Business Aviation in Europe's Major Cities and the Case of Berlin

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1 Introduction

Business aviation is a highly fast emerging business model. This segment is even growing faster than the overall air traffic market.

The network of airport pairs in Europe linked by business aviation had more than 100,000 links in 2007. These are three times as many links as the scheduled flight network. Business aviation fills a gap in scheduled services and is especially used between cities not served by daily scheduled flights. Most business flights are shorter than the average scheduled flight, with half under 500km. This highlights that business aviation is the ultimate in point-to-point air traffic and is an adequate complement to the scheduled flight traffic.

In the context of an actual project the current demand situation in business aviation has been analysed, in order to understand the recent development using private jets instead of scheduled flights. This is well explained in the most recent available flight data on business jet operations for 2006 and 2007. Based on this data, we are depicting the relevance of airports that offers general aviation services within the respective region.

It is remarkable that the average share of business aviation of the busiest ten airports in Europe is not more than 2% and we observe a further adverse trend. There is a tendency to provide airports exclusively for general aviation purposes near or even in the specific major citie. In doing so, the strengths those are characteristically for business aviation can be played out at the best.

In this context the actual situation in Berlin is of great interest. At the moment, Berlin operates three airports. The Berlin-Tempelhof is a typical business aviation airport, whereas Berlin-Tegel and Berlin-Schonefeld serve with few exceptions the scheduled flight traffic market. However, the senate of Berlin plans to operate only one airport from 2011 on – the Berlin Brandenburg International Airport (BBI).

In the following, the current situation of general aviation and the respective airports in Europe's major cities are illustrated. In the specific case of Berlin, some impressions of the importance of an airport for business aviation in respectively nearby the city centre as a result of the recent demand figures are given. The article will

discuss the relevance of the Airport Tempelhof for the business aviation and how the demand in the region will be affected in the future. Furthermore, the impacts on the operations of the BBI by serving both business aviation alongside the scheduled flight traffic are considered.

2 Business Aviation Market

Business aviation is operated under a number of different business models. The International Business Aviation Council (IBAC) classifies business aviation operators in three categories [2]:

- *Commercial:* Aircraft flown for business purposes by an operator having a commercial operating certificate. Typically these are on demand charters.
- *Corporate:* Non-commercial operations with professional crews employed to fly the aircraft (e.g. corporate fleets).
- *Owner Operated:* Aircraft flown for business purposes by the owner of the aircraft.

The definition chosen when compiling the data that underly the following analyses was selected to capture the essence of this segment of air traffic and to present clearly the related statistics. The definition for business aviation is therefore derived from a list of aircraft types with a seating capacity of maximum 19 passengers. The Top 20 aircraft types that fly the most in Europe in 2007 are listed in the table 1 below and have a share of 75% of business flights of the business market. They include jet-, turboprop- and piston-engined aircrafts. The turboprops are highlighted by red letters, the piston aircrafts by green letters and the jets are simply written in black letters.

The second criterion, which flights are considered in the data, has been the operation under instrument flight rules (IFR), which basically implies that they are under the control of an air traffic controller for some or all of the flight. Flights operated under visual flight rules (VFR) are not considered at all. Even though, they are made on business purposes. However, the main proportion of business flights is conducted under IFR, since it is the more viable alternative, for example because of the difficulties of providing the passengers with a reliable service in poor weather or at night.

ICAO ID	Manufactures and Models	Engine Type	Seating Capacity	Share Business Aviation Movements
BE20	Beech: Commuter	Turboprop	14	9.0%
H25B	Hawker Siddeley: HS-125-700	Jet	8	6.8%
C56X	Cessna: 560XL Citation Excel	Jet	10	6.5%
C550	Cessna: S550	Jet	11	6.3%
C525	Cessna: Citation CJ1	Jet	7	5.2%
CL60	Canadair: CL-60 Challenger	Jet	19	4.2%
F900	Dassault: Falcon 900	Jet	19	4.1%
F2TH	Dassault: Falcon 2000	Jet	19	4.0%
C25A	Cessna: 525A Citation CJ2	Jet	7	3.0%
C208	Cessna: Super Cargomaster	Turboprop	14	2.7%
BE40	Beech: 400 Beechjet	Jet	8	2.7%
C560	Cessna: 560 Citation	Jet	8	2.6%
GLF4	Gulfstream Aerospace: G1159C Gulfstream 4	Jet	19	2.5%
BE9L	Beech: King Air 90	Turboprop	9	2.4%
GLF5	Gulfstream Aerospace: G1159D Gulfstream 5	Jet	19	2.2%
LJ45	Learjet: 45	Jet	9	2.0%
PC12	Pilatus: PC-12	Turboprop	10	2.0%
LJ60	Learjet: 60	Jet	6	1.9%
PA31	Aicsa: PA-31-350 Navajo Chieftain	Piston	9	1.8%
FA50	Dassault-Breguet: Falcon 50	Jet	16	1.7%

Table 1: Share of Business Aviation Movements on Aircraft Type

Source: Eurocontrol 2007

Due to the definition based on aircraft-type, the statistic also picks up some operations that are not strictly for business. Hence, there are overlaps possible, in case an aircraft type that is suitable for business use is also used, for instance for training, military, and hospital flights.

The acceptance of using general aviation aircrafts for business purposes is driven by the needs of the global economy, by increasing profits and prosperity, and by a growing recognition of the economic benefits. Saving employee time and in consequence increasing productivity of personnel is the major benefit claimed by business aviation users [4]. This is due to the fact that companies flying jets for business purposes can control virtually all aspects of their travel schedule. Itineraries can be changed instantly and business aircrafts can fly to much more destinations than are served by the scheduled airlines. Business aircrafts allow passengers to conduct business en-route in complete privacy. That ensures industrial security and maximises personal peace of mind. A survey of the National Business Aviation Association (NBAA) in the United States evaluates that as for productivity and efficiency passengers felt that they were significantly more productive aboard business aircrafts than they would be even in their own office [6]. The comfort of flying with business aviation also includes reduced inconvenience and stress associated with travelling on commercial carriers.

In short, the attractiveness of using business jet services is significantly attributable to the high flexibility regarding time, operated links, and privacy. Additionally, it projects a positive corporate image of the company.

Reasons for using business aircrafts are manifold; according to the above mentioned survey of the NBAA the following figure 1 shows the main results.

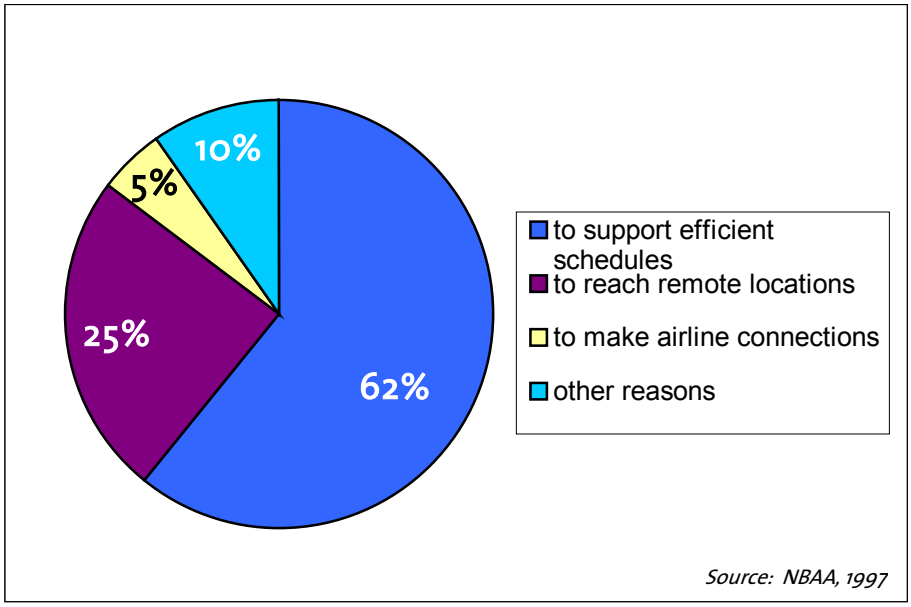

Figure 1: Reasons for using business aircraft

Basically, those companies stated reasons that highlight the business aviation segment to be an adequate complement to scheduled flight traffic. The decisive distinction are, that business aviation flies when it is needed, while cutting out check-in times, so to support efficient schedules, and it flies where it is needed. The scheduled network is organised around the capital cities and the main population centres. In contrast, the business aviation network also approaches remote locations. This also explains, why business flights, with an average range of fewer than 500km, are shorter than scheduled flights, and justifies the surname air-taxi. Of the more than 100,000 airport pairs flown by business aviation in 2007 in Europe, only 5% had a scheduled alternative, i.e. at least one scheduled flight per working day [3]. This is due to the specific customers demand, and to difficulties of airport access, so that business aviation often flies to different airports than the majority of the commercial carriers (e.g. Madrid/Torrejon rather than Barajas; Paris/Le Bourget rather than Charles de Gaulle). This point will be considered in depth in the next section. After all, it can be said that business aviation fills a gap in the schedules.

3 The Business Aviation Market in Europe

For already a decade the business aviation segment has been growing constantly. Only in 2001 after September, 11 the trend was interrupted. However, the upwardly growth continued just the other year. Flights by business jets grew particularly strong in 2006 and 2007 by 9.8% and 11.4% respectively. A noticeable proportion of the rate for 2006 is led direct to the FIFA World Cup in Germany, without that the growth rate would have been even lower. Nevertheless, in 2007 business aviation reached the highest amount of flights in Europe for the time being of about 764,000 departures and arrivals on 100,000 links. This segment of air traffic is growing at more than twice the rate of other air traffic. In the period from 2001 to 2007, 49% more business flights were registered compared to a 19% increase for the rest of air traffic in the same period [3].

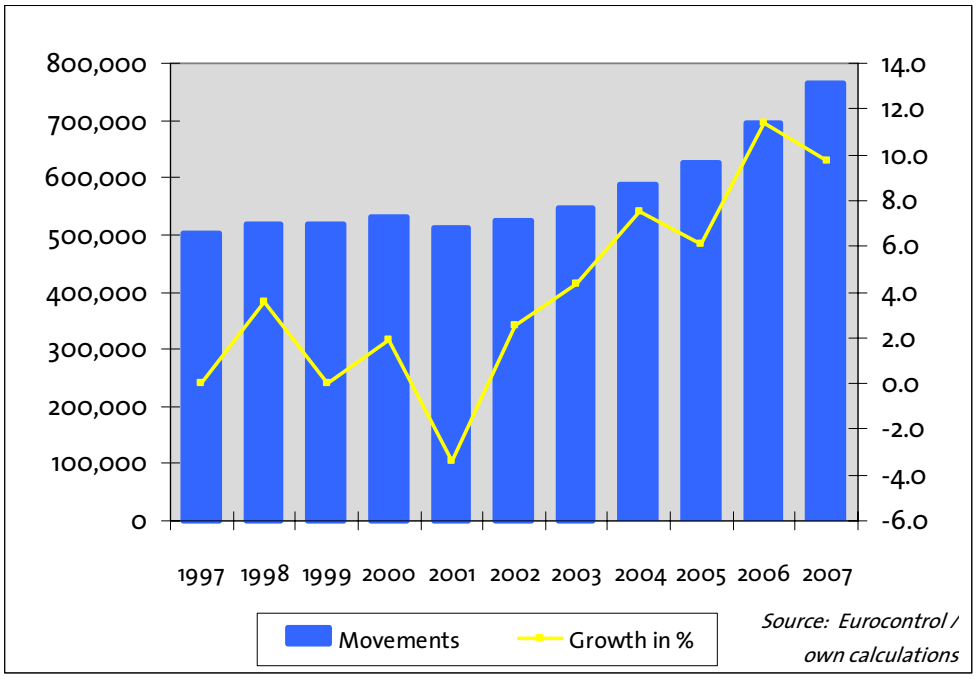

Figure 2: Development of Business Aviation IFR Arrivals and Departures, 1997 – 2007

There are many reasons for this growth: globalisation induces more business travel; increasing delays at airports, mostly because of security constraints since 2001; growing prosperity brings this sort of travel within the reach of more companies and individuals; and changing European social perspectives which recognise the value of business aviation rather than seeing it as a luxury.

Seven countries are accounting for 76% of all business aviation movements in 2006 in Europe on links that were served in minimum 52 flights the year, i.e. airport-pairs that are flown in average at least once the week throughout the year. These countries have at minimum 18,000 movements on routes that are served frequently.

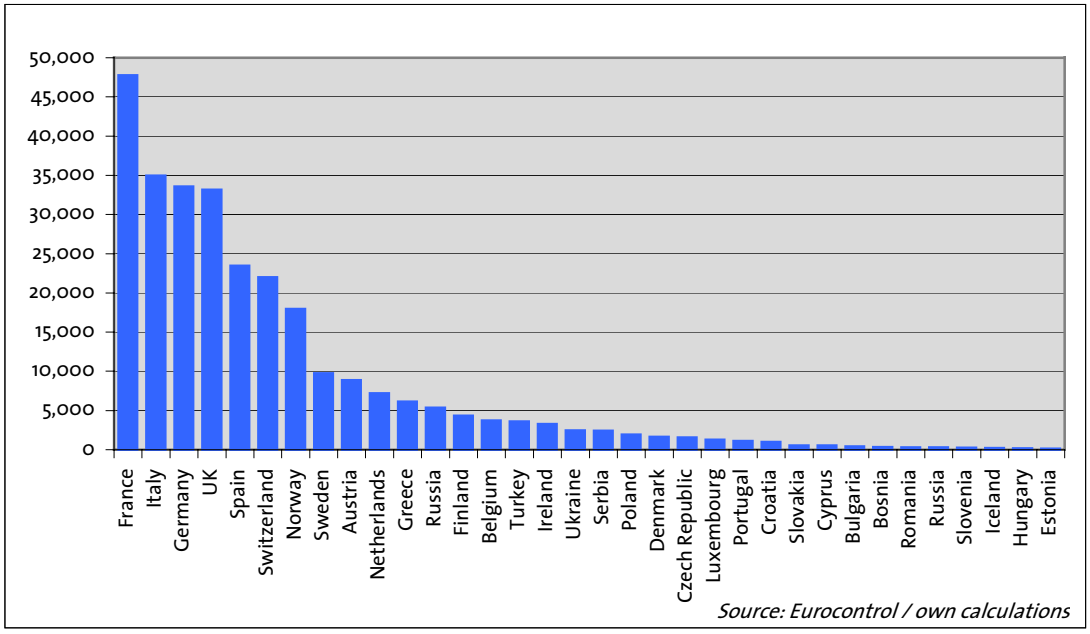

Figure 3: Business Movements per Country in 2006 with more than 52 flights per link

Business aviation is about linking major business centres. The following figure 4 shows the emerging network of business aviation routes and its density in Europe in 2007. As you can see there is a concentration of traffic along a London-Rome-Munich triangle, taking in Paris, Geneva, Cannes, Stuttgart, and Milan.

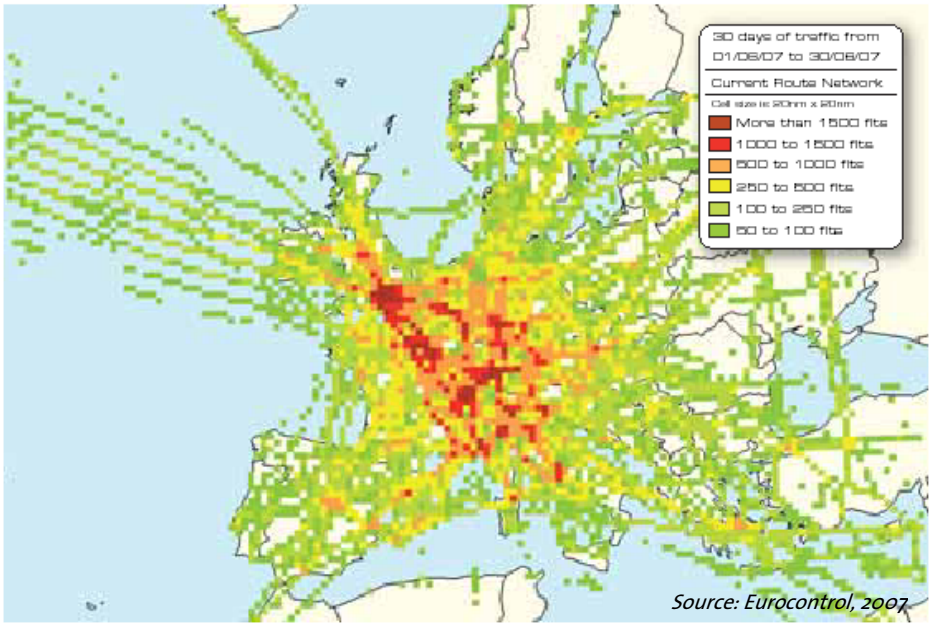

Figure 4: Business traffic density in the European airspace

The red areas are centres with the highest amount of business aviation, in consequence, of either concentrated economic activity or locations that experience

peaks at very specific periods, such as trade and business conferences, film festivals, sporting events, or political summits.

These business flights undertaken, illustrated by the density picture need access to respective infrastructure on the ground; i.e. airports that have the capacity to give access to business aviation of the adequate quality to play out the characteristical strenghts of this air traffic segment.

The share of business aviation of the busiest ten airports in Europe is not more than 2% in average and we observe a further adverse trend. Table 2 shows the top 10 international airports of Europe put opposite the counterpart in terms of the airport for business aviation within the respective region. The business aviation airports are chosen out of a list including the total movements of business jets and the share of business aviation. The rank is reported in a separate column. The data considering the international airports in Europe are including the total departures per day as well the departures of business aviation and what proportion that makes. The latter two are also covered in the table for the business aviation airports in the table.

International Airports					Business Aviation Airports			
Rank	Airport	Deps/Day Total	Deps/Day Business	Share Business	Rank	Airport	Deps/Day Business	Share Business
1	Paris Charles de Gaulle (CDG)	757	1	0.1%	1	Le Bourget, Paris (LBG)	109	88%
2	Frankfurt Main (FRA)	674	11	1.6%	29	Frankfurt Main (FRA)	11	1.6%
3	Madrid Barajas (MAD)	662	2	0.3%	9	Madrid Torrejon (TOR)	29	72%
4	London-Heathrow (LHR)	659	3	0.5%	5	Luton Airport (LTN)	47	20%
					8	Farnborough Airport (FAB)	30	90%
					14	London City Airport (LCY)	21	22%
5	Shipol Amsterdam (AMS)	615	15	2.4%	23	Shipol Amsterdam (AMS)	15	2.4%
6	Munich Airport (MUC)	587	23	3.9%	12	Munich Airport (MUC)	23	3.9%
7	Barcelona (BCN)	483	17	3.5%	16	Barcelona (BCN)	17	3.5%
8	Rome Fiumicino (FCO)	459	1	0.1%	4	Rome - Ciampino Airport (CIA)	55	60%
9	Vienna Airport (VIE)	380	26	6.9%	10	Vienna Airport (VIE)	26	6.9%
10	Milano Malpensa (MXP)	367	5	1.4%	3	Milan - Linate Airport (LIN)	58	62%

Table 2: International Airport and the counterpart airport for business aviation

Source: Eurocontrol 2007 /statistics of the airports / own calculations

These figures show that there is a tendency to consider alternative airports for business aviation purposes located near the specific city, instead of serving Europe's big international airports, where one could be faced with capacity shortage respectively slot shortage while approaching the airport. In consequence, this means to lose the advantages of flying with the cost-intensive business jets. We can see this trend best for half of all top 10 listed European Airports; cities like Paris, Madrid,

London, Rome, and Milan. In the vicinity to those cities there are alternate airports for business aviation services that serve most of the regional demand.

Considering for instance Paris: The Charles de Gaulle International Airport (CDG) has a proportion of business aviation of 0.1%, that is only 1 movement per day. Against it, the alternate airport handles about 109 movements in Paris Le Bourget (LGB). For London we see quite the same. The Airport London-Heathrow (LHR) has only 3 departures per day. The majority is flying to Luton Airport (LTN) near London (47 flights). It has not the highest share of business aviation (20%), but the overall movements per day allow for a more differentiated aircraft mix as to favoure the business traffic to choose the approach of Luton Airport. However, to cover the total demand in that region it is completed with Farnborough (FAB) and the London City Airport (LCY). The third noteworthy region is Madrid. In this case, the departures on the Madrid Barajas (MAD) are negligible, whereas the main volume of business aviation is handled on the Torrejon Airport (TOR).

Regarding the Frankfurt Airport in Germany a clear counterpart for business aviation cannot be found. That is also true for Amsterdam, Munich, Barcelona, and Vienna. It is remarkable that they have the highest proportion of business aviation of the top 10 international airports and yet are among the top 25 airports regarding business aviation operations[1]. However, in order to ensure the quality expected by business aviation users, enough free slots must be available at any time. This is not necessarily given at international airports that have narrow schedules.

Subsequently, alternatives have to be obtained in the vicinity. This process is already in progress. In regions, where an alternate airport is available, scheduled flights and business flights are approaching in most instances different airports.

4 The Case of Berlin

After the reunification of Germany and therewith of Berlin in 1990, Berlin went through a development process and rose to a thriving metropolis. Many national and international companies have built their headquarters in Berlin recently. After the removal of the parliament with most of the ministries and administration from Bonn

[1] The other airports of the top 25 ranking are: Rank 2 – Geneve Cointrin, GVA (69 deps/day);
Rank 6 – Nice, NCE (40); Rank 7 – Zurich Airport, ZRH (36); Rank 11 – Vnukovo Airport Moscow, VKO (25);
Rank 16 – Palma de Mallorca, PMI (19); Rank 17 – Athens Airport, ATH (18); Rank 18 – Cannes, CEQ (18);
Rank 19 – Stuttgart Airport, STR (17); Rank 20 – Groningen/Eelde Airport, GRQ (16);
Rank 21 – Tromsoe, TOS (15); Rank 22 – Dusseldorf International Airport, DUS (14);
Rank 24 – Oslo-Gardermoen Airport, GEN (13), Rank 25 – Olbia-Costa Smerelda Airport, OLB (13)

to Berlin the political relevance boosted. This causes an enormous growth of demand in air traffic. As a result, an appropriate amount of infrastructure and capacity must be provided.

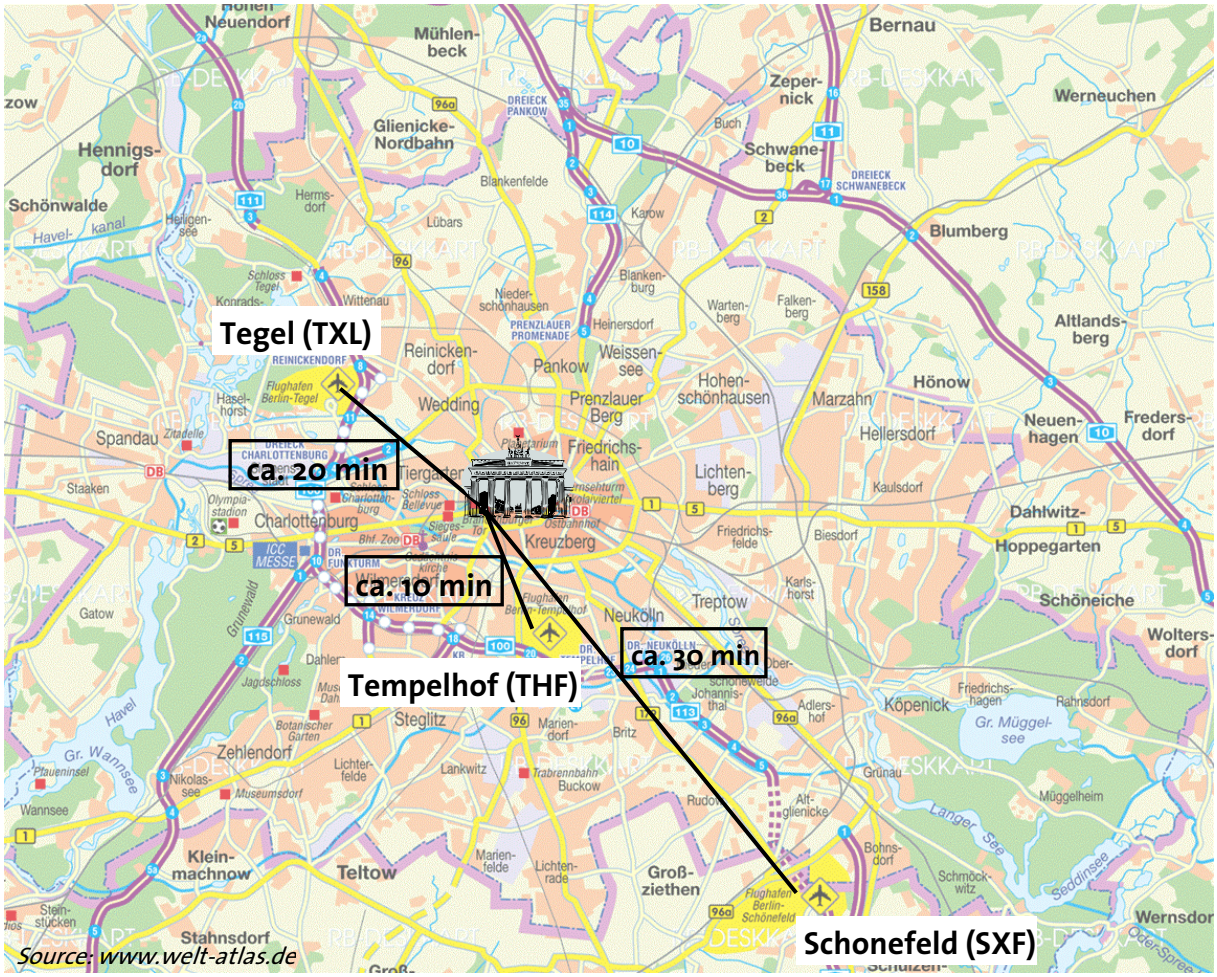

Figure 5: Map of Berlin with the three airports and travel times by car to the city centre

With due to the history of the cold war in the 20th century the aeronautical development of Berlin was affected. The Schonefeld Airport, on the eastern territory was build after World War II in 1946, because the only airport at that time was Tempelhof on the western territory. In 1948 the Tegel Airport completed the Tempelhof Airport (operating since 1923) on the western side of Berlin, since the demand exceeded the capacity provided by the Tempelhof Airport. All three were operating since. (You can see the location of the airports in figure 5.)

In Tegel and Schonefeld mainly the scheduled flights are served today. Schonefeld Airport handles only a share of 7% of the total amount of business aviation on the three airports; yet Tegel has even not more than 3%. The Tempelhof Airport serves primilary the general aviation with the segment business aviation (90% of all business movements), due to the fact that the infrastructure is constructed only for small aircrafts.

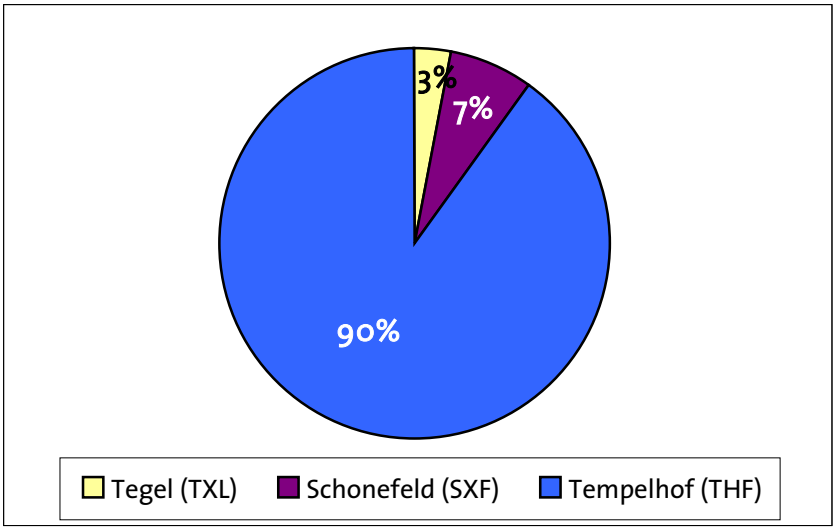

Figure 6: Proportion Business Aviation at the three Airports of Berlin

Source: Traffic Statistic Berlin Airports [7]/ own calculations

These figures, also depicted in the diagram 6, highlight the relation of scheduled flights to general aviation at international airports just as analysed in the previous section.

Taking the trend, establishing airports mainly for business aviation use, the sensate of Berlin decided to do the opposite to the current development in airport management. They intend to concentrate the air traffic at one airport. They have chosen to extend Berlin-Schonefeld to the Berlin Brandenburg International Airport (BBI) and close down the other two. The closure of the Tempelhof Airport it is intended for 31 October 2008. In the following, the infrastructure will be lost irrevocably.

The discussion is already running for a long time. Especially, the companies located in Berlin see a hugh loss of competitive advantage for the city. Berlin-Tempelhof is a best practice example for the business aviation segment. Of all European airports this is the definitive location for a city airport with the shortest travel times to any place in Berlin (see figure 5). Under optimal conditions the ride from Schonefeld to the Brandenburger Tor (close to the business centre around the Potsdamer Platz) takes 30 min, whereas from Tempelhof one needs 10 min. Considering other transport modes to the inner city, yet, Tempelhof has the best prerequisite. Other then by car the terminal of Tegel is only reachable by bus. Although, the trip to the centre of Berlin takes much time. At Schonefeld airport the passengers have direct access to the suburban and regional train, although, the schedule is not satisfying and the travel time is quite long due to the overall distance to the centre. At the Tempelhof Airport a main underground line with a high succession of trains and several bus lines are available.

Beside this, experts are expecting negative effects on the economic development of the entire region, if the plans were implemented accordingly. The business air traffic segment is used by the creatives and public figures, which are important to make access to new markets and to keep the position as economical and political metropolis. Every addition event placed in Berlin and every new company settling down there have benefits for the whole economy in that region; it implies additional consumption and finally new jobs in various industrial sectors.

Let now consider the prognosis for the BBI, concerning the runway capacity made used for the project approval in 1996, already overtaken by the reality. This is shown in the figure 6 below as well the development of the recent years and a prognosis of the Chamber of Industry and Commerce of Berlin (IHK).

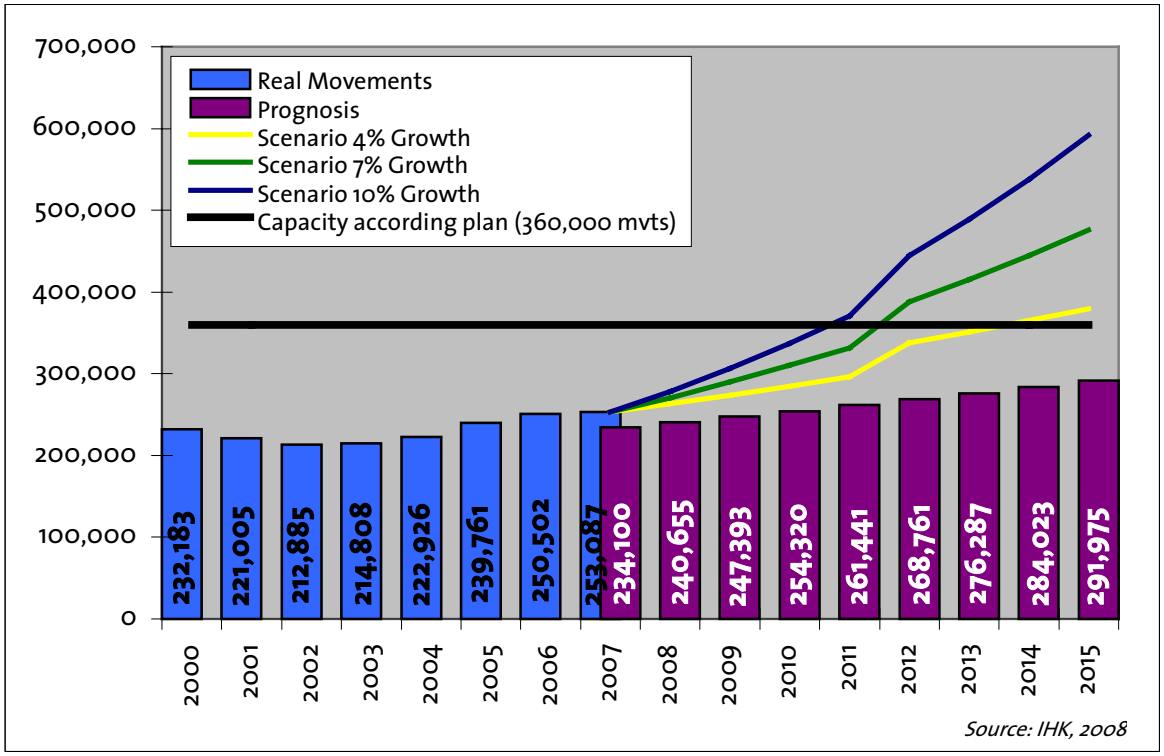

Figure 6: The prognosis of flight movements for the BBI

The conservative scenario with a yearly growth in movements of 4% is based on the growth rate of the recent years 2004 to 2007 of about 4.2%. The optimistic scenarios assume a stronger growth of 7% and 10%. There are reasons to consider a higher growth rates, with due to the international importance of the Berlin economy. First, the BBI allows for transit traffic and improves the conditions for intercontinental flights. Therewith more direct flights can be offered. Second, more movements might be demanded by passengers from the new members states of the European Union of Middle and East Europe. The strong economic growth of these countries and the emerging close economic and cultural links will induce more air traffic, especially via

Berlin. And finally, the same but even stronger effect can be observed for Asia. The economic growth and following the air traffic there is the highest worldwide. All scenarios have a jump within the year 2011/2012, which indicates the planned opening term of the airport. An one-off effect of 10% is expected, since all demand could be served that formerly was restricted [5].

Yet, these growth scenarios apparently conflict with the planned capacity of the BBI in the medium-term. The plan intends the airport to handle 360,000 movements the year with 84 movements in the peak hours on two independently operating runways. The figure shows that this plan will be exceeded in 2014 even according to the conservative growth scenario for the movement development.

Considering the mark of 84 movements in the daily peak hours at BBI, one must say that even this figure is outdated when only accumulating the today's schedule. An example of the summer flight schedule emphasis this fact: On an average working day in the period of 7:30 to 8:30 a.m. 48 arrivals and departures has been handled in Tegel, 32 in Schonefeld and 5 in Tempelhof [7]. In total, this makes 85 movements solely of scheduled flights – further flights of the business aviation and general aviation must be included. According to this calculation the BBI will start its operation under strain.

Although, keeping the Berlin-Tempelhof Airport could significantly ease the traffic load at the BBI. The statistics of Tempelhof of 2007 shows there were 16 movements per hour in average between the working hours from 6 a.m. to 10 p.m., of which about 11 movements per hour are business aviation. These movements of small aircrafts would be served also at the BBI and mean a further consideration by the air traffic management. During the approach the small aircrafts need more distance to the bigger ones with respect to the wakes. In consequence, an aircraft mix with a higher amount of small aircrafts reduces the runway capacity and tend to be rather anti-productive for the airport. Finally, it is not only delays that also affect the scheduled flights, but it means also inconvenience and loss of flexibility for the business aviation customers. Thus, the advantage of using the more costly flight will be lost.

The Airport Berlin-Tempelhof operating as a city airport is the ultimate location for business aviation. There are no conflicts with the scheduled flights like at the BBI. Moreover, Berlin has the unbeatable competitive advantage by already owing an infrastructure, which is proved to be reliable for any kind of urgent flights and suitable for a growing air traffic model as the business aviation.

5 Conclusion

The air traffic market is expected to grow further and so the business aviation segment will. A slowdown for the up-coming years is unlikely to happen. In the time of globalisation the key stuff members of multinational and international acting firms need to travel to keep the connection with their partners. In the future, co-operations between different countries will further increase, since trade barriers will be reduced and new unions will be founded, e.g. the Union for the Mediterranean recently. Thus, offering the appropriate traffic infrastructure is a decisive locational factor and an important issue for the economic development for the respective region.

In most centres of Europe with reasonable amount of business aviation, an alternate airport is used in the vicinity and thus it is independent from scheduled flight traffic to a large extend. It is not considered, whether this is a natural market process, or controled politically.

Nevertheless, in the case of Berlin, a complete air traffic concept is going to be implemented due to the new Berlin Brandenburg International Airport. It is an exceptional opportunity to direct the development in the future. By simply considering the data on the expected development of flight movements for the coming years the concept might be clear – two independent working airports for general aviation and scheduled aviation. The advantage is the availability of an appropriate infrastructure good condition with the Tempelhof Airport, which is widely accepted by the inhabitants. Even though, it seems to be an issue concerning only users of business aviation. However, in the medium-term it will affect all air traffic users in Berlin. Since, the infrastructure would be irrevocably lost and unlike to other major cities there is no further appropriate airfield in the region, which satisfies the needs of business aviation, as to approach instead of the BBI. Consequently, there is potential for a crucial capacity shortage to affect every user.

The business concept of aeronautical infrastructure may be subject of further research. It is not clarified, whether running an airport solely for business aviation is more efficient than an airport with a mix of scheduled flights and business aviation. Or else, a crosswise financing model for two airports could be a concept to minimise the overall economical loss.

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