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Airport Accessibility in Europe

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Air Transport and Airport Research

Porz-Wahnheide
Linder Höhe
51147 Köln
Germany

Head: Prof. Dr. Johannes Reichmuth

Editors: Wolfgang Grimme, Dr. Peter Berster, Dr. Marc Gelhausen

web: http://www.dlr.de/fw

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Content

1 Introduction

Airport accessibility is an important criterion for airport choice and therefore also for airport competition. When air passengers choose an itinerary, they reflect on the transport chain from door to door. Therefore, factors affecting the traveller's decision for a particular option go beyond the price and quality of air services from airport to airport. The decision for or against a particular air service and a particular airport is to a certain extent dependent on the accessibility of the airport.

Several elements of landside accessibility of airports have changed in the past decades. More and more airport operators throughout Europe see long-distance rail access as an important factor to extend their catchment area. Rail is seen as an environmentally friendly mode, which in several cases can also substitute short-haul feeder flights at congested hubs. The integration of large airports into the European high-speed railway network has made considerable progress in recent years. But also the accessibility by car continues to play an important role, as this mode is still predominant at the majority of airports. Moreover, the provision of car parking facilities constitutes a major source of revenues in the non-aviation business of an airport. With good landside access by car and rail, several of the larger airports have started developing into "airport cities", where the land-to-air intermodal function is supplemented by the development of real estate for offices, shops and even residential areas.

This report aims to provide an overview on landside access at major European airports. It is structured in three major parts. First, some theoretic considerations about airport accessibility in general and the major factors influencing passengers' airport choice are presented. In a second part, an overview on the ground accessibility of the 30 largest airports in Europe (European Economic Area including Switzerland), measured by 2008 total passengers, is presented. This overview includes the available ground access modes, travel times to the respective city centres and fares. Finally, three different airports are investigated more closely: Amsterdam Schiphol is representative for a number of European hubs with a strong intermodal integration into the European rail network. Barcelona is representative for a large secondary airport, located close to the city centre with access to the short-distance railway network, but not to long-distance trains. Finally, Hahn airport located in south-western Germany is a "new-entrant", military-civil conversion airport, which has developed into Germany's 11th largest airport, despite being located relatively far away from metropolitan areas and with only limited access mode choices for passengers.

2 Airport accessibility as a factor for airport choice

Airport accessibility is a key factor in airport choice. Factors influencing airport choice can be roughly subdivided into two categories: an "air side" which mainly reflects the service quality offered at airports, i.e. air fares, frequencies and the number of destinations served, and a "land side" which mainly comprises airport accessibility, i.e. access quality. Generally, access time and costs are the most important factors determining the access quality of an airport.

Air passengers can choose from a range of various transport modes to access the airport. The access modes can be subdivided into the two categories private (mainly car) and public transport (rail, coaches and busses).

The **car** remains the most important access mode at nearly all European airports. Several different sub-categories exist in this area. It is possible to drive to the airport in the own car and park it there. This is a very important factor for the operation of airports. Parking fees account for a huge share of non-aeronautical revenues of airport operators. An alternative is that the passenger is dropped off by friends or relatives ("kiss-and-ride"), in order to save parking fees. Finally, also access by rental car and taxi are to be mentioned. Also these modes provide some scope for revenue generation for airport operators, as they charge the rental car companies fees for using offices and parking space, as well as (at least at some airports) fees for taxi operators that want to offer services from the airport.

Rail access is an important element in the mix of airport access modes, both for long-distance and short-distance access. It usually allows a quick access, bypassing traffic jams found throughout many European metropolitan areas and has a rather high capacity. Additionally, with many short-distance rail services, it offers a high number of frequencies, which is convenient to the passenger, as waiting times are reduced. A good rail access can increase the catchment area of an airport substantially, as it was the case with Frankfurt airport, which is connected by high-frequency long-distance trains to the German and European rail network. Rail access for airports is sometimes seen ambiguous by the airport operator. While on the one hand the airport's catchment area can be extended, rail may substitute car access and parking revenues may decline.

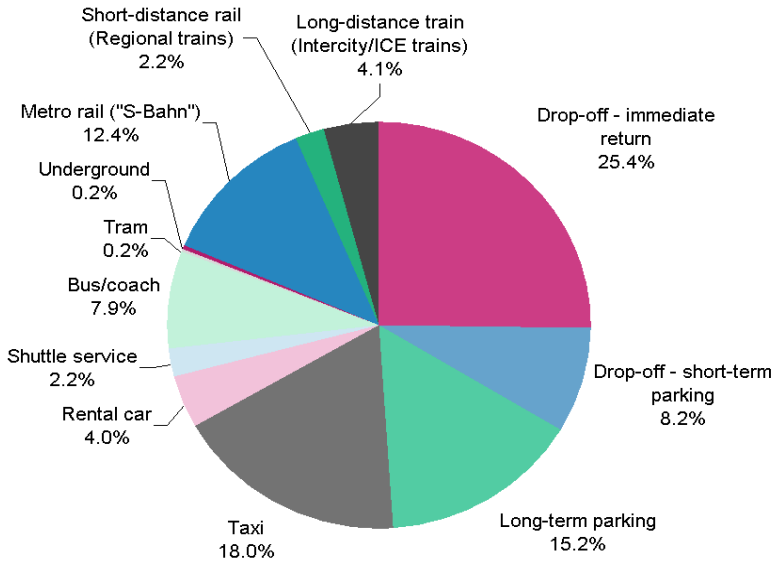
Besides rail, also **coaches** and **busses** are frequently used as airport access modes. Long-distance coach services to airports are particularly found in countries with a less well developed rail system. In Germany, for instance, long-distance coach services have so far been approved only in cases when these services do not compete with the rail operator Deutsche Bahn. Therefore, long-distance coach access to German airports is restricted to smaller airports, predominantly used by low-cost airlines, such as Hahn, Memmingen or Weeze. The regulatory restrictions of coach services in Germany limit intermodal competition and choices for passengers substantially.

Short-distance access by public transport is often realised by busses. This mode, however, is probably least preferred by travellers, as busses are prone to traffic jams and the use of crowded public transport with luggage is rather cumbersome. However, public transport companies throughout Europe have differentiated the product quality of busses going to the airports. In many cases, express busses, particularly equipped to cope with larger amounts of baggage serve the airports and offer a better service than regular bus services offered by the public transport system. For these services, often higher fares than for regular services are charged.

Unfortunately, no information on the shares of airport access modes is available on European level. Such data is gathered by individual airports, or, as in the case of Germany, on a national level. Figure 2-1 shows the shares of access modes at German airports. The data comes from the German air passenger survey, in which every four to five years, more than 200,000 air passengers are interviewed at 20 to 25 international and regional airports in Germany about their personal and journey characteristics.

Figure 2-1: Access modes for all passengers at German airports 2008

Source: German Air Passenger Survey 2008



In total, road-based access modes account for more than three quarters, while rail-based modes for less than one quarter. About half of air passengers in Germany arrive at the airports by private car, one quarter of the total is dropped off in front of the terminal, without parking the car. Another quarter uses the car park, either for short-term or long-term. A substantial number of air passengers use taxis, with 18 % of the total. Among the rail access modes, the "S-Bahn" (short-distance suburban train) has the highest share with 12.4 %. A large number of German airports is connected to the "S-Bahn" network (among them Frankfurt, Munich, Hamburg, Düsseldorf, Cologne/Bonn, Hannover and Berlin-Schönefeld).

Airport accessibility can be understood as a measure to describe how difficult it is for potential air passengers to reach a particular airport: Passengers rate the alternatives of their choice set according to their subjective preferences which may vary according to trip purpose (business vs. leisure) and destination type (e.g. domestic, European and intercontinental). Decision relevant alternative attributes usually include access time, access cost (optionally parking fees if the car is parked at the airport or the fares of public transport modes), quality of terminal access from the point of arrival (e.g. car park or rail station) and the service frequency in case of public transport modes. However, not all combinations of airport and access mode are feasible be it because of personal characteristics of the air traveller (e.g. car ownership) or due to the airport itself (e.g. no rail connection). The latter is closely related to airport accessibility; however, airport accessibility also depends on the characteristics of the trip origin of an air traveller, e.g. whether there is a bus or rail station with a fair service quality with regard to the chosen airport nearby. Moreover, this is more a problem of public modes of transport.

Table 2-1 illustrates the share of long-distance train passengers from selected German cities and departing from Frankfurt airport, based on all passengers from this area arriving by ground access modes at Germany's largest hub. From table 2-1 it is possible to conclude that an airport can increase its catchment area significantly, if it is connected to the long-distance rail network. Especially on longer distances, the train is preferred by travellers in comparison to the car.

Table 2-1: Share of passengers using long-distance trains to Frankfurt airport

Source: German Air Passenger Survey 2008

Urban area	Percentage share of travellers using long-distance trains	Distance to Frankfurt airport in kilometres
Hamburg	83	495
Leipzig	82	385
Düsseldorf	70	220
Hannover	68	350
Cologne	68	180
Munich	66	390
Bremen	57	445
Dortmund	57	225
Stuttgart	50	205
Nuremburg	44	225
Berlin	36	545

However, not only infrastructure access and regular frequencies with high-speed are important to increase the attractiveness of the train as access mode to the airport, but also the availability of attractive ticketing options for travellers. In this regard, airlines, tour operators and the railway operator Deutsche Bahn have cooperated in Germany for almost two decades now. For longer journeys, the Rail&Fly ticket, if purchased in combination with an air ticket, offers substantial discounts compared to the regular long-distance rail fare. Some tour operators and airlines even offer the rail access for free, in order to encourage passengers to use the train instead of domestic feeder flights. This is an important element of airline competition, given

that a large number of foreign airlines only serve Frankfurt, but apart from two domestic destinations (Berlin and Hamburg) all domestic feeder flights to Frankfurt are provided exclusively by Lufthansa or its affiliates. Particularly non-Star Alliance airlines have an incentive to encourage the use of trains as mode of hub airport access, as it is reasonable to assume that the pro-rate fares paid to Deutsche Bahn are lower than those to Lufthansa for air transportation on the same city pairs.

3 Overview airport accessibility in Europe

3.1 Rail access

The following table provides an overview on the airport accessibility by rail of the 30 largest airports in Europe, measured by total passengers in 2008. The geographical scope is the European Economic Area and Switzerland.

Table 3-1: Airport accessibility by rail for the 30 largest airports in the European Economic Area + Switzerland (2008)

Source: DLR compilation / passenger numbers based on ACI-Europe.

Rank	Airport	Country	Passengers in millions (2008)	Long-distance trains - no. of daily services	Short-distance trains - no. of daily services	Short-distance rail journey time to city train station	Short-distance train fare - single ticket to city train station	Underground/ Metro access	Underground/ Metro journey time to city train station	Underground/ Metro fare - single ticket to city train station
1	London Heathrow	United Kingdom	67.1	-	73	00:23	20.38 €	x	00:40	5.56 €
2	Paris Charles de Gaulle	France	60.9	62	142	00:29	8.50 €	-	-	-
3	Frankfurt	Germany	53.5	167	214	00:10	3.80 €	-	-	-
4	Madrid	Spain	50.8	-	-	-	-	x	00:22	2.00 €
5	Amsterdam	Netherlands	47.4	377	294	00:16	3.70 €	-	-	-
6	Rome Fiumicino	Italy	35.1	-	101	00:31	14.00 €	-	-	-
7	Munich	Germany	34.5	-	116	00:40	9.60 €	-	-	-
8	London Gatwick	United Kingdom	34.2	-	80	00:30	18.77 €	-	-	-
9	Barcelona	Spain	30.2	-	37	00:19	3.00 €	opening 2012	-	-
10	Paris Orly	France	26.2	-	Indirect connection to the RER regional train system by an automated people mover					
11	Dublin	Ireland	23.5	-	-	-	-	planned	-	-
12	Palma de Mallorca	Spain	22.8	-	-	-	-	-	-	-
13	London Stansted	United Kingdom	22.4	-	76	00:46	24.45 €	-	-	-
14	Zurich	Switzerland	22.0	116	185	00:11	4.68 €	-	-	-
15	Copenhagen	Denmark	21.5	40	182	00:13	4.63 €	-		
16	Manchester	United Kingdom	21.4	-	171	00:16	4.69 €	-	-	-
17	Vienna	Austria	19.7	-	126	00:16 / 00:31	3.60 € / 10.00 €	-	-	-
18	Oslo	Norway	19.3	32	156	00:19 / 00:26	13.92 € / 21.51 €	-	-	-
19	Milan Malpensa	Italy	19.2	-	39	00:36	11.00 €	-	-	-
20	Brussels	Belgium	18.5	2	114	00:20	5.10 €	-	-	-
21	Stockholm Arlanda	Sweden	18.2	-	76	00:20	29.46 €	-	-	-
22	Düsseldorf	Germany	18.2	45	332	00:06	2.30 €	-	-	-
23	Athens	Greece	16.4	-	17	00:50	6.00 €	x	00:42	6.00 €
24	Berlin Tegel	Germany	14.5	-	-	-	-	-	-	-
25	Lisbon	Portugal	13.6	-	-	-	-	opening 2011	-	-
26	Helsinki	Finland	13.4	-	opening 2014	-	-	-	-	-
27	Hamburg	Germany	12.8	-	110	00:25	2.75 €	-	-	-
28	Malaga	Spain	12.8	-	70	00:12	1.25 €	-	-	-
29	Prague	Czech Republic	12.6	-	-	-	-	opening 2014	-	-
30	Geneva	Switzerland	11.4	31	58	00:07	2.26 €	-	-	-

All values in €. Non-€ currencies were converted into € with the exchange rate of 29th June 2010.

Out of the 30 largest airports in Europe, all but seven airports have direct rail access, be it either Underground/Metro trains, short- or long-distance trains. Paris Orly is connected indirectly to the RER regional train network with an automated people mover (Orlyval), which connects the airport to the station Anthony, located about 7 km from the airport. Both Frankfurt and Düsseldorf have two railway stations each, one for short-distance trains and the other for long-distance trains. While in the case of Frankfurt, the long-distance train station is directly connected to the terminal with a walkway, an additional automated people mover (Skytrain) was built in Düsseldorf, financed with public funds originally intended to improve public transport in communities throughout Germany. The connection from the train station to the terminal requires an additional transfer, which can be relatively inconvenient when travelling with baggage. For this reason, the airport operator offered check-in counters directly at the

long-distance train station, which were constructed with funds from the European Union. However, after only a few years, the airport operator decided to remove the check-in infrastructure from the train station and to re-use the space for non-aeronautical commercial purposes. The total amount of public grants for the construction of the Skytrain and the check-in area at the long-distance train station exceeded € 70 million.

In addition to the existing train connects at European airports, several rail projects intended to improve airport accessibility are planned or under construction:

In Dublin, plans are advanced to connect the airport to the new "Metro North" line, where the construction will start in late 2010 or 2011. In Lisbon, the airport is about to become integrated into the cities' metro system in 2011, despite plans to build a new airport about 25 km east of the city, which is about to become operational in 2017. At Helsinki-Vantaa airport, rail access for suburban trains is planned to be opened in 2014 and at Barcelona, an automated metro train access is to be completed in 2012, supplementing the existing suburban train access. Also in Prague, the metro is to become extended to the airport by 2014.

While access by suburban trains is predominant in Europe (22 out of 30 airports), only a limited number of airports is connected to the long-distance train network. Nine airports are connected to long-distance trains, in Brussels, however only with a twice daily service.

The best integration into the rail network, as far as frequencies per day is concerned, can be found at Amsterdam Schiphol, with a total of 671 short- and long-distance train departures per day, followed by Frankfurt with 381 trains per day and 377 trains at Düsseldorf. However, when making this comparison, the quality of the train services has to be differentiated. Particularly in Frankfurt, a very high share of trains are long-distance intercity or intercity express trains, while in Düsseldorf the share of these trains is lower. In Amsterdam, a high number of trains is branded as "Intercity", but due to the smaller size of the country, this leaves only limited scope for comparison with Germany, where Intercity trains generally run longer distances. Additionally, Amsterdam, Düsseldorf, Frankfurt, Paris-Charles de Gaulle are all connected to the European high-speed rail network with cross-border services to neighbouring countries.

Concerning rail fares from the airport to the respective city centre train station, a wide spread of fares can be observed. The most expensive train service from airport to city centre can be found at Stockholm-Arlanda, at almost € 30 for a regular oneway ticket for the 20 minute trip. Also among the most expensive airport-city trains are the London express trains from Stansted (€ 25; 46 minutes), Heathrow (€ 20; 23 minutes) and Gatwick (€ 19; 30 minutes). In Heathrow, however, the London Underground as a competing mode offers services for less than € 6. On the lower end, train services are cheapest in Malaga (€ 1.25 for a 12 minute trip), followed by Geneva (€ 2.26; 7 minutes) and Düsseldorf (€ 2.30; 6 minutes).

3.2 Costs and travel time of different access modes

In many cases, air travellers can choose from different transport modes between the city centre and the airport. Even within one mode, transport providers have differentiated their products. For instance, in many cities a dedicated airport express train competes with a regular train or metro service (e.g. in Oslo, London-Heathrow or Vienna). Prices for the express trains differ substantially in comparison to regular suburban or underground trains. Also with regard to busses, travellers can choose between an express variant and a regular service in several European cities, with differing fares and quality attributes. For instance, the dedicated Aerobus service in Lisbon costs € 3.45 (including a day ticket for all other public transport), while regular busses can be used for € 1.45 for a single trip. Similarly in Barcelona, the Aerobus express service costs € 5.05 oneway, while the regular bus line 46 to the airport can be used for € 1.40.

Table 3-2: Comparison of travel times and costs for the access modes at the 30 largest airports

Source: DLR compilation

Rank	Airport	Airport distance from city centre (road distance in kilometres)	Reference point City Centre (central transport hub)	Shortest travel time airport-city centre by rail hh:mm	Kind of Railway Service	No. of interchanges rail journey	Costs of a oneway rail journey airport-city centre	Shortest travel time airport-city centre by bus hh:mm	Bus arrival station (if another than the cities' central transport hub)	Costs of a oneway bus journey airport-city centre	Travel time airport-city centre by car/taxi	Oneway taxi fare airport-city centre
1	London Heathrow	29.6	Waterloo Station	00:58	London Underground	1	5.56 €	00:40		6.17 €	0:39	80.27 €
2	Paris Charles de Gaulle	21.2	Gare du Nord	00:28	RER	0	8.20 €	01:13		9.40 €	0:22	50.00 €
3	Frankfurt	15.3	Hauptbahnhof	00:11	S-Bahn	0	3.80 €	00:43		3.80 €	0:16	35.00 €
4	Madrid	16.0	Atocha	00:49	Metro	3	2.00 €	00:30	Avenida de America	1.00 €	0:17	25.90 €
5	Amsterdam	20.6	Centraalstation	00:17	Train	0	3.70 €	00:56		2.40 €	0:21	46.15 €
6	Rome Fiumicino	41.0	Termini Station	00:30	Train	0	11.00 €	01:10		9.00 €	0:50	40.00 €
7	Munich	38.3	Hauptbahnhof	00:40	Train	0	9.60 €	-		9.60 €	0:36	64.00 €
8	London Gatwick	45.5	Waterloo Station	00:42	Train	1 or 2	18.77 €	01:05	Victoria Coach Station	9.26 €	0:59	117.32 €
9	Barcelona	13.4	Sants	00:17	Train	0	3.00 €	00:30	Plaça Catalunya	5.05 €	0:19	20.00 €
10	Paris Orly	23.2	Gare du Nord	00:37	Metro+Orlyval	1	13.50 €	00:30	Denfert-Rochereau	6.60 €	0:32	50.00 €
11	Dublin	13.1	Heuston Station		No Railway Access			00:45		6.00 €	0:20	25.00 €
12	Palma de Mallorca	9.7	Plaça Espanya		No Railway Access			00:31		2.00 €	0:12	12.14 €
13	London Stansted	59.5	London Waterloo	01:06	Train+Metro	2	29.39 €	01:45	Victoria Coach Station	12.35 €	1:02	122.26 €
14	Zurich	10.3	Hauptbahnhof	00:11	Train	0	4.86 €	00:29		6.20 €	0:13	42.00 €
15	Copenhagen	13.2	Central Station	00:13	Train	0	4.63 €	00:41		4.63 €	0:16	26.86 €
16	Manchester	15.5	Piccadilly Station	00:14	Train	0	4.69 €	00:20	Central Coach Station	5.06 €	0:19	30.87 €
17	Vienna	21.7	Südbahnhof	00:25	S-Bahn	0	3.60 €	00:44		3.60 €	0:23	31.00 €
18	Oslo	50.1	Sentralstasjon	00:19	Train	0	13.92 €	00:43	Oslo Bus Terminal	22.77 €	0:41	77.17 €
19	Milan Malpensa	50.6	Centrale	00:49	Train+Metro	1		00:50		7.50 €	0:46	70.00 €
20	Brussels	13.7	Centraal	00:20	Train	0	5.10 €	00:53		5.00 €	0:17	35.00 €
21	Stockholm Arlanda	42.0	Central Station	00:20	Arlanda Express	0	29.46 €	00:30		12.52 €	0:33	49.97 €
22	Düsseldorf	10.3	Hauptbahnhof	00:06	Train	0	2.30 €	00:27		2.30 €	0:22	20.00 €
23	Athens	40.8	Larissis Station	00:42	Train	0	6.00 €	-		-	0:39	35.00 €
24	Berlin Tegel	11.4	Hauptbahnhof		No Railway Access			00:20		2.10 €	0:18	25.00 €
25	Lisbon	7.5	Santa Apolonia		No Railway Access			00:39		1.45 €	0:14	10.00 €
26	Helsinki	19.3	Main station		No Railway Access			00:35		5.90 €	0:21	35.00 €
27	Hamburg	11.4	Hauptbahnhof	00:25	Train	0	2.75 €	-		-	0:22	17.50 €
28	Malaga	10.2	Maria Zambrano	00:12	Train	0	1.25 €	00:20		1.10 €	0:15	15.21 €
29	Prague	18.7	Hlavni Nadrazi		No Railway Access			00:30		1.74 €	0:28	25.16 €
30	Geneva	6.3	Gare de Cornavin	00:07	Train	0	2.26 €	00:19		1.51 €	0:10	26.40 €

All values in €. Non-€ currencies were converted into € with the exchange rate of 29th June 2010.

As with the train fares, taxi fares differ substantially. The two most expensive airports concerning taxi access are London-Stansted and London-Gatwick, both costing about € 120 (£ 100) per taxi trip from the city centre. The distance to the airport, however from the city centre exceeds 60 and 45 kilometres, respectively.

As taxi fares depend almost entirely on the distance travelled and the distances between city centre and airport vary, the following table shall provide a more detailed look at the taxi fare per km.

Table 3-3: Comparison of costs for airport-city centre transfer by taxi

Source: Websites of airport operators, taxi companies and tourism authorities.

Airport	Airport distance from city centre (road distance in kilometres)	Oneway taxi fare airport-city centre	Taxi fare per km
Geneva	6.3	26.40 €	4.19 €
Zurich	10.3	42.00 €	4.08 €
London Heathrow	29.6	80.27 €	2.71 €
London Gatwick	45.5	117.32 €	2.58 €
Brussels	13.7	35.00 €	2.55 €
Paris Charles de Gaulle	21.2	50.00 €	2.36 €
Frankfurt	15.3	35.00 €	2.29 €
Amsterdam	20.6	46.15 €	2.24 €
Berlin Tegel	11.4	25.00 €	2.19 €
Paris Orly	23.2	50.00 €	2.16 €
London Stansted	59.5	122.26 €	2.05 €
Copenhagen	13.2	26.86 €	2.03 €
Manchester	15.5	30.87 €	1.99 €
Düsseldorf	10.3	20.00 €	1.94 €
Dublin	13.1	25.00 €	1.91 €
Helsinki	19.3	35.00 €	1.81 €
Munich	38.3	64.00 €	1.67 €
Madrid	16.0	25.90 €	1.62 €
Oslo	50.1	77.17 €	1.54 €
Hamburg	11.4	17.50 €	1.54 €
Barcelona	13.4	20.00 €	1.49 €
Malaga	10.2	15.21 €	1.49 €
Vienna	21.7	31.00 €	1.43 €
Milan Malpensa	50.6	70.00 €	1.38 €
Prague	18.7	25.16 €	1.35 €
Lisbon	7.5	10.00 €	1.33 €
Palma de Mallorca	9.7	12.14 €	1.25 €
Stockholm Arlanda	42.0	49.97 €	1.19 €
Rome Fiumicino	41.0	40.00 €	0.98 €
Athens	40.8	35.00 €	0.86 €

All values in €. Non-€ currencies were converted into € with the exchange rate of 29th June 2010.

A strong correlation between taxi costs and costs of living can be observed, as Switzerland and the United Kingdom top the list for the most expensive taxi rides between airport and city centre. Relatively low costs per km can be found in Greece, Spain and Italy. Interestingly, also Stockholm-Arlanda is relatively cheap based on the fare per km, although Sweden belongs to the group of countries with relatively high costs of living. Moreover, the differential between the regular fare of the Arlanda Express train (about € 30) and the taxi fare (around € 50) is relatively small, so that the taxi is already cheaper than the train for two persons travelling together. Nevertheless, the bus service is a further alternative, costing only € 12.52.

As the example of Germany in figure 2-1 has shown, airport access by car plays an important role. Therefore, parking fees are of high interest to passengers, but also to airport operators. Parking fees account for a large share of non-aeronautical revenues. The following table provides an overview on the parking fees to be found at the 30 largest airports in the European Economic Area (including Switzerland).

Parking fees for different airports in Europe differ substantially. On average, parking fees vary between € 3.15 and € 4.71 for one hour, € 16.91 and € 40.50 for a day and € 70.88 and € 190.56 for one week. In the table, we have shown minimum and maximum values for each airport, as airports have started to differentiate prices for parking, depending on distance of the parking lot to the terminal and, as a fairly new phenomenon, whether the parking space has been pre-booked over the internet. With this pricing strategy, airport operators follow low cost carriers, which also sell tickets booked in advance at a lower rate. Additionally, some operators have started initiatives to increase attractiveness of airports for shoppers, offering free parking, if a certain amount of purchases is exceeded. Munich airport, for instance, offers 2 hours free parking if articles worth more than € 10 are purchased or 5 hours free parking with a gastronomic expenditure of more than € 20.

In comparison to other countries, particularly the parking fees at Spanish airports are relatively low, for instance in Madrid or Barcelona with € 2.02 per hour, while comparably sized airports charge between € 3.60 and € 5.31. Again, a high correlation between general cost of living and the cost of airport parking can be observed. Parking fees at the London airports range from € 4.94 to € 5.31 per hour and also Zurich is among the most expensive airports with parking fees starting from € 5 per hour. A bit of an exception is Geneva, which offers 1 hour of free parking in the parking garage at the airport's train station, while the maximum rate for short-term parking at the arrivals area amounts to € 2.26.

Table 3-4: Comparison of car parking fees at 30 largest airports in the European Economic Area (including Switzerland)

Source: DLR compilation, based on information on airport websites.

Rank	Airport	Parking fee 1 hour		Parking Fee 1 day		Parking fee 1 week	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
1	London Heathrow	5.31	5.31	20.01	57.92	135.72	405.42
2	Paris Charles de Gaulle	4.00	4.00	22.00	30.00	130.00	175.00
3	Frankfurt	3.60	4.00	23.50	25.00	49.00	115.00
4	Madrid	2.02	6.00	10.60	60.00	61.20	118.80
5	Amsterdam	3.80	3.80	26.00	26.00	48.50	76.00
6	Rome Fiumicino	4.00	4.00	18.00	30.00	69.00	99.00
7	Munich	1.00	4.00	14.00	40.00	35.00	250.00
8	London Gatwick	5.19	5.19	11.61	34.33	55.57	240.31
9	Barcelona	2.02	2.02	13.00	18.00	83.50	115.20
10	Paris Orly	1.80	3.40	13.30	27.00	93.10	153.00
11	Dublin	3.00	3.00	5.50	40.00	38.50	280.00
12	Palma de Mallorca	1.06	1.06	10.60	67.90	53.55	475.30
13	London Stansted	4.94	4.94	11.73	86.44	82.12	246.36
14	Zurich	5.00	6.00	31.00	42.00	123.00	208.00
15	Copenhagen	3.36	6.04	13.43	40.29	53.72	241.74
16	Manchester	4.94	4.94	24.70	33.34	79.03	233.40
17	Vienna	3.00	3.50	20.00	30.50	86.00	152.30
18	Oslo	2.53	6.07	18.98	36.69	61.99	146.74
19	Milan Malpensa	3.80	10.00	18.00	45.00	45.00	196.00
20	Brussels	3.50	6.50	17.00	37.00	79.00	154.00
21	Stockholm Arlanda	4.21	8.42	11.57	30.51	46.29	213.56
22	Düsseldorf	3.50	3.90	23.00	29.00	39.00	203.00
23	Athens	3.50	3.50	12.00	24.00	50.00	168.00
24	Berlin Tegel	4.00	8.00	26.00	140.00	75.00	109.00
25	Lisbon	2.55	2.80	17.00	43.00	110.00	302.05
26	Helsinki	3.00	6.00	7.00	30.00	29.00	130.00
27	Hamburg	2.00	3.00	10.00	22.00	52.00	154.00
28	Malaga	2.02	2.02	18.00	18.00	115.20	115.20
29	Prague	1.94	7.74	19.35	46.83	77.40	112.23
30	Geneva	0.00	2.26	20.37	24.14	70.16	128.25
	Average	3.15	4.71	16.91	40.50	70.88	190.56

All values in €. Non-€ currencies were converted into € with the exchange rate of 29th June 2010.

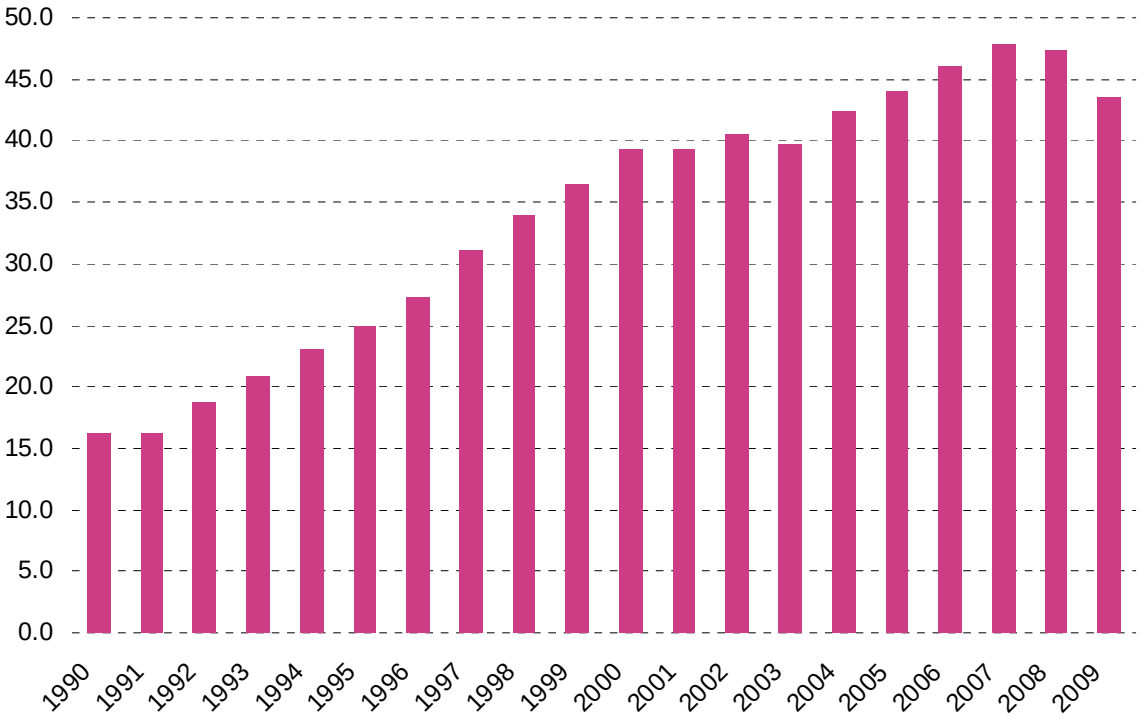
4 Airport accessibility case studies

4.1 Amsterdam

Amsterdam-Schiphol is the fifth largest airport in Europe with 47.4 million passengers in 2008. It is located about 12 km southwest of central Amsterdam.

Figure 4-1: Development of total passengers at Amsterdam Schiphol Airport 1990-2009

Source: ICAO.



The airport is equipped with a train station beneath the main terminal building. It is very well integrated into the train schedule of the Dutch railway operator Nederlandse Spoorwegen. Since the opening of the new high-speed railway line Schiphol-Antwerp in September 2009, it is also connected to the European high speed railway network with services by the operator Thalys. The new high speed line allows maximum speeds of up to 300 km/h, reducing trip time from Schiphol to Brussels to 1 hour and 39 minutes. Travel time from Schiphol to Paris is a bit more than three hours.

According to figures published by the Schiphol Group in 2009, 41.5 % of the passengers at Schiphol arrived by public transport (up from 40.3 % in 2008). This value shows the high quality of both the bus network and the rail-based airport access and the acceptance by passengers. The airport operator reports a high level of passenger satisfaction with both frequencies and punctuality of the train services. Also the number of employees commuting to

their workplaces at the airport is relatively high with 28 %. The interaction between airlines, airport operator and Dutch railways goes as far as train schedules are adapted to flight schedules to provide convenient transportation for aircraft arriving late in the evening and departing early in the morning.

The environmental consciousness of the airport operator with regard to ground access modes is also underlined by the fact that the Schiphol Group made it mandatory to taxi owners operating at the airport to use taxis which comply with the EURO 5 emissions standard. These vehicles emit substantially less nitrous oxides (NO_x) and fine particles (PM_{10}).

Overall, the good accessibility of Amsterdam Schiphol by air and ground access modes led to the development of the term "airport city", which can also be observed at other major airports throughout Europe. In this function, airports are not only intermodal transport hubs, but have become attractive as business locations. With the development of real estate at or close by the airport, airport operators can exploit synergies, created by aeronautical activities. While in the past, operators mainly relied on the revenues generated by the provision of services for airlines (mainly provision of airport infrastructure and ground handling services), in the meantime, due to globalisation, the connectivity provided by the airlines in itself creates value for the airport operator. Short journey times to major business locations all over the world by air and quick access by ground transport modes increase the value of real estate located on the airport's premises or close by. Businesses, mainly from the services sector locate offices directly at the airport or in its vicinity. In the case of Schiphol, the airport operator reports that by 2007, 596 businesses were located around the airport, mainly working in logistics, but also knowledge-intensive services and regional headquarters of world-famous companies, such as Microsoft. From these developments, not only the airport operator benefits financially, but also the competitiveness of the Amsterdam area in the European competition for business locations is greatly enhanced.

For the airport operator Schiphol Group, the non-aviation related revenues accounted for only 42 % of total revenues in 2009, but for 76 % of profits.

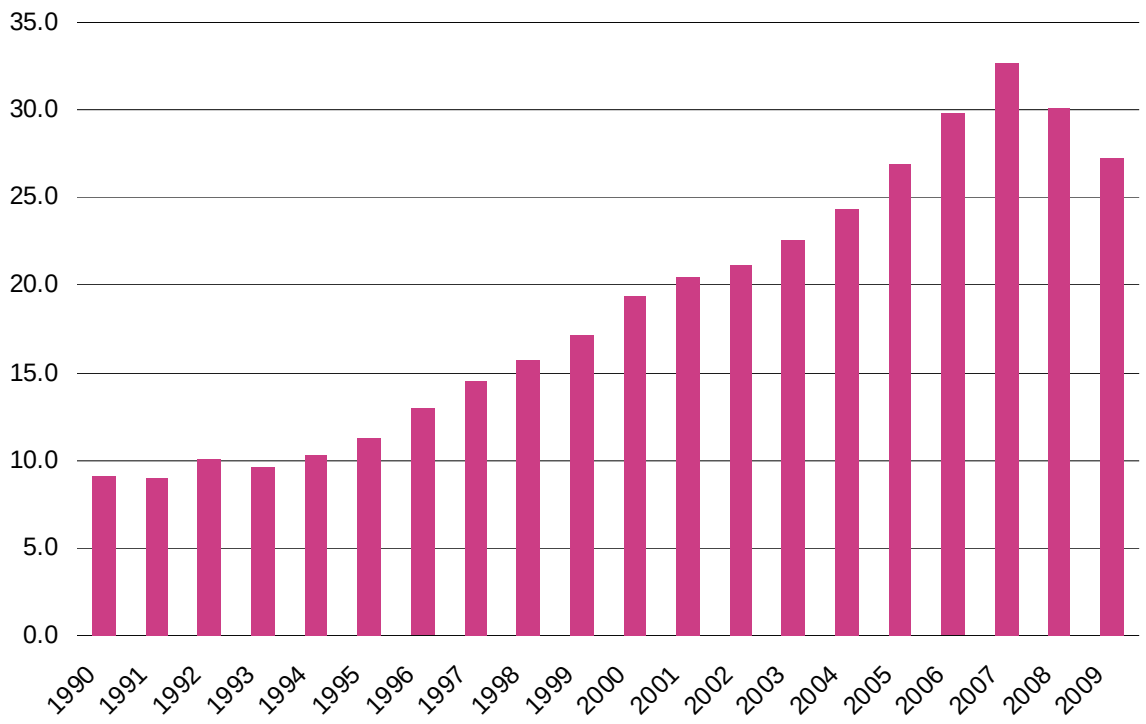
4.2 Barcelona

4.2.1 Barcelona International Airport El Prat

Barcelona's International Airport El Prat is the second largest airport in Spain and the 9th largest airport in Europe with 30.2 million passengers in 2008. It is located about 13 km south-west of the city centre. The airport has shown a tremendous growth over the last two decades. It more than tripled passenger numbers between 1994 and 2007. However, it was also seriously affected by the global recession, with passenger numbers dropping by more than 15 % between 2007 and 2009. The Barcelona area is also served by the airports in Girona and Reus, both of which are intensively used by the Irish low cost carrier Ryanair. Nevertheless, Ryanair announced in May 2010 that it will also open a base at Barcelona International Airport.

Figure 4-2: Development of total passengers at Barcelona International Airport 1990-2009

Source: ICAO.



In recent years, El Prat's capacity has been expanded substantially with the construction of a new parallel runway in 2004 and a new terminal in 2009. The infrastructure measures brought the hourly capacity to 90 movements per hour (up from 52) and the passenger capacity of the terminals from about 30 to currently 55 million, with the construction of a satellite near the new terminal to be completed in 2012 even to 70 million passengers.

Several public transport modes are available for accessing the airport. A railway station for short-distance trains (Cercanias Barcelona) exists, which connect the airport with the city centre

in about 20 minutes. Train services run every 30 minutes and a one-way ticket costs € 3. An alternative to the rail services are busses. Several metropolitan and regional bus lines connect the airport with the city centre of Barcelona and nearby communities. The public bus service line 46 from Plaça d'Espanya to the airport takes about 30 minutes, at a single fare of € 1.40. It runs from 5am to 12:15am every 20 minutes throughout most of the day. Additionally, two express bus lines A1 and A2 operate from both airport terminals to the city centre, at a one-way fare of € 5.05. At night, the night bus line N17 connects the city centre with the airport.

According to the EU-funded research project BEST (Benchmarking European Sustainable Transport), the share of passengers using individual transport modes is dominating with 79.5 % compared to 20.5 % using public transport to come to the airport. Among the individual transport modes, private car (32.2 %) and taxi (44.1 %) dominate. With public transport, share of buses (9.8 %) and trains (10.4 %) are about even.

With the opening of the new terminal in 2009, car parking facilities were nearly doubled in capacity to about 24,000 spaces at El Prat. This large number of spaces reflects the fact that airport access by car is the most important mode. Compared to other European airports, this brings Barcelona in the top league concerning the provision of car parking spaces at airports (Frankfurt: 28,000 parking spaces; Amsterdam 16,000 spaces or London-Heathrow 18,500).

Taxi fares in Barcelona are regulated by the Barcelona Metropolitan Transport Authority. The minimum fare from the airport to the city centre is € 20.

4.2.2 Barcelona International Airport and high-speed rail access

A major shift of passenger flows in Spanish transport occurred in 2008, when the high-speed railway line between the country's two most important metropolitan areas, Madrid and Barcelona, was opened. This also had several impacts on Barcelona airport. On the one hand, a major shift of the world's busiest air route between Madrid and Barcelona to the train occurred, as train journey time was reduced to less than 2 hours and 40 minutes for the 630 km long journey. On the other hand, the airport cannot fully benefit from the new high-speed railway line, as it is not directly connected as other airports (e.g. Frankfurt or Paris Charles de Gaulle). Although the new line passes by the airport terminal in a distance of only 4 km, it was not planned to include a stop at the airport. Instead, a new railway terminal (Estació de la Sagrera) will be completed in 2012 in the northern part of the city. This terminal will combine the already operational high-speed rail (AVE) and Metro line 9 (to be opened in 2014) to connect high-speed trains with the airport.

The connection of airports to the high-speed railway system is in most cases associated with conflicting objectives of transport planning. While on the one hand particularly large airports generate a large number of potential railway passengers, airports are not directly located in the

city centres. Therefore, an additional stop besides the existing railway stations in the cities need to be added to the schedule, often associated with a diversion, when the airport is not directly on the line between major city centres. This means that for a majority of travellers, who do not want to go to the airport, journey time increases, while for a minority of travellers, journey times can be reduced.

The exclusion of El Prat airport from direct access to the high speed railway system can also be explained by the settlement structure in Spain, which differs considerably from Germany or other Western-European countries. The main purpose of the new railway line between Madrid and Barcelona is to connect the two metropolitan areas as quickly as possible. Each day, several train-sets travel non-stop on the 630 km long route. At maximum, there are four stops along the line (Calatayud, Zaragoza, Lerida and Tarragona). In comparison to the duo-centric structure of Spain, the populous agglomeration area in continental Western-Europe (sometimes referred to as "blue banana"), spanning from the Netherlands to Northern Italy, is rather polycentric in their structure. Many populous metropolitan areas are accessed by the high-speed network in northwest Europe. For instance, Frankfurt airport is located almost in the middle of the 440 km line between Amsterdam and Basel, with 13 regular stops along the line in the Netherlands, Germany and Switzerland.

Most certainly, a stop for high-speed trains at Barcelona airport would be neither beneficial for air passengers from Madrid, which have their own, even larger airport than Barcelona, nor for travellers from city centre of Barcelona, who can travel to the airport easily and at a high number of frequencies by regional trains (Cercanias), buses or taxi (or in future by the Metro line 9).

Therefore, the benefits for Barcelona's El Prat airport by increasing its catchment area with high-speed rail would be less significant than for instance in the case of Frankfurt, which lies in the middle of a densely populated area with a large number of metropolitan centres.

4.2.3 Alternatives to Barcelona International Airport

Besides the international airport El Prat, located close to the city centre, the Barcelona metropolitan area has two other airports, Girona (91 km to the northeast) and Reus (118 km southwest near Tarragona). The two airports are intensively used by Ryanair, additionally also holiday flights by various airlines, mostly as seasonal services during the summertime, use the two airports. In 2009, Girona had 5.3 million passengers and Reus had 1.7 million passengers.

From Girona, about nine bus lines connect the airport with the surrounding communities. One line is going to Perpignan in France. The bus service to Barcelona is € 12, with a journey time of 1 hour and 10 minutes. The bus schedule is based on the Ryanair arrivals and departures.

Typically, passengers do not have to wait longer than 1 hour between scheduled flight arrival and bus departure. Compared to other European airports, parking fees at Girona are relatively low, with € 0.95 per hour, up to € 8.90 per day and € 56.90 per week.

Five bus lines connect Reus airport with surrounding communities. The line to Barcelona operates up to seven times daily and also matches the Ryanair schedule. Travel time is up to 1 hour and 45 minutes. Single tickets cost € 13.

The accessibility of the different airports in the Barcelona metropolitan area will be analysed in the EU-funded research project Interconnect (http://www.interconnect-project.eu).

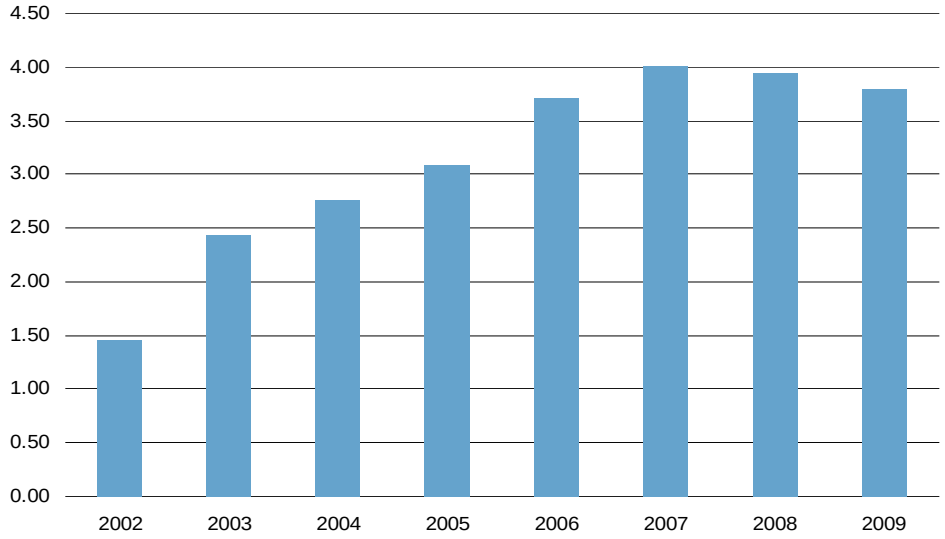
4.3 Hahn

4.3.1 Overview

Hahn airport, located in the south-western German state of Rhineland-Palatine, was a pioneer in the low cost revolution that took place in the last decade throughout Europe. The airport is a military-civil conversion project and opened in 1993 for civil operations. Since April 1999 Ryanair uses the airport, which constantly increased its passenger numbers to almost 4 million in 2007. Since then, passenger numbers are decreasing, partly due to the economic recession, but also because Ryanair has increased services from various other airports in Germany.

Figure 4-3: Development of passenger numbers (in millions) at Hahn Airport 2002-2009

Source: Hahn Airport.



Throughout the 1990s and early 2000s, Hahn was considered by many as the perfect "reliever airport" of chronically congested Rhein-Main International Airport in Frankfurt. Hahn is located

about 120 km west of the Rhine-Main metropolitan area in the sparsely populated Hunsrück region. The airport has a 24-hour operational permit and is therefore also attractive for cargo airlines. Nevertheless, interest from passenger airlines in serving the airport was relatively small, as besides Ryanair with a share of more than 95% of departures only Wizz Air and Iceland Express operate very few services from Hahn.

4.3.2 Road infrastructure / coach services

Hahn airport is located in a sparsely populated area (avg. of 108 inhabitants per sq. km / German avg. 229 inhabitants per sq. km) and was used as a base by the US Air Force during the Cold War. While on the one hand the airport's location far away from densely populated metropolitan areas is beneficially for its operation, as noise complaints are relatively limited, the conversion of the airport and its use as a low cost airport also put enormous challenges on the ground access on the other hand. As major cities in south-western Germany are relatively far away, it was clear that a lot of long-distance traffic to and from the airport would be generated. Despite the relatively weak ground access opportunities, Hahn has developed into the 11th largest airport in Germany by passenger numbers.

As the airport has no active rail access, road is the only way to get to the airport. The major artery, linking the airport with the conurbation in the Rhine-Main Area (Frankfurt, Mainz, Wiesbaden is the Bundesstraße 50 (federal highway 50). Recently, the B50 was extended to four lanes and by-passing villages along the way, as through-traffic had become unbearable for residents. By 2011, the road will be completed on a total length of 20.7 km, at a project cost of € 102.9 million. The project does not only facilitate access for passengers to the airport, but also for the trucking of air cargo.

It is intended to extend the four-lane upgrade of the B50 also in westerly direction towards the Autobahn A1 and Luxembourg. This requires a huge bridge over the Moselle, which will become one of the largest bridges in Germany (1.7 km long, 160 m high). The project cost is calculated with € 330 million. The project is highly controversial, as it cuts through the scenic Moselle valley.

The following table 4-1 shows the average driving time by car from major cities in south-western Germany. Major conurbations in the vicinity of Hahn are located between 70 and 200 km from the airport. Corresponding travel time by car is between 60 and 120 minutes.

Table 4-1: Travel time car/coach from major cities in south-western Germany to Hahn

Source: German Statistical Office destatis, Coach operator websites and maps.google.de

City	Population (2007)	Road distance to Hahn Airport	Travel Time Car	Travel Time Coach	Daily frequencies Coach	One-way fare coach
Trier	103,900	67.3 km	61 min	60 min	12	5-12 €
Coblence	106,100	86.3 km	62 min	70 min	6	14.30 €
Mainz	198,100	87.8 km	62 min	75 min	12	11 €
Saarbrücken	176,500	111 km	85 min	-	discontinued	-
Frankfurt	659,000	124 km	87 min	105 min	20	12 €
Kaiserslautern	97,800	129 km	84 min	-	-	-
Ludwigshafen	163,800	131 km	83 min	100 min	7	18 €
Mannheim	309,800	134 km	86 min	110 min	7	18 €
Bonn	316,400	154 km	94 min	-	-	-
Cologne	995,400	178 km	112 min	135 min	6	15 €
Aachen	259,000	222 km	132 min	-	-	-

The availability of parking spaces and the level of parking fees are important service elements of airports. Initially, the airport started with free parking, but in the meantime parking fees are levied. The airport applies a product differentiation strategy, as the parking fee depends on the distance to the terminal. Parking fees for one hour range from € 2 to € 2.50, for a day from € 2.50 to € 18 and for a week from € 17.50 € to € 95. Compared to the parking fees shown in table 3-4 at Frankfurt Rhein-Main International airport, these rates are relatively low.

An interesting business model was developed by property owners in the nearby village of Lautzenhausen, as free spaces on private property are rented as parking lot and free shuttle services to the airport are offered. This prompted already some conflicts, as this is seen by residents as a negative effect on quality of life in the village ("a village as parking lot"). The competition of parking offered by the residents of Lautzenhausen prompted the airport operator to differentiate its product and to decrease parking fees.

An alternative to airport access by car are several coach services, which have been established by private operators, some, however, partially subsidised as part of the public transport concept, funded by the Bundesland (federal state) Rhineland-Palatinate. The airport announced in 2005 that about 40 % of its passengers originate in the Rhine-Main area and about 12 % from Cologne, the two cities with the highest capacity of coach seats available to the Hahn airport. On peak days, 20 daily services are operated between Hahn and Frankfurt and 6 services between Hahn and Cologne.

In total, about 15 % of passengers used the coach services to come to the airport. However, the operation of coach lines to the airport is also associated with economic risk, as several lines have been discontinued due to a lack of demand. Coach access to the airport is also possible from neighbouring Luxemburg and France, as one operator has services from Metz and Thionville via Luxemburg to the airport.

4.3.3 Future rail infrastructure

The relatively weak access by road has prompted transport planners to re-instate rail access to the airport. A rail line between the Rhine-Main area and Hahn exists, but had been without scheduled passenger services since 1984. It was partly used as cargo line and used by the US Air Force to transport coal and other cargo to the airbase.

In 2002, the ideas to improve access to Hahn included a concept for a maglev train ("Transrapid"). By that time, the purpose of a quick connection between the Rhine-Main area and Hahn was to create an airport system with short transfer times between Rhein-Main International and Hahn. However, the estimated construction costs of more than € 3 billion finally resulted in the cancellation of the project, as the benefit-cost ratio used in German transport planning was apparently relative low.

Finally, in 2007 it was decided to re-instate the rail line at a cost of more than € 100 million, almost exclusively funded by the Federal government. Travel time between Mainz and Hahn is estimated at 90 minutes, between Frankfurt and Hahn at 130 minutes. This is substantially longer than by car and even longer than with the existing coach connection.

While the re-opening of the rail line between Bingen and Hahn was triggered by the airport, the transport ministry of Rhineland-Palatinate also justifies the investments with a better accessibility of the Hunsrück region, which had been detached from the German railway system for more than 20 years. The reactivation of more than 60 km of track is the largest project of this kind in Germany.

4.3.4 Critical assessment of the accessibility of Hahn airport

The example of Hahn airport shows that an airport located at the periphery of large urban areas can grow considerably, although it has a weak landside access. Low air fares, offered particularly by Ryanair, have outweighed the lengthy and often cumbersome journey from metropolitan areas in south-western Germany. Passenger surveys have shown that low fares have prompted passengers from virtually all places in Germany and neighbouring Luxemburg, Belgium and France to fly from this airport.

At least partly, one can conclude that air travellers do not fully reflect the full costs for airport access in their decision for Hahn. Particularly if time and travel costs for the journey to the airport are taken into account, the fares offered by the dominating low cost carrier at Hahn have to be put into perspective. Nevertheless, aggressive advertisements of low fares apparently are a successful strategy to attract new customers.

The example also shows that substantial investments of public funds are necessary to improve the infrastructure for landside access at airports that show an enormous growth trend in passenger numbers. The four-lane improvement of federal highway B50 and the reopening of the railway line between Hahn and Bingen are associated with considerable costs, exclusively borne by the tax payer. The benefits, however, fall almost exclusively upon the airport operator (which in this case is publicly owned) and the airlines operating there. While these measures are important elements for the economic development of rural areas, they are also sometimes quoted as examples that air transport does not fully bear its total costs.

Particularly the cost-benefit relation of the reinstated rail access is questionable, as travel times to the metropolitan areas of Mainz and Frankfurt will not be shorter than currently with coach services. While long-distance coach operators generally operate without subsidies and even contribute to the state income with taxes paid on the fuel used, regional train services are heavily subsidised by public funds. Therefore, the taxpayer does not only bear the costs for the rail infrastructure, but also for each train operated in future on this line.

5 Conclusions

This report has shown several aspects concerning airport ground access. Air transport market analyses usually focus on the number of destinations, frequencies and prices. However, ground access is an important factor for the individual travel behaviour when passengers choose an airport.

While no harmonised dataset concerning the modal split for access to European airports exists, data available from the German air passenger survey and sources for other European airports suggest, that the car remains the most important mode for passengers travelling to the airport.

Nevertheless, also rail is an increasingly important mode. Currently, 23 out of the 30 largest airports in the European Economic Area (including Switzerland) have a direct rail access at or in the vicinity of the passenger terminal. A number of rail access projects are currently being planned or under construction. The airports of Barcelona, Dublin, Helsinki, Lisbon and Prague are all destined to benefit from new rail connections within the next five years. This, together with the move from Berlin-Tegel (without rail access) to the new Berlin Brandenburg International airport (with rail access), will result in the fact that 28 out of the 30 largest airports will be connected to the railway system. Only Paris Orly (indirect rail access with an automated passenger shuttle to a train station 7 km away from the airport) and Palma de Mallorca remain without a direct rail link at the respective terminals.

In the case of most of the 30 largest airports in Europe, passengers have a choice between different public transport service providers for access between the centres of the respective cities and the airports. While dedicated express train services are in many cases the quickest mode, they are at the same time the most expensive mode (e.g. Stockholm Arlanda or the London airports Gatwick, Heathrow and Stansted). However, price sensitive passengers can chose from other modes, such as express busses, regular busses or metro/underground trains, which often take longer, but are considerably cheaper.

Taxi fares to and from the airports naturally depend to a large extent on distance travelled and given the relatively long distances of some airports (e.g. London Gatwick, Heathrow and Stansted) can be very expensive. Taking a look at the fares per km travelled, a high correlation with the cost of living in the respective country can be observed, making the journey to airports in United Kingdom and Switzerland the most expensive and Greece, Italy and Spain relatively low-priced.

Also with parking fees at airports, a high correlation with the general price level in the respective country or city can be observed. The London airports, Zurich and Paris are among the airports with highest parking fees. Nevertheless, airports have started to differentiate the service "airport parking" and offer substantial discounts in case of pre-booked parking space. Parking fees are also highly dependent on convenience, as parking lots only reachable by shuttle bus and used for long-term parking offer significant savings for the passenger, compared to parking lots located in the direct vicinity of the terminals.

A good ground access in combination with the airside connectivity can create valuable synergies, which are exploited by airport operators in concepts often referred to as "airport cities". The intermodal connectivity is a value in itself, as it increases the attractiveness of the airport as a location for business activities, ranging from logistics to knowledge-intensive services. For airport operators, real estate projects therefore develop into an important business segment, creating often higher profit margins than the primary function of an airport, which is the provision of infrastructure and services for airlines.

While the intermodal integration into high-speed railway networks often creates benefits for the airport operator, transport planners carefully assess the effects such integration has on railway passengers. Additional stops at airports increase journey times for travellers on the high-speed trains, which do not travel to or from the airport. Therefore, as the example of Barcelona has shown, it can be reasonable not to connect the airport directly to the high-speed railway network. In other cases, such as Frankfurt's Rhein-Main International airport, the integration has increased the airport's catchment area and the modal share of airport access, therefore creating substantial benefits for the airport operator and airlines operating there.

Finally, the example of Hahn airport in Germany has shown that the flourishing low cost airline business at a "new-entrant", military-civil conversion airport can incur several other investments to improve ground access, which are actually borne by the taxpayer. In the case of Hahn, the costs for the re-opening of the railway line will cost more than € 100 million, while the benefits for travellers from the Rhine-Main region in terms of travel time savings compared to the existing coach services are virtually non-existent. Moreover, as parking fees at Hahn are relatively low compared to other airports, it is relatively unlikely that a larger modal shift towards rail will occur after the inauguration of the rail line.

Also in the case of Düsseldorf, as an example for a large secondary airport, public funds were used to improve ground access. More than € 70 million in federal and EU grants were used to connect the long-distance train station with the terminal and to construct a check-in area at the train station, which was used only for a short time.

However, the case of Hahn shows that even with a rather sub-optimal ground access, both in terms of travel time and costs, airports can grow substantially, as long as airlines apply an aggressive low-price strategy for the acquisition of passengers. Nevertheless, recent trends show, that the low cost market is starting to saturate. As Ryanair has increased services from various airports in Germany, short-term growth prospects for Hahn have to be seen critical. From a long-term perspective, with future aviation growth and capacity constraints at various German airports in mind, it is certainly positive to have additional airport capacity available.

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Deutsches Zentrum für Luft- und Raumfahrt e.V.
in der Helmholtz-Gemeinschaft

German Aerospace Center DLR

Air Transport and Airport Research
Lilienthalplatz 7
38108 Braunschweig
Germany
ww.dlr.de/fw

www.DLR.de