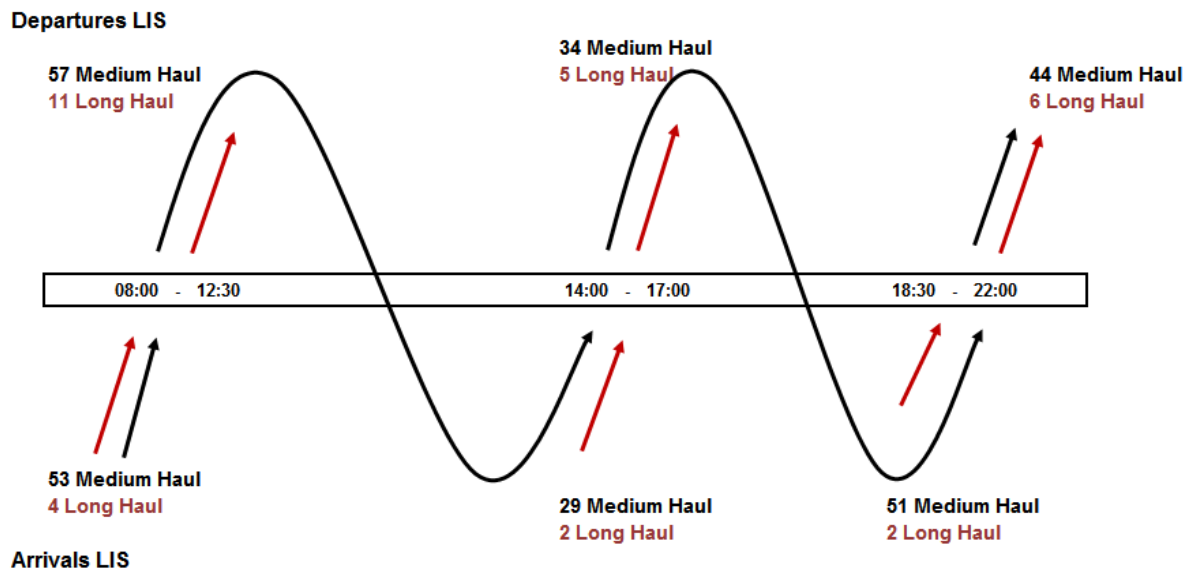
The airport, the ground handling companies and the airlines, may give a completely different response to the customers, because the entire infrastructure supports the concept of transfer traffic, and might even be able to have a more competitive MCT (Minimum Connecting Time) in line with the most efficient European airports, leading to a better positioning of Lisbon as an international hub and providing a greater attractiveness to the airport, city, region and country.

Moreover, as there are significant constraints in the major European hubs leading to more delays, large waiting times for take offs and landings, and also in check-in areas, passport control, etc, Lisbon can take advantage of this congestion by positioning itself as a strong alternative for connecting traffic.

At the current infrastructure there are two crossed runways not allowing a simultaneous use, resulting in a constrained number of movements. In the new airport two parallel runways are planned, with parallel taxiways along the entire runway, with quick exit taxiways allowing a more efficient and secure use of the runways. Therefore it is expected an increase of the number of movements per hour, and better timetable availability for airlines which are currently constrained at the hours of higher demand.

Currently the wave system, considering all airlines present at the Lisbon airport, is divided in three major banks:

**Figure 58: Lisbon Bank Structure**



This is the current wave system with restrictions and movement constraints in the peak periods. In a new infrastructure, with high levels of efficiency and availability of movements, these banks could be enhanced by the increment of operations at the hours of higher demand allowing more connections from medium haul to intercontinental flights and providing a more effective response to point-to-point traffic and connecting flows.

Lisbon can emerge as a strong and solid option not only for O&D traffic but also as a hub, becoming more attractive to national and international carriers, whether being part of a global alliance, such as STAR Alliance, increasing the number of flights and destinations to the airport hub of the companies members of their alliance, or by other means that may contribute with additional traffic to the intercontinental destinations through Interline agreements.

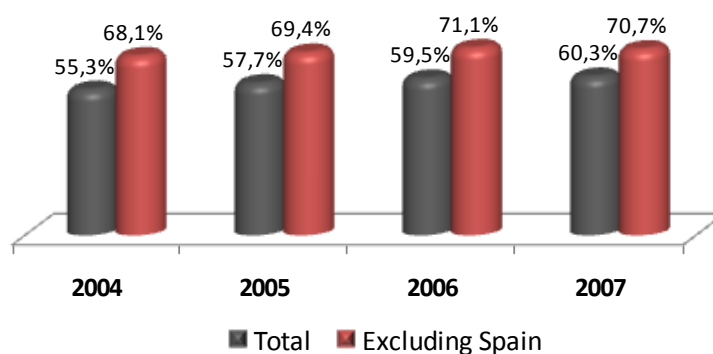
Air Cargo might also be improved due to the development of new terminal, with higher capacity and better operational conditions. This allied with good connections to the platform logistics of Poceirão may allow a development of air cargo strengthen the positioning of Lisbon as a cargo hub. Hence a new path could be traced to develop a fleet of freighters to leverage and take advantage of this business potential.

By withdrawing the airport from the city center, there will be improvements to the city itself, whether related to environmental issues, by reducing noise and CO<sub>2</sub> emissions, whether in safety, by avoiding eventual accidents or problems that could arise by the proximity to large urban centers and very busy roads.

From tourism perspective, the magnitude of Lisbon increases, because with a more attractive infrastructure, the airlines tend to invest more thereby raising the flow of tourists, which means that the revenue to the city and to the country will also enlarge, enhancing and developing a sector of such importance to Portugal.

Considering INE Tourism statistics (2008), the leadership of air transport in the entrance of foreign tourists has been consolidating. In the graph below the data is presented in two versions, one including the Spanish market and the other excluding, because this market due to its geographical proximity may distort the analysis by presenting a lighter weight of air transport compared to other foreign markets:

**Figure 59: Tourist Entrance through Air border**



Source: INE - Border Inquiry on Passenger Flows

Hotels and other types of accommodation, restaurants, travel agents, tour operators, rent a car, other modes of transport, events and cultural areas might also assist to an increased of demand.

**Figure 60: People employed in Tourism related activities**

	People employed
1. Hotels and similar	60.494
2. Restaurants and similar	232.291
3. Railway	4.280
4. Ground Transports	36.600
5. Maritime Transports	2.018
6. Auxiliary Services to Transports	20.813
7. Transport Equipment Rental	3.607
8. Travel agencies, tour operators and touristic guides	8.622
9. Cultural services	12.003
10. Sports, Recreation and leisure	26.973
<b>Total Activities</b>	<b>407.700</b>

Source: INE, 2007, annual average

And if tourism already contributes with 10% of the workforce, it can still foster employment statistics given the prospects of a wider range of destinations and more traffic flows to Portugal.

Other related areas may also experience significant growth, such as catering companies, cleaning, fuel, airports, aircraft builders, GDS (Amadeus / Galileo), among others, as well as their own suppliers like wine and catering suppliers for example.

And if there is already a strong role of national airlines considering sales made in external markets, and being exports a major driver of national economy, it will be expected an increase of this contribution given the possibility of expansion, enlargement of destinations and service improvement that may be achieved in this sector with a concerted commitment and strategy. But in addition to exports, it is also expected an increase in investment, trade, GDP, and various types of development, positively affecting the national economic accounts.

The aviation sector has such a scope that can still provide a wide range of challenges and opportunities with respect to knowledge and implementation of partnerships.

As already mentioned, aviation seems to assume an increasingly important role in today's society and the estimates indicate that this will remain in the future, where globalization and interconnection of economies will be strongly implemented. The need for air transport will therefore be raising as already seen in the previous chapter, and even with the existence of financial or economic crises, pandemics or natural phenomenon, aviation seems to get through and present very interesting growth rates.

For several countries which are now at the stage of its higher development, such as Brazil, Russia, China and India, the demand for air transport began recently is now presenting greatest expansion, with high levels of aircraft orders and demand for services dedicated to aviation.

Also in more developed regions the demand will continue to rise although with lower growth rates. However, in these areas more than the increase in the number of aircraft, there is a need for replacing the current fleet that is becoming obsolete and with lower levels of efficiency. In addition the demand for maintenance centers and renewal of aircraft will also increase by the general growth that worldwide fleet will suffer in coming years.

It is therefore legitimate to say that aviation is presented as a promising sector, with very interesting opportunities. It is a high-tech industry, with strong application and development of themes such as technology, engineering and science, allowing improvement of knowledge,

strengthens business performance and its strategic positioning in an industry of global importance.

### Training Partnerships

In Portugal, the most significant investments in training regarding aviation have been focused on the operational side, where it was witnessed the creation of several flying schools and pilots training. Much of this surge was triggered by the need for a greater number of pilots to cope with the expansion of the main national airline in the recent years.

However, investment in knowledge can be extended to other areas and may include several entities as a complement to this training. With the prospect of establishing factory unit components by Embraer, within a possible partnership with TAP and Airbus, the knowledge slope could be driven and explored by involving all these entities with the reference schools in the country and also with international universities.

A cooperation involving engineering, piloting, maintenance, development and construction of components, international universities, technical expertise of national firms, could be an interesting way for the strengthening of knowledge towards a strong recognition and acknowledge of resources in the international arena.

**Figure 61: Cooperation between organizations**



In terms of engineering, in particular aeronautical engineering, a close cooperation between educational institutions, Embraer, Airbus, OGMA and airlines, could develop Professional Training Programs integrated not only in Portuguese units but also in international units, like



Embraer or Airbus. After that experience, these employees would return to Portugal where they would continue the development of the knowledge acquired and remain as fundamental human resources.

Regarding the pilot area it could also have greater cooperation opportunities. The demand for air transportation will entail the need for pilots and certified qualifications for the various types of aircraft. If on one hand traditional airlines still prefer to train their pilots according to high standards and corporate culture, other carriers in order to reduce costs, choose to hire pilots already qualified on specific aircraft. Whilst the Portuguese market has a small size and is now at a maturity stage, there are other countries and regions presenting needs for qualified pilots which provide an opening for Portugal to export knowledge.

The placement of Portuguese pilot schools as a reference with international projection can bring many gains. The adoption of a more international posture exhibiting the various advantages that may exist in training can be a first step towards that goal. Another step, results from the establishment of partnerships with universities, national and international schools that can increase the value of services and "experience Portugal" as well as extend its brand awareness internationally and the consequent uptake of different nationalities to training in Portugal. This, in addition with a close cooperation with the big Construction Aviation Companies to equip some Portuguese schools with certifications to pilots aircraft qualification can be a huge competitive advantage.

Cooperation should also allow all areas to achieve the maximum possible synergies by joining knowledge of different aspects of this industry. The possibility of acquiring new knowledge and experience should be fostered. There are several things that are common to a pilot, an aeronautical engineer and an engines engineer. The interrelation of knowledge that each one can bring is a substantial increase in the degree of training. If the institutions that train these elements develop closer relations among themselves and with other institutions and constructors, it not only creates a cluster in terms of business, but mainly as a cluster of knowledge and capability in a recognized worldwide sector.

### **4.3.2. SCENARIO 2 - PORTUGAL DOES NOT CONSIDER AIR TRANSPORT A STRATEGIC SECTOR**

Portugal does not consider air transport as a strategic sector opting not to be a player in world aviation. Although the main infrastructure of the country presents heavy constraints, Portugal considers that the maximum capacity of the current airport serves the national interest for the air transport and tourism. Given the constraints of the capital's airport the national and foreign airlines will not have significant capacity for expansion, especially in the hours of strong demand.

This way, it is not expected large increments of operations or destinations. It is assumed that the maximum capacity of the airport's capital is sufficient to meet the demand that is intended for the country. But with a maximum capacity of about 17 million passengers, Lisbon faces the risk of losing importance in terms of tourism and global positioning and Portugal could see the traffic divert to other cities benefiting from the growth expectations for the coming years.

Portugal therefore takes the decision to invest in other sectors neglecting some issues in terms of capacity, environment, quality of infrastructure, quality of service to passengers and customers / suppliers.

#### **4.3.2.1. IMPACTS**

##### **4.3.2.1.1. INFRASTRUCTURE**

Currently, Lisbon airport is undergoing a process of qualitative improvement and capacity increase, which will enable the airport to meet the short term demand.

The runway is limited to 40 movements per hour and the main terminal does not have much space for expansion. According to Carlos Madeira, Chief Executive of NAER in (ACI) Airport Development News (2009), the current airport must adapt to the growing demand. It is expected to reach the maximum capacity of 17 million passengers by 2014/15, so between that time and 2017 it will go through a period of deterioration in passenger service quality. Meanwhile, a number of adaptations are taking place in the existing airport. In 2010, the number of check-in counters will reach 154 (formerly 102), the volume of processed baggage per hour will increase from 4300 to 8000, the gates will go from 26 to 47, new shopping areas will be expanded and new aircraft parking stands will be created passing from the current 51 to 64, some of which will be equipped with jetways.

**Figure 62: Lisbon Airport Expansion Plan**

Source: ANA – Aeroportos de Portugal, Presentation to IADC-SVG, October 2009

However, in spite of the expansion plan, increasing the number of jetways, branches, gates, and given that this airport is the hub of Portugal with a wave system in operation, the efficiency and speed of transfers will be constrained. And with the forecast demand, the main national hub will not be able to accommodate the number of passengers and lose competitiveness and importance, and in the medium term can even put into question the existence of the hub system.

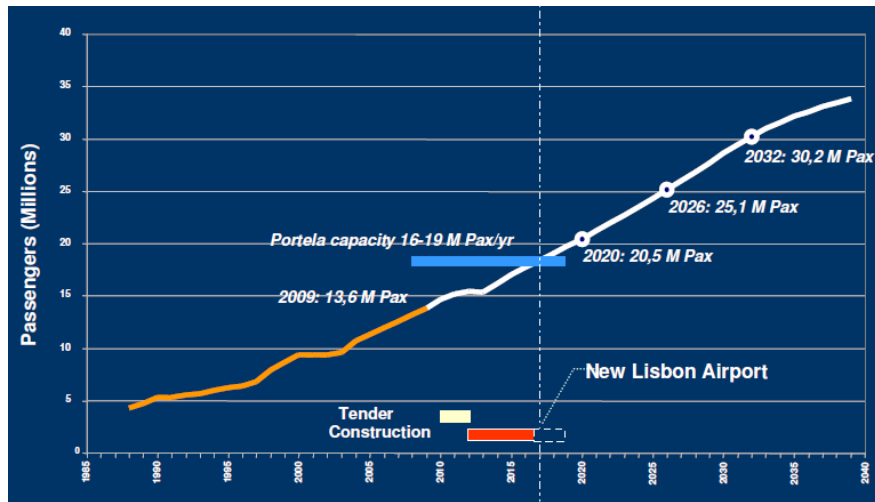
And if this is the situation that the airport faces in 2010, how will it be in the coming years with the airlines wanting to explore new emerging markets, new aircraft models and take advantage of demand growth of passenger and cargo worldwide? And how can this infrastructure deal effectively with operation increases of the current airlines, collect new companies diversifying the range of operators and destinations and deal with a greater number of passenger and luggage transfers?

Beyond these issues, another problem relates to the airport parking stands. On the expansion plan, the stands will increase from 51 to 64, which is not enough for the expected growth in aviation. As the director of the airport, Dr. Francisco Severino said, TAP replacement plan provides 80 planes for 2017, when the airport only allows 64 planes at the same time.

This means that only TAP, not counting with the other companies that have operational base at Lisbon Airport (Sata International, EuroAtlantic, White, Netjets, etc.), exhaust all the parking capacity of this infrastructure, even with average turnaround times below to those currently used.

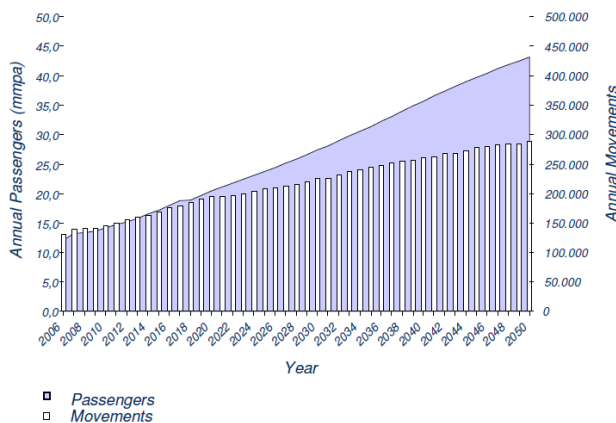
When considering demand forecasts and passenger movements planned for the coming years, in the "Engineering and Infrastructure Development - The New Lisbon Airport Project - Presentation to IADC - SVG (2009)" it is possible to observe that from the time when saturation happens, the demand will not be satisfied by the constraints of infrastructure:

**Figure 63: Lisbon airport: capacity vs. demand**



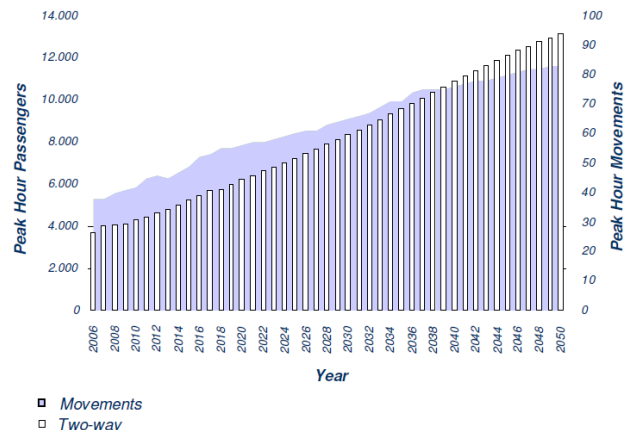
Source: ANA - Aeroportos de Portugal, The New Lisbon Airport project

**Figure 64: Annual Forecast Commercial Passengers & Movements (excluding cargo)**



Source: ANA - Aeroportos de Portugal, The New Lisbon Airport project

**Figure 65: Forecast Peak Passengers & Movements**



Source: ANA - Aeroportos de Portugal, The New Lisbon Airport project

Considering the projections of IATA and Airbus, we obtain three possible curves, depending on the following estimates:

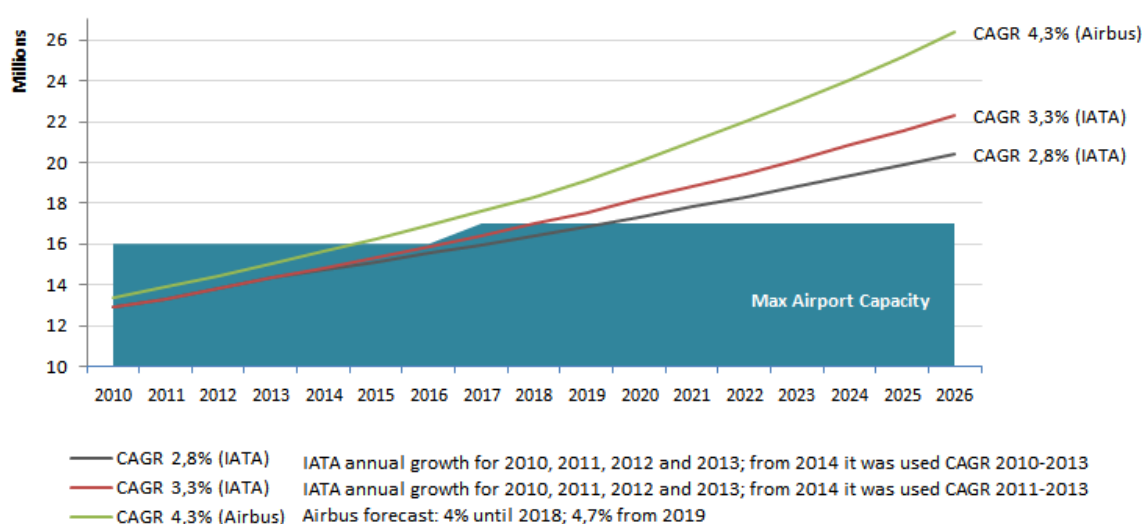
- Growth rate expected by IATA to Portugal for 2010, 2011, 2012 and 2013, and from that period applying the average rate of 2.8% referring to this period, including the year 2010 which IATA forecasts a growth of 0, 7%;

- Growth rate expected by IATA to Portugal for 2010, 2011, 2012 and 2013, and from that period apply the average rate of 3.3% for the period 2011 to 2013, removing to this average the year 2010;

- Airbus forecasts for Europe a 4.0% annual growth until 2018 and 4.7% from 2019, resulting in an average rate of 4.3% per year

Applying these forecasts to the maximum capacity of Lisbon airport, the country by choosing to keep the current airport is, with one or two years of difference, undermining the demand for the years to come.

**Figure 66: Lisbon Airport Capacity vs. Demand Forecasts**



Based on all these predictions, it appears that Lisbon will not be able to meet demand and maximize the benefits of air transport, losing thousands of passengers each year, affecting not only the air transport but also the sectors that work around it, such as tourism, hotels, travel agencies, restaurants, among others, as well as the economy and exports.

And as the constraints will be larger, more inefficient the airport will be, the greater the delays and will be less attractive to the different customers, degrading the image and value of this airport, not only when compared with other Portuguese airports but also with other European and worldwide airports. In these circumstances an airport city will not exist and Lisbon will not take advantage of the constraints experienced in other European airports, on the contrary, it will be part of the constrained infrastructures.

With the maximum capacity achieved the Minimum Connecting Time (MCT) can also increase in order for the transfers be feasible, reducing this way, the competitiveness of the hub system at this airport.

And observing the current MCT's and comparing it with the other similar airports in terms of passenger volume, it shows that Lisbon already presents the highest transfer times:

**Figure 67: Minimum Connecting Time Comparison**

	Brussels	Athens	Stockholm Arlanda	Berlin (Tegel)	Lisbon	Helsinki	Hamburg	Prague	Geneva	Milan Linate	Warsaw	Budapest
DOM-DOM	0:50	0:45	0:15	0:30	1:00	0:20	0:40	0:40	0:40		0:50	0:40
DOM-INT	0:50	0:45	0:20	0:30	0:45	0:20	0:35	0:40	0:40	0:40	0:35	0:40
INT-DOM	0:50	0:45	0:45	0:30	1:00	0:30	0:35	0:55	0:40	0:45	0:50	0:40
INT-INT	0:50	0:55	0:50	0:30	1:00	0:40	0:35	0:55	0:40	0:45	1:00	0:40
DOM-SHE					0:45							
SHE-DOM					0:45							

DOM-DOM (Domestic to Domestic)  
 DOM-INT (Domestic to International); INT-DOM (International to Domestic)  
 INT-INT (International to International)  
 DOM-SHE (Domestic to Schengen); SHE-DOM (Schengen to Domestic)  
 Source: GDS's (Global Distribution Systems )

The MCT is not exclusively defined by the airport. In LIS, for instance, it was the main airline in conjunction with the Handling Agent that defined it. And this practice also occurs in other airports.

Extending the comparison with airports with higher passenger volumes and taking into account the movements that these airports have, Lisbon continues to present lower attractiveness compared to the majority of the other cities, some of which are large global hubs like Frankfurt and Amsterdam:

**Figure 68: Minimum Connecting Time Comparison**

	Frankfurt	Amsterdam	Rome Fiumicino	Munich	Barcelona	Paris Orly	Zurich	Copenhagen	Manchester	Vienna	Oslo	Dusseldorf	London Stansted
DOM-DOM	0:45	1:00	0:45	0:35	0:30	1:00	0:40	0:30	0:40	0:30	0:35	0:40	1:00
DOM-INT	0:45	0:25	0:45	0:45	0:30	0:50	0:40	0:30	0:30	0:30	0:35	0:40	0:45
INT-DOM	0:45	0:50	1:00	0:45	0:45	1:15	0:40	0:45	0:40	0:30	0:40	0:40	0:45
INT-INT	0:45	0:50	0:45	0:45	0:45	1:00	0:40	0:45	0:40	0:30	0:40	0:40	0:45

Source: GDS's (Global Distribution Systems )

Also the image of the airport as a hub may be strongly affected, resulting in a decrease of the passenger traffic choosing other European airports for their transfers that offer better conditions and shorter lead times, instead of Lisbon, leading to a loss of revenue for the operators and for the airport.

It will also remain unsolved issues concerning the environment (noise, emissions of CO2) and safety. The impact of an eventual accident in an airport located in the city center adjacent to significant urban areas and congested roads can be very significant, as well as the quality of the infrastructure itself which create huge constraints to the major customers.

The key questions that have to be raised are: from the moment the infrastructure reaches saturation, how many passengers is the country willing to lose? And how many destinations

will still not be served? What will be the quality level provided to the passengers that use this infrastructure? What expansion plan can the airlines accomplish? And how many operators will be constrained? And how many passengers or airlines will opt for other cities? The city, the country, tourism and national economy will gain or lose with this solution?

#### **4.3.2.1.2. AIRLINES**

In the case of the main national airline, which has adopted a strategy of being present in key markets, being a member of the STAR Alliance and positioning the Lisbon Airport as a gateway of Europe, more global and less peripheral, will not have the necessary conditions for the expansion of the hub and will be strongly affected in its strategy as a legacy carrier, reducing its attractiveness. An airline that has difficulties in expanding in its own hub airport will also have its growth strategy constrained.

And if STAR Alliance, chooses to replace the main national airline by another carrier of a different country because TAP could be losing competitiveness in the Iberian Peninsula and also in the intercontinental routes to Brazil and Africa?

This reality can have larger proportions for potential buyers in the privatization process, because we cannot dissociate the airline of its main airport, its operational base. If the carrier has difficulties in expanding in its own hub and is restricted to a number of aircraft regardless of the market opportunities, with levels of efficiency and quality under other airports, the attractiveness to a potential investor will be less, since it will have difficulties to grow and to profit from the investment.

The other national and European operators would also find themselves restricted and with very little capacity to increased frequencies or destinations, at least at the peak hours where the constraints are bigger.

In terms of LCC, since Lisbon will present constraints and these companies prefer very short rotations, what can be expected is an increase of flights from these carriers to the airports of Faro, Oporto and Funchal in order to fill the capacity constraints of Lisbon. Another possibility is the use Beja airport by the low-cost carriers, as an alternative to Lisbon and in an attempt to make use of the investments made in that infrastructure.

Given these facts, if any new destinations or new entrants are added in Lisbon, they have to be inserted in the available hours and parking spaces, reducing the attractiveness not only for the national companies but also for the foreign airlines.

It might as well give the case of ANA increases airport charges in order to face the constraints and reduce the demand. In this perspective, the competitiveness will decrease and the airlines could be forced to divert their operations to other competing airports (already happening with EuroAtlantic), including airports in the Iberian Peninsula.

#### **4.3.2.1.3. IMPACTS ON THE NATIONAL ECONOMY**

A small and weak economy as the Portuguese should have exports as the main driver. Being an airline the largest national exporter, if it is constrained and unable to expand its contribution to the national GDP will also be affected.

Air transport is essential for tourism, and vice versa. The impossibility of extending the range of destinations would affect the entire tourism sector and the activities connected with it. Mobility would be undermined by lack of air links. And the options of choice for the foreign tourists to other cities or to other countries are numerous. Portugal would be stagnant and the growth of tourism would be strongly affected. How to achieve the target markets if the main hub of the country has capacity limitations and no ability to respond?

Tourism would be one of the most affected sectors given the clear inter-dependence between this sector and air transport, and put in cause some of the strategic plans created for the different target markets. In the short term, can be a mitigating of this situation because there is the possibility of increasing capacity through the use of larger aircraft with more number of seats. However, this optimization also has its limits. The hotels, restaurants, business events, exhibitions and congresses, Golf, Rent-a-Car, museums, monuments, other means of transport, among many other players, could also suffer collateral damage by the limitations of Lisbon airport.

And it is not just the case of tourism, also the trade, GDP, exports, investment, mobility of people and goods, the benefit of the emerging economies and many others. How to offer a competitive transport of goods when speed is the key factor? The same with, perishable goods, technology products, diplomatic cargo, among others, that has to be in the destination as fast as possible? Certainly, the other national infrastructures could give some response to this situation, but the main volume is concentrated in Lisbon.

In this situation, we cannot just count the losses of passenger, cargo, tourism, revenue, and economic impacts. There are various assets that cannot be accounted for and that are also important, especially in terms of knowledge and training of the staff involved in the sector.



This is not an industry with low levels of knowledge, but a high-tech sector which involves in several areas high levels of training and skills.

### **4.3.3. CONCLUSION**

The existence of a wide variety of issues involving the air transport industry is undeniable. Its broad coverage led to the deepening and development of several aspects throughout this dissertation.

Air transport is a key factor in development, investment, innovation, economic growth, trade, tourism, among others. A country that wants to rise economically must be connected with the world and for that purpose the air transport plays a strategic role.

As previously showed, we are in the presence of clear opportunities and growth prospects for aviation, but threats and risk factors should not be ignored.

The benefits of air transport can reach numerous areas of activity and its encouragement allows to boost competitiveness, strategic positioning and enhance the national economy. Its absence strongly undermines the mobility, affecting severely the flow of people and goods, and several other areas, as recently observed with the volcano in Iceland.

The environmental impact of aviation will remain small compared to other modes of transport and with undeniably large benefits. However, the industry is determined to minimize and even reduce this impact, while seeking to maximize the contribution that it can make to improve the quality of life, to understand other cultures, to greater learning and to sustain economic development. In 20 years, it is estimated that air transport will directly employ 8.5 million people and, measuring across aviation, with indirect contribution, will reach 50 million jobs and US\$3.6 trillion of GDP.

Only one percent lower than currently forecasted will have significant consequences due to the magnitude of these values and may reflect a reduction of 2 million jobs in Asia, 1.5 million each in Europe and North America, 400-500 thousand in Africa and in Latin America and over 200 thousand in the Middle East. The impact on GDP would be 600 billion USD.

In this long term industry, where demand and growth will drive the need for more aircraft or new/additional frequencies and where the consequences are so significant for the millions of people who depend on it, aviation must continue to innovate and assure the best for the customers and for the environment, even if it is not necessarily the cheapest or easiest way. The weight of responsibility surely demands it.

Given all this dynamic and this whole environment, Portugal can then decide whether or not to have a strong presence in this sector. Depending on the option there are always consequences that must be highlighted by its impact. Isolating each of the scenarios and in conclusion, the lessons that can be drawn from each of them are the following:

**4.3.3.1. SCENARIO 1 -PORTUGAL CONSIDERS AIR TRANSPORT A STRATEGIC SECTOR**

Portugal decides to invest in air transport with the clear aim of being a player in world aviation. Obviously, the construction of a totally new infrastructure in the capital, solving the current constraints, with the possibility of modular expansion in order to meet the demand, is undoubtedly a very important factor in this strategy. But that is not enough. The strategy for the country has to go much further, must involve the major stakeholders within the sector, through airports, airlines, tourism entities, ministries, among many others, that without ever losing their individuality, should also reconcile objectives, work together and develop joint approaches and efforts.

The new Lisbon airport will have beneficial effects not only in the city but also in the country by boosting the entire hub strategy placing the airport as more global, due to the quality and efficiency of the main infrastructure and therefore for what it can provide in terms of cargo and maintenance. But the country is not confined to Lisbon and a new airport. Portugal has infrastructures throughout the continent and islands, and should take advantage of the positioning of each with the purpose of increase their competitiveness, becoming more attractive and with better security levels.

Aviation forecasts point to a strong growth worldwide. And for accomplish some of that demand the national airlines should be able to grow, to expand, to put into practice their strategies and to develop a highly dynamic sector. A possible partnership between the two major carriers, with different placements but with common goals to establish as many links to the country and improve the effect of the hub pattern, could bring a large number of benefits.

Also allied to this is the use of new technologies contributing to maximizing operational efficiency and reducing environmental impacts.

Privatization models should not overlook the national objectives, whether for national airlines, whether for airports, where the city and the region involved should also play an important role as well as the main carriers in each infrastructure. National interest should be safeguarded to assure its strategic positioning.

But beyond the impact on airports, airlines, tourism and revenues for the country, there are other opportunities that also deserve to be highlighted. And these relate to training partnerships with commitment to deepen knowledge. There are areas where the expertise and training have a preponderance, and Portugal has these capabilities and has the possibility to enhance, to expand and leverage the synergies of such specialized areas as engineering and piloting, together with university centers and large aviation constructors such as Airbus and Embraer. Therefore advantages can be taken regarding infrastructures, new opportunities giving the country an important position within aviation industry.

The threats should not be disregarded, but they should not serve as excuses for not investing in aviation. In the short term, the weight of the investments involved in this option may reach very high values, but what volume of revenues, what strategic positioning and knowledge may the country be disregarding in the medium-long term?

#### **4.3.3.2. SCENARIO 2 - PORTUGAL DOES NOT CONSIDER AIR TRANSPORT A STRATEGIC SECTOR**

In this option, the strategy of Portugal for the air transport is not different from what the country has followed over the past 35 years. During this time there was no joint strategy between the different players in the sector in the development of the necessary conditions for a significant improvement in the sector allowing the country to force a stronger global positioning and the resulting economic benefits that it could entail.

Thus, the expression that best describes this scenario is continuity. The permanence of the same problems and the same solutions, the same way of operating and without exploiting all the advantages the industry provides. The continuity will remain in Portugal, but that probably will not be the reality for the rest of the world, where the estimated growth in air transport points to another direction. A path of expansion, higher demand, new opportunities, new needs, new habits of consumption, new aircraft orders, stronger hubs for passengers and cargo, along with the rise of airport cities, new clusters associated with air transport.

The impacts of this option affect the GDP, Exports, Trade, Investment, Tourism and service quality, outcomes of the national airlines and aviation authorities, contact with other people, markets and cultures, among many others. The benefits of air transport can be so many, that when the maximum capacity at its main airport is reached, and its role cannot be fully absorbed by an alternative airport infrastructure, the result is loss of opportunities and challenges that the sector allows.

But since what stands out are the short term investment costs and financial resources, not being visible the income and future benefits that may be added to the economy, the arguments justifying the non-investment in infrastructure, in that perspective, can be considered legitimate. However, a more complete analysis should take into account, not only the short-term impact but also the profits that might result, and above all, the future costs and the loss of revenues resulting from maintaining the current situation. The status quo, in most cases, does not mean that there will not be higher associated costs.

It is therefore extremely relevant to have the perception that such a solution will have significant effects on air transport, but these will be most felt in the economy and hence in the country.

How will the country meet future forecasts for passengers and cargo? How can the country explore the potential of the emerging economies? How to reach the objectives of the Tourism of Portugal to reach 15% of GDP? What will be the impact on revenue in GDP, Exports, Trade and Investments? How to keep the mobility standards of the various segments? How to implement the airlines expansion plans? How to potentiate the hub system effect? The country is likely to become more isolated, less attractive to other markets, affecting the national economy.

Some eventual losses for the country can be quantified, but there are also those not measurable that go beyond material goods, possessions or infrastructures.

These were just some highlights of what might happen in each scenario.

Another relevant issue that for its importance was also focused is the intermodality concept, as a way to complement and develop synergies between the different modes of transport.

The aim of this project was to raise some questions that can serve as a base for discussion of the options that can be taken and their impacts on the future of the national aviation.

However, after the analysis I do consider that Portugal can have significant benefits if the country decides to invest in air transport in a coherent, planned and coordinated way, with quality and reliability in an extremely dynamic sector, full of challenges, opportunities, strong growth perspectives for passengers and cargo worldwide, with cutting edge technology and with high importance in the development, prosperity and national projection.

Thus, bearing in mind the lessons in major business schools and competitive companies, I know that is conveyed clearly the notion that in order to get good results and have the ability to face competition from other companies and other markets it is necessary to innovate and invest to remain competitive. This notion is reinforced by the best national and international managers. And indeed, we find that the companies and sectors that are most successful are those that invest more, especially in innovation and development.

If this reality and this type of behavior produce excellent results and are encouraged by various authorities in relation to other companies and other sectors, why does not this same concept can be applied to the air transport industry? And if we invest in this sector trying to get the maximum benefits, we will not be successful as well? Or is this concept unique to certain sectors? Can we or can we not get the most of this sector if we take advantage of the opportunities that Portugal has if we invest in an efficient way in this strategic sector?

The difficulty arises because this sector is overly dependent on the state and the permanent scrutiny of public opinion. The processes are too slow, not allowing an efficient advance and are always dependent on policies that often do not meet the needs of the sector. With this, opportunities are lost, as well as growth, income, knowledge and many others.

But Portugal can have an important role in the world, as we had in the Age of Discovery, at that time we were courageous, ambitious, we invested and we were pioneers in various aspects. The reality today is completely different, but there are still challenges and opportunities that Portugal can take advantage, but it is necessary to delineate objectives, to face adversity, overcome obstacles, design a plan, formulate a strategy, create a path of prosperity and innovation for an entire industry, and above all, for the Country.

## 5. METHODOLOGY

Throughout this project, in addition to research, reading and analysis of the documents referenced in the bibliography, several people and entities associated directly or indirectly to the Air Transport have been contacted.

The study was carried out between March 2009 and April 2010 through interviewing over 20 experts and leaders from the air transport industry. The objective was to understand and analyze the interviewees' views in order to have a broader vision of the sector and a more complete document.

The purpose of these contacts was to collect as much relevant information in order to obtain a better understanding of the major issues of the sector, the potential, the themes and also to acquire a more rigorous characterization and a enhanced adaptation to reality of the facts and variables involved.

In this sense, it was possible to achieve a strong contribution of the importance of national and international Air Transportation not only in the current situation but also the strategic vision and the future direction that can be traced.

Regardless of all the documentation gathered and all the research done, being able to exchange views with those who deal on a daily basis in this reality, allows a broader perspective of the sector and a level of knowledge that can only be transmitted by those who have the experience in the aviation industry.

There is no doubt that the diversity of the interviewees, covering multiple areas, different professional positions within the sector was extremely valuable for the realization of the whole project.

In order to address multiple subjects without constraints of any order, particularly because of the political issues that involves some aspects of the sector, it was decided to establish informal conversations rather than formal interviews, not having an established framework of questions. Obviously, common topics were covered but the uniqueness of each person and each area were leading and changing the course of conversation.

And it is precisely by the political issues involved, that many of the interlocutors requested to maintain anonymity and thus expressing openly their opinions and making their unconstrained contribution. In these cases, respecting the request it will only be listed the consulted entities or areas of expertise not mentioning the names of the interviewees.

Without any preferential order, I shall list the various entities:

### **Airports**

Besides the support throughout the dissertation, Dr Maria de Fatima Rodrigues, one of the main responsible for the New Lisbon Airport and with previous positions at Portela Airport, was extremely important not only to exchange ideas and experiences in all chapters but also essential to analyze the national airport infrastructure and for the vast knowledge and characterization, constraints, operating limitations, movements constraints per hour, aircraft parking, jetways, remote stands, consequences for airlines, passengers, tourism and the country itself, among others. On the other hand, allowed to consolidate the knowledge of the NLA infrastructure proposal and the potential of having an airport designed from scratch with the possibility of modular expansion able to adapt to the new realities and the benefits it can contain.

The areas of marketing from Lisbon Airport, Oporto, Faro, Madeira and the Azores were also contacted. These areas were essential in order to provide the current reality in terms of traffic development, supplying data to present the numerical level of passenger and cargo airlines, and movements on each of the airports in the Diagnosis of Status, helping in the characterization, positioning, expansion works and constraints of different national infrastructure.

### **Airlines**

In the case of TAP Portugal, I had the complete cooperation of Dr. Sonia Mendonça and Dr. Ana Almeida, senior positions of the national airline in the department of Network Development and Economic Analysis. Apart from the help in gathering data and information search, numerous conversations were also taken throughout this project. Multiple topics were covered mainly the importance of air transport, mobility, different traffic segments, the hub system developed by the company over the years, creation and consolidation of new routes, diversification of destinations, the relationship with airports and how the limitations may affect the company's strategy, the importance of air cargo, the importance of global alliances, the aggressiveness of the LCC and ways to react, the future prospects of aviation, how did the company respond to the crisis and to the oil prices, etc.

Several conversations were also held with pilots, highlighting the First Officer Nuno Gonçalo Correia, A330/A340 fleet in order to assess the more technical issues related to safety and

environment, as well as knowledge of different national and international infrastructures and the different air traffic controls. Pilots have the contact with different realities and thus a higher range and greater ability to identify the practices adopted by different countries. More general topics were also addressed, such as the vision for the air transport in Portugal, the airline expansion, the destinations, the type of operation and the constraints that the company is facing.

In terms of technical issues related to environment, security, operational safety, new developments and new aircraft technology, maintenance engineers were also consulted.

Other business professionals like cabin crews, public relations, marketing and sales were also involved. The interviews had common objectives to capture their experiences, their lore of aviation and how it has evolved, practical issues and techniques of each particular area. Aspects related to airports, tourism, competition, market characterization were also subjects of discussion. The intention was to gather views and knowledge that could allow a consolidation of the different subjects.

Since Air Cargo was also one of the themes analyzed in this thesis, important contacts were also made in this area, not only for numerical reasoning of the business but also for better characterization of the different types of cargo, specifications, major foreign markets, major airlines and the impact of the new cargo terminal at Portela airport.

I also had the privilege of interviewing the company's top managers and members of the board where I was able to benefit from their vast experience in aviation. Many subjects like the evolution of TAP, the strengthening of its positioning, the importance of the business for the country and for the national economy, the global variables that most affect the industry, the problems that the company faced and what are the main constraints, the importance of a new airport and what could an appropriate infrastructure bring to the company's expansion, the hub system, the importance of Star Alliance in the current context and the prospects for growth and emerging markets.

All of this dynamic and diverse business areas of the company enabled a more complete knowledge and different perspectives and approaches, not only in terms of the airline, but also the surrounding areas, the hub strategies, development of new routes, competition from traditional airlines and LCC, safety, environment, traffic segmentation, marketing strategies, sales and onboard service, national infrastructures, specific air cargo among many other contributions, all of them extremely valuable for the project.



From SATA I can refer captain Ana Monteiro A320 fleet as well as top managers who transmitted not only the reality of the airline, but also helped in the characterization of several national infrastructures, issues related to the strategic positioning of the autonomous regions of Azores and Madeira, environment, safety, and other subjects like the deregulation in certain markets, the entry of LCC and the impact on flag carriers, the diversification of destinations that is being made, the effort in strategic markets with the support of tourism entities and specific issues of air cargo.

It was also essential to have the perspective of the leading LCC - Ryanair and EasyJet. In the first case the internal view was transmitted by Mr. Filipe Miguel Novelha and in relation to Easyjet by a former employee, who started his career in this company gathering the knowledge in the aviation world, having recently diverged to the airport sector where he now performs functions of marketing and negotiation in a Scandinavian country. The themes in question related to both companies, were the LCC model, the service on board, the operational mode, human resources management, sales forces, distribution channels, marketing campaigns, expansion plans, the positioning, renovation and maintenance of the fleet, target markets, the coefficients of occupation, the target segments, the cost structure, the company's outlook and philosophy / culture.

### **Air Traffic Control**

The contribution at this level was critical for the characterization of Air Traffic Services in the diagnosis of the situation. The experience of those who deal daily with the congestion of the air corridors was very important and the positioning of NAV Portugal, which currently has the responsibility to control an air space which corresponds to 55 times the national territory, and what is the vision of the company under the Single European Sky agreement.

It was intended to understand the objectives of the Portuguese air traffic control, the importance of maintaining this control, the area of influence and interconnection of the systems with EUROCONTROL. The constraints experienced in Lisbon were also discussed, the characterization of the Portuguese system and the comparison with Germany, France, and United Kingdom and also with countries of southern Europe, particularly Italy and Greece, as well as the issues related to safety and environment.

### **Aviation Schools and Flight Instructors**

Due to the strong expansion of aviation the investment in training and education as also grew, especially with the beginning of degrees in Air transport management and Aeronautical science as well as partnerships between universities and flight schools led to a development of skills and knowledge at this level.

The perspective of those who teach as a primary vocation allowed the assimilation of how these institutions work and a wider range of understanding of the technical issues and also the importance of aviation and the transversal issues of environment, safety, fuel, equipment, new technological developments, etc.

### **Handling**

Two employees of Groundforce, one from the operational area, another from the international relations and contracts, were very important for a better understanding of the constraints, the critical success factors and capital gains in respect of airlines, airport infrastructure, baggage terminal, customs, passenger and cargo. The main issues discussed were:

- The operation of the infrastructure in terms of baggage terminal and ways to improve;
- Problems in resource management in the six terminals;
- Criteria for the use of Jetways, the problems of the new jetways and if they are causing delays in the operation. Is there a human cause or the problem is related to the infrastructure?
- What considerable improvements were made by the Lisbon airport from the standpoint of Handling and consequently for the airlines?
- What are still the main problems and what is the better way to solve them with a new airport?
- How long on average it takes the debarkation and boarding in remote stands in terms of buses, placing stairways, journey, etc. compared with the jetways. And the comparison and resources that Groundforce have to provide more for the remote stands against the jetways.
- What is the objective of AIMS (Integrated Action Programme for the Improvement of Services) and if it is having good results in terms of improvement of the infrastructure and services?

- How is the new cargo terminal working? Waiting times at passport control has improved? Has anything been done at this level?

### **INE/Tourism of Portugal**

Contacts with some areas of information were also made, including the INE and Tourism of Portugal to provide data that allowed the detailed analysis. Regarding the INE the following indicators were requested:

- Amount of Tourism Revenue and percentage of GDP;
- How much tourism represents in terms of percentage of the active population;
- Number of tourists received in the last five years and the division between external and internal tourism,
- Major markets of Tourism to Portugal and the percentage in the total revenue;
- Emission Markets by Region;
- Weight of "transport and communications" in the GDP;
- From the total visitors who enter in the country how many use air transport as the mean of transportation?
- Division between air, rail, sea, road in percentage and absolute terms;
- Individuals employed in the tourism sector;

Regarding the Tourism of Portugal, in addition to the statistical data provided and included in the chapter dedicated to this subject, the themes were focused on the importance of aviation to tourism and vice-versa, in what air links can do for the national tourism compared to other means of transport, strategic markets, which markets to develop and to diversify, target regions, the role of the airlines, the airport infrastructure, the objectives of the sector, and how can air transport contribute to influence and achieve these objectives.

### **Hotels**

The Hotel industry is undoubtedly depended on Air Transport. As such, the perspective of this sector could not be left out. The contacts were made with employees of Grupo Pestana and Marriot Hotels in order to better sustain the correlation with the number of destinations and

routes, the importance of aviation, partnerships with airlines, tour operators, the joint strategies in terms of marketing and promotion, times of peak demand, seasonality experienced in different regions of the country, the main tourism flows and market positioning as the existing supply.

### **Other entities outside the aviation sector**

Industries are becoming more interconnected and the experience of success in certain areas can serve as a basis for constant learning.

Taking advantage of the diversity of colleagues and friends working in different areas and from a wide range of sectors such as: banking, education, military, law, telecommunication, advertising, consulting, insurance, agriculture, publishers, among others, it was important to understand how Air transport influences those sectors and how would be the daily basis without air transport and what can be further developed or exploited in terms of synergies in a constantly changing environment.

Despite being mostly informal conversations, especially because of the confidentiality involved, this process was crucial in the development of this thesis, for a deeper knowledge of the dynamics of the sector and to obtain the maximum information in order to create and deliver a consistent document.

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## 7. ANNEXES

### 7.1. AIR TRANSPORT – CURRENT SITUATION DIAGNOSIS AND PROBLEM IDENTIFICATION

#### 7.1.1. CONTEXT

##### 7.1.1.1. AIR TRANSPORT IMPORTANCE

Over time, several developments have influenced the behavior of passengers and airlines affecting the direction and contour of the aviation industry and determining the level of demand for air transport worldwide.

The latest impact has been the global economic downturn greatly affecting aviation resulting in lower Yields, lower load factor, capacity adjustments, decrease on aircraft orders, and so on. But these negative cycles make the industry search for new means of survival in order to remain competitive, and when the recovery starts the sector is stronger and better prepared. And there is no doubt that the main reason for this phenomenon to happen has to do with the benefits that air transport brings to the world, economies, and above all, people, and that can be measured in various factors, such as: economic, employment, wealth and prosperity to communities and individuals.

Air transport is a vital element in raising the quality of life in developed countries, developing countries and emerging economies, uniting people from every corner of the world, allowing a new concept of life, exploring new cultures and giving access to international careers and educational opportunities. Air transport responds to all these human needs as no other.

While the environmental costs caused by air transport are often highlighted, very little is said about its benefits. Everyone knows they exist but few words are said about it. Broadly speaking it can be said that aviation contributes to worldwide trade by opening access to several markets, for investment through internationalization and access to new resources and skills in order to stimulate productivity and encourage competition as well as tourism. What is crucial to all these elements is that there is an encounter with different realities, developing and creating links, establishing relationships of trust and understanding between cultures, people, markets and places that can only be reached being physically there.

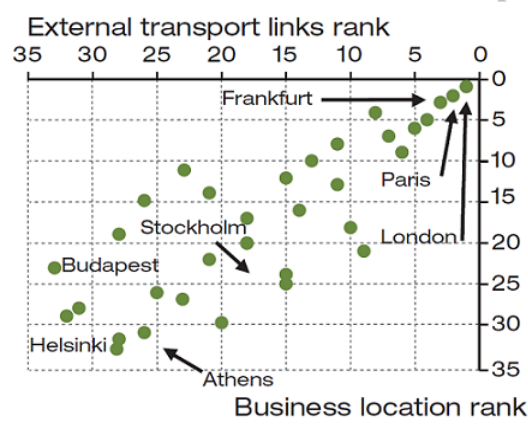
Different benefits can be isolated as follows:

- Trade - This is a very important element in terms of economic growth allowing reaching certain markets that are geographically distant. 35% of world trade is made through air

transport. As manufacture increase, the greater the need for speed to ensure the levels of production, and in this case, time is literally money, being aviation of vital importance in terms of time savings.

- Investment - Air transport is essential for the establishment of links between countries and major business centers in the world, helping to create and sustain international markets, ventures and business. As a clear indication of this, when seeking for cities with the best locations for doing business, these are also the most relevant ones in terms of air transport rankings.

**Figure 69: Business locations and air transport links**



Source: European cities monitor 2007, Cushman & Wakefield, Airbus

In a survey carry out by IATA (2008), accounting with 600 companies, 63% assured that the air transport networks are critical for investment decisions, and if any constraints appears, 30% ponder invest less or find another location.

Many companies do research around the world before deciding where to install new activities. And not only the entire installation process would be far more complicated, but the research process will also be negatively affected if during this period it couldn't be possible to reach by air transport some ideal locations (case of Bangalore in India where companies like Siemens, Samsung, Dell, GM, HP and IBM are installing facilities).

- Productivity and Efficiency – From the aforementioned IATA (2008) survey, 80% of companies said that air transport was important for efficiency and 50% considered it as vital. More than 2/3 stated that they also can achieve greater economies of scale and increase efficiency levels, while more than 50% said it reduced costs. Opening markets to international competition promotes innovation which typically leads to efficiency gains.

- Tourism - With 40% of international visitors travelling by plane, there's no question about its importance to the growth and sustainability of tourism. This industry contributes about 10% of world GDP and employs more than 80 million people. Because this is a major source of economic growth, many governments have put it in the center of attention in terms of national growth strategies, which involves the development and promotion of air links. In 2007 the expenditures of foreign visitors by air directly supported more than 8 million jobs in tourism. With direct and indirect jobs the total amounts to more than 18 million.

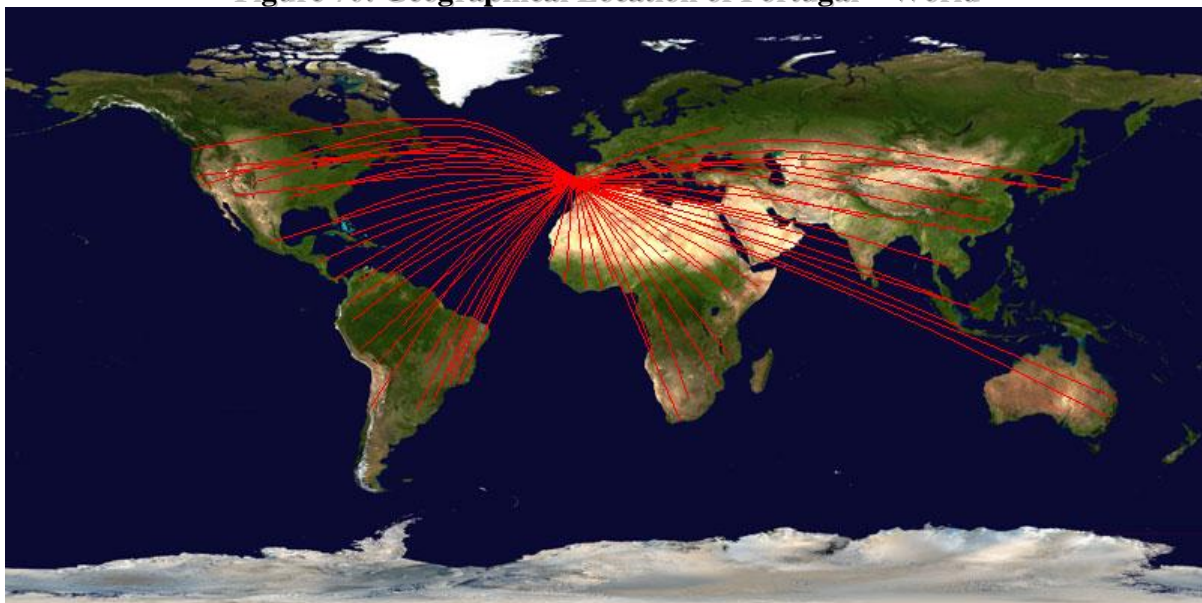
Today, many of the benefits are so obvious and are so integrated in society that are taken for granted. But what would be the impact in the growth of passenger and freight if the forecasts were 1% less? About 1.5 million jobs would be lost only in the air transport sector, 3.8 million if added the indirect and about 6 million including tourism. It is too much to take for granted.

#### 7.1.1.2. PORTUGAL'S POSITIONING

Located at the western end of Europe, Portugal turned early to the Atlantic and other distant lands arising from there the discoveries and conquest of lands where today its people still speak the language and cultural roots are still very close, allowing more economic and professional relations.

Looking at Portugal's geographical location it is located in the center of the world:

**Figure 70: Geographical Location of Portugal – World**



Source: [www.sage.wisc.edu](http://www.sage.wisc.edu), adapted

While standing on the western part of Europe it is the closest country to North America and South America. As an example, in only seven hours of flight we can be in the United States. These location advantages should not be neglected, and inversely must be compounded and exploited. Some of that path has already begun to be explored by the main national airline - TAP Portugal – in what concerns to Brazilian destinations.

Other key factor of Portuguese geography is related to its location within Europe. Being at one end of the European continent and with only a single border with Spain, it creates a dependence of this country in what concerns to connection by land with other European countries. At this point air transport plays a role of extreme importance, thus being the only one which enables fast, efficient and quality in intra-European network.

**Figure 71: Geographical Location of Portugal – Europe**



Source: [www.sage.wisc.edu](http://www.sage.wisc.edu), adapted

Despite the High Speed Train (HST) might be considered an alternative to air transport, according to the official document of the European Commission White Paper - European Transport Policy for 2010: Time to decide (2001), this mode of transport can only be considered as a real option for travels that don't exceed three hours to reach the destination, equivalent to one hour and thirty minutes by aircraft. Thus, the railway only allows serving Madrid in a competitive way, while all the other European cities can be served with efficiency standards through air transport.

The peripheral position of Portugal is only truly competitive in the European continent throughout aviation, and it is through this that advantages can be taken of being in the center of the world to enhance and boost the relations and connections to other continents, where

given the distances involved, is not an additional hour on the flight time that will make a real difference when considering intercontinental air links.

## **7.1.2. SERVICE**

### **7.1.2.1. MOBILITY**

In today's society model, where there is greater integration of different economies derived from the effect of globalization, the need for movement of people and goods proves to be strong and constant. The need for mobility is increasing, whether by travel habits in a society increasingly motivated in seeking new experiences and cultures, whether by professional issues where international trade plays a major role in a global economy.

The Air Transport has introduced not only globalization itself but also the concept of unlimited mobility, since it is possible to shorten distances and have access to anywhere in the world, using the aircraft as a mean of transport.

No one questions the importance of globalization for the world economy. Neither the importance of trade with Brazil and Africa has for the Portuguese economy. Not even the volume of passengers and amount of frequencies to major European cities. It's not a concern to be at 3 hours distance from a city like Brussels, Milan or London or less than an hour from Madrid. It is known that this is the reality and people can count on it. And how can you achieve this mobility? Only through air transport it is possible to have a meeting in Lisbon in the morning, a conference in Paris right after lunch and taking advantage of the time difference to be in New York for a business dinner.

And just the existence of an air link to a particular destination causes the natural growth of traffic, even if this would not be a preferred city for travelling. For example, if the option is to leave Portugal for a holiday in Miami or Fortaleza, the choice will lie mainly in the city that offers a direct flight.

This sector not only feeds the demand for mobility as it foments it, becoming a fundamental foundation of the economy. Its role is not evident, but it is always present in a silent way, because it is impossible to have a model of society like today without air transport. Intrinsically, it is almost taken for granted, not equating, in most cases, the possibility of using other means of transport.

The geographical position of the country is also an aspect of particular relevance since it has effects on its level of importance and in the way the mobility is performed. For example,

England has an enormous need for air transport, because the other modes of transport are not as efficient, as fast or as competitive.

In Australia, due to its remote location, this sector is particularly important because it led to shorten distances considerably. In Russia, there are domestic flights that take 10 hours while terrestrial alternatives take days.

In Portugal, there's the case of Madeira and Azores Islands. The economies of these autonomous regions are completely dependent on air routes that assure the major part of the travel. In Madeira, the tourism industry depends primarily on air transport, where about 90% of people arrive on the island using this transport, so all the development model is supported by the excellent air connections of the island. In the Azores the existence of the SATA Air Azores has proven to be an essential base for the sustainability and development of the archipelago, operating very efficiently in adverse weather conditions and ensuring the mobility necessary for the population of the various islands and for the incoming tourists visiting the region.

But what if this type of transport did not exist? Could the concept of mobility as we know today exist without the air transport?

#### **7.1.2.1.1. MAIN SEGMENTS:**

##### **Leisure**

According to a study of EUROCONTROL Challenges of Air Transport 2030 (2008), 69% of the Europeans that use air transport are travelling for leisure and it is expected to become even higher.

With globalization, the EU enlargement, the introduction of the euro as the single currency, the increase of middle class wealth, a greater willingness to discover and experience new destinations, there was an increased in the use of air transport which attracted new entrants such as Low Cost Carriers (LCC). These companies have created a new concept of service in aviation and allowed access to new destinations generating new markets and new flows of traffic with more competitive fares. The access to a wider range of cities with more diversified and with considerable price differentiation generates the boost on people's mobility.

Besides the traffic traveling for leisure, in addition to traditional holiday trips, visits to family and friends, other relevant motives can arise:

- The concept of city break already existed but in the recent years it has raised considerably due to the introduction of LCC. However, the consumer behavior has changed, introducing mid-week city breaks, instead only in weekends, since the price assumed a higher importance in the final decision. Scheduled airlines also changed their strategy and positioning to adapt to this new reality.
- Senior Tourism - with a higher life expectation and with retirement at 65 years in Europe, there is a 15/20 years of margin where people look for quality of life, still feeling strong and healthy, and with financial capacity to travel. With the establishment of air connections to almost all of Europe, this segment of traffic is increasing its importance for the airlines.
- The growing trend of 2nd residences - for example in the Algarve and Alentejo the acquisitions of houses by British, Scandinavian and Dutch people, because they appreciate not only the cultural aspect and diversity of the country but also the concept of Sun, Sea and Golf that has been gaining particular importance. In the Douro region, due to wine enthusiasts and nature tourism, many people are also acquiring farms and vineyards.
- Ethnic Traffic - those who left the country in search for better conditions. There is a significant traffic flow to Switzerland, Germany, UK and Luxembourg. On the other hand there is the growing presence of Brazilian and east citizens in our country. This phenomenon has resulted in the increment of connections between the countries, as well as opening new routes to meet the growth demand, for example in the route between Lisbon and Kiev.

### **Business**

In the Business segment there are several aspects that deserve special attention, such as:

- The enlargement of European Union which allowed markets that were closed and turn into open economies and trade between countries become substantially easier. This made it possible for companies to develop into a multinational level in several European countries and economies become more exposed to foreign direct investment with increasing impact on the mobility of its executives. This situation has developed an industry around the European Union that did not exist. As an example the increased volume of traffic to Brussels which is sustained by the fact that the headquarters of the European Union are based in that Capital.

- Exports directly related to GDP growth. The exports volumes are only achievable with the existence of produced goods by different companies that need to export not only their products but also their professional workers to establish and increase the number of transactions.
- The emerging BRIC countries are experiencing a significant economic growth and will have greater needs for mobility, not only because of the increase of development and purchase power of the middle class but also because these economies are based on exports requiring constant flights in order to sustain this business model. The growth of India and China has been very significant and as a result, the flights to and from these countries has increased. In order to respond to the number of aircraft orders by China, Airbus has created a local factory in Tianjin.
- Internationalization process is becoming a way to find alternative income sources since many companies cannot increase the number of sales in domestic markets and in order to grow and become more global, the emerging economies can represent a good option. In the Portuguese case we have assisted to the internationalization of BCP and Jerónimo Martins in Poland, leading to the establishment of new flights to Warsaw by the main national airline - TAP.
- The intercultural experience of mobility occurs, not only at company levels, but also in formation and training, conducted through seminars, conferences, fairs or congresses. The number of mergers and acquisitions between companies in different countries as also become more frequent causing additional traffic flows.
- The use of new technologies as a result of the cutting costs on business trips. Due to the international economic and financial crisis of the last 2 years, one of the alternatives found was through video-conference. This option can easily work with some European and American companies but it has some obstacles especially when it involves other cultures. In Asia, the human contacts are highly privileged (in Japan and China before business meetings they seek to create a more personal atmosphere). And even in the Latin culture face to face meetings assume a relevant importance. No matter how great advances in technology, it will be very difficult to overcome cultural differences and adapt to it. For some businesses the technology could be a good option but, for most of the cases physical presence is still the best way, at least in the medium term.



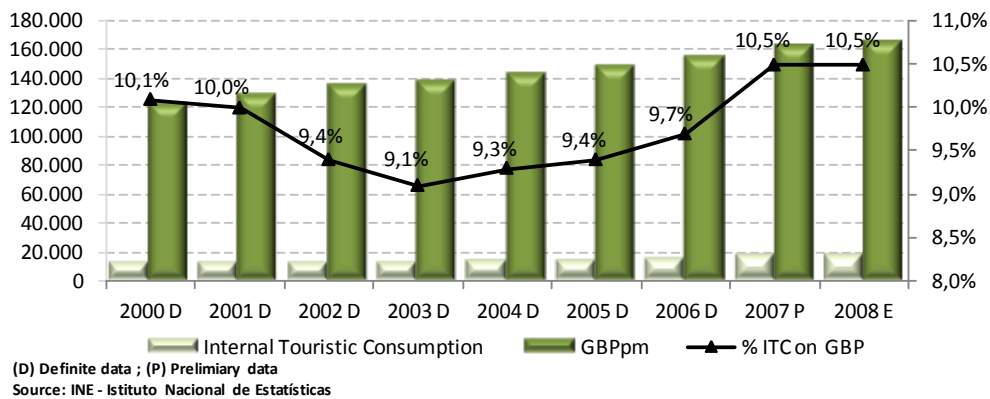
7.1.2.2. TOURISM

**Importance for Portugal**

Tourism is one of the most important sectors of the Portuguese economy, representing approximately 10.5% of GDP, implying 10.2% of the active population. The increase in the number of tourists is a constant goal and the strategic importance of tourism is reflected in the amount of revenue it provides, the work force it employs and the various effects that induce to economic agents involved.

In recent years we can find a growing trend as evidenced by the graph below (INE data):

**Figure 72: Internal Touristic Consumption in GDP**



Portugal has a combination of different factors that enhances the attractiveness as a tourist destination for quality and diversity. These are mainly related with the pleasant Portuguese climate, the natural beauty of the coastline, beaches, diversity of landscape from, culture, hospitality, historical places and monuments, golf infrastructures, gastronomy and wines, spas, nautical tourism and the offered level of accommodation.

New investments have been made, not only in capacity expansion of touristic offers regarding hotel accommodations, but also towards greater diversification. In this context we can find the concept of rural tourism, country houses, tourism in villages and manor houses, historical buildings or places of great natural beauty, charm and design.

Another trend is the number of internal tourism that is growing at higher rates than foreign visitors. Most tourists who visit Portugal are from Western Europe, particularly in EU countries. The U.S. is the most important source of tourists outside Europe. There is a strong dependence of 4 external markets confirmed by statistics of the number of nights spent by foreigners in 2008: UK (28%), Germany (14%), Spain (12%) and France (6%) and Revenue:

UK (22%), France (16%), Spain (15%) and Germany (11%), which means that there is a high growth potential in other tourist markets.

Tourism revenues have registered increments in recent years, reaching EUR 7.4 billion in 2008, an increase of 0.5% over the previous year. During the period 2000-2008 only 2002 and 2003 registered slight declines related to the overall situation of tourism in those years. The average cumulative annual growth was 3.3%.

According to the World Tourism Organization (UNWTO, 2009), Portugal was the 20th receiver of international tourists worldwide in what concerns to number of visitors in 2008, and 27th in terms of revenues dropping three positions compared to 2007.

The growth of tourism revenue was 0.5 percent, to USD 10.9 billion, below the estimate of OMT for last year evolution average, which showed a growth of 1.8 percent. Still, it was better than the European average (-1.1 percent), and Southern Europe and Mediterranean region, which fell by 0.5 percent. Portugal is among the group of countries involving Russian Federation (USD 11.9 billion), India (USD 11.8 billion), Poland (USD 11.7 billion), Egypt (USD 11 billion), Croatia (USD 11 billion) Japan (USD 10.8 billion) and Singapore (USD 10.6 billion).

UNWTO considers that tourism still has political weight and needs to unite efforts to become a priority. Moving towards that direction, the organization announced the mobilization of 20 countries with highest weight to constitute the G20 in the sector. Besides these, the World Tourism Organization will address invitations to some other countries to join the group, including Portugal.

In the report *The Travel & Tourism Competitiveness (2009)*, Portugal occupies the 17th place among the most competitive tourist destinations in the world. The country marks its presence, for the second consecutive year, among the twenty most competitive tourist destinations, and is also the 18th most popular destination in the world. Moreover, is one of the European countries in the top of this ranking, with Switzerland, Austria, Germany and France in the first positions.

This document took into account 14 factors of competitiveness in 133 countries, being Portugal praised by places and monuments listed as World Heritage. The hospitality of the people, the accommodation infrastructure and international fairs and events are the other special criteria.

In the 16th edition of the World Travel Awards, considered the Oscars of tourism, Portugal was awarded with four prizes in Europe, being one of them the title of best European destination. Lisbon has also received awards for best destination for city breaks and for cruise ships.

Portugal has extraordinary resources and tourism potential, on which it has developed a significant activity with relevant influence on the economy. The strategy for the promotion and development must address the multiple dimensions of the sector, including the potential for increased external revenue, cover the deficit, combat unemployment, enhance natural and cultural heritage of the country, as well as improve the quality of life of the Portuguese citizens reducing regional disparities.

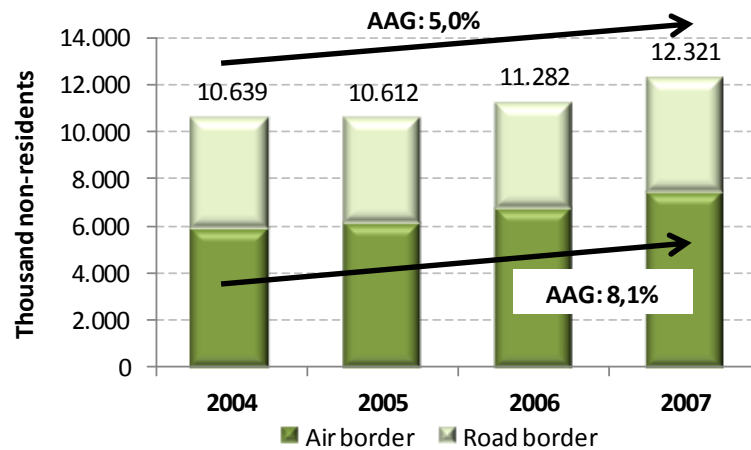
The aim for tourism is to perform even higher in economic impact, becoming a major sector of the country development. According to the National Strategic Plan for Tourism – PENT (2007) the target for 2015 is to represent 15% of GDP and 14.8% of the labor force.

The future of the industry goes through a perspective of environmental sustainability, economic and social development, under a new model of tourism expansion that is focused on increasing air connections, improving quality of the destination itself and the infrastructures involved and reducing high seasonality of the demand curve.

### **Air Transport relevance to Tourism**

Unlike rail, sea or road, commercial aviation can be considered as "new" because its use only began more intensely after World War II, particularly since the introduction of jet aircraft, which enlarged the mass tourism increasing flows of travel, resulting in the first major link between tourism and air transport.

Air transport is one of the most important if not the most relevant link to tourism growth and development since according to the peripheral location of Portugal this is the major mean of access to external markets, and for some internal flows. It is through this mode of transport that the country connects to the worldwide generators of tourism.

**Figure 73: Entrances of non-resident tourists (Road and Air Borders)**

Source: INE - Border Inquiry on Passenger Flows

Air transport system contributes to the development of tourism, being a major influence in determining traffic flow due to the fact that the mean of transport is an extremely important variable when selecting a preferred destination, because it is directly related to accessibility, time distance and travel costs.

If in one hand the air transport promotes tourism in the other hand it also benefits from it since tourism increment greater movement of people who select the airway for this purpose. What is clear is that there is a win-win relationship between the two parties, i.e. the increase in demand for air travel growth promotes tourism and vice versa.

But the existence of an air route is not enough by its own. The role of tourism is also to make sure that the motive of visiting Portugal is not only to visit one of the cities. Benefits should be taken from such connection as an entry point in the country and connecting to other domestic destinations, thus multiplying the positive effects of tourism in the country and all activities that depend on it, such as hotels, rent a car, buses / trains company's, travel agents, restaurants, airport infrastructure, tourist guides, cultural institutions, trade, services, among others.

Portugal should not be seen as a country distant from the main centers of tourism and for that air transport is essential, because without it the volume of tourists, who come every year in Portugal allowing such an expression on the national GDP, would be much lower. Moreover, tourism demand becomes the main user of this form of transport. Thus, it is crucial to be

aware of data and prospects of tourism in order to have a better internal planning to adjust supply to demand.

A small network of flights, results in a low level of direct air connectivity. This creates the need to use intermediate points, which means having to change planes or airlines, representing more risk regarding loss of baggage and more delays affecting directly tourist satisfaction. Under these conditions and with numerous options for destinations with a high level of competitiveness in the world, would Portugal be able to maintain the same number of visitors?

Future perspectives sustain this strong relationship between air transport and tourism. The airlines and the airport infrastructures will continue to have a direct influence on the lives of millions of tourists. Structural changes in the tourism industry worldwide, which in recent years have been marked by the impact of the internet and e-commerce sector have launched new challenges to players that have to be prepared to turn opportunities into positive realities.

Simultaneously, changes in the aviation industry will be crucial for the sustainable development of tourism industry. The growth of low cost carriers will continue to open new markets and generate new streams of demand all over the world, while new types of large aircraft will approach more distant markets.

Another aspect to take into account is that strong economic growth in India and China will be a key driver for the industry development worldwide with direct impact on patterns of traffic flows. In this context, it is expected a major growth of existing routes and the development of new ones, thus entering in the world tourism market with a very significant amount of tourists who never traveled by plane.

Also affecting world tourism market growth will be the processes of liberalization of air space for domestic and international traffic, fuel prices, environmental constraints and political stability of countries with emerging economies.

### **Portuguese Tourism Target Markets**

Within PENT, 21 target source markets were selected and differentiated taking into account the revenue potential, competitive positioning, future growth, proximity and seasonality.

These markets were aggregate into 3 groups:

**Strategic markets** – Portugal, UK, Spain, Germany and France - who should be object of a large effort to promote and ensure a significant contribution to tourism encouraging a higher growth rate in low season (October to May);

**Markets to develop/consolidate** – Scandinavia, Italy, USA, Japan, Brazil, Holland, Ireland and Belgium - where the goal is to achieve a relevant growth all year;

**Diversification markets** - Austria, Switzerland, Russia, Canada, Poland, Czech Republic, Hungary and China - where the aim is to increase market share supported in strengthening the reputation of Portugal.

Going through this aggregation, the conclusion is that strategic markets (UK, Spain, Germany and France) are those with largest number of flights to and from different parts of the country. On the other hand, diversification markets are the ones worst served by air, except for Switzerland which has several flights to and from Portugal (traditional airlines and low cost) and should therefore be regarded as a market to develop.

Portugal's promotion is an integrated strategy that goes through the continuing focus on the traditional markets but also investing in new destinations, in emerging markets with a huge growth potential.

So what is the plan to reach real growth in these markets and to evolve to a higher importance level? How can be acquired the diversification of external markets? All of them are located at considerable distances from Portugal, so it will not certainly be by land or by sea, despite the increasing development of the cruises segment. Will be mostly through air transport since exists a powerful correlation between the weight of the different markets and the number/frequency of direct connections.

The UK remains the major market for Portugal and, during 2008, was responsible for 7.3 million overnight stays and EUR 1, 6 million in revenue. Despite the pound devaluation and the impact of financial crisis in the purchase power of the British visitors, they still have their preference for holidays abroad and Portugal keeps as an affordable destination, largely due to frequent connections to Lisbon, Porto, Faro, Funchal and Ponta Delgada, offered by traditional airlines and LCC. Portugal was the 5th destination in terms of tourism expenses and in number of nights spent by British tourists.

It is a fact that, with a superior number of flights the importance of the outbound market is also bigger. In this sense and through the Program "Initiative.pt", the Tourism entities are

promoting new routes to markets with strong interest for tourism, a good example is the new TAP connections to Helsinki (developed market), Moscow and Warsaw (diversification markets), which have shown interesting performances in recent years with an expected high growth resulting from the stimulation caused by the introduction of these new flights.

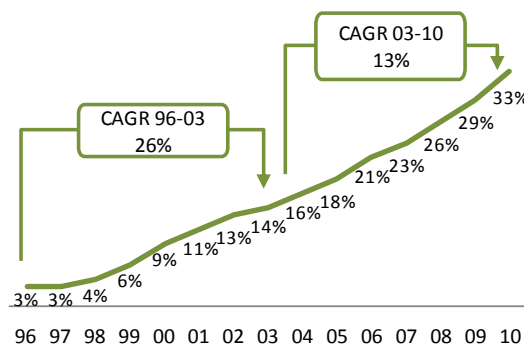
The development of target markets is strongly influenced by air accessibility. Air transport despite being seen as a simple mean of transportation, is actually much more than that, it is also a key factor in boosting and promoting tourism, creating an image of Portugal in world.

### Role of Airlines (Legacy and LCC)

Once proven the high parallelism between the existence of direct links and the weight of the markets, the airlines assume a strong importance. According to statements by Dr. Bernardo Trindade, Secretary of State for Tourism, between 2005/2009, 188 new routes were created in Portugal, 113 of which are operated by LCC and 75 by traditional airlines.

Low cost market is growing at very high rates, particularly in Europe, which has been reflected in current market share of these carriers. In Europe, the share as grown from 3% in 1996 to 14% in 2003, this represents an annual growth of 26%. Forecasts predict that - even at more moderate annual growth rates (13%) - Low cost carriers will account for 1/3 of the market in 2010.

**Figure 74: LCC Market Share in Europe (1996-2010e;%)**



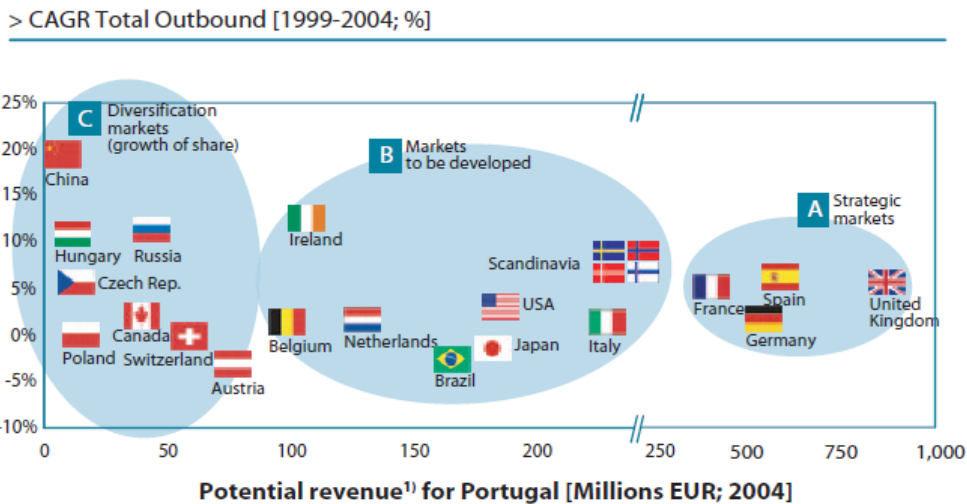
Based on a highly optimized cost structure, the nearly 50 LCC airlines in Europe stimulate the emergence and growth of the market by offering lower prices. Studies show that ¾ of passengers carried by these companies are actually passengers who did not use air transport.

However, we are witnessing an intensification of the aggressiveness of these companies to capture traffic that was already using the traditional companies to maintain their profitability through occupation levels close to maximum capacity.

According to PENT it is assumed to invest on the development of low cost airlines as the basis for a strong tourism performance in Europe. The same report stands that is critical to have low cost companies based or with significant operations in the Portuguese airports since it has been observed that the costs during the stay of this passengers are gaining weight in total tourism expenditure, as opposed to the decrease of spending on transport. Illustrative of this, in terms of traffic, is the positive performance of airports with low cost carriers presence compared with the ones without.

Focusing on target markets previously identified and its strategic goals (graphic illustrations):

**Figure 75: Market Segmentation**

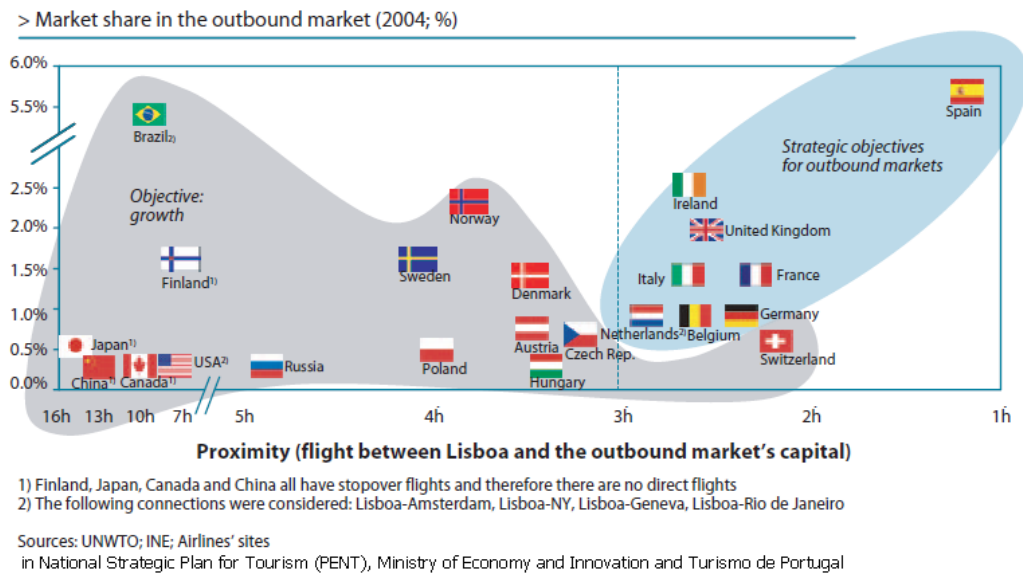


1) Potential revenue = average expenditure per tourist trip multiplied by the number of guests in Portugal; average expenditure per trip excludes expenditure on transport in order to enter the Country

Sources: UNWTO; INE in National Strategic Plan for Tourism (PENT), Ministry of Economy and Innovation and Turismo de Portugal



**Figure 76: Markets Strategic Objectives**



Two major objectives:

- 1) To grow and reduce seasonality - in countries where, currently, Portugal already has some relevance, but with a very seasonal demand - United Kingdom, Spain, Germany, France, Italy, Netherlands, Ireland and Belgium.
- 2) To grow, increase market share and enhance reputation - in countries where Portugal has some notoriety but the demand is more concentrated in low season as well as in countries where awareness is still low - Scandinavian countries, Japan, USA, Brazil, Austria, Switzerland, Russia, Canada, Poland, Czech Republic, Hungary and China.

If in the first cluster, distances are still relatively short allowing operation either from traditional companies, or LCC, the opposite occurs in the 2nd group, in which countries like USA, Brazil, Canada, China and even Eastern destinations (at least 4 hours flight away) can only be presently served by traditional airlines. The PENT focuses on developing and raising low-cost carriers but the added value of legacy airlines to serve high potential markets, either directly or indirectly, taking advantage of the hub strategy and alliances partnerships should not be overlooked or neglected.

Markets such as China, Brazil and Russia have shown a huge growth potential. Currently about 40 million Chinese are making their vacations outside the country, estimating that in 2020 it could reach 100 million. In 2008 about 50 thousand Chinese tourists visited Portugal

and stayed on average of 4 to 5 days. And this number is expected to double. Also the Brazilian market has experienced significant growth in demand for Portugal, as showed in the chart of market shares where Brazil reaches the highest value. Overnight stays of Brazilians in Portugal grew more than 30% in 2008.

This is due to the strategy implemented by the flag carrier by offering several Brazilian destinations enhancing the entire flow of traffic between Portugal and Brazil as well as the use of Lisbon as a hub from Europe to South America. How could this market share be achieved without a traditional airline operating direct flights? Another tourism market of high growth is Russia with strong purchasing power and with desire for travel. The launch of TAP operation to Moscow, with a flight time of more than 5 hours, will allow boosting this destination. Will LCC considerer to launch a profitable operation with such a long distance?

Tourism will always be dependent on air connections. The option of attracting more and more LCC is a strategy justified given the volume of passengers usually captured since their philosophy is to operate routes with extremely high load factors. When this does not occur the route is quickly abandoned and the aircraft is redirected to other markets. There is no concept of continuity, regularity, there is something more related to seek opportunities. It is its own interest and not the national interest that really matters. For example, Ryanair launched Oporto Stockholm in October 2007 and cancelled it in May 2008 (occupancy levels below the minimum), and also ended all the operation in Basel due to financial disagreements with the airport authorities regarding airport charges affecting the Oporto Basel route (started in September 2009 and was discontinued on 2 December of the same year).

This is a new concept in aviation, but the National Tourism strategy should not just focus on developing connections for low-cost. Before the appearance of this model the traditional carriers have come a long way. And they continue to tread, adapting to new realities, new competition practices, but maintaining its operation based at major airports and taking advantage of its network and partnerships to offer a strong combination of medium and long haul destinations in order to gather tourists anywhere in the world, something that the LCC cannot do. The key question that may arise as a reflection is: are the low cost airlines the ones aligned with the strategy of the Tourism of Portugal, or, on the contrary, are the entities related to tourism that attempt to capture them to the Portuguese market through an attractive incentives program?

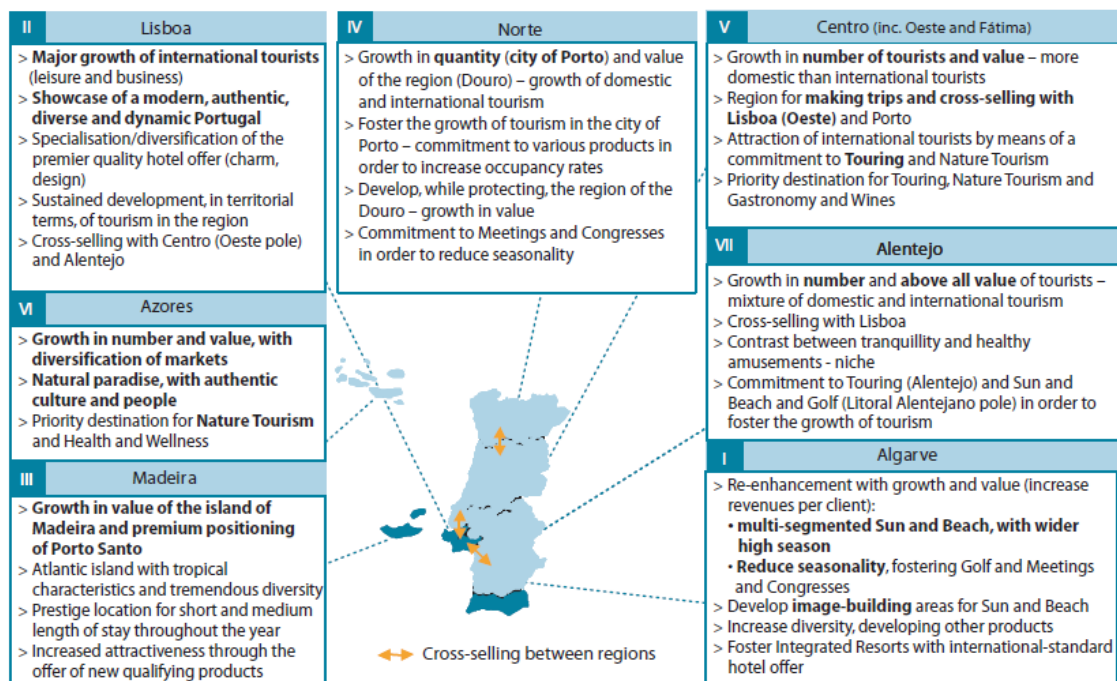
## Geographical Importance of regions

In order to take into account the advantages and potential of international demand, PENT has defined a portfolio of 10 strategic products (sun and sea, business tourism, cultural and scenic touring, golf, city breaks, health and wellness, nautical tourism, gastronomy and wine, residential tourism and tourism of nature) and identified new tourist regions like Douro, Serra da Estrela, West, Alentejo, Alqueva, Azores and Porto Santo.

The purpose is to invest on diversification and tourism quality that enables the consolidation of traditional products and simultaneously provide alternative products able to keep up with market demands.

With the identification of new tourist regions the goal is to give importance to places with enormous potential which were being neglected. The reality today is not only Lisbon, Porto, Algarve or Madeira, there are new areas to discover and explore. The objectives outlined in PENT document for each region are highlighted in the table below:

**Figure 77: Concept/objective by region (NUTS II)**



Source: National Strategic Plan for Tourism (PENT), Ministry of Economy and Innovation with Turismo de Portugal

In the figure there is a conjunction between the regions, products and strategic objectives outlined. However, it is not intended in this context, an exhaustive analysis of what is proposed in PENT at this level.

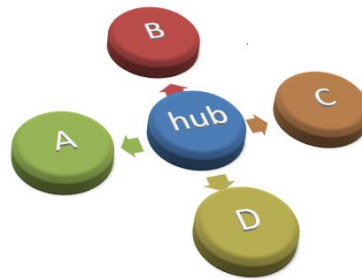
What is important to note is that there is a strong purpose regarding the growth demand by external markets, taking advantage of the diversity of various regions spread all over the country and focussing on specific tourist products. And for that, air transportation is absolutely essential. Otherwise, how can cross-selling with Lisbon and Porto marked on the map be implemented? How is it possible to boost and stimulate the Midwest, the Alentejo and the Douro regions? How to increase the business traffic segment, and strategic products of food and wine, golf, cultural touring, sea and sun? What about the goals for tourism of nature in Azores or in tropical climate of Madeira? Certainly these ambitious targets will not be achieved by road or rail.

Everything revolves around air accessibility that is established in cities/areas with greatest tourism potential in each market, as well as those that may be implemented in the near future, benefiting from air connections to enhance the surrounding regions. And that is why Portuguese Tourism has acted proactively in partnership with ANA Airports in order to create better conditions for the development of new routes that allow Portugal to increase the rate of external demand and capture new markets, positioning as a country capable of providing a high range of experiences given the different motivations of each tourist.

### **7.1.2.3. HUB**

The term "hub" comes from the English word that means the central part, the nave of a wheel, such as a bicycle. In aviation, it means that aircraft take off and land in the same point, connecting several cities in the country and in the world. Because of this similar relationship with a bicycle wheel, the airport that has a central function and is used by airlines from countries all over the world came to be called "airport hub". Naturally, this makes it more practical, generating an even greater flow of people and products and their benefits are enjoyed not only by the region itself but also across all the country.

In point to point routes connections occur only between 2 points, with no integration between others. In the hub pattern concept, all points are integrated by a central one, creating therefore an increase in airlines network.

**Figure 78: Hub System**

The carriers choose a particular city to be the hub for their flights resulting from combination of geographical and economic demand. The connecting passengers have to change the aircraft at the hub airport selected as the path to their final destinations. In most cases, this city is where the headquarters of the main airline are located thus also absorbing most of passengers from other airlines that elected this hub as connecting point.

In countries that have more than one carrier operating the hub strategy in the same airport, the company that has a better position and a bigger segment is the one integrated within a global alliance or with a greater number of code share agreements. Examples are the airports of Heathrow and Chicago. In both airports, traffic is split between companies affiliated with STAR and Oneworld (American Airlines and United at Chicago Airport, and British Airways and British Midland at London Heathrow).

The hub system proves to be an extreme competitive advantage by:

- Increasing visibility and importance of the airline and the airport:
- Giving more destinations and flight options which mean the increase in connectivity, competitiveness and visibility;
- The economic impact in the city transforming it into an important business centre due to additional number of passengers and cargo with a positive impact on the country itself;
- The facility of transfer between flights;
- The short lead time benefiting from the wave system;
- Maximising routes of higher demand allowing multiple markets to feed the same flight.

However, the system is not perfect and there are also some disadvantages such as:

- Delays due to several aircraft arriving and departing at very close time schedules generating a burden on airport infrastructure, mainly in unloading baggage, parking, air traffic congestion and in areas of immigration and customs;

- Increase of total elapsed time of the trip, because there is a stopover and also a greater discomfort in exchange of aircraft and airport.

If a perfect hub had to be elected, probably it would be the Frankfurt airport. This is the one that best reflects the hub system derived from excellent combination of several factors:

- The geographical location within Europe allows being one of the bigger gateways in Europe receiving flights from all continents as well as benefiting from neighbour countries traffic, resulting in additional volume of passengers;

- The perfect route system consists of the integration between the flights of long - haul and short-haul creating the so called banks or waves that are characterized by the number of arrivals and departures designed with a minimum connecting time to allow the maximum transfer passengers;

- The quality of the terminal with all facilities and services concentrated;

- The predominance of the national airline (Lufthansa) and the presence of major airlines in the world (European routes and long distance) leading to a multi hub. That is, a hub not only for the operation of the flag carrier but also the strong incidence of other airlines that are also used as feeding and de-feeding;

- The possibility of using a huge variety of aircraft types (from the smaller regional jets flights to larger aircraft);

- The fact that it is also one of the major cargo hubs in the world.

Today we are witnessing an increment of point to point routes caused by expansion of low cost airlines that operate mainly short haul flights, without a network working as a hub and without any integrated reservation system, interline or code-share agreement with other airlines.

But despite the increase of point to point traffic, the hub system is seen as a way to face economical crisis for traditional carriers because, by concentrating flights in-between the airline may offer a wider range of destinations than the LCC, as well as benefit from being part of major alliances or from cooperation agreements that result in additional passenger traffic since there is a concentration of operations from allied companies through that gateway.

So far long-haul flights are operated only by traditional airlines. But since these long range flights require connecting traffic in addition to point to point to fill the aircraft, it is essential to maintain the hub system, with degrees of competitiveness increasingly aggressive. The LCC operate medium-haul routes with high density of passengers, because there was already a strong and huge market, or because it was created with the introduction of this kind of operation. At this time, there is still no LCC on very long routes, but this entry is expected to start between Europe and United States due to the traffic volumes involved.

A successful case of a hub pattern is the one implemented by Emirates, an airline with no domestic market that is building a strong and solid strategy in Dubai International Airport. Its strategy was based on the exploitation of air traffic liberalization and open skies agreement with all major countries. This makes it possible to unite Emirates airports to Europe, Asia, America, Africa and Pacific region taking advantage of its natural geographic position. In addition to this, the airline has chosen aircrafts with a very long range that allows reaching directly any major city in the world. The route that currently has the largest growth rate is the London-Dubai, precisely because it connects the largest airport hub in Europe with the new global hub.

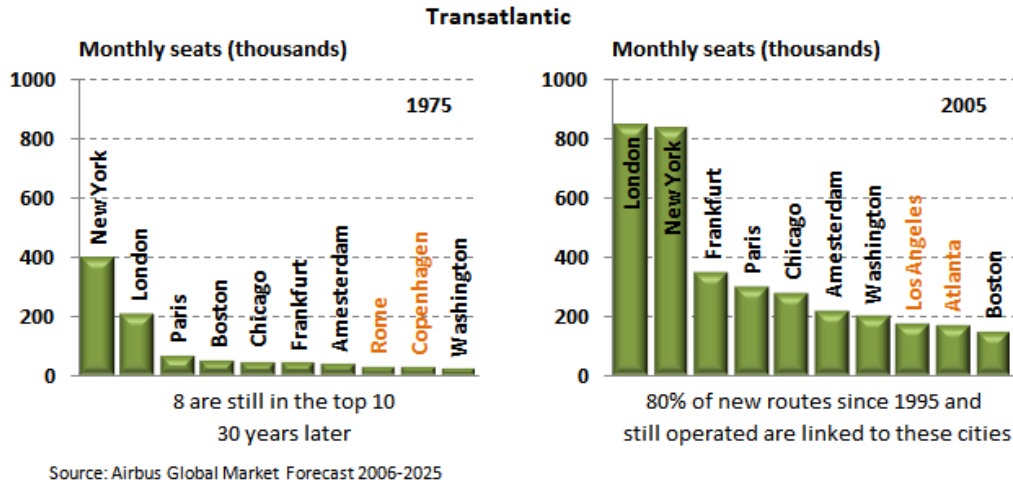
Another issue that deserves special attention is the effect that the entry of large aircrafts like the Airbus A380 will have on hub concept. This aircraft type could be a marker in the wave system because the large number of seats will need a high feeding and defending of connecting passengers to/from other destinations. With the constraints and saturation in major hub airports this kind of aircraft, with only one flight, is able to maintain the same number of seats that was offered with 2 slots. For instance, Air France has replaced two flights operated by B777 in the route Paris-New York by a single operation in A380. Thus the slots at congested airports, like the case of Heathrow or Frankfurt, will be released and can be used for growth, expansion and hub development on other routes.

Obviously, this can only be possible if airport infrastructures are prepared to accommodate very large aircraft and the growing number of intercontinental transit passengers. The future of air transport will depend not only on product innovation and customer needs, but also on policies to support large investments in major infrastructure (capacity of the runway, terminals, logistics platforms, etc.)..

Growth of traffic volumes, globalization of economies, deregulation of air traffic and advances in technology has allowed expanding the connectivity between different cities. And

for this reality hubs have been crucial, not only because few long-haul flights could survive without connecting traffic but also because high volumes of point to point traffic are precisely to/from 32 major hubs of world. Consequently, these hubs are important mega cities and business centres and account for 77% of long haul destinations demand.

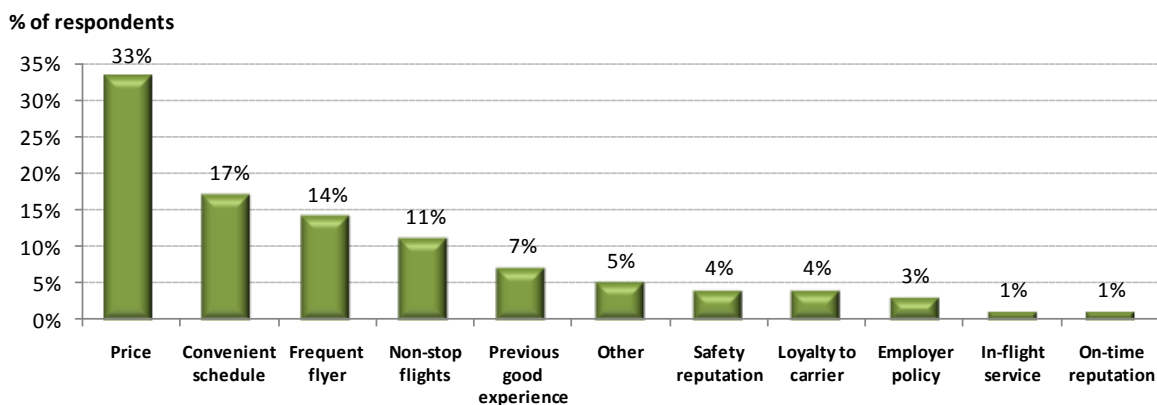
**Figure 79: Hub cities remain dominant**



The development of airlines network is driven by demand but also by the profitability of the route, the aircraft availability and the constraints of the infrastructures. Even if most of the people prefer not to change aircraft during the journey it will never be possible for everyone to travel directly to the final destination.

As leisure segment represents 76% of total tourist traffic and it is expected to grow even more due to increase of tourists from emerging economies, the elasticity to price will continue to be crucial: (see chart below):

**Figure 80: Passengers Preference Criteria**



Source: Survey of International air travel. US Department of Commerce

And until the price of the airfare keeps playing a major role in the decision process, being more important to passengers than a direct flight, the best solution is to combine larger



aircraft with lower unit operating costs (per seat) among international hub airports with a wide choice of destinations and schedules.

### **Portuguese Hubs**

This concept was introduced by TAP Portugal, in late 90s, by establishing a privileged access platform from Europe to other Continents. TAP currently flies to 66 destinations, throughout 30 countries spread in Africa, North America, Central and South America, standing out as the leading European carrier operating to Brazil.

The airline has adopted a strategy of developing its distribution base in Lisbon, adding value not only to itself but also to the country as a hub benefiting from the volumes of traffic and economic activity between Europe, Brazil and Africa. On the other hand, a mini-hub at Oporto has been developed, launching direct operations to several European destinations to feed long-haul direct flights to Rio de Janeiro, Sao Paulo, Caracas and New York.

This strategy has gained notoriety and in the 16th edition of the World Travel Awards TAP was elected as the world's leading airline to South America. The award resulted of online voting from tourism professionals, especially travel agents, and this year it was also open to the general public.



TAP currently flies directly to eight Brazilian state capitals (São Paulo, Rio de Janeiro, Salvador, Recife, Fortaleza, Natal, Belo Horizonte and Brasilia) and to Caracas, Venezuela. The increase of traffic to these destinations results from the privileged geographic position of Lisbon to receive traffic from all European capitals and distribute via hub for direct flights toward its flights to South America.

Another relevant aspect in the hub strategy, was the entrance of TAP in Star Alliance which lead to a considerably increase of range of destinations and connectivity options. The impact of this membership is not limited to outgoing traffic, despite the visibility that the introduction of new destinations naturally provides. The potential for attracting tourists to Portugal is very high, since it will be sold throughout the distribution network of Star Alliance carriers. The opportunities from a membership are a continuous work and it applies in two directions. For

example, there is a concept marketed by Star Alliance which is called “Round the World”. It is a product that TAP benefits in the Portuguese market since its entry into the Alliance. But it is also an opportunity because in addition it discloses Portugal in external markets allowing the Alliance to increase its visibility as a tourist destination.

The projection of Lisbon airport as a major hub for South America is due exclusively to the strategy of the national airline that allowed not only to put itself as a leading company for South Atlantic but also to place on the world scene, a point to point and peripheral airport, as an important gateway from Europe to Brazil. This airport is not yet at a higher level of notoriety due to the limited capacity expansion as well as the lack of comfort for the passengers, but these, among other issues, are expected to be solved with a new airport, which together with TAP will continue to consolidate and develop the important role on mobility and connectivity between this two major continents.

An airport like Heathrow will always be a hub for London, one of Europe's most influential cities worldwide. But Lisbon is only considered as a hub because of the strategy and positioning of the national carrier not because it was elected as a excellence passenger airport in terms of platform, as Frankfurt or Charles de Gaulle that are not only functional infrastructures but also perceived as quality traffic transfer airports.

#### **7.1.2.4. AIR CARGO**

Airlines keep trying to find and increase secondary sources of revenue to boost their business. The term "air cargo" is used to express the goods transported by air that generates additional revenues besides passengers and luggage. The freight is extremely heterogeneous and its characteristics influence the operation, design and size of Cargo Terminals.

As different types of cargo we can find:

- Normal or Common: the ones that do not require special care or unusual procedures for handling and storage;
- Perishable: with validity limited by time, subject to deterioration or to become worthless. This type of load may require special storage. Ex: flowers, magazines, newspapers, medicines, food, etc.
- Great Urgency: Generally related to health care, especially to maintain or save lives. Ex: serums, vaccines, etc.

- High Value: Includes materials, artificial or natural products of high value, as well as the ones consisted of small volume, but with individual high monetary value. This type of load may require storage in a specific safe. Ex: gold, silver, precious stones, electronics in general, etc.
- Live: Consisting on live animals for which facilities and specific procedures are needed;
- Restricted: These are subject to severe restrictions imposed by government authorities regarding import and/or exports, and therefore require special treatment and supervision. Ex: weapons and explosives.
- Risk or Dangerous Goods: This cargo is comprised of articles or substances that can impose significant risk to health, safety or property when transported by air. This requires special care in handling and storage. Ex: gases, flammable liquids, radioactive materials, etc.

The air cargo in the last 5 to 10 years has had an average annual growth of around 6%. The flows of demand and supply are directly related to global economic growth and exports/imports. The World Bank has stated a decline of 9.7% in exports, 7.7% for imports and 2.9% in GDP. For the year 2010 it is expected grows (in percentage of GDP) of 2% and 3.2% for 2011. Air freight traffic has historically grown an average of 2 times the GDP (i.e. when the GDP increases the air cargo increase is in proportion two times higher, and the same applies when there is retraction).

This is due to the fact that air cargo is a mean of transport more expensive compared to land or sea transportation, but much, much faster. During recession periods companies normally reduce production and inventory stocks so the need to run off products as fast as possible becomes less important. The opposite occurs during recovery as companies need new components to rapidly increase production levels. The air cargo sustains the model just-in-time used in various industries.

The countries with higher levels of exports, like Germany, USA, and Japan are also those with greater volume of air cargo and aircraft suitable for this purpose acting as authentic logistics platforms, like Lufthansa. A strong export sector needs to sell their products. And the importance of the products they produce strongly influences, for example, if it is high-tech or perishable goods the greater the need for mobility or speed. Only by air is possible to avoid obsolete technology or a spoil of goods.

Despite the overall growth, air freight such as mobility of passengers, has suffered from terrorist attacks in 2001, the dot.com crash (5.9% drop in load) and the global economic crisis of 2008/2009 (in 2008 a break of 5% and 15% in 2009). The year 2009 was the worst ever in terms of air freight due to high Yield reduction (-20%).

**Figure 81: Air Freight Yields and Ton Kilometers Flown on International Markets**



Source: Cargo-IS, IATA

This decline occurred mainly because the crisis hit most of the developed countries, U.S., Europe and Japan, which are the ones with more volumes of air freight. The search and transfer of cutting-edge electronic goods in Europe, USA and Japan is a strong enhancer of this traffic. Semi-conductors, for example, are accompanied by the freight industry because of the importance that “speed” has for the sector (the weight of mobile phones and PC represents 60% of sales). The faster the products are placed in the market, the greater the return. If products of high demand are transported by boat or land, its delay in delivery will have severe negative impacts.

The type of products and different consumer behaviors directly affect the air freight. An example of perishable cargo has to do with the production of flowers in Holland, transported by KLM. The KLM Cargo, bases much of its business in flowers, so it can indicate that the productive activity of a country and level of exportation of the product directly affects air freight business and importance. An example related to consumption habits can be the wine Beaujolais Nouveau, with major cities organizing reception parties for this specific wine, right after the harvest season. And for these events, the wine must be there perfectly on time. So Air France, with not enough freight aircraft available to meet such demand, needs to rent or

charter other aircraft for that purpose. The same happens with opening of new stores in other countries or present specific collections on certain dates, like for instance ZARA, speed is essential in order to meet all the deadlines inherent to this process.

For 2010 recovery is expected and a 5% growth boosted largely by Asia where China has suffered less consequences from the international crisis. For example, it is expected a growth of 10.2% for semi-conductors sales with impact in terms of cargo transportation. In 2013 the upturn of the years 2008 and 2009 will be completed, starting to have an actual growth similar to the year of 2007.

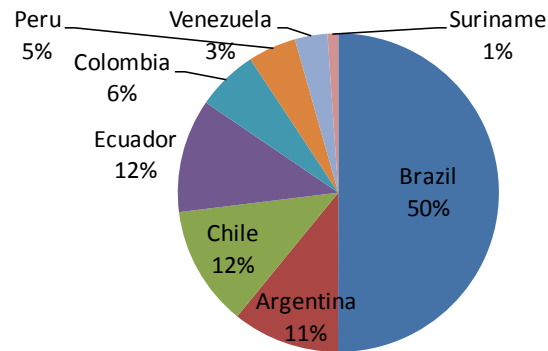
As key trends there is an increase of purchasing power and the appearance of a stronger middle class from the emerging economies such as China, India, Brazil and Russia. At this moment 150 to 200 million Chinese have a significant purchasing power and will begin to develop new habits and look for new products from other countries. Same situation can happen in India, Brazil and Russia being estimated as new drivers of air cargo. As income rises in these countries, also the demand for higher commercial value goods like electronics, wines, among others, will increase, and these products are transported by air.

The rapid growth of these economies has two effects, not only their exports increases as these countries become richer and more developed, but also large imports are expected which can bring vast opportunities in terms of stimulus and importance of air cargo industry.

### **Cargo in Portugal**

Benefiting from cultural and commercial links between Portugal, Brazil and Africa, cargo business may also be of particular relevance. Observing the flow in 2008 with regard to transport between Europe and South America, it is clear that the main market is Brazil, accounting for 50% and a growth estimate of 6.4% for 2010-2013.

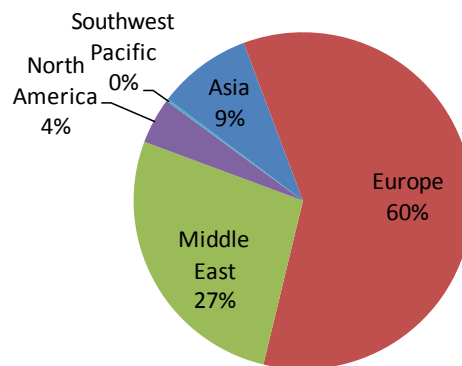
**Figure 82: Main Cargo Markets between Europe and South America**



Fonte/Source: IATA - AIRLINE INDUSTRY FORECAST 2009-2013

If we consider African continent, it can be easily established that the main market is Europe with an expected growth of 4.7% in the period of 2010-2013:

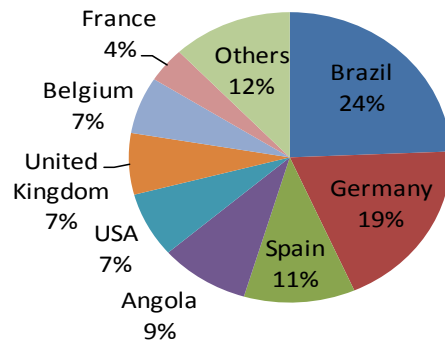
**Figure 83: Main Cargo Markets to/from Africa**



Fonte/Source: IATA - AIRLINE INDUSTRY FORECAST 2009-2013

It is perfectly clear that there are natural flows of cargo to Brazil and to the African Continent. In that regard, Portugal can also take advantage of the privileged position and further improve volumes of cargo transportation. Accordingly to 2008 figures it is showed that the main markets transmitters/receivers of air freight, to and from Portugal are mainly Brazil, Germany, Spain and Angola:

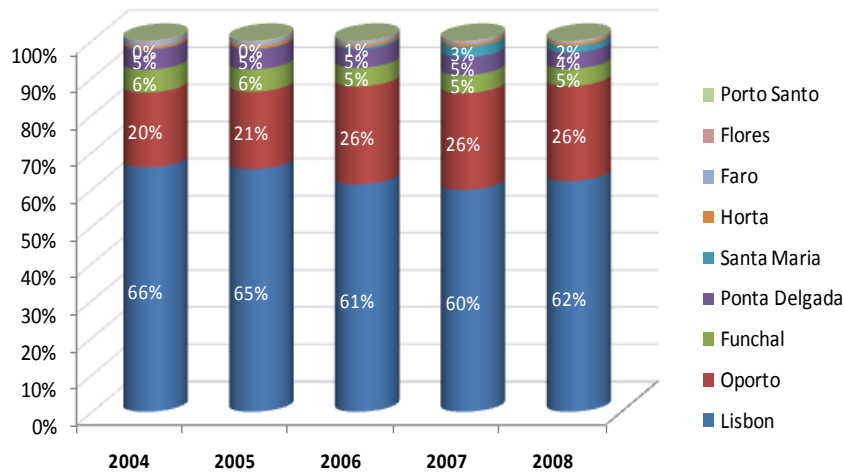
**Figure 84: Main Cargo Markets to/from Portugal**



Fonte/Source: IATA - AIRLINE INDUSTRY FORECAST 2009-2013

Analyzing the distribution of air freight by the various national airports it can be concluded that Lisbon and Porto are responsible for more than 85% of the total, so the focus will be on these two infra-structures.

**Figure 85: Airport Importance in Total Passenger Traffic**

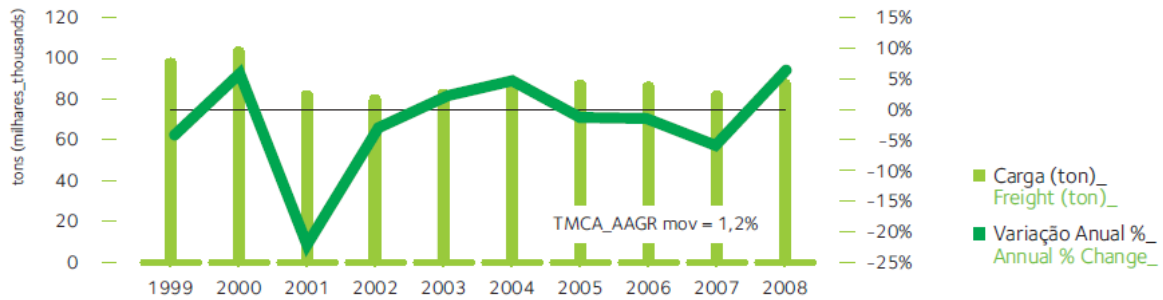


Source: ANA Aeroportos de Portugal-Traffic Reports-Lisbon, Oporto, Faro, Madeira and Azores

## Lisbon

The air cargo performed very positively in 2008, inverting the downturn trend over the three previous years. 88.835 tons of cargo represented an increase of 7.1% compared to 2007 well above the annual average of the past five years (+1.2%). The enlarge in freighters operated by TAP, the cargo transported by this company in regular passenger flights belly's and the consolidating of Agro operation to Funchal, boosted the market, allowing a reversal trend and somehow beating competition of the other means of transportation.

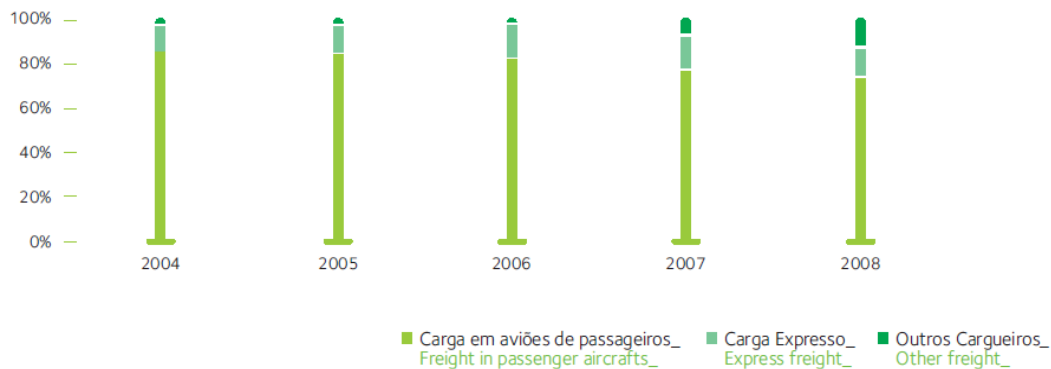
**Figure 86: Freight Annual Evolution at Lisbon Airport**



Source: ANA Aeroportos de Portugal, Lisbon Annual Traffic Report 2008

From the various segments of cargo at the airport, we can see the increment of freighters, which carried 12% of the total cargo transported, 5% more than in 2007. With a total of 10,970 tons, which corresponded to 94% increase over previous year, this segment of freight traffic was the main responsible for positive results in 2008.

**Figure 87: Type of Freight Market Share at Lisbon Airport**



Source: ANA Aeroportos de Portugal, Lisbon Annual Traffic Report 2008

The consolidation of Agro operation, who entered in the market in late 2007 and the development of freighters by TAP, resulting from the hub strategy in Lisbon as a transfer point for cargo between Europe and Brazil (90% of cargo transported by TAP to Brazil comes from Europe) - were the big contributors to Air Cargo during the year 2008. Agro carried 3.197 tons of cargo, 2348 tons more than last year. In what respects TAP Portugal, the total handled cargo in freighters was 5.500 tons, an increase of 79%, over 2.429 tons in 2007.

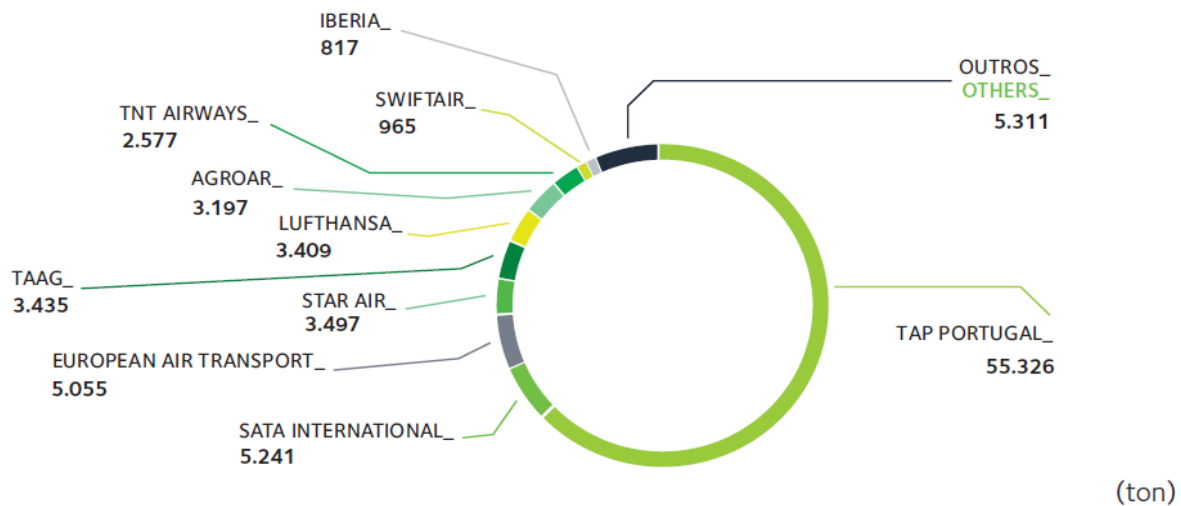
Cargo carried on regular passenger aircraft also contributed to the growth of this business with an increase of 2.2%, thus contradicting recent years trend, during which there had been successive decreases. Despite this increment, and maintaining the largest percentage of the



market, the market share reduced from 78% to 75%. In total, 66.193 tons were transported on passenger aircraft, 1.435 tons more than in 2007.

The third segment is express cargo companies, which fell 2% on its market share, having shipped 13% of total Cargo. Of the four companies, express freight, European Air Transport, Star Air, Swiftair and TNT, only Swiftair showed an increase of 1.1% compared with the previous year. All together, these companies transported 11.669 tons, less 667 tons than in 2007. The national carriers, TAP Portugal and SATA International, accounted for 68% of freight handled at Lisbon airport. With a total of 60.566 tons the airlines raised 9.5% and 2.6% respectively. From the remaining scheduled airlines, Lufthansa stood out with a 2.5% increase and TAAG with 1%.

**Figure 88: Freight Carried by Airline at Lisbon Airport**



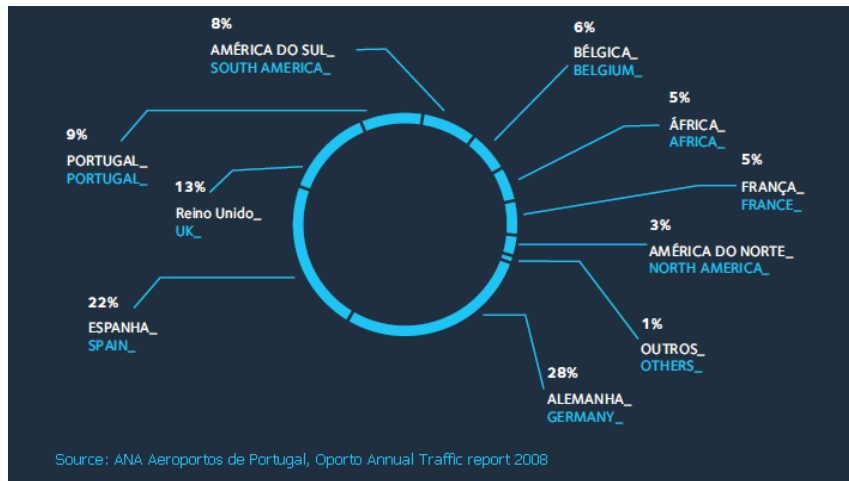
Source: ANA Aeroportos de Portugal, Lisbon Annual Traffic Report 2008

The most relevant international markets, representing 67% of total cargo were, in order of importance, Brazil, Germany, Spain and Angola. Brazil (+21%) and Angola (+20%) registered the biggest increases.

### Porto

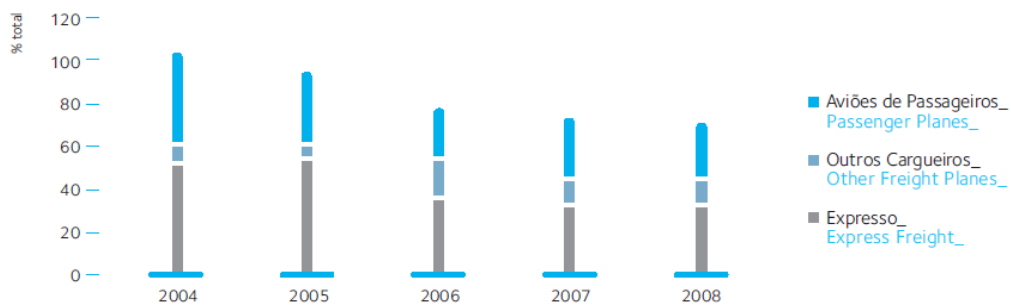
During 2008 Cargo accounted for 36.646 tons and presented a slight recovery with a growth of 1.4% corresponding to more 500 tons compared with last year. The most important markets were Germany, Spain and UK.

**Figure 89: Freight by Country in Oporto**

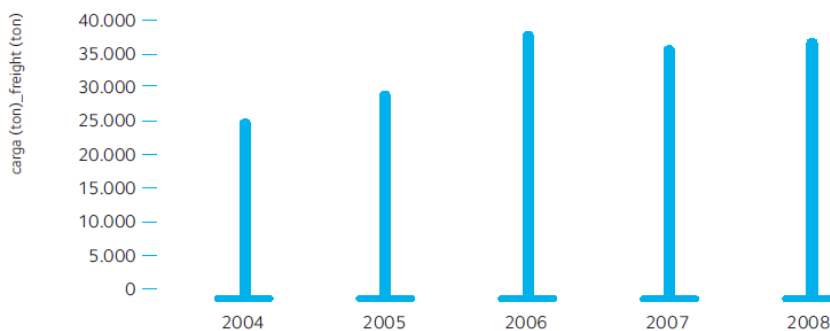


The express cargo companies represent 37.5% of total freight traffic, with an improvement of around 6.3% with more 13,748 tons carried compared to the year of 2007.

**Figure 90: Freight Market Share evolution in Oporto**

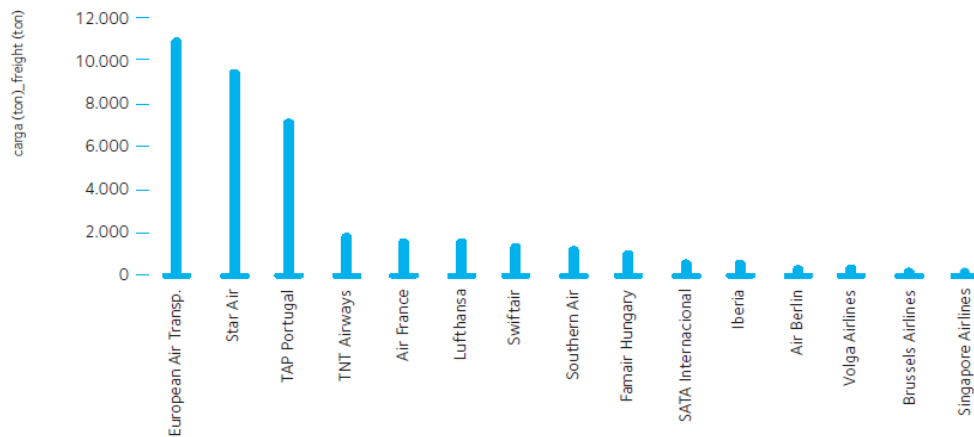


**Figure 91: Freight Market Evolution in Oporto 2004-2008**



Most cargo is still transported by: European Air Transport, Star Air and TAP Portugal. The best performances in 2008 were by TNT Airways, Air France and European Air Transport with a growth of 15.8%, 12.0% and 4.6% respectively over homologous period.

**Figure 92: Freight Carried by Airline in Oporto**



Source: ANA Aeroportos de Portugal, Oporto Annual Traffic Report 2008

The main destinations of freight traffic in 2008 were: Cologne (7748 ton), Victoria (4554 ton), London Heathrow (3,201 tons), Lisbon (2714 ton) and Liege (2018 ton).

### TAP Cargo

With a turnover of 128 million Euros and a 15% growth in 2008, TAP Cargo broke the record in terms of results. Domestic market accounted for one third of the revenue. For this, it was very relevant the contribution of freighters to Luanda (out of Lisbon and Oporto) and the consolidation of regular freighter operations from Germany, Belgium and UK. Another decisive factor for TAP Cargo results was the inauguration of a new cargo terminal at Lisbon Airport.

TAP Cargo has the objective of making the maximum profit in the remaining space in the specific aircraft cargo areas after the placement of passenger baggage. The most lucrative route is Lisbon-Luanda, which records occupancy of 100% and the highest yields of the entire network.

There are 4 routes in Europe with freighters especially dedicated to feed/de-feed flights to Brazil:

- Oporto London operated by European Air Transport, B757
- Lisbon Frankfurt operated by MNG Airlines Airbus A300

- Lisbon Cologne operated by MNG Airlines Airbus A300

- Lisbon Brussels operated by Royal Jordanian Cargo Airbus A310-300

TAP Cargo also operates freighters in Lisbon-Luanda and Luanda-Oporto routes under the lease of ACMI (Aircraft, Crew, Maintenance, Insurance) when demand exceeds supply. These flights are usually operated with Boeing 747-200F, chartered from other airlines. The most widely used has been Atlas Air.

During 2009, TAP Cargo and TAM Cargo, signed an agreement for freight transportation. In total, this agreement will include 30 new destinations and facilitate exports from Brazil to Europe.

For TAP Cargo, new destinations will be: Victoria, Florianopolis, Porto Alegre, Curitiba, Manaus, Belém, Goiânia, Aracaju, Joao Pessoa and Sao Luis, in Brazil, and also Buenos Aires, Asuncion, Lima, Montevideo and Santiago in Latin America. In what concerns to TAM Cargo it will have destinations like Lisbon, Porto, Amsterdam, Prague, Budapest, Stockholm, Copenhagen, Oslo and Zagreb, in Europe, and also destinations in Africa, including Luanda, Maputo, Dakar, Sal, Sao Tome and Guinea-Bissau.

### **SATA Cargo**

Regarding SATA, the agreement with the Canadian firm CargoJet will allow the transport of cargo between Portugal and main destinations in Canada. SATA Cargo will integrate the "European Interline Partners of CargoJet, which includes airlines such as Lufthansa, SAS, Alitalia, Air France, British Airways and KLM. The CargoJet is the leading provider of air cargo services for highly perishable products in Canada, carrying over 340 tons of perishable cargo per day in North America, with a fleet of 41 air freighters.

This deal will also strengthen the visibility that SATA has been gaining in a significant market not only in size but also due to the strong link with emigrant communities.

The main problems in Portugal are related to the lack of a dedicated cargo fleet from the national carriers, which imply no flexibility in freight transport. If cargo is privileged by its speed, and if these companies are dependent on space available of its regular passenger aircraft, what often happens is that passengers and luggage account for all aircraft payload leading to the need to withdraw the space already sold by Cargo Areas because it is seen as a marginal business. If we consider perishable goods or specific Cargo that needs to be at the

final destination in a very strict and short period of time (such as the transport of ballot boxes for elections on a certain date), the image of the company itself will also become more fragile.

Another situation that can happen is the necessity to arrange special charter deals to assure certain businesses that might be of extreme importance for the country, leading to a dependence on other companies. In a time of expansion, air Cargo will depend on the aircraft availability. But in times of economic growth it is extremely difficult to find aircraft available because every airline is flying at maximum levels.

In terms of infrastructure despite the construction of a new cargo terminal at Lisbon airport, it was built on the west side of the main runway and parking stands for aircraft are on the east side, which leads to a long journey between the aircraft and cargo terminal and vice versa.

**Figure 93: Cargo Areas in Lisbon and Madrid Barajas**



Source: Google Maps, adapted

### 7.1.3. OPERATORS

#### 7.1.3.1. AIRLINES

#### Differences between Low Cost carriers and traditional airlines:

- Only one class available (compartment) in LCC aircraft (no business or first class);

- Use of only one type of plane (usually Boeing 737 or Airbus A319/20) reducing costs of training and related services;
- Training usually lasts for a month and the costs are supported by the crew. This training is given by other companies who provide this kind of services, but only guaranteeing the minimum knowledge. There is no specific training on corporate culture, or a more complete knowledge to ensure that the cabin crew can use defibrillators or a correct administering of first aid;
- Pilots are usually those who were not admitted in traditional carriers because of requirements imposed by these companies (e.g. minimum number of flying hours);
- Smaller space between seats (pitch) resulting in less comfort. For example, Ryanair's Boeing 737 has 148 seats whilst in a traditional company the number of seats is 126;
- The fleet is generally very young, avoiding maintenance costs, and planes are sold before their first heavy maintenance visit (HMV), which is normally after six years of service;
- There is no seat reservation, but if the passenger pays a fee he is allowed to enter the aircraft before other passengers and choose a seat. Passengers are also asked to board expeditiously, in order to reduce delays;
- Low cost carriers use secondary airports, which offer greater incentives and lower airport charges both for airlines and passengers. That's not the case of Portugal where they operate at major airports with same conditions and better incentives than national carriers;
- Low Cost Carriers fly only in high density routes and operate at non-preferred hours reducing airport charges and avoiding delays due to heavy traffic;
- The flights are sold as "one way" and there is no concept of "round trip" or connection flights, which transfers the burden to the passenger for flight cancellations or delays (the company sells only tickets for that circuit and is not responsible for combinations made by passengers for other flights of this airline or for a third carrier);
- Ticket selling is made by Internet directly to passengers, avoiding fees and commissions of travel agents, tour operators and global distribution systems (GDS);
- Employees perform multiple services, for example, flight attendants also clean the aircraft or stand at boarding gates checking passports and boarding cards, reducing costs with staff;
- LCC avoid "night stop" flights because it implies extra costs of parking the aircraft out of their airport bases as well as hotel expenses with crews;
- Onboard service is included in the ticket on traditional airlines but is charged in LCC

(beverages, snacks, audio system);

- Aggressive policy of reducing fuel costs;
- LCC make large investments in terms of advertising / communication, especially outdoors, as there is a great need for a constant presence in the market and get people to consult their web sites, the main channel for product distribution;
- The rotation of flights at airports is very fast, reducing the airport charges and allowing greater use of airplanes. These rotations are done in thirty minutes whilst the traditional carriers take 45 minutes;
- LCC operate mainly from point to point flights within Europe (the traditional companies also feed their flights with connecting traffic enjoying the effect of "hub");
- Additional services for passengers, such as car rental, sales on board, Internet revenue, hotel reservations commissions, are extra revenue for these companies allowing them to extend their core business.

## **National Airlines**

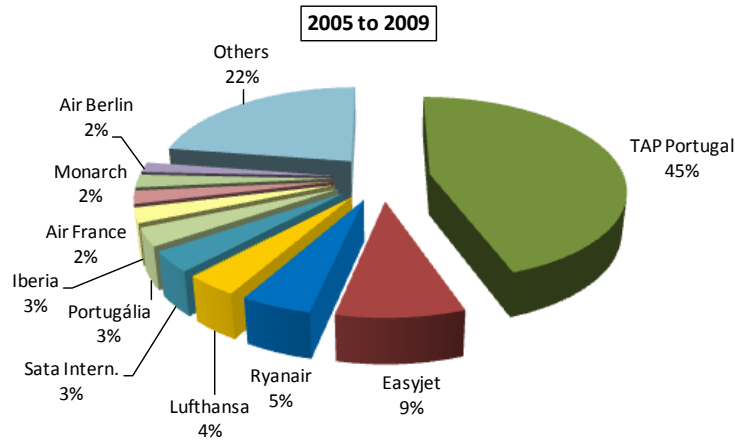
### **TAP**

TAP Portugal was founded on March 14, 1945, and it is the flag carrier of Portugal and the largest airline in Portugal. It is a member of Star Alliance since 2005. In 2007, TAP acquired the airline Portugália, considered for five consecutive years the best regional airline in Europe.

Currently, TAP network (which includes Portugália) covers a total of 66 destinations throughout Europe (9 are domestic, 38 in the rest of Europe), Africa (9), South America (8), Central (1) and North (1), being present in 30 countries worldwide and operating an average of more than 1,850 flights per week. From June / July 2010 three new destinations will join TAP's the network, 2 in Africa and 1 in South America, totaling 69 destinations in 31 countries. TAP and PGA fleet consist in 71 planes: Airbus A319 (19) Airbus A320 (17) Airbus A321 (3), Airbus A330 (12) Airbus A340 (4), Embraer 145 (8), Fokker 100 (6) and Beechcraft (2). The average age of TAP fleet is 9.0 years (considered one of the most modern in Europe).

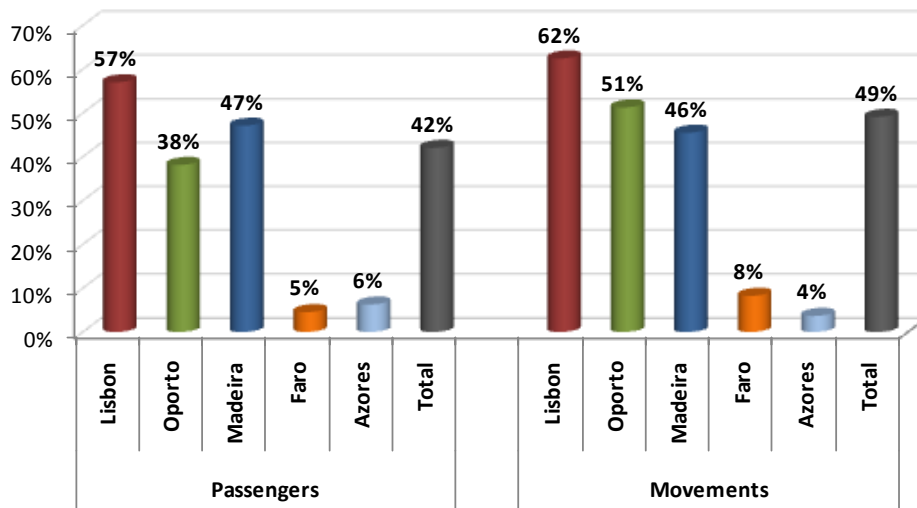
TAP represents 45% of total passengers at major Portuguese airports, with a high margin compared to the LCC Ryanair and Easyjet, registering a growth of 26% between 2005 and 2009.

**Figure 94: Market Share by Airline of Major Airports**



Source: ANA Aeroportos de Portugal- Traffic Reports- Lisbon, Oporto, Faro and Madeira

**Figure 95: TAP Passenger and Movements Market Share, by Airport (2009)**



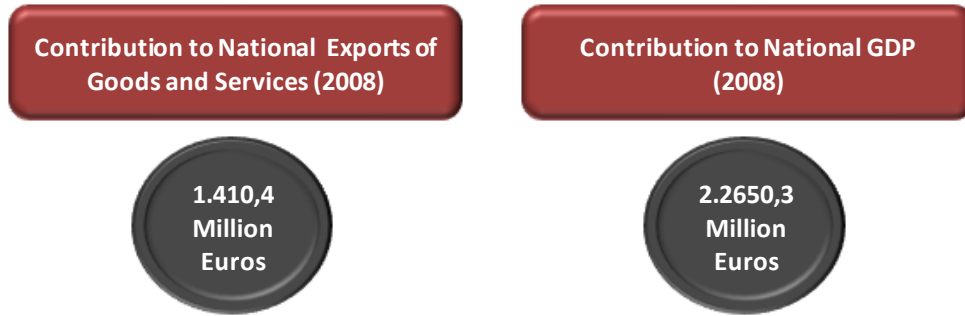
Source: ANA - Aeroportos de Portugal

In the context of the Portuguese economy, the importance of the Airline continued to consolidate, reflected in various aspects such as the level of investment made, the position as one of the largest generators of employment in the country and also the significant contribution to the volume of national exports.

Thus, in 2008, the airline strengthened the position among the top Portuguese exporters, with a total of EUR 1.410,4 million in sales and services in foreign markets, 14.9% more than EUR 1.223,6 million last year. Also the contribution for the national tourism suffered a significant increase of traffic to Portugal from its entire network of operation.



**Figure 96: TAP Contribution to Exports and GDP (2008)**



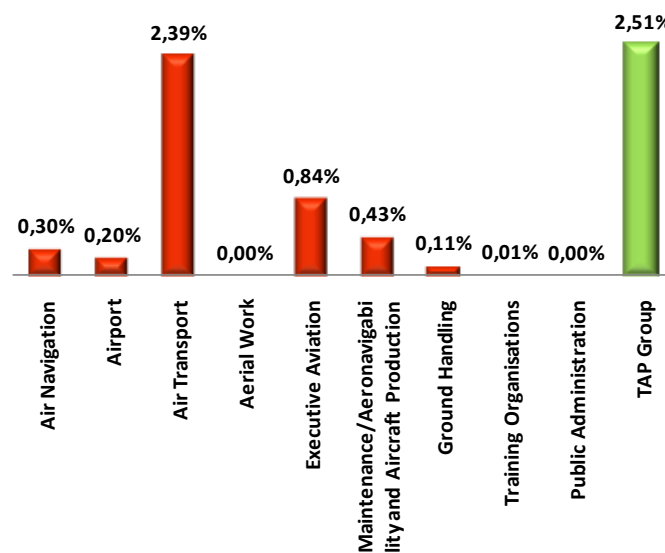
Source: TAP Portugal, Annual Report 2008

The TAP Group is responsible for 59% of the total weight of civil aviation in the Portuguese economy.

TAP's numbers in 2008:

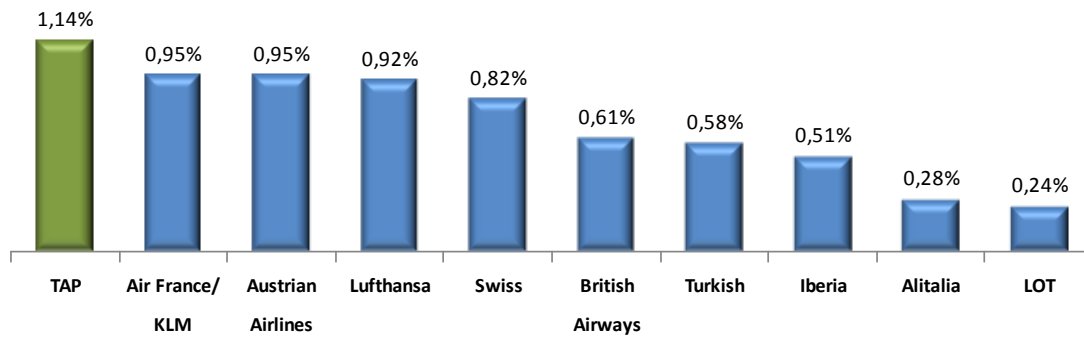
- Together with Star Alliance partners, TAP offers connections to 166 cities, 102 of which are located in Europe and 64 in other continents;
- Between 2003 and 2008 the annual growth rate of TAP in foreign markets was 15.3%;
- The growth in passenger traffic for the airlines of the AEA (Association of European Airlines) suffered a huge cut, standing at 1.2%, but TAP experienced an increase of 14.5%;
- The impact of TAP group in Portuguese exports of goods and services is 2.51%.

**Figure 97: TAP Group as a % of Portuguese Exports of Goods and Services**



TAP's revenue in GDP is higher when compared with other companies:

**Figure 98: Airline Revenue in GDP**



TAP 2007; Other Airlines 2006  
Source: TAP Portugal presentation at "Forum Ambiente 2008"

However, despite its absolute importance for the country and for national air transport, TAP has some weaknesses. It is a company owned by the public sector, where unions have an excessive role, with an inadequate cost structure, with employment agreements with no flexibility that create huge difficulties in terms of management and with a large number of employees compared to the average of the companies with the same dimension.

Another significant aspect is that TAP has been increasing its Long Haul operation but mainly to Brazil and for Africa. While this is an adequate approach, there are still important markets unexplored, namely in North America, Middle East and Asia, not taking full advantage of its strategy of connecting long haul flights to the main European markets in order to position Lisbon as a strong hub to the four corners of the world.

## SATA

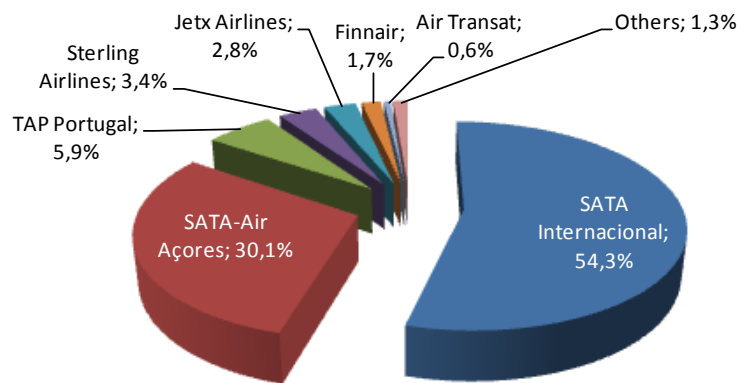
In August 21, 1941, was established the “Sociedade Açoriana de Estudos Aéreos, Limitada”. Six years later, in 1947, its name changed to SATA Air Azores. SATA International is a subsidiary company of SATA Group and operates flights from Azores to other countries. This subsidiary resulted from the acquisition of Oceanair in 1994, amending the designation to SATA International in 1998 and in June 17, the company obtained the Air Operator Certificate.

SATA International (S4) network include São Miguel, Terceira, Faial, Santa Maria, Madeira, Lisbon, Porto, Faro, Cape Verde, Madrid, Paris, London, Manchester, Newcastle, Dublin, Amsterdam, Frankfurt, Zurich, Boston, Toronto, Montreal, Oakland and Salvador.

The destinations offered by SATA Air Açores (SP/SAT) are Santa Maria, São Miguel, Terceira, Pico, São Jorge, Graciosa, Faial, Flores, Corvo, Madeira, Porto Santo and Gran Canaria.

SATA Group is responsible for about 84% of total traffic at the airport of Ponta Delgada, the main airport in the Azores, with the highest share of 54% belonging to SATA Internacional. This company has been implementing a growth strategy in terms of diversity of international destinations either departing from Ponta Delgada, either from Funchal.

**Figure 99: SATA Market Share, 2008**



Source: ANA Aeroportos de Portugal, Açores, Annual Traffic Report 2008

Recently three new routes were launched from Ponta Delgada directly to the three capitals of northern Europe: Copenhagen (Denmark), Stockholm (Sweden) and Oslo (Norway). SATA and the Azores Regional Government are launching a marketing campaign to promote the region in the Scandinavian market with the objective of increasing awareness of the Azores as a tourist destination.

The airline will also operate a direct connection between Madrid and Terceira in the summer period. The opening of this air route is a way to place Terceira Island as another tourism destination in Azores. This experience will serve to evaluate the results of this new strategy and evaluate if it can be extended to the other islands.

This company has an important role in what concerns the strategy of tourism entities in Azores in capturing foreign markets, contributing to the notoriety of the Azores and to increase the awareness of the archipelago as a touristic destination.

Despite the investment in some foreign markets, it still reveals a relatively low expression. The excessive alignment with the objectives of the region may eventually limit the business strategy, opting for more seasonal operations, not taking advantage of new opportunities from other parts of the country, predominantly in Lisbon, where there are multiple markets with

strong potential still not served. In this regard a partnership with TAP could benefit from the effect of hub pattern and provide added value leading to an increase of passengers, a higher impact on tourism and above all the country's attractiveness.

**7.1.3.2. AIRPORTS**

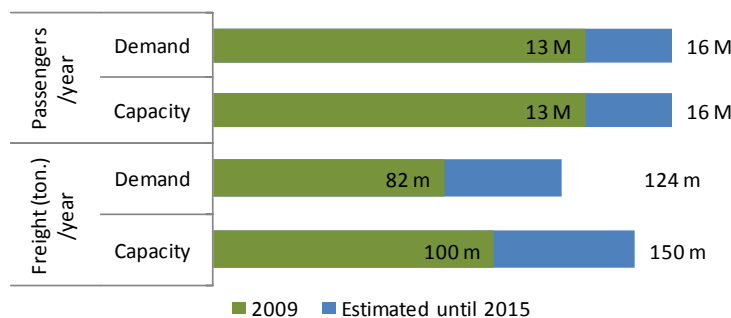
Accordingly to MOPTC – Strategic Guidelines for the National Airport System (2005), there are currently 99 infrastructure divided as follows:

- 5 Major Airports: Portela, Francisco Sá Carneiro, Faro, Madeira, Ponta Delgada
- 10 Complementary Island Infrastructures: Porto Santo, Lajes, Horta, Santa Maria, Flores, Graciosa, Pico, Corvo, S. Jorge, 1 heliport approved
- 84 Complementary Continental Infrastructure: 24 certificated aerodrome, 2 approved aerodrome, 9 certificated heliports, and 49 approved heliports.

**Lisbon**

Lisbon Airport is oriented for international business and tourism, not only point to point traffic but also benefiting from connecting passengers due to the hub strategy adopted by TAP Portugal. The catchment area, according to ANA Airports of Portugal: Presentation to IATA(2009), is 4.25 million people. This infrastructure shows severe capacity constraints, and is constantly operating at the limit of its capacity, not able to meet the demand of the operators for several occasions, especially in what regards the slots of most interest. Thus, companies that showed interest in flying to this airport do not find adequate availability, losing opportunities for expansion and to increase the volume.

**Figure 100: Lisbon Airport Capacity**



Source: ANA Aeroportos de Portugal

The main constraints include long time for rotation and transfers, inefficient processing of luggage, limited availability of jetways and aircraft parking stands, restricted space for Cargo and Maintenance businesses.

Most of these constraints are from the responsibility of the airport, but in terms of baggage processing the responsibility has to be shared between infrastructure conditions and Handling performance. Regarding airport infrastructure the baggage terminal does not have much space for expansion (the terminals have increased from 3 to 6 in recent years). For Handlers the fact that many aircraft are parked in remote stands, plus the need to adapt the human and physical resources to 6 different terminals, makes the whole process less efficient in terms of speed and accuracy.

Within the expansion plan, the objective was not only to increase capacity but also to develop operations efficiency, positioning Lisbon as the main European gateway for traffic to South America and Africa, increase customer service levels, approximate with the European quality level, facilitate the growth of cargo business and improve rotation times and efficiency of the handling companies.

Although these improvements have reached significant results, the structural problems at Lisbon airport will not allow the levels of quality and efficiency of other European airports. In addition to the constraints identified above, and despite the increased number of jetways from 7 to 20, the vast majority of arrivals and departures of flights continues to be carried out by stairs and buses which do not allow the levels of efficiency and comfort of jetways. Additionally this airport is the Portuguese hub, with the wave system. Without enough number of jetways the turnaround time must be longer and often causes significant delays in all operations. This practice of boarding and disembarking at European international airports it is an exception and not the rule. As an example, from the entire network of destinations offered by TAP only in Lisbon, Maputo and Luanda boarding and disembarking is done this way.

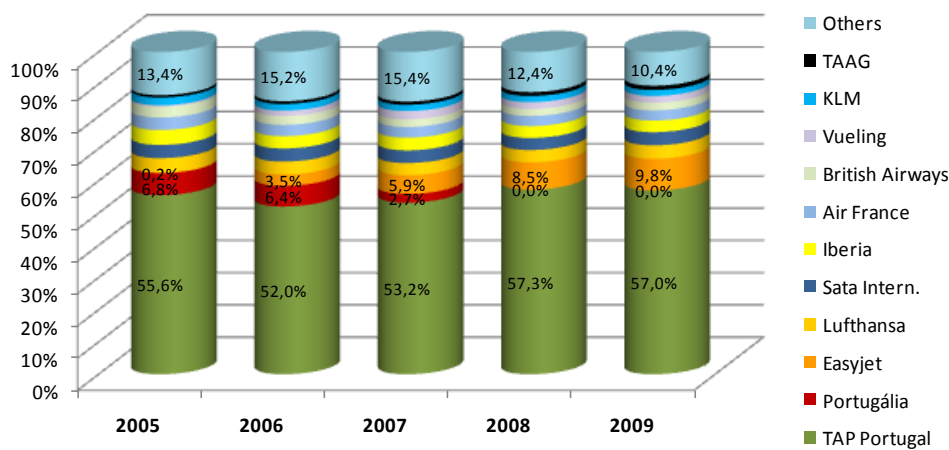
Lisbon Airport has kept its position among European airports ranking and, despite having overcome Malaga airport, is ranked as 4<sup>th</sup> largest airport in the Iberian Peninsula after Madrid, Barcelona and Palma de Mallorca. The main airport of Portugal located in the cosmopolitan city of Lisbon, is below not only the airport of Palma de Mallorca, a Balearic island, with a majority position of leisure traffic, particularly on holidays or short stays, but also Barcelona, with a catchment area of 5.5 million, traffic essentially O&D, weak expression of long-haul

flights (17%) and experiencing a disinvestment of Iberia (reduction of 71% between 2004 and 2008).

If the main competitor is Madrid, with a dense operation by the national carrier Iberia and also benefiting from the continuous development of its hub strategy, then Lisbon airport due to its strong structural constraints and high difficulty of expansion is clearly inefficient in competitive terms, not only within the Iberian Peninsula (where even Malaga’s airport had a higher ranking position) but also when compared with major European airports.

From 2005 to 2009 total traffic in Lisbon grew 27.6%, and TAP (main carrier) registered increases of 30.9% (from 5.6 million to 7.3 million passengers). Considering TAP + PGA the average growth was 16.6%. Easyjet is currently 2<sup>nd</sup> biggest company operating in Lisbon growing exponentially from year to year due to constant aircraft capacity increase. SATA International and Lufthansa have been registering steady shares but with an average annual growth of 19.3% and 26.2% respectively, from 2005 to 2009. Considering top major airlines the only carriers experiencing accumulated declines are BA reducing 9.6% and KLM 2%.

**Figure 101: Market Share Evolution in Lisbon**



Source: ANA Aeroportos de Portugal-Traffic Reports

In this airport there is a strong presence of major traditional airlines in Europe, but also of LCC. Unlike what happens in the majority of European cities, the LCC in Lisbon operate at the main airport and not in a secondary airport, benefiting from all the advantages and incentives that were part of the process of collecting low-cost airlines to Lisbon.

In terms of global alliances, and comparing only the years 2008 vs 2007, Star Alliance has continued to be the most representative, with 60% of commercial passengers, registering an increase of 10% in passenger’s volume, which was related to the traffic growth of TAP Portugal. Oneworld and Skyteam decreased the market share. Air France / KLM, Alitalia -

belonging to Skyteam, decreased 14%, holding 6.2% of total passengers, and 1% less than in 2007. Regarding Oneworld, the decrease in traffic of Iberia and British Airways, the two leading companies of the Alliance, was not compensated by an increase of passengers by Finnair, resulting in a total decrease of 4% and a market share of 5.9%.

Although 2009 was a year marked by the international crisis, the decrease in passengers (-2.5%) did not have a significant impact in the forecasts of demand growth rates and in terms of reduction of the infrastructure constraints. The average life expectancy of the airport has not increased considerably (one year), what was achieved was a slight improvement in traffic accommodation until the closure of the airport.

### **Oporto**

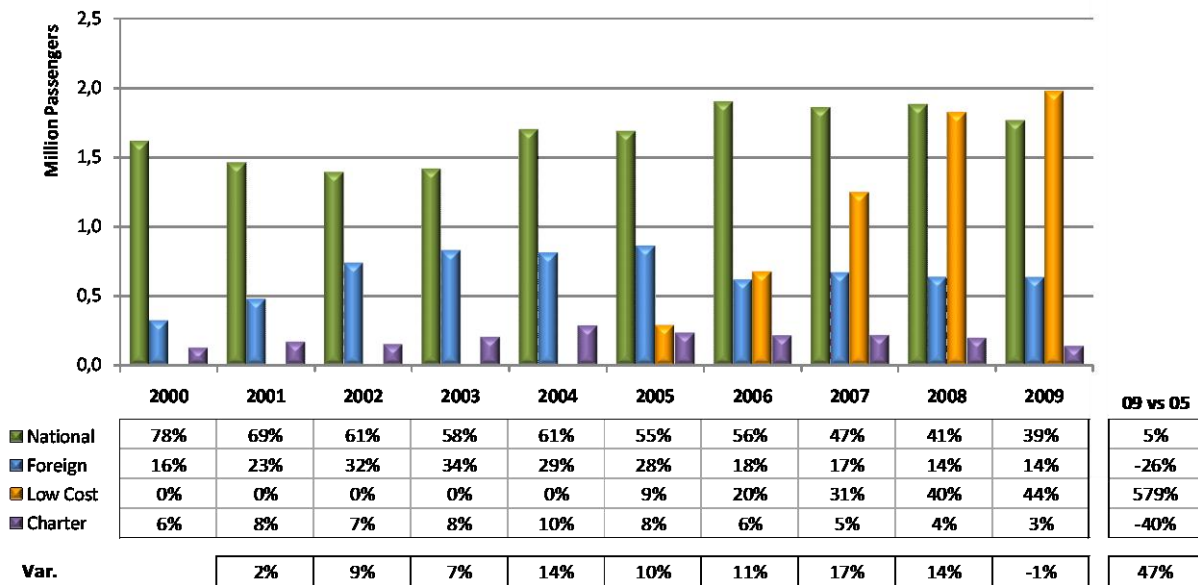
Francisco Sá Carneiro Airport is also characterized by international traffic flows of business and tourism, but essentially acts as point to point, serving a catchment area of 5.38 million people, according to ANA Airports of Portugal: Presentation to IATA (2009). After the expansion plan, there are no relevant constraints, and it became a well modernized infrastructure with available capacity for the next 20 years.

This airport was considered the third best in Europe in 2009, by ACI-Airports Council International (2008), behind Keflavik in Iceland, and Zurich in Switzerland. Porto airport as also received the same award in 2006 and 2008. In 2007 it was considered the best European airport up to 5 million passengers.

The main airport opportunities are to position as the leader of the Northwest Peninsula, maintain or develop long-haul routes to South America, Central and North America, work as a second hub for TAP capturing traffic volumes from the north of Portugal and from Galicia, establish bases of LCC (as already happens with Ryanair), facilitate the creation of new routes, increase traffic volumes, and promote Air Cargo business.

This airport has been adopting a strategy to capture more low-cost airlines, as evidenced by the evolution of these carriers:

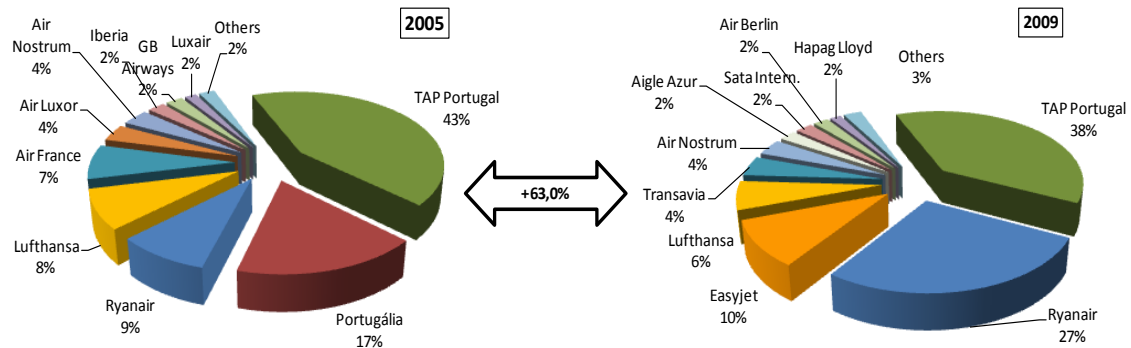
Figure 102: Market Evolution in Oporto



Source: ANA Aeroportos de Portugal- Traffic Reports

What is perfectly clear is that, with the entry of LCC airlines in 2005, traditional companies that have the effect of traffic distribution to any place in the world via the main intermediate points in Europe began to abandon the route. The graph below shows a 26% reduction of the foreign regular airlines leaving TAP and LH as the main traditional carriers.

Figure 103: Market Share Evolution in Oporto



Source: ANA Aeroportos de Portugal- Traffic Reports

The growth of LCC is due to a strong evolution of Ryanair since 2005, passing from a market share of 9% to 27%. TAP Portugal is still responsible for the highest share, even when compared to the sum of Ryanair and Easyjet. The growth of passenger movements at this airport has been constant but traffic is essentially O&D due to the increment of LCC and the reduction of traditional distributors of traffic via hub system.



With this strategy, the airport becomes less attractive for the legacy carriers, losing importance in terms of positioning as a global and international airport, being essentially an attractive regional airport to LCC but without any possibility of becoming a European hub and particularly a hub for the northwest of the Iberian Peninsula.

This Airport, despite having one of the best European terminal infrastructures, will be perceived at the same level of Girona, Cagliari, Beauvais and Charleroi in terms of attractiveness due to Ryanair's base. And the levels of aggressiveness of this LCC, not only discourages the entry of traditional carriers but also can put in question the maintenance or increase of certain international routes and the maintenance of legacy carriers that have been serving this airport for several years.

Therefore, unlike other cities such as Brussels, Barcelona or Frankfurt where there is more than one airport and the LCC operates to secondary airports, in Oporto with only one airport, that option is not possible. This infrastructure instead of becoming a global airport allowing the passenger to travel anywhere benefiting from the hub effect within a specific airline, or taking advantage of the global alliances, will be regarded as a regional airport with strong LCC presence and with no relevant interest for traditional airlines.

This is the strategy chosen by the airport and brought significant growth of passenger volumes and movements, but in the medium term there is no global positioning of worldwide access. And in this scenario, where the airport is focused on O&D traffic, other airports in Galicia may become more attractive for traditional companies willing to create new routes, feed the hub system and take advantage of the alliances.

Even for the main national airline, the investments in long-haul flights have become highly conditioned by the fact that it cannot count with the contribution of interline carriers. TAP has increased the number of flights and destinations from Oporto, not only to Europe but also to Rio de Janeiro, Sao Paulo, New York and Caracas. The launch of long-haul routes has allowed a presence in other markets benefiting from new opportunities and was the first step to position the airport in a global level and also less regional.

However, strong competition from LCC companies has created huge constraints and does not allow positive results in routes that only carry point to point traffic, forcing airlines to a constant redesign of their operation. And TAP is not an exception. For this reason some routes have been reduced in terms of frequency (like Oporto London, Oporto Amsterdam) because it became unsustainable to keep the same number of flights per day.

Flight reductions in markets that are essential to feed the long-haul flights undermine the expansion of these routes and may even lead to a disinvestment. And, as traditional carriers are leaving the airport, there is no possibilities of counting with a significant interline contribution or to take advantage of global alliances, since the operation of these carriers to this airport is decreasing. And despite the growth of LCC traffic, these carriers do not bring any contribution of passengers from Europe to South America.

The infrastructure utilization and profitability may be also in risk if the airport has only operation of LCC. What benefits can be taken of a Minimum Connecting Time of 40 minutes if there are almost no connecting flights? Without airlines like AF or BA and with the decrease of TAP's operation in short-haul flights, the long-haul flights and the concept of hub can be jeopardized. This can drastically reduce the possibility of developing Oporto as a 2<sup>nd</sup> hub in Portugal, like Lufthansa did in Munich, for example.

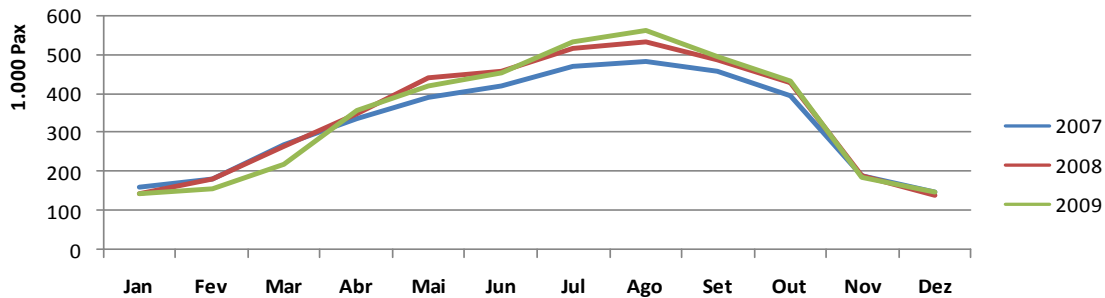
Having present that the main strategy is to raise the number of movements of LCC, it is not a surprise that Europe, with 94% market share, continues to represent almost the entire traffic volume at Oporto Airport. Keeping this strategy and continuing with the reduction of legacy carriers operation, especially the flights of the major national airline, the airport will be less attractive for other airlines and consequently for the connecting traffic.

## **Faro**

The passengers using Faro Airport are primarily international tourists, since the region depends essentially on this sector. With a catchment area of 562 thousand people this infrastructure has available capacity for the next 10 years.

The main constraints include a heavy dependence of tourism, resulting in an extreme seasonality, an inappropriate distribution of daily slots with aircraft congestion and problems with accurate management of handling teams, plus an environmental context that limits future expansion. From the opportunities identified in MOPTC - Orientações Estratégicas para o Sistema Aeroportuário Nacional (2005) stands the cooperation with outside entities to promote new routes, continue to invest in low-cost airlines and charters, capture traffic from multiple sources in Europe and, in particular, extend the catchment area to the south of Andalusia, positioning this infrastructure as touristic airport reference of Algarve and southwest of Andalusia.

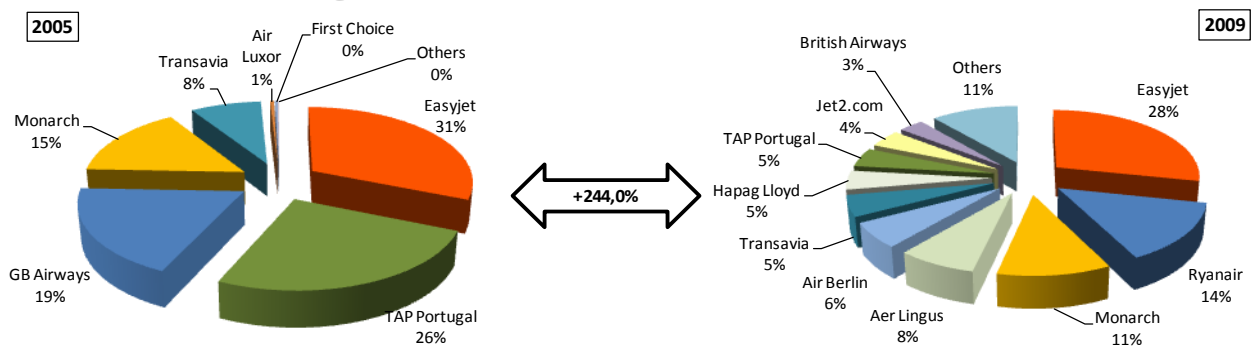
**Figure 104: Traffic seasonality in Faro**



Source: ANA Aeroportos de Portugal- Traffic Reports

Major airlines are essentially LCC and Charters and this is due to the fact that demand comes essentially from foreign markets, since resident traffic is practically inexistent (about 2%). This way point to point operation is the best suited model for tourism traffic.

**Figure 105: Market Share Evolution in Faro**



Source: ANA Aeroportos de Portugal- Traffic Reports

Passenger growth has been extremely high (growth rate from 2005 to 2009 of 244%). The cause of this outstanding increase is the entry and growth of LCC in a huge touristic market with a strong demand during summer. Traditional airlines have lost a considerable part of the market and reduced the operation at this airport.

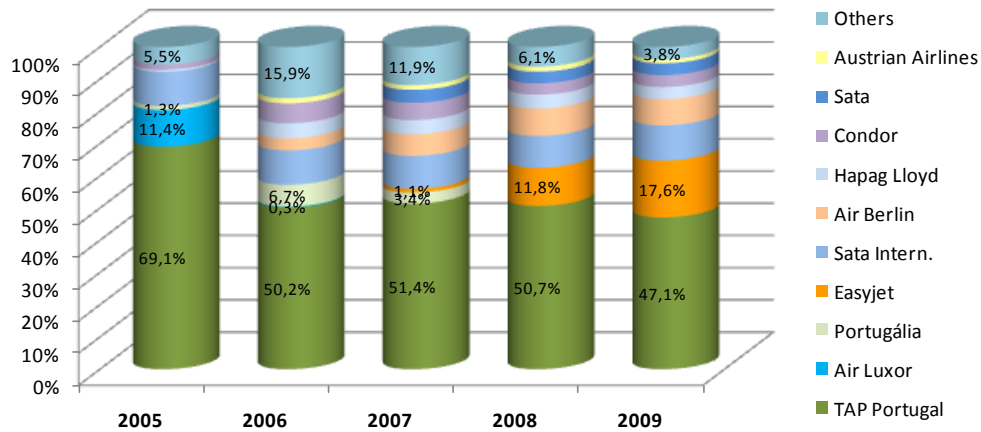
## Madeira

The airport of Funchal is also characterized as tourism traffic, national, international and inter island, with a catchment area of 239 thousand people. The airport of Porto Santo is focused at inter-island traffic, serving a catchment area of 4.4 thousand people. The airports of Funchal and Porto Santo have available capacity for the long term.

The main opportunities for the airport entities in these infrastructures are: encourage the opening of new routes to other European cities, increase promotion and create strong

partnerships between ANAM and regional entities (public and private) to promote tourism, increase traffic volumes, make better use of existing terminal capacity and contribute to the region development.

**Figure 106: Market Share Evolution in Madeira**



Source: ANA Aeroportos de Portugal- Traffic Reports

In 2006, several companies started new operations resulting in an increase of 29% in airport passengers compared to 2005. From this year, the annual growth registered variations between 1% and 3%. TAP has been losing influence but keeps as principal airline, mainly because of the dense operation between Lisbon and Funchal. Easyjet is the 2<sup>nd</sup> airline, having started in October 2007 operations from London and Bristol, and in October 2008 from Lisbon to Funchal. TAP + PGA lost 11% in passenger volume from 2007 to 2009. The cumulative growth of the airport from 2007 to 2009 was 4%. The biggest growth are attributed to Easyjet (as new entrant in 2007), SATA (11%) and Air Berlin (25%)

As in Faro, routes are essentially point to point which are the most appropriate for the region and for tourism.

### Azores

There are nine airport infrastructures with available capacity in the Azores islands, serving a total population of 241 thousand habitants. The airport of Ponta Delgada and the civil terminal of Lajes Military Base are the infrastructures that serve the two islands with higher population density, being Ponta Delgada the main archipelago hub.

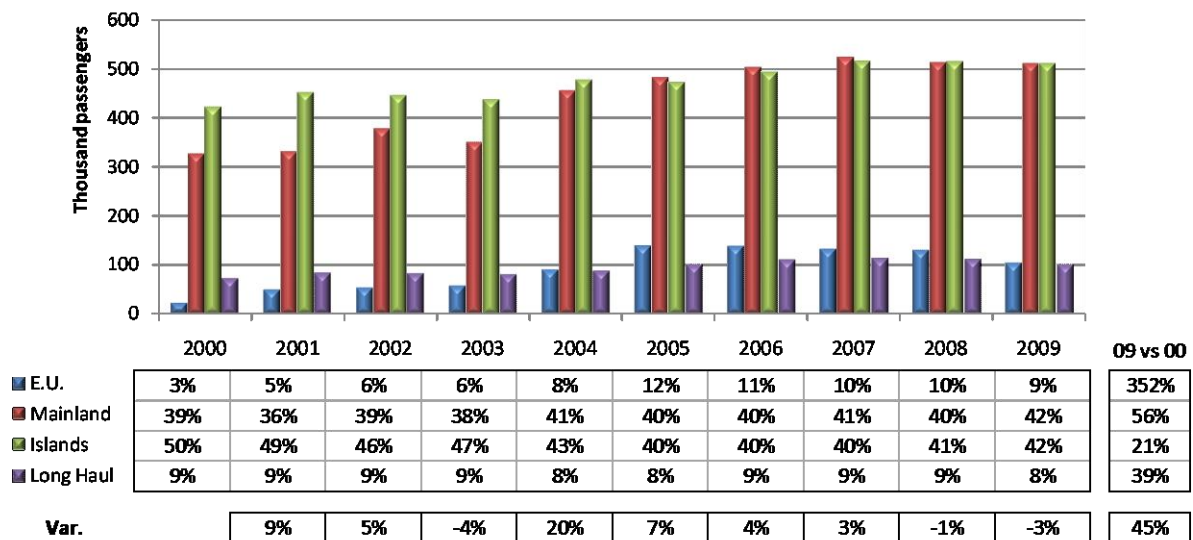
The main constraints of Azores infrastructures includes the distribution of a small number of habitants dispersed between nine islands with a purchasing power below the national average and navigation constraints due to weather and infrastructure conditions. The main challenges are the opening of Ponta Delgada to other destinations, in order to attract new traffic volumes

to optimize the existing infrastructure, and the increase promotional efforts to support tourism development in the region.

The remaining infrastructures of the Azores islands are mainly used to serve the intra-regional traffic, allowing territorial cohesion and mobility of people and goods between the islands of the archipelago.

Traffic volume is concentrated in mainland and islands, but it is worth noting the increased weight of the connections to Europe (+352% from 2000) and the Long Haul (+39%) largely due to increases in operation and introduction of new routes by the SATA Group. The total growth of airports in the Azores between 2000 and 2009 stood at 45%:

**Figure 107: Market Evolution in the Azores**

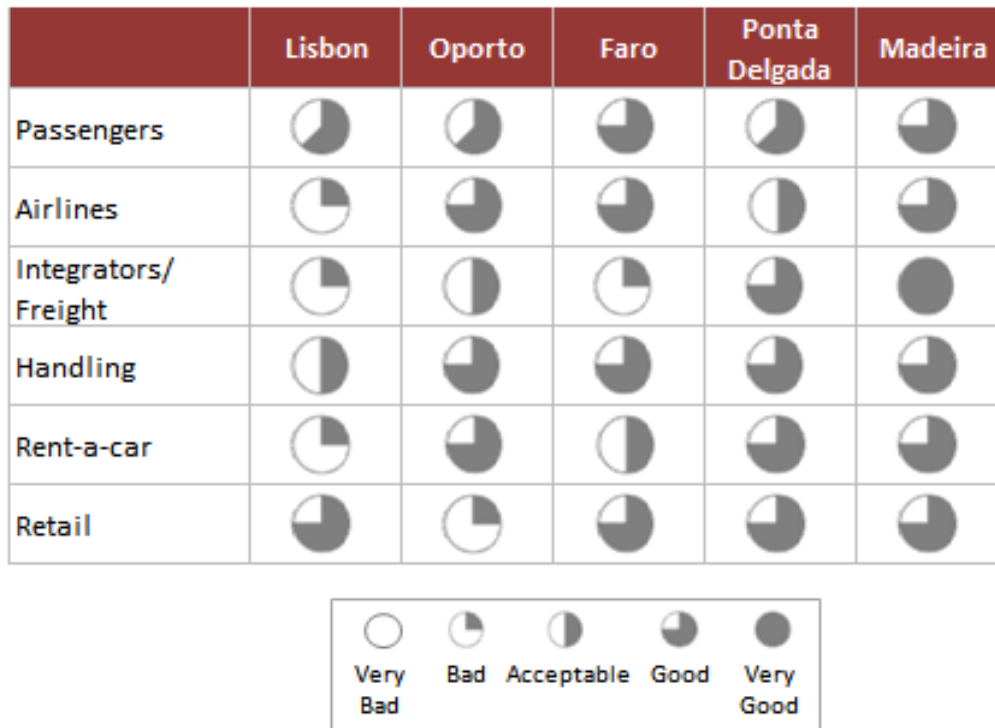


Source: ANA Aerportos de Portugal - Traffic Reports

### Satisfaction Level of the Major Airports

According with MOPTC - Orientações Estratégicas para o Sistema Aeroportuário Nacional (2005), several interviews were made to a range of entities in order to obtain a vision of the external environment of airport infrastructure and, in particular, to understand the existing level of satisfaction and identify the major opportunities for improvement.

**Figure 108: Airport Evaluation by Costumers**



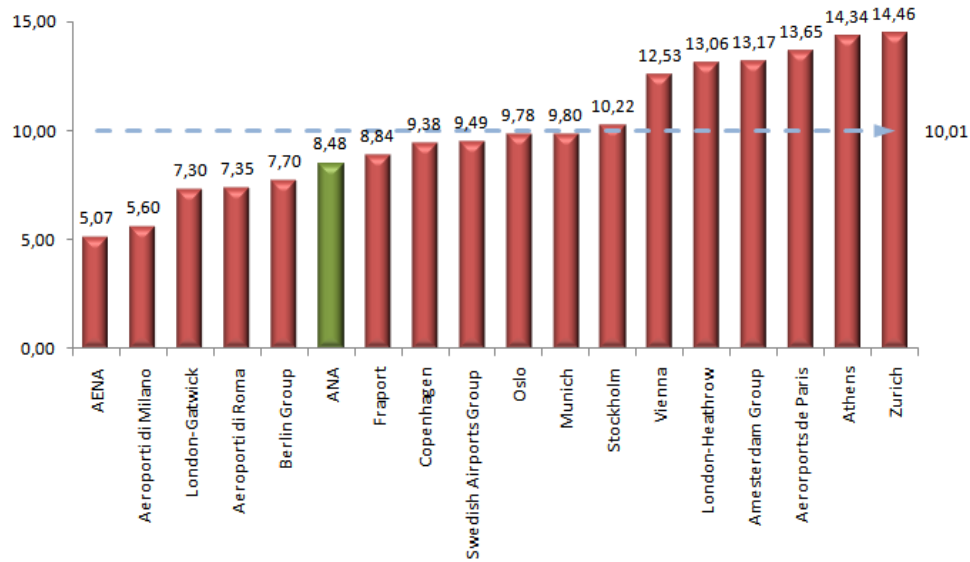
Source: MOPTC June 2006

Lisbon airport is subject to the biggest concerns by customers, which is justified by the capacity constraints affecting all customers except retailers who benefit from the greatest volume of air traffic passengers in Portugal. The classification “bad” attributed by the airlines, reflects the problems of this infrastructure, especially capacity restrictions and jetways availability which affects the entire process of baggage transfer, increases waiting times for stairs and buses provided by Handling companies, among others, affecting operability and efficiency of the carriers.

According to a study made by IATA (AETRA Survey December 2005) the level of passenger’s satisfaction (scale 1 to 5) in what regards the national airports, was: 3.7 to Porto, 3.6 to Faro and 2.8 to Lisbon. The study's average rating was 3.74 and Lisbon came in 61<sup>th</sup> place of 63 airports worldwide. The penultimate place attributed to Lisbon cannot be ignored or neglected and must be subject of a deep analysis, since this ranking only confirms and highlights the weaknesses of this airport.

The Portuguese airport charges, when compared with other countries of Southern Europe (Spain, Italy and Greece), present higher values, with exception of Athens that has the highest value of all. AENA airports and Milan have the lowest rates.

**Figure 109: Airport Charges Comparison**



Source: Jacobs Consultancy - "Airport Performance Indicators 2008"

### Airport future competition

Evaluating some initiatives in the public domain that may take place in Spanish airport industry, it is expected a greater future competition with several impacts depending on the infrastructure in question.

Lisbon airport will face some competition from the future airport at Campo Real Madrid, which will begin operations within 25 to 30 years. In terms of Faro airport the main potential competitor to consider is the implementation of the new airport in Huelva focused on tourist traffic in the southwest Andalusia and in Algarve. Considering the Francisco Sá Carneiro Airport there is a possible threat of concentration of Galicia’s airports.

The high-speed train may also have some impact, but not very significant since the predicted ticket values are between 80 and 100 Euros/one way, being the current air fares extremely competitive and attractive. Moreover, it is difficult to carry luggage for passengers traveling to Long Haul destinations. From the experience of some high-speed trains we can see the example of Germany where Lufthansa decided to make a partnership to cover the different schedules without any need to reduce flight frequencies.

TGV in France more than a competitor is an enhancer of traffic since one of the main TGV train station is Charles-De-Gaulle airport enabling the distribution of traffic to many French

cities and neighboring countries via rail system. There is therefore a high level of mobility by combining the HST with Air France operation. For example, in Brussels where there are some gaps in terms of flight operations and long haul destinations, the high-speed train between Paris and Brussels allows the distribution of traffic through CDG airport. And how many flights exist between London and Paris, each day? More than 20 flights and they coexist with several daily connections made by trains like the TGV and Eurostar. It can act as feeder and distributor of traffic using the airport as a hub. This new means of transport should be looked as an opportunity rather than competition. Like it happens between Brussels and Paris, the fact that TAP have long-haul flights to destinations where Iberia has no presence, may potentiate additional traffic from Madrid to Lisbon via TGV.

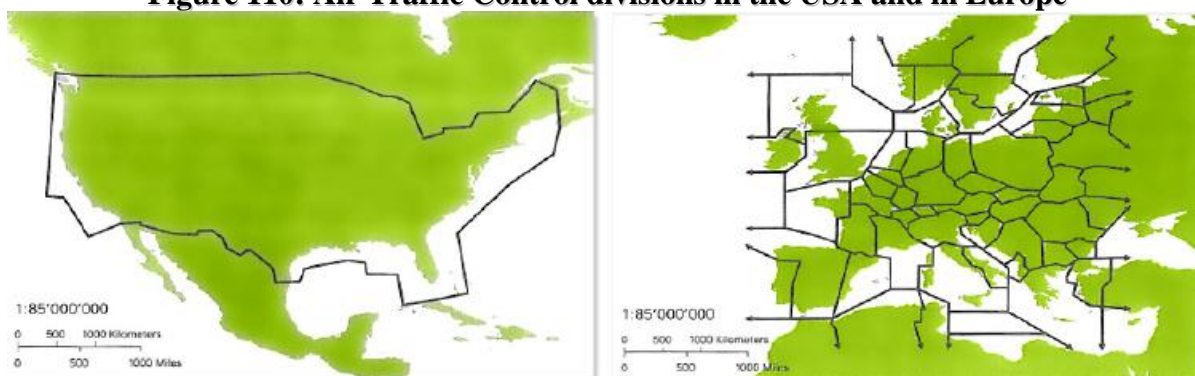
### 7.1.3.3. AIR TRAFFIC SERVICES

The air traffic services are the invisible support that allows the organization of all operational activity. Although not able to see, there are congested “roads” in the sky that require constant regulation. There is a huge structure, involving air traffic controllers, navigation charts and communications between the pilots and ATC services that allows this process to operate in an efficient and safe way. In highly congested airports such as LHR and FRA, where we can see multiple planes in line to land and take off, the use of the entire airport structure in such an optimized way would never be a reality without the competence of air traffic services.

#### Single European Sky (SES)

Currently, the airspace is bounded by the borders of each country. If in the U.S. this does not cause major problems considering the size of the country, in the EU the number of countries (27 navigation services as shown in the picture below), does not allow a total efficiency. The cost structure is higher and the harmonization of operational systems is more difficult.

Figure 110: Air Traffic Control divisions in the USA and in Europe



Source: TAP Portugal presentation at “Forum Ambiente 2008”



According to a study conducted by EUROCONTROL Challenges of Air Transport 2030 (2008), 5 or 6 services would be enough to ensure ATC services in Europe.

To minimize the negative effects of having so many airspace divisions, the European Union created the Single European Sky in order to manage and regulate the European airspace as a whole and not by each country separately. The aim is to benefit from a global vision, making it more effective, with greater security and greater capacity for traffic accommodation.

However, there are political constraints that delay the introduction of this process because it involves sovereignty issues that must be solved within the European Union. The needs of the air transport sector are not always taken into account by politicians mainly by lack of involvement and knowledge about the sector and also because they do not consider it as a priority. The cultural differences in terms of operation and level of experience among the several states, are also limiting factors of a faster and more efficient integration process.

But it is necessary to implement this process as soon as possible. If the prospects for traffic growth become a reality, it must be accommodated by air traffic services. With a single entity regulating airspace the routes can be shorter allowing the reduction of fuel consumption and CO2 emissions.

One way to raise capacity is to use the military airspace which has been facing a increasingly reduce use, eliminating some restrictions that still exist today. But to make this possible we need to have a greater coordination between civil and military aviation.

A failure in increasing air transport capacity will have a very negative impact with significant economic losses. In this scenario SESAR (Single European Sky Air Traffic Management Research) is particularly important, with the constraints and difficulties to accommodate air traffic demand, this project aims to overcome the various obstacles and create the necessary conditions to implement SES.

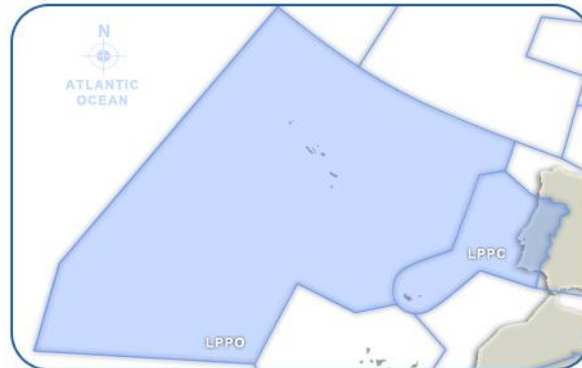
SESAR will have to work in line with other countries especially with NextGEN (2008) (similar U.S. program) for a standardization of systems. If countries such as China, Brazil and India develop or use different systems with different technology it will be extremely difficult to work together. In addition, sharing information at various levels will also have to take place so that certain situations do not happen, such as setting a direct route between two points allowing shorter distances and reaching the destination faster with less fuel burn and less CO2 emissions, and then have to wait for a runway to land or for gate attribution and logistic services at the airport.

The required innovations and developments will have to be made in terms of infrastructure and operational processes requiring the integration of different entities implicating more time consuming. Much of the technology available today in the cockpit of an aircraft is not fully used because there are no adequate infrastructures on airports.

### Air Navigation in Portugal

In Portugal NAV is the entity responsible for air navigation. It is part of the network of 27 Air Navigation Services in Europe and controls one of the largest areas of the continent (NAV has the responsibility to control an airspace which corresponds to 55 times the national territory). It is divided in two FIR zones (Flight Information Region), Lisbon FIR and Santa Maria FIR. Lisbon is responsible for airports, airfields and military bases in Portugal and in the autonomous region of Madeira, while Santa Maria controls the airports in the Azores and has the responsibility for a portion of the Atlantic airspace.

**Figure 111: Airspace controlled by NAV**



Source: IVAO Portugal

According to NAV Portugal (2009), the goals set for the medium to long term involve the preparation for implementation of the SES, the accommodation of increased air traffic, and to position as a major player in providing air traffic services. In order to achieve this, the airspace associated to military bases has to be used for civilian navigation eliminating existing operational constraints (e.g. Lisbon) in articulation with the various infrastructures, enabling an increase in capacity and allowing more direct routes to achieve operational efficiency gains.

A close cooperation with EUROCONTROL and other air traffic services providers would allow greater communication between the various entities and better training for the employees, leading NAV Portugal to be one of the leading air traffic services provider, not only by the size of the area it controls, but also by the good operational levels that can present.

Note that the NAV Portugal has inaugurated a new Centre for Air Traffic Control in Lisbon in early 2008 (in operation since December 2007), equipped with new technology and highly specialized human resources. Beyond safety, this new Centre can become very important in the future allowing Portugal to be in excellent conditions to compete with other European centers in the control of a part of the European airspace under the Single European Sky.

#### **7.1.4. TRANSVERSAL SUBJECTS**

##### **7.1.4.1. ENVIRONMENT**

Environment and Climate change have recently assumed particular importance in society in the recent years. There is a greater awareness of people and economic agents for the necessity to reduce emissions and find new solutions in order to maintain a sustainable level of development. These measures have proved to be somehow ambitious and consensus might be difficult to achieve, especially between developed and developing countries, mainly because there are different development needs that require models based on different modes of production and pollution levels. The lobbies and economic interests of certain industries have also delayed a significant advance in technology and the introduction of new energy sources.

Despite these limitations, it is expected that in the near future major environmental constraints will be introduced causing a significant impact on the type of society we know today. This impact will be felt in several sectors, mainly in the transport sector that will have to adjust to new regulations and find new energy sources that do not depend only on fossil fuels.

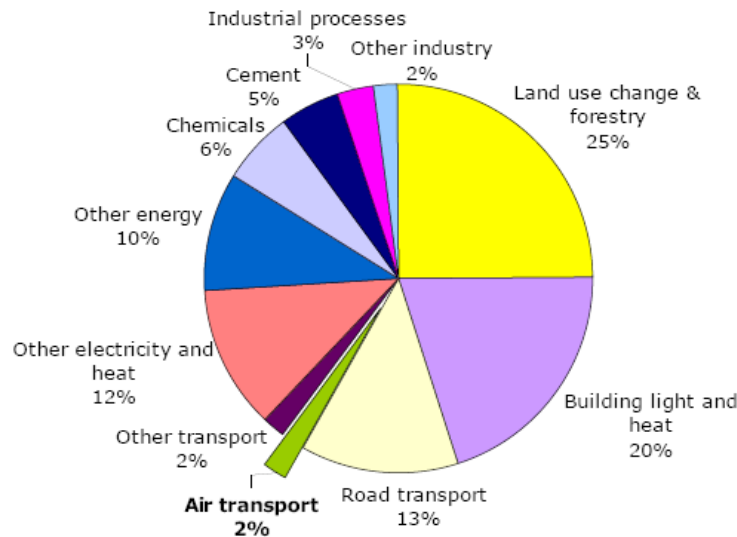
In air transport the energy efficiency level is already quite high, especially in new aircraft, where in a long flight, such as Lisbon - Sao Paulo, the fuel consumption per passenger is only 2 liters per 100 kilometers. Still, with the need to reduce emissions and increasing fuel prices, several changes are expected in the next thirty years. New operating procedures as well as legislation imposing certain restrictions are just some of the examples.

#### **Air Transport Image**

Although air transport contributes only 2% for the global CO<sub>2</sub> emissions, is seen as one of the major responsible, thus suffering from a negative image by society. Indeed, it is much easier to blame the airplane than the car that is used on a daily basis by an individual from home to work and vice versa. On the other hand, society has not fully surpassed the stigma that air

transport is for the higher classes of society being seen as a luxury mean of transportation, and that's why it is subject to tighter legislation and higher rates. It is necessary to know the real contribution of each of the means of transportation and act in accordance with their responsibility.

**Figure 112: CO<sub>2</sub> emissions by sector of Activity**



Source: IPCC (Intergovernmental Panel on Climate Change), 2007

## Airports

Airports will be the most affected and the ones that will have to develop major adjustments in the future. Air quality and especially the noise level in cities and surrounding areas of airports will have to be significantly improved. Nowadays, in 15% of the European airports there are expansion limits due to environmental issues. In the UK local people managed to stop the expansion of Heathrow airport which included the construction of a new runway arguing that it will contribute to an increase in noise and CO<sub>2</sub> emissions. These issues have been debated for some time by the aeronautical authorities and the European commission, which are studying solutions to reduce the impact of noise exposure. One of the today's debates in these institutions is whether airports should pay a compensation, or pay the installation of noise insulation equipment to populations exposed to noise levels above 55 (night) / 65 (day) dba.

Most European airports already have environmental restrictions, such as:

- Operating times, many airports close between midnight and six o'clock in the morning;
- The use of older aircraft or of certain manufacturers that do not comply with the rules imposed by the E.U. is forbidden;

- Approaches are made in Continuous Descent Approach (CDA) and with lower speeds under ten thousand feet of altitude, so that fuel consumption and emissions are lesser as well as the noise level.

Being only a few examples, other changes are already planned involving operating limitations, especially in airports near the cities, where there is more population with greater exposure.

Another major concern relates to the existing waiting times for take-off and landing. At airports with high levels of congestion, waiting times reaches 45 minutes, where the aircraft already have the engines running releasing emissions, with no effective productivity being only a waste of time and resources. This argument has been particularly important in defending the expansion of infrastructure and airspace capacity, because if there is greater capacity and flexibility, the waiting time for landing and takeoff will be smaller and there will be a significant gain in energy efficiency with a decrease in noise and CO<sub>2</sub> emissions as well as reducing irregularity or delays and releasing aircraft for other operations.

### **Climate Change**

The debate remains, involving scientists and politicians, arguing with several theories concerning global warming or a global cooling, with the first at this time having more support and where more work has been produced, including whether if climate change was caused by human behavior or if on the other hand it is just a natural cyclical behavior of the planet. Regardless of theories, which seems to generate consensus is that the climate has indeed changed, and it is already causing practical effects in aviation.

Weather phenomena of great adversity have been increasingly common and are likely to be more frequent in the near future. Long and rigorous winters and summers ending in late October, will lead to a reduction of the intermediate seasons, spring and autumn. Greater number of hurricanes and tornadoes, heavy rain, heavy snowfall, lower temperatures with the formation of ice are just some of the most frequent examples in recent years with special regard to the winter of 2009, where airports such as Heathrow, Frankfurt, Schipol and Charles de Gaulle were closed due to the lack of sufficient means for cleaning the runways and for aircraft de-icing. Even the Eurostar was canceled for several days.

These type of situations have create more delays, airports closed for longer periods, parked aircraft, passengers and cargo waiting for the flights, more congestion and operational difficulties, leading to efficiency losses for the economy and a significant increase of costs for airports and airlines.

In terms of infrastructure there are also some problems. These facilities were created in accordance with the needs of each geographical area and to support certain weather conditions, not being prepared for such a significant change. For example, runways that were designed to handle certain levels of rainfall now have to handle two times more, leading to difficulties in water flow and consequently to operational restrictions. Another example is the case of an airport in the UK where the taxiways and the runway started to melt and to deteriorate and had to be repaired with stronger materials suffering a complete re-design of the infrastructure. This was caused by an unusual number of long summers and higher temperatures that are becoming more frequent in the region.

### **Future Forecasts**

According to studies conducted by different investigators and collected by EUROCONTROL in the Challenges of Air Transport in 2030 (2008), some predictions were made about what may happen if these theories are proven:

- To prevent a large-scale climate change it is required a 50% reduction in emissions in 2050 in comparison to 1990 levels;
- The sea level will continue to rise even if emissions are stabilized. Many of the world's major airports are located in coastal areas (e.g. Faro), estuaries, islands (Hong Kong, Japan where islands were created for Osaka airport - now the authorities are proceeding to an elevation of the airport in order to stay afloat) putting in risk those infrastructures;
- Temperatures will rise in summer, where in the southern regions of Spain, Portugal, France, Greece and Italy tourism may decrease due to excessively high temperatures;
- Higher temperatures will lead to a change in the payload of the aircraft that will need longer runways for takeoff and different departure paths due to operational limitations.

## Portugal

### Airports

With the exception of Lisbon and Faro airport, other Portuguese airports do not present significant problems. Porto airport has been awarded for good environmental practices, being among the best in Europe, in various related matters. In Madeira and Azores regions, in addition to very adverse weather conditions that occur almost all year, causing some constraints and operational difficulties, there are no other significant problems. In these airports the traffic demand is not so intensive, leading to a reduced level of CO<sub>2</sub> emissions.

At Faro Airport, because of the location near Ria Formosa, there are severe limitations of expanding its capacity in the future. Forecasts indicate a possibility of expansion up to 15 million passengers whose capacity is not required before 2030. There is therefore scope for accommodate demand in the long run not putting in question the infrastructure in the next 20 to 30 years. However, considering the context where the airport is located there are several variables that must be taken into account in terms of airport operations due to its proximity to the coast and to the national park of Ria Formosa.

In Lisbon is where the most serious problems within the country are concentrated. This airport is the busiest infrastructure of the country and is inserted in the middle of the city, which creates significant problems. It is not just a question of emissions but also of noise. And although the level of emissions is much smaller compared to the traffic congestion of city, this aggravates the city air quality since takeoffs and landings are made over the city center, precisely when the engines are at maximum power.

The city not only suffers from chronic environmental issues by being a metropolis, but the location of the airport creates greater impact when compared with the other European capitals with airports located in the periphery.

Although the emissions cannot be seen or felt, the same does not apply to noise, which is why it is the biggest concern of the populations living near international airports. And this happens every day, since the city center is over flown by aircraft during the entire approach to land or in case of adverse weather conditions the over flown is done when the aircraft is taking off. In this case, the concentration of clouds is much bigger so the noise of the aircraft while taking off using the engines at maximum power causes a huge disturb and discomfort to the local residents.

If the European authorities apply some of the legislation that is being discussed in terms of sanctions and restrictions on noise levels at airports closer to city centers, already mentioned above, Lisbon airport is not only the 1<sup>st</sup> in line to receive such penalties, but will also face huge limitations in terms of operational efficiency, reducing the attractiveness and competitiveness of the airport.

### **Airlines**

In terms of the Portuguese airlines, TAP was awarded by UNESCO and by the International Union of Geological Sciences with the Planet Earth 2010 Prize in the category of 'Most Sustainable and Innovative Product'. The prize was awarded in recognition of the success of the Carbon Emissions Compensation Program create by the company. It is the first of its kind in the world and was developed in partnership with the International Air Transport Association (IATA).

SATA is developing a fleet renewal with new aircraft Dash Q 400 NextGen. According to the Vice President of Bombardier Sales, Kevin Smith, this is an environmentally friendly aircraft, combining speed and low fuel consumption. António Gomes de Menezes, President of SATA Group, said that this will bring more seats and greater cargo capacity with less noise and vibration. The "Q" of the Q400 means "Quiet". The system NVS (Noise and Vibration Suppression), developed by Bombardier and with equipments from Ultra Electronics these aircraft allows a quieter cabin and vibration-free.

#### **7.1.4.2. SECURITY AND SAFETY**

### **Security**

Safety is a key factor for air transport. From it, not only depend the lives of the passengers but also a whole image of a sector, which despite being the mean of transport with more security control, remains the favorite target for terrorists to give dimension to their claims. Situations such as 9 / 11, December 25 in Detroit or Lockerbie in 1988, had a severe impact on aviation. After 9 / 11, airlines suffered huge losses of traffic demand leading to great difficulties in sustainability. In response to the December 25, and to avoid a new crisis of insecurity, new X-ray machines and body scanners are being deployed in major airports around the world. The Lockerbie case led to the closure of one of the most important and emblematic airlines in the world – Pan Am.



Today thousands of passengers avoid flying on U.S. airlines because they are prime targets of terrorists. But these costs are not just supported by American carriers. All the other airlines that fly to the United States have higher costs due to tighter security measures such as double-checking security, and many others. Security costs of a large airport represent 35% to 40% of their operating costs.

This situation also creates a decrease in traffic, not only because the propensity to travel reduces due to the fear of flying after a terrorist act, but also because the inconvenience of flying due to huge list of additional security measures implemented to increase the level of safety. For example, to enter the in U.S. it is required to take photographs to each passenger, take fingerprints of both hands, an iris control, the passenger has to provide detailed information, and also all the documentation that is needed to obtain the visas. The impact is not only on a domestic perspective, but these situations also affect and create a lot of constraints to the countries that have flights to many American cities.

Another important aspect that is often overlooked relates to security breaches resulting from the high turnover of people who are in daily contact with the aircraft and with the airport infrastructure, such as the outsourced security companies, catering, cleaning and handling employees. These people work with part-time contracts with low wages and no recognition of the role they play in the company. This may create the propensity to facilitate in certain security measures or in an extreme situation to get involved in corruption or coercion practices benefiting from the easy access that they have to aircraft, baggage, and restricted areas, being able to participate in robberies, attacks or even in terrorist acts.

## **Safety**

Although air transport is still the safest mode of transportation in the world, is also the one that still has some resistance to travel, there are always people with reluctance of getting on an airplane, something that does not happen with the car. This can be attributed to:

- Air transport is the mean of transport that most defies the laws of nature. The natural behavior of the human being is to be in the ground and not up in the air;
- It is a relatively new mean of transport in relation to others;
- In air transport the accidents have greater notoriety.

Although there are many more cars than planes, being the transport capacity much higher per unit in the aircraft, only in one year in Portugal more people die in car accident than by aircraft worldwide. In 2008, the number of deaths in our country was in 2587 with 772 serious injuries, compared with 433 resulting from plane crashes worldwide. In the EU the number of victims in car accidents has reached 39000.

In fact, even with the exponential growth that aviation has experienced over the past years where the number of flights per day is increasing, the number of accidents has been reducing as well as the number of fatalities and casualties. The most common situation is now incidents and not accidents with most passengers leaving the aircraft with minor injuries. This is mainly because the aircraft are becoming increasingly safe, where accumulated practice of construction, advances in technology and constant research as well as the operational experience gained by pilots allows these machines to achieve high standards of performance and safety.

With severe competition in air transport, mainly due to the entry of LCC with very lean cost structures, traditional airlines have been forced to revise its cost structure trying to keep competitive in the market, but regardless of the aggressiveness of competition, security cannot be neglected.

Take the case of Spanair, a company which was experiencing serious financial problems, in the middle of peak season (crucial time to capture revenue and minimize costs), let the economic pressures overlap security procedures and influenced the decision of taking off before checking all the safety procedures.

This is just an example of what cannot happen. With the competition being so strong and with so many options to choose from, some airlines in an attempt to catch as much traffic as possible have putted in question some security procedures for their passengers. And given the media attention surrounding aviation, when an accident occurs the consequences of such notoriety can be very dramatic and even dictate the end of an airline.

As already mentioned, the number of serious accidents has been declining as well as the number of fatalities. However, within the minor accidents there is a specific type that has increased which is the Runway Overrun. This type of accident means the plane skids of the runway because it cannot stop within the runway length. The risk is four times greater on wet runways, and its most common causes are: excessive landing speed, landing long, landing long and with excessive speed, and landing in a wet, snowy or icy runway. If the first three

can be attributed to human error, which has often originated by the short time that aircraft have to land because of traffic constraints that exist at international airports having to accomplish the assigned slots, the latter factors are often unexpected and not controlled by the pilots.

To have an idea of the numbers, only in the months of December 2009 and January 2010 there were four situations of this type, although without any consequences for passengers, caused significant damage, especially in the American Airlines Boeing B737-800 in Kingston, Jamaica. In all these situations the weather conditions were a decisive factor, heavy rain, ice and snow created such conditions that the aircraft were not able to stop.

Climate change also have an important role, as stated in the chapter dedicated to environment, the infrastructures were built to support certain weather conditions, and there are now more severe phenomena and some of them with very different characteristics. In places where before was not usual to have heavy rain or heavy snow, now will be increasingly more often.

These situations do not happen only at airports with fewer conditions, in August 2005 an Air France plane arriving from Paris skid off the runway at the Toronto Pearson International Airport, Canada. The aircraft was only able to stop 200 meters after the end of the runway. At the time, the weather conditions were very adverse with heavy rain and strong wind, and in combination with a long landing by the crew lead to the incident. All the passengers were able to exit the plane without serious injuries, but due to the irregularity of the terrain at the end of the runway, the aircraft broke up and burst into flames. Another similar example, but with more serious consequences was TAM Airlines Flight 3054 landing at Congonhas airport in Sao Paulo that was not able to stop and crashed in the surrounding buildings killing all the passengers and crew. The consequences of this accident were very severe because this airport is inserted in the city center with buildings and gas stations near the end/beginning of the runway as showed in the diagram below:

**Figure 113: TAM's accident in Sao Paulo Congonhas diagram**

Source:wikinews.org

These cases are a good example that these situations can happen at any airport and with any airline. However, the consequences can be very different depending on the places where they take place, but what we can see is that the consequences are much more severe when airports are placed inside a city or near residential areas.

Aviation security is an effective competitive advantage for those who have this image in the market, such as Lufthansa and TAP. In times where the obsession with cost reduction becomes the strategy adopted by most airlines, the security issue cannot be regarded as a cost, but instead should be seen as an investment.

### **Infrastructure Problems**

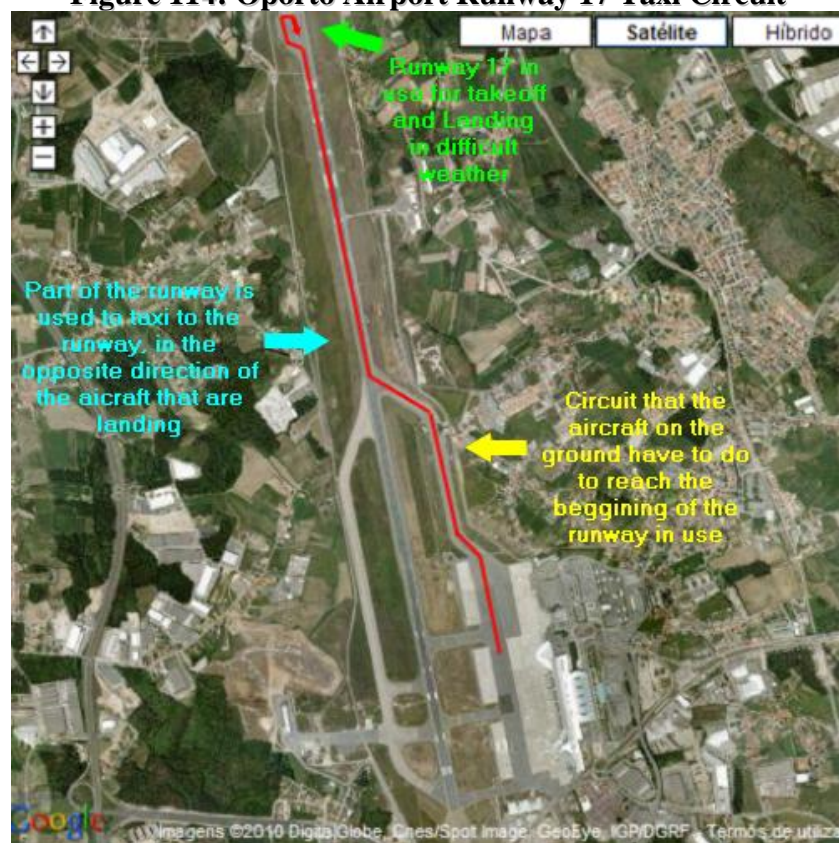
Portuguese infrastructure suffered many improvements over the past ten years, with the emphasis on Funchal airport, where the extension of the runway has lead not only to an increase of additional routes, new destinations and the use of larger aircraft, but mainly due to the increase of operational safety levels.

Also at Porto airport developments were made in terms of infrastructure, but only in terms of Terminal facilities. There are still some operational problems that have not been corrected, thus not allowing the optimum level of efficiency and security of this infrastructure. The most important example is the lack of a parallel taxiway to the runway, which means the aircraft

have to use part of the runway in use to reach the beginning of the runway before take-offs or taxi to gates after landing, this maneuver is called Backtrack.

This issue assumes greater significance when the runway in use is 17 because it is the one in use when exist adverse weather conditions. It is also used for Low Visibility Operations (LVO) which means when visibility is reduced, because it is the one that has the support equipment needed for the aircraft to approach the runway. In these circumstances, most of the airplanes that are on the ground for take-off, have to go to until the beginning of the runway using part of the one actually in use, and then make a 180 degree turn.

**Figure 114: Oporto Airport Runway 17 Taxi Circuit**



Source: Google Maps adapted

This maneuver represents a significant risk, because although the air traffic controllers are constantly aware of all movements in the airport, in a situation of reduced visibility the aircraft do not have a visual contact with the runway. A similar situation led to the Tenerife accident where a failure of communications associated with reduced visibility, putted the two planes on the same track in opposite directions. The aeronautical world has learned a lot from this accident and today new procedures are used in runways with these characteristics. But it is also true that rare are the airports of the world without parallel taxiways.

Also in Madeira and Azores, the absence in almost all infrastructures of parallel taxiways, makes the procedure of Backtrack the mode of operation at these airports. Whilst an airport like Funchal inserted in a difficult geographical location makes it very hard to build these taxiways, but in the other airports this situation does not happen. And if in some airports the number of movements cannot justify the costs of construction, such as Porto Santo, Pico or Horta, this does not apply to an airport that has a significant traffic volume and aims to be the main gateway for the northwest of the Iberian Peninsula.

However, it is in Lisbon where we can find the most serious problems, highlighting three situations of particular concern. It is known that about 85% to 90% of aviation accidents occur during takeoff, approach and landing. With the airport inserted in the city all takeoffs and approaches to land are made over the historical center of Lisbon or over the urban areas in the north of the airport. It is true that in many cities approaches and takeoffs are performed using the airspace of the cities, but in any major European Capital airport the aircraft does not overfly the historical center and the city major hospitals and universities at such a low altitude.

**Figure 115: Lisbon Airport Approach Path**



Source: Google Maps adapted

In situations of normal weather conditions the runway in use is 03, which indicates that all approaches are made, as already mentioned, above the city center, and consequently take-offs

are made to the north, passing above the IC17 CRIL and Camarate. If adverse weather conditions are observed, heavy rain, wind or low visibility, runway in use is 21, which means that take-offs are made over the city center of Lisbon and the corresponding approach is made through the area north of airport. This leads us to the second problem.

When runway 21 is in use, the larger aircraft (wide-bodies) have to cross it to reach the beginning of the runway in order to takeoff, as there is no complete parallel taxiway at the east of the runway. The diagram below shows this situation.

**Figure 116: Lisbon Airport Runway 21 Wide Bodies Taxi Circuit**



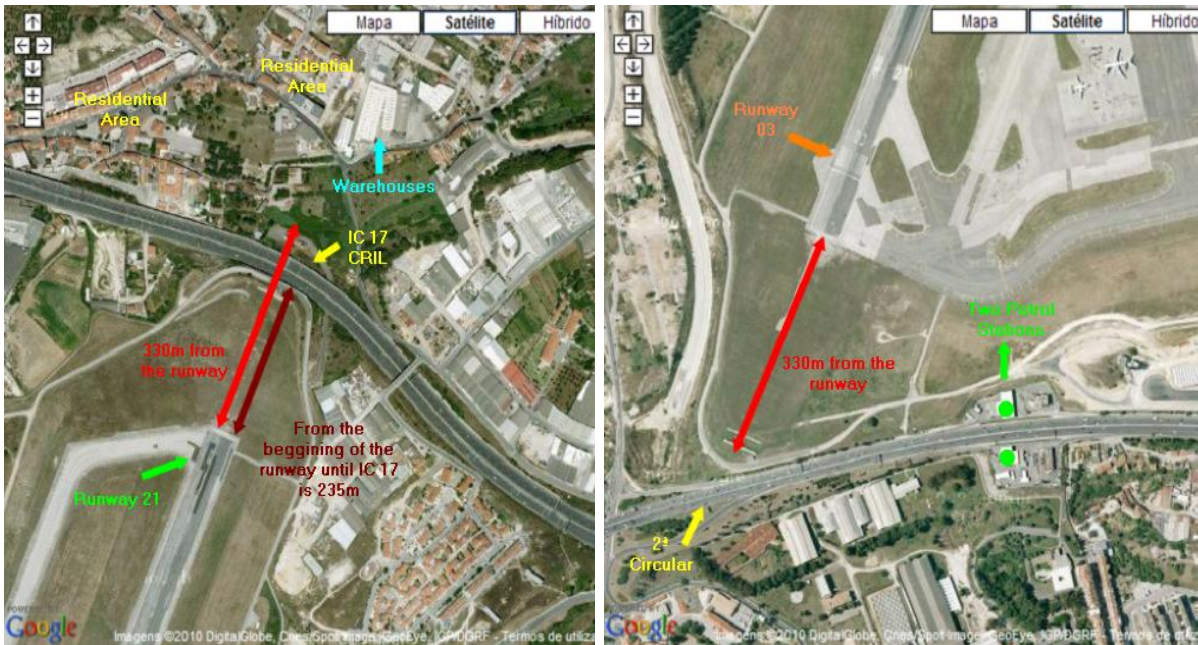
Source: Google Maps adapted

Although less severe, this occurrences has some similarity with Oporto airport situation. Whether at the Lisbon airport (runway 21), or at Oporto airport (runway 17), these runways are used in adverse weather conditions and Low Visibility Operations (LVO) that means that the pilots have no visual contact with other aircraft. Whilst the aeronautical authorities and their agents provide all security measures and that should not be put into question, this example is merely illustrative of the weaknesses and constraints the infrastructure has.

The third and final problem relates to the possibility of a runway overrun in Lisbon like the ones that have been described previously. If such an accident happens, the consequences in

the worst scenario can be very severe. In normal weather conditions the runway 03 is in use, and if there is a runway overrun it can be aggravated by a large gap that exists between the airport boundaries and CRIL IC17. In the case of landing in adverse weather conditions, the runway in use is 21, and if the plane is not able to stop, it has right at the end of the runway the busiest road in the country (2ª Circular) and also two petrol stations.

**Figure 117: Lisbon Airport Runway Threshold**  
**Runway 21** **Runway 03**



Source: Google Maps adapted

These situations can happen anywhere in the world and as the number of movements increases so will the probability of an event of this nature. The aim is only to warn for the consequences of having two runways inserted between two busy roads. This kind of incident in an airport with sufficient space at the end of each runway does not have the same consequences as in an airport where exists a huge residential area and two of the most congested roads.

#### 7.1.4.3. PROPERTY STRUCTURE

Airports are no longer just an infrastructure where aircraft can land and take off and began to be places with a high strategic importance, being extremely relevant in terms of wealth creation, the value they generate for the countries and regions where they are inserted, working as true development poles and business promotion. These activities allowed airports



to be managed like businesses, with many other areas of activity and not just focused in aviation. This creates the concept of “airport city” that feeds and generates many other industries around it, besides aviation.

Nowadays, it is impossible to imagine Germany without Frankfurt airport, England without Heathrow or Holland without Schipol, among others, because these infrastructures have a structural importance for the economy for the development of these countries. All airports are essential to increase the attractiveness of the region and for the development of business centers.

And to keep those statutes it has to be a continuous expansion of the infrastructure in order to meet the increasing mobility demands. But, given that these investments have significant costs, there is a need for new ways of financing, being privatization one of the options to bring these resources and also a more professional management model.

But the processes of privatization are not all equal, there are some who are real success stories but there are others that did not went so well. Due to the relevance that such infrastructures have for the countries, a difficult process can have huge consequences. This situation is even more pronounced in a city where there is only one airport. The competition in these cases is reduced because there is no financial capacity to build another airport and no secondary airports as an alternative, resulting in monopolistic practices.

In theory, a private company has the main objective of profit, but public company must guarantee the national interest. Unlike other industries or other businesses where they clearly serve only the interests of shareholders, there are those, such as airport infrastructure that should primarily serve the city where it is located and the interests of the nation. And because there is this difference, it is not possible to privatize airports like normal company that operates in a market with competition.

Privatization processes are usually time-consuming mainly because there is depth financial analysis that has to be done by the private companies in conjunction with the government in order to take into account all relevant variables. For example in Australia the process took 10 years, 15 years in the United Kingdom and almost 10 years in Canada.

According to an MIT study for the FAA (Federal Aviation Administration) Airport Privatization Issues for the United States (1999) the full privatization of an airport should never be done, it must be avoided private monopolistic practices in an infrastructure of national interest. It also states that there must be an involvement of public authorities in

monitoring the infrastructure; this can either be done by a shared management agreement between public and private entities or by strengthening the regulatory powers of the competition authority.

Analyzing some cases of privatization in other countries:

- United States - the U.S. airports are the most privatized in the world and where, despite a strong presence of private entities, the most important operational aspects are always controlled by government entities. These airports are managed through a partnership between the federal government, private companies and the interests of civil authorities (municipalities, metropolitan areas).

Another key factor in the development and management of these airports are the airlines, particularly those that are based at the airport, for example in Denver American Airlines has participated in the development of airport infrastructure. Another case is the airlines assuming the responsibility for the terminal in a certain airport. These airlines have the responsibility for the expansion or reformulation of the facilities. Delta Airlines in New York JFK airport is a good example. This approach creates a direct involvement of the airline in management issues and can adjust the facilities to their needs. By having the based airline operating in the best possible conditions can also create more traffic demand and can enhance the importance of the airport infrastructure.

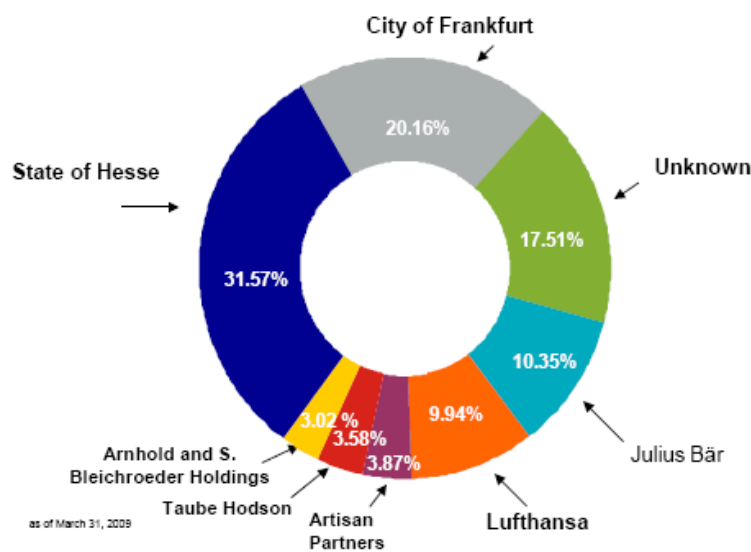
- London, UK - The British example is different from the American, because in this case the entity that manages the airport was totally privatized and, in order to ensure the national interests, the government decided to increase the regulatory powers of the competition authority. Given the absence of a partnership between public and private entities and that government entities do not take place on the board of directors, the decision making takes more time and is involved in more bureaucratic procedures. However, also in this process the major airlines are integrated in the process. A good example is the Terminal 5 at Heathrow Airport entirely dedicated to British Airways.

Since these infrastructures are planned in the medium/long term, with an average of 10-15 years, the investments have to be made in the short term. In some cases the shareholders do not want to invest and assume the costs because the return on investment is only achieved in the long term. In this situation the national interests are not a priority, being the profit the

primary objective creating a difficult situation to solve because the necessary investments are not made in order to accommodate current demand and the future growth.

- Germany - the German model resembles to the American model, it provides a direct involvement of public and private entities that, together develop the most appropriate strategic decisions for the infrastructure, avoiding the central supervision model used in the UK and bureaucratic constraints. The involvement of Airlines is also considered crucial in the development and management of the infrastructure, especially Lufthansa, since it is these companies that are the main users and the ones that generate more revenue. Given the importance that Lufthansa has for Frankfurt airport, the company not only participates in the development of this infrastructure but it is also one of the main shareholders of Fraport AG, the company that manages Frankfurt airport.

**Figure 118: Shareholders of Fraport AG**



Source: Fraport's presentation "Transport for a Global Economy" at International Transport Forum 2009, Leipzig

We can also see that even allowing the entry of private entities (38.33%) and the consequent entry of capital; the national interests are safeguarded with a strong presence of both the federal state and the City of Frankfurt. Although the Frankfurt airport is a European hub it serves primarily the City of Frankfurt and the German territory. Thus, not only the national interests are guaranteed but also the city authorities can participate in the strategic development and management of main infrastructure of the city.

## Portugal

In Portugal ANA Airports of Portugal is the responsible for the airport management of Lisbon, Porto, Faro and Azores (4 infrastructures) and has a sub concession in Madeira airports management. The company is publicly owned and includes the following subsidiaries:

- NAER - New Lisbon Airport SA, has to mission to plan, develop and launch the construction of the new Lisbon airport;
- ANAM - Airports and air navigation Madeira SA which holds a 70% of the capital being the other shareholders the autonomous region of Madeira (20%) and the government of the republic (10%), and has the primary objective of exploring and developing the airports in the autonomous region of Madeira;
- Portway - Handling of Portugal SA, aircraft assistance in the Portuguese airports;
- ADA - Administration of Airports, Ltd. Responsible for the administrative functions of airports, including Macau airport;

**Figure 119: ANA Airports**



Source: ANA – Aeroportos de Portugal

In order to finance a significant part of the New Lisbon airport it is planned a privatization of a portion of the capital of ANA, a process that should begin in late 2010. The privatization model has not yet been released. The only specific points that are already known is that all airports will be involved in the privatization process, and the percentage of capital available for private players will not exceed 50%. It will be a concession of airport operation and not a privatization of ownership.

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### 7.3. GLOSSARY

ACARE Advisory Council for Aeronautics Research in Europe  
AIP Associação Industrial Portuguesa (Portuguese Industrial Association)  
AMS Amsterdam Schipol Airport  
ANSP Air Navigation Service Provider  
ASK Available Seat Kilometer  
ATC Air Traffic Control  
ATM Air Traffic Management  
ATS Air Transport System  
BCN Barcelona El Prat International Airport  
BRIC Brazil, Russia, India and China  
BRU Brussels National Zaventem Airport  
CAAFI Commercial Aviation Alternative Fuels Initiative  
CAEP Committee on Aviation Environmental Protection  
CDG Charles De Gaulle (Paris North Airport)  
CIS Commonwealth of Independent States  
CO Carbon Monoxide  
CO<sub>2</sub> Carbon Dioxide  
DXB Dubai International Airport  
EC European Commission  
ESFRI European Strategy Forum on Research Infrastructures  
ESRAB European Security Research Advisory Board  
ESRIF European Security Research and Innovation Forum  
ETS Emission Trading Schemes  
EU European Union  
EUROCONTROL The European Organisation for the Safety of Air Navigation  
FAA Federal Aviation Administration  
FAO Faro International Airport  
FNC Funchal International Airport  
FP7 Seventh Framework Programme  
FRA Frankfurt Am Main Airport

GALILEO The European Satellite Navigation System

GDP Gross Domestic Product

GMES Global Monitoring for Environment and Security

GoP Group of Personalities

HLTC High Level Target Concept

HST High Speed Train

IATA International Air Transport Association

ICAO International Civil Aviation Organization

IFR Instrument Flight Rules

INAC Instituto Nacional Aviação Civil (Civil Aviation Portuguese Authority)

IPCC Intergovernmental Panel on Climate Change

KLM Royal Dutch Airlines

JTI Joint Technology Initiative

JU Joint Undertaking

LCC Low Cost Carriers

LH2 Liquid Hydrogen

LHR London Heathrow Airport

LIS Lisbon Portela Airport

LNG Liquid Natural Gas

MAD Madrid Barajas International Airport

MCT – Minimum Connecting Time

MMD Manufacturing, Maintenance and Disposal

MOPTC Ministério Obras Públicas Transportes e Comunicações (Ministry of Public Works, Transport and Communications)

MUC Munich International Airport

NAV – Navegação Aérea de Portugal (Portuguese Air Control Authority)

NEXTGEN - Next Generation Air Transportation System across United States

NOX Nitrogen Oxides

OECD Organisation for Economic Co-operation and development

OPO Oporto International Airport

O&D Origin and Destination

PDL Ponta Delgada Airport

PENT Plano Estratégico Nacional de Turismo (National Strategic Plan for Tourism)  
PRC Popular Republic of China  
PTS Personal Transport System  
PXO Porto Santo Airport  
R&D Research and Development  
RPK Revenue Passenger Kilometre  
RTD Research and Technology Development  
SEF Serviços Estrangeiros e Fronteiras (Portuguese Border and Immigration Control Authority)  
SESAR Single European Sky ATM Research  
SFC Specific Fuel Consumption  
SRA Strategic Research Agenda  
SRG Strategy Review Group  
TAM Linhas Aéreas do Brasil  
TEN-T Trans-European Network for Transport  
TMA Terminal Control Area  
TGV Train à Grande Vitesse (HST)  
UAV Unmanned Aerial Vehicle  
UHC Unburned Hydrocarbons  
UN United Nations  
VFR Visual Flight Rules  
VLA Very Large Aircraft  
VLJ Very Light Jet  
XTL “Anything” to Liquid