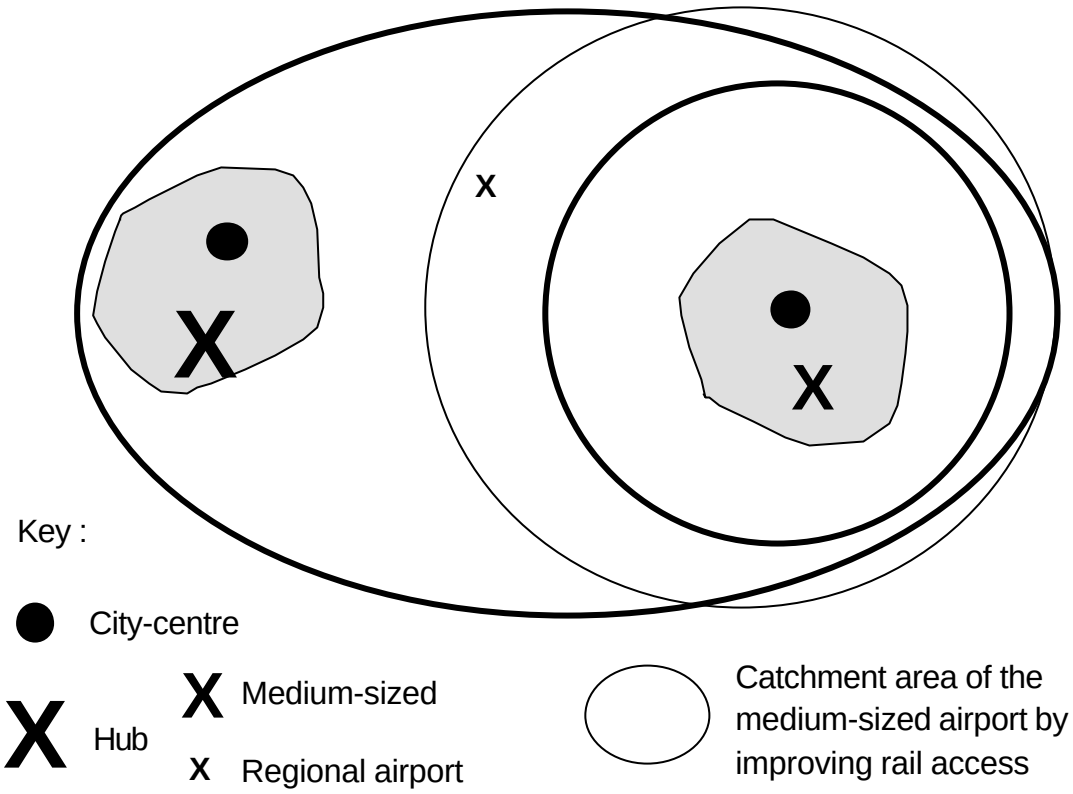

Do rail stations at airports allow a better distribution of air passenger demand among airports ?

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Abstract

The paper presents the results of a study on the effects of rail stations (and High-Speed Rail) at airports on the route and hubbing patterns of airlines. Background for the work is Action COST-318, chaired by IVT.

EU-liberalisation, fierce competition, cost-cutting, hubbing of major European airlines at their home base, increased airport catchment areas by existing (high-speed) rail access at most of the major European airports, leads to air traffic congestion, whereas a number of other (medium-sized) airports are under-utilised. In the future, saturation of demand and fading trust trough repeated and unpredictable delays in air transport could emerge.

Moreover, most of the European airports cannot be extended due to encroaching urbanisation and noise and air pollution concerns.

In this situation, the idea arises, at least where the catchment areas of several airports overlap, in particular when airport (high-speed) rail access is provided, that users could shift to other, less crowded airports.

This process has not been observed so far. The issue was therefore studied using expert interviews based on the "Delphi" method (statement of personal convictions in several rounds, after having read the arguments put forward by the other experts during the round before).

Answers to the issue involve, among other things, the future of:

4 Air traffic concentration and hubbing
5 Improved technologies to cope with airport congestion
6 Cost-effectiveness of hubs (considering also delays)
7 People's reaction regarding noise and air pollution
8 Hub-by-pass development
9 Airport choice by air travellers just as airline choice
10 Rail stations at airports: a new way of distribution of air passenger demand at (medium-sized) under-utilised airports

Keywords

Airport congestion – airport access – rail – Delphi-method – Europe – COST– Swiss Transport Research Conference – STRC 2001 – Monte Verità

1. Introduction

1.1 Air transport liberalisation

Air transport liberalisation is at a first glance meant for the airline industry; particular aspects being excepted, such as air safety, which remains of course under state control.

1.1.1 US-Deregulation and EU-Liberalisation

The US-deregulation of the airline industry began in 1978 with the Deregulation Act of the President Carter's Administration. At once air routes could be operated and air fares set without any commercial restriction. Many took the opportunity to start running a new airline. In the meantime, free enterprise, fierce competition and the action of the most powerful competitors have led to a string of commercial and financial struggles for survival, finally ousting from the market by merger or bankruptcy all of the new-comers but two.

The EU-liberalisation has been put into force step by step until the 1st of April 1997, involving air routes and fares without any commercial restriction between and within EU-states as well. One main aspect intended to protect competition in particular is that the EU-Commission has to monitor and rule out any dominant position. Switzerland will be allowed to take part to the liberalised market while operating to/from, between, but not within (cabotage) or beyond any of EU-states, and this is to occur two years after the last bilateral agreement package has been ratified by all the parliaments of the EU-states.

1.1.2 Competition pressure

Competition facing airlines under "Deregulation" and "Liberalisation" has led in particular to the following both relevant aspects:

Increases in flight departure frequencies (for each airline) on a specific air route; much appreciated by the business community.

reductions in air fares in general (on to "rock-bottom prices" in particular); very much appreciated by the general public on travel for private purpose.

1.1.3 Cost-cutting pressure

Shortfalls in revenues per air passenger due to competition lead to tremendous efforts by airlines in cutting costs, specially in the following both relevant operational aspects:

Concentration of the long-haul flights at least, in particular and significantly at the air carrier home base; for example, all Swissair long-haul flights (but one in Geneva) to Zurich.

Prime importance of connecting passengers (from Geneva and other origins), in order to bundle the airline's air passenger volumes, maximise the load factors and carry them as far as possible.

1.1.4 Alliances

Alliances should overcome primarily geographic shortcomings of a specific airline, where (in Europe) connecting places are (much) better located and, in order to be a "global player", where the air passenger traffic volume is too low for the airline to be operated alone.

Just starting in the airline alliance process is the involvement of railway companies, in order to serve best by (high-speed) rail unprofitable destinations by air. It is the case for Lille-Paris; in the coming weeks for Brussels-Paris; in the very next future for Cologne-Frankfurt.

1.2 Hub-and-spoke system

The hub-and-spoke system is the organisation of the air traffic concentration process within a specific airline or alliance in waves of arriving flights preceding shortly waves of flight departures, so that air passengers spend little time at the connecting (hub) airport.

A hubbing pattern suits to an airline operation system; so the system must not be run only at large airports; but for instance at the regional airport of Clermont-Ferrand; or at the EuroAirport Basel-Mulhouse-Freiburg i.B. ("Euro-Cross" of Crossair).

1.3 Traffic concentration at major (hub) airports

Air traffic concentration however started first at airports supported by the local air traffic of major locations, due to the following main features:

role as a socio-economic pole

The role as an economic pole is boosting business travel, for instance in Frankfurt.

The role as a social pole is represented by the centre of gravity of a population or covering an agglomeration, which is not necessarily identical to the economic pole (of a country).

role as an international pole

The role of international (organisation and foreign population) activities, boosting the potential for air traffic over population and economic power aspects, best represented by Geneva.

geographic location

A geographic central location (out of an inconvenient topography) should have a better development chance than a location at the periphery (unlike transport by sea, on obvious grounds).

operational and historical grounds

Airports follow up (and anticipate) the expansion of the airlines, first of all the so-called "home carrier"; this is the case with Zurich and Swissair (and also with EuroAirport Basle-Mulhouse-Freiburg i.B. and Crossair).

Anyway, most of the major (hub) airports in Europe are the home base of major European airlines, as they are (former) national air carriers.

1.4 Rail access at airports

1.4.1 Rail network development in Europe

It is worth-mentioning that Europe runs a dense railway network. This is in particular the case within and around agglomerations. Moreover trains in Europe are popular; there is a kind of "railway culture" to be considered, even for those who are not frequent users.

1.4.2 High-speed rail

Following the very successful 'Shinkansen" example in Japan, Europe began in 1981 to operate on new tracks high-speed trains, halving since 1984 time spent between Lyons and Paris compared to classical fast trains. Since then there is an expansion of high-speed rail networks taking place in Europe.

1.4.3 competitive or complementary ?

In fact both together.

The Trans-Europe-Express network run in the post-war years was based on a comfortable rolling stock, but on low commercial speeds due to an antiquated rail infrastructure, and Trans-Europe-Express strategy failed to succeed commercially. In comparison, high-speed rail was quite at the start able to compete with air transport effectively and efficiently, mostly on routes where (door-to-door) travel time appears to have the same order of magnitude.

Moreover HSR services are to be seen as an alternative and a challenge to the regional feeder air services at increasingly congested main airports. As already mentioned, there are no longer even feeder flights between Lille, Brussels and Paris, as this will be the case between Frankfurt and Cologne in the very next future. According to the latest press reports, Air France is going instead to charter TGVs for feeder services, beginning at five a day between Brussels and Paris-CDG2 Airport.

1.4.4 Airport rail stations

Due to the fact that most commercial airports are (within or) close to agglomerations, there is in Europe (almost) always a rail line (very) close to an airport. The opportunity is given to build an airport rail station on a diverted track or at the end of a branch line. In fact, there is now a rail station at most of the main airports in Europe. Rail transport is complementary to air transport while considering airport access landside

Not only the airport vicinity is connected by rail, but also (with no change) the larger cities within the region or country while enabling a stop of long-distance trains at the airport. In 1994, the first airport stations to be fully integrated into the HSR systems went into operation (Paris-CDG2) and Lyon-Satolas); next example of this type will be Frankfurt/ Main airport.

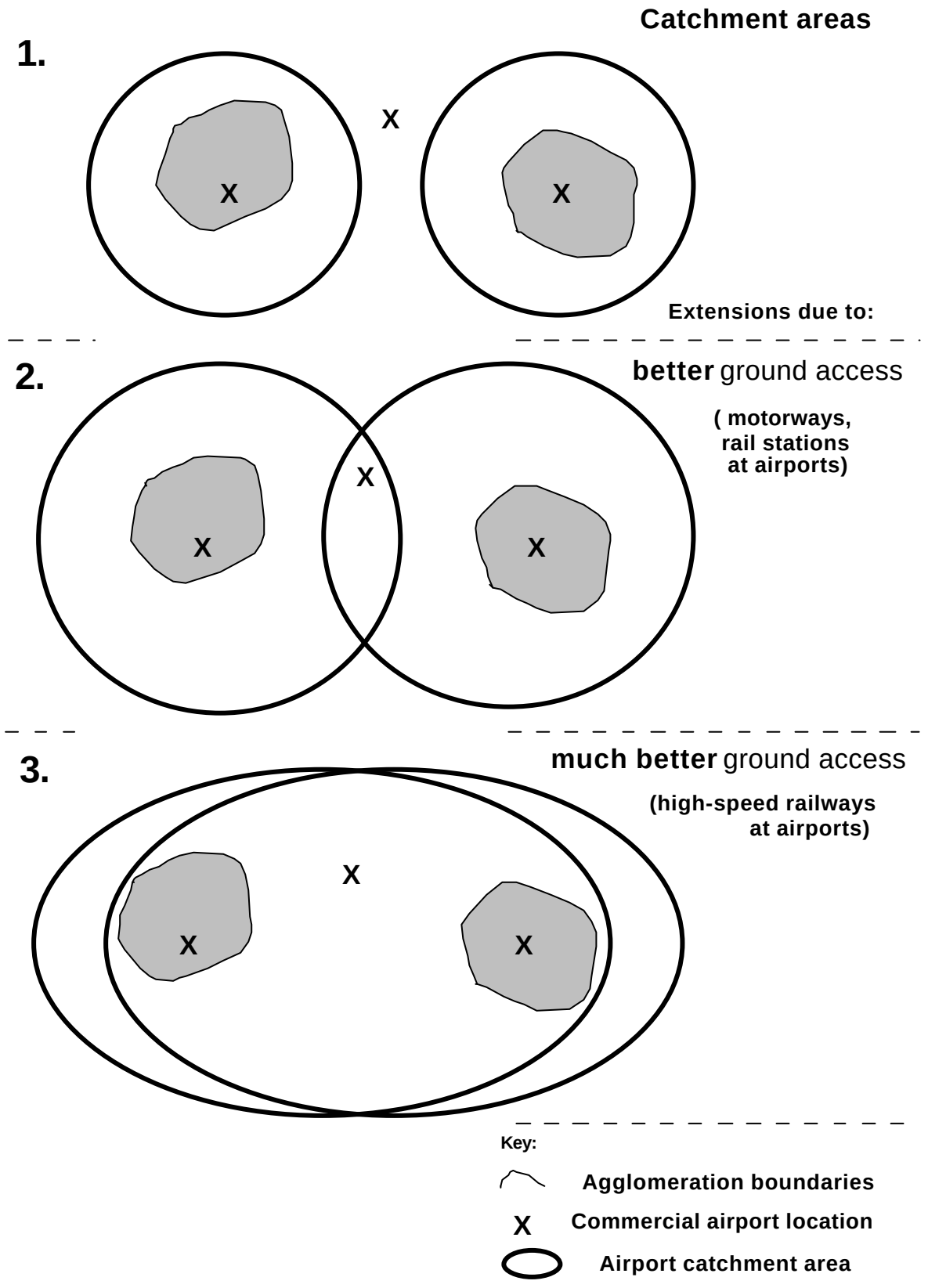
Rail stations at airports offer an alternative whenever (congested) road access at airports is at stake. It has an acknowledged lead in terms of punctuality, safety and air pollution over (private) road transport.

However, rail transport to be efficient needs high volumes of transport demand, as well as frequent train departures. That is why rail stations at airports developed first at major airports, where succeed was at a first glance the most promising.

Table 1 Types and examples of airport rail access

Type of link	Conventional	High-speed rail
City-centre to airport	Brussels London-Heathrow London-Stansted Newcastle Paris-CDG Paris-Orly Milan-Malpensa Rome-Fiumicino Barcelona Madrid-Barajas Stuttgart Munich	Oslo-Gardermoen
Sub-urban and inter-regional rail system at airport	Amsterdam Geneva Zurich Birmingham London-Gatwick Stockholm-Arlanda Frankfurt	Paris-CDG2 Lyon-Satolas Frankfurt
with no change airport to airport	Zurich to Geneva	Paris CDG2 to Lyon -Satolas

Figure 1 Airport catchment area extensions according to a specific airport access time



1.5 Summing-up existing conditions before question

1.5.1 Traffic catchment area expansion at major airports

airside, due to EU-liberalisation, fierce competition, cost-cutting constraints, hubbing of major European airlines (at their home base).

landside, due to airport rail access by rail, up to high-speed rail access, even replacing air feeder flights, freeing arrival and departure slots airside for other (long-haul) flights.

1.5.2 Airport infrastructure expansion at existing or new sites

Most of the European airports cannot be expanded due to close urbanisation and noise and air pollution concerns. A ceiling of the activities at some airports is already being implemented, like at the Paris-Orly airport.

Beside costs, sites for new airports to be built are scarce and often far from agglomerations; only two examples in Europe for the time being: Oslo-Gardermoen (opened in October 1998) and Athens-Spata (to be opened in March 2001).

1.5.3 Delays

Weather issues (or strikes) are no longer the main cause of (cumulated) delays (at the end of the day). Today delays come often from air space congestion, as well as from running hub-and-spoke systems, as (one or) few delayed flights may delay a string of other connecting flights, and so on, frustrating the air passengers having missed their flight. They may come from airport and airline management, with last but not least from the lack of airport space.

As a consequence, airport saturation and fading trust could emerge, due to repeated and unpredictable delays in air transport.

1.5.4 Congestion at major (hub) airports

Once new improvements in air navigation and air traffic control are working, thanks to future satellite coverage, concerns on three-dimensional air traffic management will shift to (one-dimensional) issues at airports.

Exacerbated congestion at most of the major European airports is taking place, whereas other (medium-sized) airports remain under-utilised.

1.5.4 Remaining airport infrastructures

Remaining airport infrastructures are at first under-utilised medium-sized airports. Other airport infrastructures left by the military after the cold-war period ended are so many, that even choice is permitted; like in the Rhine valley downstream from Basle or for the choice of the future airport for Berlin.

1.5.5 The question is:

Do rail stations at airports allow

a better distribution of air passenger demand

among airports ?

2. First answer to the question

2.1 Major airports

There are, as seen before, two opportunities in order to reduce air traffic (congestion) at (major) airports, provided that specific conditions are met:

- Reduction in local air passenger traffic thanks to high-speed rail instead
- Reduction in feeder flights thanks to airport rail stations

2.2 Remaining airport infrastructures

At least where the catchment area of two airports overlap, even more the case where airport (high-speed) rail access is provided, users have the choice to shift from the one to another airport. See Figures 1 & 2 for the logic of this situation.

2.3 Within Action COST-318

This paper deals with one aspect of the effects of rail stations (and HSR) at airports. It is based on the work of the European Union supported research Action COST-318, chaired by the Institute for Transport Planning, Transport Technology, Highway and Railway Engineering (IVT) at the Swiss Federal Institute of Technology (ETHZ) in Zurich. An Action with the Co-Operation in the field of Scientific and Technical research (COST) is started whenever at least five European countries are committed to deal with an issue of common interest.

2.4 according to the "Delphi"-method

As (still) no published statistics nor even data are available on the question whether rail stations at airports allow a better distribution of air passenger transport demand among airports, the issue is suited for an expert questionnaire (see Appendix) based on the "Delphi"- method.

The "Delphi"-method helps to reveal:

- Expectations on issues, which have never occurred before.
- A statement based on stabilised opinions on what may happen

In case of expert statements, the participants have to be competent and reliable. This is a prerequisite, as aspects involved in the questioning are evolving, such as air transport liberalisation and airport access, hub-and-spoke systems and regional (hub-by-pass) air transport, air traffic concentration and airport congestion, environment protection, according to technology improvements, economics, priorities set by the business world and by the society as a whole.

The survey is based on:

- A unique questionnaire for several rounds of questioning
- Statements made by each participant are consolidated in a further round by confirming or adjusting the answers given after having read a report on the previous round answers reflecting the views of all participants
- Statements are thought to be based on the knowledge about the issues, on experience close to the issue and are expected to reflect objectively the convictions of the expert
- The experts are expected to express a general synthesis on the matter, that is out of a specific project context

The survey proceeded from the general to the particular, starting with questions related to the wording, making sure that each of the participants understands the issue accordingly; then to questions related to the context/ background, such as liberalisation, airport saturation prospects, etc. At last, with questions related to airport ground access, rail access in particular. Some questions were related to others, not least in order to have a chance for consistency checking. Each question is formulated in a chain of questions. If the respondents answered "no", the question "why ?" emerges.

2.5 The experts

Experts included the COST-318 Action's Management Committee members, as well as experts from the following professional areas:

- Research institutes/ universities;
- Chambers of commerce & industry;
- Air passenger organisations;
- Air transport organisations;
- Management of small-, medium-sized and large commercial airports;
- Airport authorities;
- Civil service;
- (National) air carriers;
- Charter and regional airlines;
- Railway companies operating rail stations at airports and/ or high-speed trains;
- Railway organisations;
- Travel agencies;
- Editors of topic-related technical or scientific periodicals.

The confidentiality of the answers was assured, meaning that no names were attached to to specific opinions. 58 experts had been invited to participate. 26 fully usable questionnaires were returned at the end of the 1st round. 21 experts took part in rounds of questioning and came from Belgium, the European Commission, France, Germany, Great-Britain, Italy, Netherlands, Slovenia, Sweden and Switzerland.

2.6 Results

The answers to the questionnaire was compiled and divided into the following categories:

- Clear statements with an overwhelming majority, if not unanimity;
- More contentious statements with a sizeable expert minority not agreeing;
- Unclear areas, where opinions are divided nearly equally

It is worth noting as a rough sensitivity test, that the range of the answers given by the experts participating within the Action COST-318 did not differ from overall range of answers.

The outcome (personal statements after both rounds and having read the arguments put forward by the other experts in the previous round) involves, among other things, the future of:

- Air traffic concentration and hubbing;
- Improved technologies to cope with airport congestion;
- Cost-effectiveness of hubs (considering also delays)
- People's reaction regarding noise and air pollution
- Hub-by-pass development
- Airport choice by air travellers just as airline choice
- Rail stations at airports: a new way of distribution of air passenger transport demand at (medium-sized) under-utilised airports

2.6.1 Question meaning

There is a quite unanimous agreement among the experts that the wording suggests that air passenger demand could be distributed in another way than the one taking place nowadays. However, for a minority (which may be right), the wording does not suggest, that "there is a felt need of a better distribution of air passenger demand among (more or less close) airports". But when felt, quite unanimously the experts agree, that "rail stations at airports are beneficial to this need".

2.6.2 Air passenger transport trends

Considering air passenger transport trends, boosted in particular by European air transport liberalisation, "airport choice opportunities for users will increase (just as present airline choice opportunities)" as, unanimously stated by the experts, airports will be keen to offer new services according to flexibility and market opportunities (just as airlines are doing it), competing between them: this speaks for airport rail connection whenever feasible !

However, concentration in air passenger traffic will last (even up to saturation). A qualified expert majority is trusting the use of improved technology (surprisingly only one-third of those coming from research institutes and universities believe in an improvement), as well as the skills of airport and airline management, to be able to cope with more concentration without a saturation to intolerable levels". Some experts are expecting concentration in air passenger traffic even without effects of hub-and-spoke systems operated by the airlines (on some airports). As large airports in Europe were generally served first by rail operations, this speaks (for the time being) against a new distribution of air passenger transport demand towards other airports (by rail).

Underlining this, it has been acknowledged as correct, that more traffic gives an airport the opportunity to be more cost-effective and more profitable. Passenger transport access by rail, first occurring at large airports, offers new service opportunities (advantages of rail transport, such as punctuality, transport capacity, car parking supply relief and in some cases, feeder air services alternatives) is capable to increase air passenger traffic concentration. That means that the actual situation will last to prevail at least for the (very) near future.

2.6.3 Large (hub) airport constraints

As air passenger traffic is concentrating at large (hub) airports, constraints come up, such as long walking distances and delays. Until now, although often predicted, no lasting air passenger transport collapse occurred in Europe, which should not mean that such an event is out of question. Experts think, that some shift between feeder flights and rail access should occur.

The facts however are that most (large) airport areas in Europe (a few excepted), some of them close to the city-centre, cannot be extended outside their present boundaries, due to (dense) urbanisation and environmental concerns. Moreover, only a slim expert majority think, that people from airport neighbouring communities will protest against more air traffic

concentration, but finally accept, as they did in the past. Three quarters of the experts, who do not agree, believe they will (even) be able to stop the process (of air traffic concentration). This means that a potential reallocation of air traffic lies ahead (without or with air passenger transport liberalisation) to (more or less close) airports, which will have to be competitive (and rail access at the airport being, without doubt, one key element of attractiveness).

In this respect, it is confirmed, that airport access in general and air services supply are more important for people travelling for business purposes, whereas ground transport costs and air transport fares are more important for private purposes. Ground access time is more relevant than ground access distance.

2.6.4 Airport catchment areas

A clear majority agrees that airport ground access by rail extends the catchment area of an airport and that this would not only be the case at major airports.

That means also that catchment areas of airports being linked by rail are extended, giving the opportunity of a more equal distribution of air passenger transport demand, at least within areas where the catchment areas of several airports overlap. See Figure 1 for the logic of this situation.

Almost unanimous is the conviction that the airport catchment area will extend surely much further when high-speed rail stops at the airport.

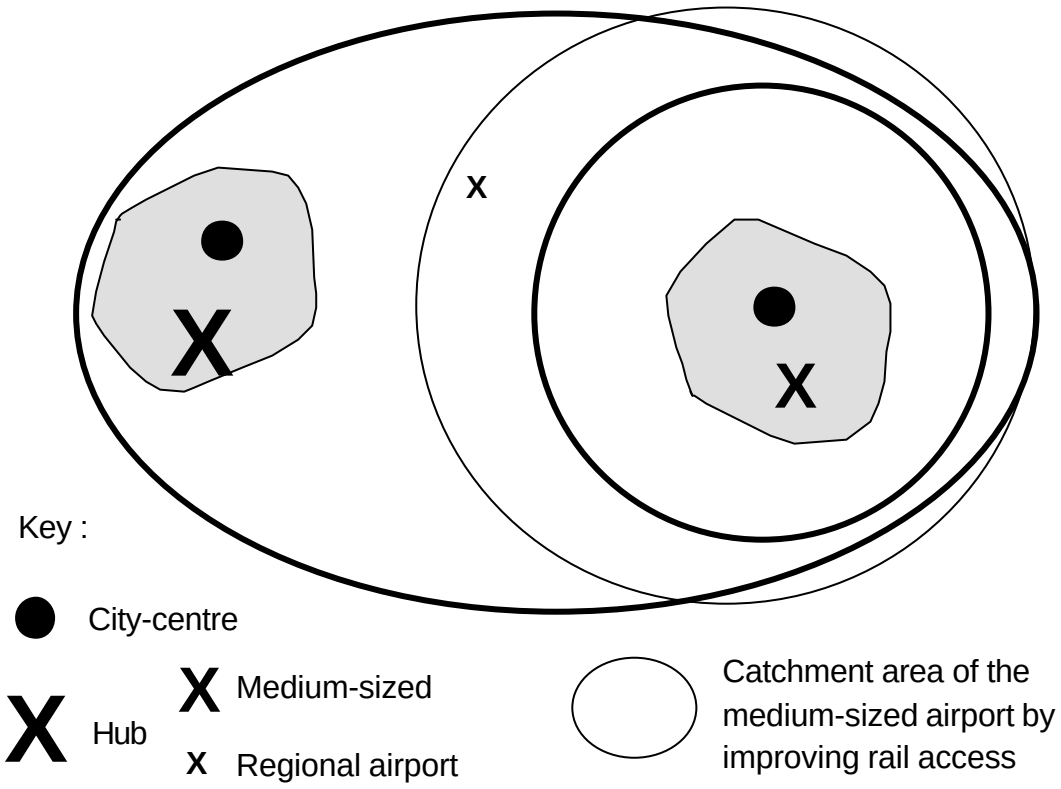
Additional effects of increasing catchment areas are cited as: increasing airline choice; direct flights; more competition between airlines; accelerating concentration at large airports and more air passenger flexibility.

2.6.5 Medium-sized airports

With regard to medium-sized airports, an expert majority thinks, rail transport access could provide them the same opportunities as to major airports. This statement implies among other things, that the airport catchment area being extended. Expert expectations are quite high, that airport rail access is going to cause a new distribution of air passenger transport demand from

an agglomeration with a major airport to medium-sized airports. See Figure 2 based on Figure 1 for the logic of this situation.

Figure 2 Air passenger demand distribution towards medium-sized airport



2.6.6 Airports within an agglomeration

Experts seem to trust, but less, in the adequacy of rail accesses to airports to cause a new distribution of air passenger transport demand within an agglomeration. The statement was surprising for some experts.

2.6.7 Regional airports

A reallocation of air traffic from large to regional (small-sized) airports (outside an agglomeration) would be expected by the experts to be slow; an overwhelming majority of them think, that there will be further a development in regional air transport, especially with "hub-by-pass" flights; but a clear majority think, it will not be relevant in terms of air traffic volume relief at major airports. A "better" distribution of air passenger transport demand among airports by the expected development of regional air transport, if better stands for relieving congested airports, is not lying ahead, according to a majority of experts.

2.6.7 Airport rail access features

Rail ground access distance/ time range suitability to airports set by the experts vary significantly from an expert to the other, as probably the background in their respective countries may be (quite) different: airport access up to 50 km by underground; up to 100 km by local train; by Intercity train up to 450 km; and up to 500 km by HSR (whereas the true substitution function of HSR (to air passenger transport) is quoted up to 800 km).

For new way of distributing air passenger transport demand between airports, all experts stress, it is important for an airport to be connected to high-speed rail. However, for half the experts, it does not make sense to have high-speed trains between airport rail stations. This would mean according to the expert majority, that no new distribution of connecting air passenger demand is expected (or even more wishful) between airports lying (too far) apart (in the present HSR distance range, this implies, for instance, that Lyons-Satolas airport can not to be considered as a potential reliever for the Paris air-ports).

A large expert majority agree that the traffic volume share of a given rail link to the airport has to be increased (by enhanced, compared to airport road access) by every possible mean (integrated rail-air services, improvement of transport supply and services (frequencies, quality, fares), profitability of rail links, framework of EU transport policy and long-term development).

Further enhancement conditions cited were: integrated supply of services; communication centres at airports; logistic facilities (check-in and luggage handling); more attractive rail stations; software issues. These are issues, which public transport should address.

Weights given to the access system characteristics vary significantly from one expert to the other, except for "frequencies" for business travel purpose, set thorough as "important" or "very important". As rail transport supplies a significant transport volume per unit time, this means that transport volumes by rail at airports have to be substantial in order to achieve high frequencies without empty trains.

Other quantitative and qualitative matters within the transport supply to look at are: transfer; check-in; reliability; punctuality, modal integration; time; information. These are aspects, that rail management should be able to manage successfully.

2.7 Conclusions

Due to the EU-driven liberalisation of the air transport systems, airport choice opportunities will increase, just as presently airline choice opportunities (expert ratio: 19 yes/ 2 no). Concentration in air passenger traffic (boosted by hub-and-spoke systems) will last (19 yes/ 1 no). A qualified majority of experts still trust the use of improved technology and management skills to cope with more concentration without saturation reaching intolerable levels (14 yes/ 6 no). Because of noise and air pollution, the experts' belief is, that people will protest against more air traffic concentration, but (as they did in the past) finally accept (12 yes/ 8 no); if not, they will be able to stop the process (6 yes/ 2 no).

As airport access time is more important than access distance (21 yes), a clear majority of experts agrees, that airport ground access by rail extends the airport catchment area not only at major airports (7 yes/ 12 no). This process applies of course much more with HSR (stopping at the airport) and leads to the extension of airport catchment areas with the attending overlap between airports (19 yes/ 1 no).

Experts' answer to the question is, that rail stations at airports are expected to lead to a new way of distribution of passenger demand among airports, in particular from a major airport (hub) to other (medium-sized) airports:

Rail as airport access suits very well: 19 yes/ 1 no
A new way of air passenger distribution: 18 yes/ 2 no
To a medium-sized airport: 13 yes/ 4 no

See Figure 2 based on Figure 1 describes this shift in the logic of the situation.

3. References

COST 318 (1998) *Interactions between High-Speed rail and air passenger transport*, final report, European Co-operation in the field of Scientific and Technical Research, (COST), European Commission (EC), Directorate General Transport (DG7), Brussels

Widmer J.-P. and Schilling R. (1997) *Do rail stations at airports allow a better distribution of air passenger transport demand among airports*, Report on experts' answers to a Questionnaire based on the "Delphi"-method, IVT-Bericht, **114**, Institut für Verkehrsplanung, Transporttechnik, Strassen- und Eisenbahnbau, ETH Zürich, Zurich.

Widmer J.-P. and Hidber C. (2000) *Effects of Rail Stations at Airports in Europe*, paper presented at the 79th Annual Meeting of the Transportation Research Board, Washington, D.C., January 2000.

Appendix A: Questionnaire form

Herewith the questionnaire form dealing with the titled question according to the "Delphi"-method

Do rail stations at airports allow a better distribution of air passenger transport demand among airports ?

Name: *Working with:*

Part 1: About the wording

- Do you have something to add to the information provided ?

  _____

  _____

  _____

- Do you agree that the wording suggests:

  a) air passenger demand could be distributed in another way than the one taking place nowadays? O Yes O No

  b) do you feel there is a need of a better distribution of air passenger demand among (more or less close) airports? O Yes O No

  c) rail stations at airports are beneficial to this need? O Yes O No

- What else does the wording suggest to you ?

  _____

  _____

Part 2: Considering airport authorities, airlines, air passengers and general public separately in the emerging European context (EU air transport liberalisation):

- Do you think airport choice opportunities for users will increase just as present airline choice opportunities ? O Yes O No

  If no, why ? _____

- Due to EU-liberalisation, airports will be keen to offer new services according to flexibility and market opportunities just like airlines are doing it, competing between them ?

  O Yes O No

  If no, why ? _____

- Will concentration in air passenger traffic last? O Yes O No

  ... due to hub-and-spoke-systems? O Yes O No

  Why ? _____

  Are there other reasons ? _____

- Will there be even more concentration up to saturation at major airports (hubs)?

  O Yes O No

  Why?_____

- Will the use of improved technology, as well as airport and airline management, be able to cope with more concentration without a saturation to intolerable levels ?

  O Yes O No

- How will people (airport neighbouring communities, etc.) react to more air traffic concentration with regard to noise and air pollution ?

  - They will protest, but finally accept (as they did in the past) ? O Yes O No
  - If no: they will protest and be in grade to stop the process ? O Yes O No

- Is it correct that more traffic gives an airport the opportunity to be more cost-effective and more profitable? O Yes O No

If yes, what prospects have medium- and small-sized airports ? _____

_____

- Will there be a further development in regional air transport, especially with "hub-by-pass" flights ? O Yes O No

  Will it be relevant in terms of air traffic volume relief at major airports (hubs) ?

  O Yes O No

- How important are the following factors of airport choice for air passengers ? (Please give a value among 6 (very important); 5 (important); 4 (less important); 3 (no idea); 2 (not important); 1 (no influence)): for business purpose for private purpose

  - airport access in general value:_____ value:_____
  - ground access flexibility (rail vs. road) value:_____ value:_____
  - air services supply (destinations, frequencies) value:_____ value:_____
  - ground transport costs value:_____ value:_____
  - air transport fares value:_____ value:_____

- Catchment areas are related much more to ground access time than to ground access distance. Do you agree with this statement? O Yes O No

  If no, why ?_____

- Do rail stations at airports, that means airport ground access by rail, extend the catchment area of an airport:

  a) at every commercial airport? O Yes O No

  b) only at major airports? O Yes O No

  c) surely much more when high-speed rail stop at airports ?O Yes O No

  d) if yes, is there an extension of the airport catchment area to be expected, if there are high-speed rail services from an agglomeration without a rail station at its airport?

  O Yes O No

- What about the area where the catchment areas of several airports overlap:

  a) will the area extend even more when airport access by rail is provided ?

  O Yes O No

If no, why ?_____

b) is there an increasing demand in air transport in areas where the catchment areas of several airports overlap:

1) between agglomerations ? O Yes O No

2) within agglomerations ? O Yes O No

- Are there additional effects of increasing catchment areas to be expected?

O Yes O No

If yes, which ones are important ?_____

Part 3: Considering the advantages and constraints of rail transport

- Will railways lead to a new way of distribution of air passenger transport

demand between airports? O Yes O No

Due to: _____

a) Do you think rail transport suits very well for ground access to airports?

O Yes O No

Due to: _____

b) Do you think rail transport access to airport could provide the same opportunities to medium-sized airports as to major airports? O Yes O No

Why ?_____

c) Is rail access to airport going to cause a new distribution of air transport demand between airports:

1) within an agglomeration operating more than one commercial airport ?
O Yes O No

2) from an agglomeration with a major airport (hub) to another major airport ?
O Yes O No

3) from an agglomeration with a major airport (hub) to a medium-sized airport ?
O Yes O No

- In which ground access distance/time range to airports are the following types of rail links best suited:

	distance:	time:
a) Underground ?	from km_____ to km_____	from h:min_____ to h:min_____
b) Local train?	from km_____ to km_____	from h:min_____ to h:min_____
c) Intercity train?	from km_____ to km_____	from h:min_____ to h:min_____

  Any comments ?_____

- Within which ground access distances/time to airport(s) has high-speed rail a complementary (feeder) function to air travel ? from km___ to km___ from h:min___ to h:min__

- Within which city-centre to city-centre distance/time has high-speed rail a substitution function to air travel? from km___ to km___ from h:min___ to h:min__

- Is it important, whether the airport is connected to high-speed rail ? O Yes O No

  Why ?_____

- Does it make sense to have (possibly non-stop) high-speed rails between airport rail stations ? O Yes O No

  Why ?_____

- Ground access to airports by rail has to be enhanced compared to airport road access.

  Given a rail link to the airport exists or is feasible, its traffic volume share to the other airport ground access modes has to be increased; by every possible means. Do you agree?
  O Yes O No

  If yes, which are the most influent factors aiming at achieving this goal?

  _____

  Anyway, which transport policy measures do you consider as appropriate to expect changes by users in favour of public transport ?_____

  _____

- Are there - besides transport aspects - further thematic areas and subordinate conditions to be found in the background and which may play an important role when considering an airport rail station ? _____

- How important are the following characteristics for the choice of the transport system from/ to the airport ? (Please give a value among 6 (very important); 5 (important); 4 (less important); 3 (no idea); 2 (not important); 1 (no influence)):

	for business purpose	for private purpose
- uni-modal transport system	value:_____	value:_____
- integrated multi-mode transport system	value:_____	value:_____
- high-speed	value:_____	value:_____
- frequencies	value:_____	value:_____
- comfort	value:_____	value:_____
- fares	value:_____	value:_____

- what about other quantitative and qualitative opportunities within the transport supply?

_____

- Special remarks: _____

Thank you very much !