

Air/Rail Intermodality – Recent Experiences from Germany

This paper tries to explore recent developments in Germany, where an integrated intermodal product, the so-called AIRail, offers unique service features, like integrated ticketing and baggage handling, which is so far only known in the air transport industry. A new approach to integrate air and rail services was undertaken with AIRail, which has achieved considerable success so far, as more than 170,000 passengers per year use this service. Characteristics and advantages of AIRail will be explored in the rest of the paper, but also shortcomings and challenges that can be identified. Furthermore, special attention will be given to the impact of high-speed train services between Frankfurt and Cologne on air services between these cities.

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Background

To increase the benefits of the transport system or infrastructure, policy-makers often demand a better integration of the various modes of transportation. For environmental reasons and to relieve congested airports, a shift of short-distance feeder air services to rail is a frequently expressed objective in transport policy. However, as a prerequisite to the market success of such ideas, it is necessary that rail transport providers offer attractive products for passengers to create an incentive to choose rail services over short-distance air services. Forced modal shifts by command-and-control regulatory instruments are incompatible with liberal market economy regimes. They tend to reduce consumer welfare and should therefore be abandoned in favor of more market-oriented measures. The attractiveness of intermodal products has to be increased with regards to both price and journey time, as well as convenience.

This paper tries to explore recent developments in Germany, where an integrated intermodal product, the so-called AIRail, offers unique service features, like integrated ticketing and baggage handling, which is so far only known in the air transport industry. The idea, however, to operate a train with the service characteristics of air transport is not new. Deutsche Bundesbahn operated a dedicated train service on behalf of Deutsche Lufthansa, the so-called “Lufthansa

Airport Express”, as early as 1982 (until 1993), connecting both Düsseldorf (via Cologne) and Stuttgart with Frankfurt Airport. These services were discontinued for several reasons, the most notable probably being considerable increases of leasing rates by the train operator, which Lufthansa was not willing to pay. Another problem was the difficulty to achieve a high load factor of a fully dedicated train, which offered only few daily frequencies and considerably longer journey times than air travel.

A new approach to integrate air and rail services was undertaken with AIRail, which has achieved considerable success so far, as more than 170,000 passengers per year use this service. Characteristics and advantages of AIRail will be explored in the rest of the paper, but also shortcomings and challenges that can be identified. Furthermore, special attention will be given to the impact of high-speed train services between Frankfurt and Cologne on air services between these cities.

AIRail Service Characteristics

AIRail, jointly developed by Deutsche Bahn, Lufthansa and Fraport, can be considered as the most advanced intermodal product available to travelers in Germany, if not in Europe. It was introduced on the route between Frankfurt Airport and Stuttgart in March 2001 and between Frankfurt Airport and Cologne in May 2003 after the high-speed train line had been

inaugurated several months before, which reduced travel time between both cities tremendously. The service features integrated ticketing and baggage handling. The latter point is particularly important to gain passenger acceptance for rail services. With AIRail, baggage is checked through from the Lufthansa-branded check-in counter in Cologne or Stuttgart main station directly to the final destination and vice versa.

However, this service is particularly challenging for the participating service providers for several reasons. First, the new ICE 3 high-speed trains do not feature baggage compartments. Therefore, a passenger compartment is converted in a “quick change” configuration to carry baggage on the AIRail segment of the journey, which is associated with a loss of 10 seats that could otherwise be used for paying passengers. The second challenge is associated with Deutsche Bahn’s very dense and synchronized timetable, requiring the loading and unloading of baggage during the brief stops not to exceed 4 minutes. Baggage is transported in closed containers on wheels from the platform at Frankfurt Airport to security screening and the baggage handling system which was extended for this purpose into the airport’s new long-distance train station. Thirdly, baggage of passengers who started their journey outside Germany is required to be cleared by customs. For this purpose, small customs offices have been set up at the train stations of Cologne and

Stuttgart, so passengers can clear their baggage directly at the train station.

A total of 15 regular trains per day in each direction between Frankfurt Airport and Cologne are designated as AIRail trains as well as 7 trains between Stuttgart and Frankfurt Airport, therefore offering passengers a wide range of frequencies, resulting in reduced waiting time for connecting flights. On average, about 31 seats in 2nd class for economy class passengers and 6 seats in 1st class for business and first class passengers are reserved on each train designated as AIRail service. In total, this results in an available AIRail capacity of 555 seats per day or about 200,000 seats per year on the Cologne-Frankfurt route, with slightly less than half of this quantity for the Stuttgart-Frankfurt route. The “blocked space” agreement of Lufthansa with Deutsche Bahn has evident advantages over the lease and operation of a complete train as it was done with the “Lufthansa Airport Express” from 1982 to 1993. On the one hand, it is possible to offer more frequencies and on the other hand, it is less difficult to achieve higher load factors. Moreover, the agreement between Deutsche Bahn and Lufthansa is flexible so that the number of available seats can be adapted to demand on short notice.

The AIRail service is not limited to passengers traveling on Lufthansa. A total of 27 other airlines have agreements with Lufthansa to use the AIRail service to feed passengers to Frankfurt Airport. For the participating airlines, this service has clear advantages, as they do not have to provide own check-in agents at the train stations and they also do not need to create an interface between the airlines’ and Deutsche Bahn’s reservation and inventory systems, as Lufthansa provides this gateway function.

Besides an attractive number of frequencies, short travel times and convenient baggage services, another incentive for AIRail passengers is the fact that they receive the same amount of frequent flyer miles as they would have when using a feeder flight. Besides these positive characteristics,

which have made AIRail a well-accepted alternative to feeder flights, there are also a number of challenges and problems associated with the service. First, it is a rather complicated and costly process when a foreign airline wants to make use of the AIRail service. Interested airlines have to apply for approval at their home country’s civil aviation authority, as AIRail is a deviation from standard security procedures found in international aviation. Second, AIRail cannot be booked on Lufthansa’s own website caused by technical problems with the booking engine of Lufthansa. This inadvertently creates incentives for internet users to book a feeder flight instead of the AIRail service. This fact becomes even more curious as it is possible to book AIRail on other internet-based travel agents such as Opodo. Third, it is rather difficult for foreign travel agents, who are not familiar with the different intermodal products available in Germany, to identify the service characteristics of AIRail in comparison to other intermodal products, most notably code-share agreements that Deutsche Bahn maintains with American Airlines, All Nippon Airways, China Airlines and TAP Portugal. While code-share services include more destinations than AIRail, these services do not feature through-baggage handling and are therefore less attractive for passengers. Traditional booking engines and computer reservation systems are not able to display additional information about the exact service characteristics of code-share trains. Although it seems that these challenges may be overcome quite easily, they are, in fact, rooted in an incompatibility of the information technology systems of railway operators and airlines and in the rather uncommon combination of the two modes for one integrated product. Therefore, these problems are indeed difficult and expensive to solve.

Besides the more technical obstacles for passengers to find information on AIRail and to book actual AIRail journeys, other reasons have been found that limit the acceptance of AIRail. Anecdotal evidence suggests that passengers that still use feeder

flights prefer air transport due to better accessibility of the airports of Cologne and Stuttgart by car and due to lower parking fees at the airports than at the main train stations. As both Cologne/Bonn and Frankfurt Airport are directly connected by high-speed train this may lead to the idea to offer AIRail from Cologne/Bonn Airport instead of or in addition to the services from the main train station. Apart from increased customer acceptance this would also help to save costs as check-in and customs facilities are already available at the airport. However, this would require an increase in train frequencies between the two airports from its three services daily at the moment of which two are operated very early in the morning and one very late in the evening. It may be sufficient to offer four daily services, equal to the current number of flights which could arrive at/depart from Frankfurt Airport synchronized with Lufthansa’s flight banks.

Case study: Impacts of the high-speed railway line on air services between Cologne and Frankfurt

The city pair Cologne-Frankfurt seems to be a perfect example for the benefits of a shift from short distance air services to railway. Since 2002 Germany’s fastest high-speed line has reduced railway travel times from Cologne main station to Frankfurt Airport from two hours to 50 minutes. Comparing this to the travel time by air, taking into account the time needed for the transfer to the airport, for check-in, security checks, boarding, the actual flight and deboarding it seemed questionable if there was a future for air services on this city pair. The following analysis, mainly based on German air transport statistics, should give an insight on the developments of air services before and after the inauguration of the high-speed railway line.

Traditionally, the route Cologne-Frankfurt has been one of the shortest distances flown in Germany, as both airports are only 136 kilometers apart. Figure 1 shows the number of seats offered and the number of passengers flying between Cologne and Frankfurt from 1989 to 2006.

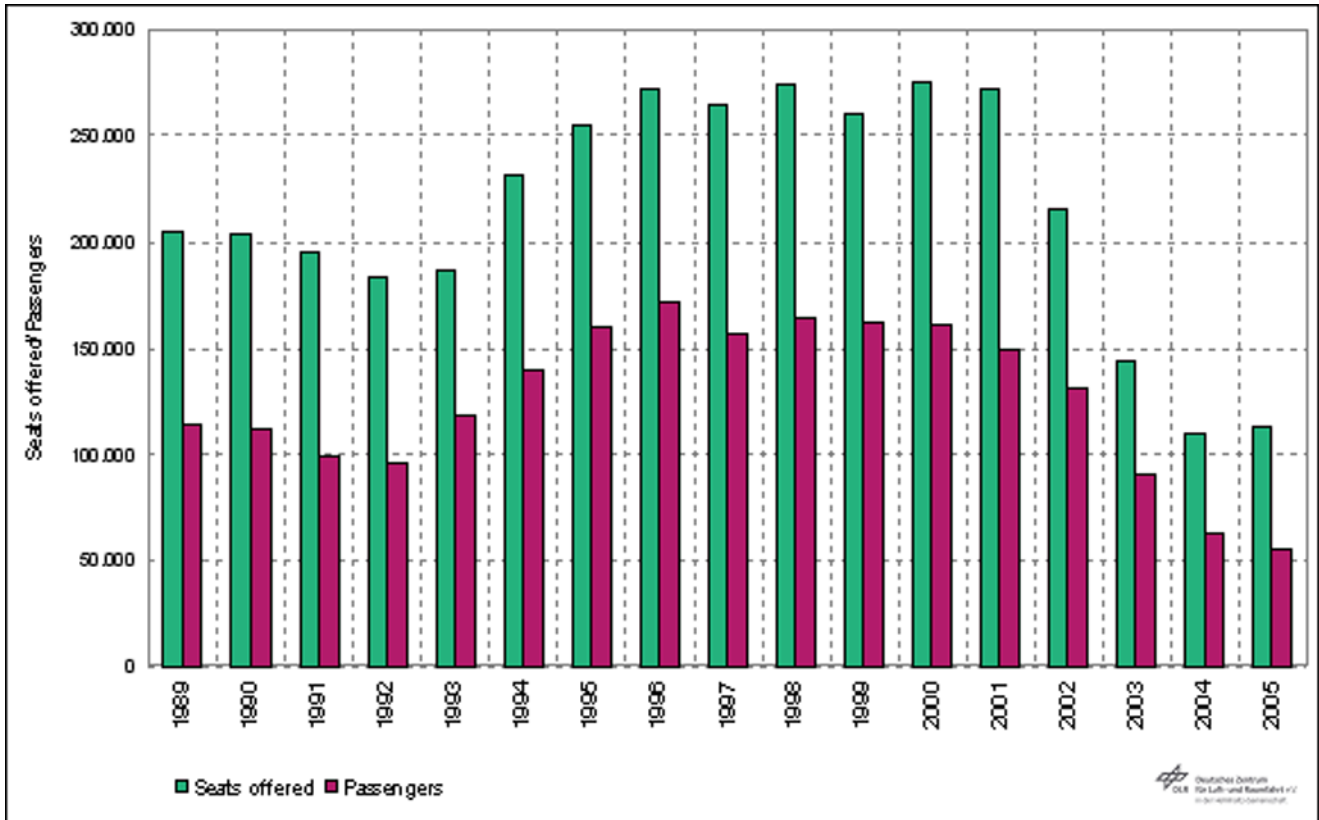


Figure 1: Seats offered and passengers on air services between Cologne and Frankfurt
 Source: Own representation based on data of the German Air Transport Statistics.

From the early 1990s up to 2001, the number of passengers was consistently between 150,000 and 170,000 annually. Included in this number are passengers connecting in Frankfurt to another flight, as well as passengers traveling on the city pair Cologne-Frankfurt only. The latter group of passengers amounted to a significant number, as in the 1990s 20-25% of passengers flying between Frankfurt and Cologne were origin/destination passengers on this city pair. During the 1990s, Lufthansa offered between four to seven daily services, with an average aircraft size between 105 and 133 seats, mainly Boeing 737-300 and -500 and in peak times also A320s. Figure 1 shows the dramatic impact of the inauguration of the high-speed line between Cologne and Frankfurt in 2002. The demand for air services was further reduced by the introduction of AIRail in 2003. The number of available seats was reduced from more than 250,000 to slightly more than 100,000 annually, by means of a reduction in frequencies to a maximum of four per day and a reduction in average aircraft size to 73 seats. The number of passengers has fallen from more than 150,000 to just 50,000. Load factors

have fallen from an average of 60% to less than 50% in 2005. There is still a marginal residuum of origin/destination passengers of about 10% of total passengers or about 5,000 passengers annually.

Under these circumstances, it is indeed questionable whether air services between Frankfurt and Cologne will be viable in future. So far, Lufthansa has argued that these services are especially needed to retain premium passengers that are not willing to change to the AIRail service. In addition to the abovementioned problems of asymmetric information and relatively inconvenient access to train stations by car, the reluctance of some passengers to use the train may also be explained by the relatively bad image Deutsche Bahn has among Germans, while for some foreign travelers, for instance from North America, rail travel is not in their evoked set of travel alternatives at all.

However, there are several arguments which would favor the discontinuation of air services between Cologne and Frankfurt. Firstly, Lufthansa should take into account the opportunity costs

of the use of slots in Frankfurt. This airport is heavily constrained and operates at its capacity limits during most time of the day. Therefore it is hardly possible for Lufthansa to expand its network from Frankfurt. It is likely that a substitution of the Cologne-Frankfurt route for new long-haul services would have positive economic impacts for Lufthansa, even when taking into account a limited, although possible loss of premium passengers who do not accept the AIRail service. Secondly, opportunity costs of crews and aircraft currently used for the Cologne-Frankfurt route should also be taken into account. It is likely that the use of these aircraft somewhere else in Lufthansa's network could create positive returns, which cannot be currently generated when looking only at the revenues attributable to Cologne-Frankfurt and at the disproportionately high costs per available seat kilometer on this suboptimal stage length. Thirdly, the strategic situation at Cologne/Bonn Airport has changed considerably in the last few years. As this airport is dominated now by low-cost carriers, several traditional network carriers have withdrawn from the airport. This can be

attributed to the fact that yields on origin/destination markets have eroded and a “degradation” of services merely to feed the hubs of the respective airlines is not seen to be economically viable. After the withdrawal of Air France, Alitalia and – most recently in early 2006 – British Airways, Lufthansa faces only KLM as the last major European network carrier serving Cologne/Bonn. Therefore, the strategic risks of losing passengers that do not accept AIRail to other carriers can be considered very limited. Furthermore, it is highly likely that the frequent-flyer program of Lufthansa and the opportunity to accrue miles on the AIRail segment of a journey will retain loyal Lufthansa passengers even without air services between Frankfurt and Cologne.

Conclusion

The analysis has shown that AIRail is an attractive product, offering a number of incentives for passengers to switch from air to rail. However, it has also been shown that the process to introduce and operate the system is complex and expensive. The first prerequisite to achieve a high level of customer acceptance is through baggage handling, which requires the establishment of check-in, customs and baggage handling facilities at train stations. This in turn requires a high level of daily passenger throughput to be economically viable. In case of Cologne more than 10,000, in the case of Stuttgart about 5,000 travelers per month use AIRail at the moment.

However, the decisive prerequisite to offer attractive intermodal products is the availability of high-speed train lines to achieve competitive travel times and the integration of airports into the high-speed train network. While travel demand would be sufficient, the former problem is an obstacle to introduce AIRail in Nuremburg and Düsseldorf to connect these cities with Frankfurt Airport. The latter problem impedes the connection of Nuremburg and Stuttgart with Munich Airport by AIRail, as this airport is only served by regional trains and the newly-built high-speed line between Munich and Nuremburg does not run via the airport. From the perspective of

intermodality, the prestigious maglev train connection to be built between Munich main station and the airport will be of very limited use for an AIRail service, as it will be an isolated application on a short distance only. Intermodal products with through-baggage handling from e.g. Stuttgart or Nuremburg would require an additional baggage transshipping process at Munich main station, raising complexity and costs and reducing attractiveness for passengers.

Nevertheless, interesting opportunities for international train services with integrated ticketing and baggage handling for air connections may emerge in the future with the extension of cross-border high-speed train lines that are currently planned or built under the Trans-European Networks (TEN) initiative of the European Commission. Amsterdam airport for instance currently already attracts a significant number of passengers from the north-western part of Germany. Therefore, it may be conceivable to operate a train with the service characteristics of AIRail between Cologne, Düsseldorf and Amsterdam-Schiphol to substitute or at least complement KLM's feeder flights from the respective airports.

Finally, it has to be noted that the objective of transport policy to eliminate short-distance air services with the help of an attractive intermodal product has not been achieved with AIRail. In fact, only 2-3 daily slot pairs at Frankfurt have been released for alternative use due to the reduction in frequencies between Cologne/Bonn and Frankfurt. This compares to 4 daily slot pairs still in use for this extreme short-distance route. Between Stuttgart and Frankfurt, Lufthansa still operates 6 daily frequencies and equipment with a size of up to 150 seats. This fact is an indication that an expansion of AIRail to other city pairs is likely to have only a very limited positive impact to relieve capacity constraints at hub airports.

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