

ANALYSES OF PASSENGERS' PREFERENCES IN AIR-RAIL INTERMODAL TRANSPORT

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Abstract

The objective of our research is to investigate passenger travel preferences from a perspective of air rail competition in order to analyse passenger modal split in Europe in the future and demonstrate the necessity and importance of High-Speed Train inter-modal connections between European airports.

There are numerous advantages in transferring some short haul flights to high-speed train, principally that it releases runway and ATC resources, offers immediate relief to congestion, reduces negative environmental impacts, and finally improves ground access to airports. Passenger perspective is the key element; it is rather impossible to develop a well-organised and satisfactory intermodal interchange node with efficient baggage handling logistics and integrated ticketing if there is no passenger feedback. In order to provide the latest results of our research this paper will focus on detailed analyses of passenger travel preferences and some existing barriers of intermodality from passenger perspective.

Our approach was to investigate passengers open to air-rail competition in order to better understand passengers' perception of the potential for mode change and their main requirements. For this reason we focused on passengers travelling on board of Eurostar (London-Paris), Thalys International (Paris-Amsterdam) and passengers travelling on short-haul flights at Lisbon International and Paris Charles de Gaulle Airport. All passengers have agreed that ticket price, travel time and access to the airport or station are the most relevant travel attributes based on which they decide on their mode of travel.

1 Introduction

More than hundred years ago, the first flight of the Wright brothers fundamentally changed our mobility prospects by offering an attractive alternative to ground transportation means. According to Bill Gates, CEO, Microsoft Corporation this achievement "created the single greatest cultural force since the invention of writing. The airplane became the first World Wide Web, bringing people, languages, ideas and values together." Not many analysts would have forecasted that railways will again challenge air transport in some key markets.

Indeed the renaissance of railways in Europe triggers a change in perception of how rail can compete with air in speed and comfort. And why competing if they can co-operate? Air and rail are not necessarily competing modes of transport. The complementary capabilities and characteristics of these two modes together can satisfy the principal requirements of the passenger transport market.

Co-operation between air and rail transport, or intermodality in other words, is a combined air rail journey that results into a seamless travel experience. Despite the fact that some barriers of intermodality are highly visible there are number of reasons to support the idea of system integration. Some of the main reasons are the high potential growth of air travel, congestion in air and on the ground, delays and their rising cost to operators. In Europe 10% of the city pairs represent as much as 50% of the traffic, due to airlines' hub and spoke way of operation. En-route ATFM delays have significantly decreased in summer 2003 (1.2 min/flight, -35%), met the agreed target (2.1 min/flight), and nearly reached the medium term optimum delay target (1 min/flight). However airport ATFM delays increased in proportion and have not improved significantly in absolute value since 1997. The distribution of ATFM delay duration continued to improve for en-route but not for airports. Since 2000, airport ATFM delays have doubled in proportion (46% vs. 23% of all ATFM delays). In total 8 airports (Frankfurt FRA, Rome FCO, Paris CDG, London LHR, Milan MXP, Zurich ZRH, Amsterdam AMS, Munich MUC, Barcelona BCN, Vienna VIE, Heraklion HER) account for 19% of arrivals in Europe, generate 71% of all arrival airport ATFM delays and 31% of the total ATFM delay [1].

1.1 Understanding travel preference rules

Individuals choose to travel by a mode of transport that offers a preferred bundle of levels of attributes which are important in making the choice between available alternative transport modes. In determining travel preference rules, individuals implicitly attach weights to a set of attributes that influence their choice, and make a choice based on

the available set. The challenge is to identify these weights and in so doing obtain knowledge of what attributes drive an individual's choice. An attribute with a very low weight would be unimportant. To complete the set of items needed to derive a demand function a questionnaire was designed to identify the homogeneity of passengers; main passenger groups and major travel attributes that most passengers find crucial when deciding between air and rail transport.

1.2 Objective

One of the objectives of our research is to gain a sound knowledge of passenger requirements; a weight to determine the most important travel attributes related to intermodal transport and assign an importance to each attribute. A general unknown in the field of intermodality is passenger behavior.

Lessons learned from the passengers will help to obtain a forecast of passengers' tendency to shift to different transport modes considering infrastructure network, in order to evaluate the potential air traffic reduction between certain city-pairs as a result of a modal shift. The main objective is to forecast the impact of intermodal transport on air traffic, considering passenger requirements, high-speed train infrastructure and transport operators' vision.

1.3 Traveling by HST – up to what distance?

In the case of air travel passengers spend at least 3 hours by traveling to the airport, waiting at the airport and checking-in. Traveling by rail the time spent reduces to 1 hour 10 min. Airports are moving further and further from the cities they serve, a reflection that airports are not good neighbors, with noise and pollution being among the most significant problems. But the move away from city center's brings more problems – notably that of access. Different cities have different public transport and road networks. The time needed to reach an airport can be anywhere between 40 to 120 min in extreme cases (Paris CDG). For a particular city pair, even if the time spent on a train is much longer than the time spent actually in the air, due to the difference in wait and access times there is a threshold distance where the total journey time is shorter if the journey is undertaken by rail [2].

The journey duration of each transport mode indicates that high-speed trains could replace flights of up to 750 km's [2]. Although this distance is considered to be short-haul in the aviation business, in Europe the catchment area of 750 km's can connect significant origin destination pairs as seen below. Out of the 20 busiest routes in Europe, 9 are

above 1000 km, 3 routes are between 800-900 km and 8 are less than 800 km. In theory high-speed train can replace 40% of the 20 busiest routes. For passengers that are less cautious about time the percentage rises to 55%. Examples show that HST competes with air services on routes of 300-600 km distance. Naturally the shift to rail by passengers decreases as distance grows. Most studies talk about distance from 500 to 800 km [2, 3, 4, 5], very much depending on passengers' sensitivity to different travel factors. However there is more to a journey than a simple equation of time, distance and speed. There is baggage to be transferred, tickets to be exchanged; quality of interconnection points, there is passenger comfort, safety & security and many other factors, becoming crucial deciding factors when it comes to passengers' choice of travel mode. Passenger shift to high-speed rail depends on the level of satisfaction, not necessarily providing better services than air but fulfilling certain needs that stand in priority to others.

1.4 Questionnaire design and methodology

A questionnaire is not some sort of official form, nor is it a set of questions which haven been casually jotted down without much thought. We should think of the questionnaire as an important instrument of research, a tool for data collection. A questionnaire has a job to do: its function is measurement.

But what is to measure? The answer to this question should be contained in the questionnaire specification, which can mean many weeks of planning, reading, design and exploratory pilot work before any sort of specification for a questionnaire can be determined.

Before we made a start with our questionnaire some important points had to be tackled. Are we conducting a short, factual inquire or are we conducting analytical research on a set of attitudes? How large is the sample likely to be? Shall we be dealing with adults or with children? If with adults, will they be housewives, company directors, relatives of prisoners, students or probably a healthy mix of the entire population? All these, and many other issues, will effect our measurement specification and procedures.

Each survey has its own particular problems, but it is possible to present some general considerations that have to be borne in mind in most surveys and about which decisions will have to be made before we can begin to write our first question. These decisions fall into five groups:

(1) The main *type of data collection instruments* which will need, such as interviews, postal

questionnaires, content analyses of records, observational techniques and so on;

(2) The *method of approach to respondents* (after their selection through the sampling procedures), including sponsorship, stated purpose of the research, length and duration of our questionnaire, confidentiality and anonymity;

(3) The *build-up of question sequences* or modules within the questionnaire, and the ordering of questions and scales or other techniques within a general framework;

(4) For each variable, the *order of questions* within module, using approaches such as personal information (age, gender) at the end of the questionnaire;

(5) The *type of questions* to be used; for example 'closed' questions with pre-coded answer categories versus free-response questions.

Each of these topics had been discussed, bearing in mind that every survey is unique to a large extent. The best way to move from general to the particular, in order to find solutions for specific dilemmas, is through small-scale field trials. Guess-work, intuition, expert advice and spurious orthodoxy are no substitutes for properly conducted pilot work [7]. Regarding type of questions and responses we have decided to use several techniques. Scales are used to obtain responses that will be comparable to one another, and scales can be arranged so they capture answers to many questions quickly and in very little space. One of the examples of scaling we used in our questionnaire is the *verbal frequency scale*. This form of attitude measurement was ideal in order to obtain people's position on certain issues and conclusion. The verbal frequency scale contains five words that indicate how often an action has been taken.

The *ordinal scale* is actually a simple choice item that shares some of the arithmetic characteristics of a verbal frequency scale. With a multiple-choice item, the response alternatives don't stand in any fixed relationship with one another.

Forced ranking of items produce ordinal values, just as the verbal frequency scales and the ordinal scales do, only the items are each ranked relatively to one another. The forced ranking scale obtains not only the most preferred, but also the sequence of the remaining items. In our case people are faced with choices among travel attributes, they are constantly making choices among a limited set of options.

In other case we wanted to measure simple choice between alternatives. The *paired comparison* scale is appropriate to such a need. The focus must be almost exclusively on the evaluation of one entity relative to another. In this sense, paired comparison

can be regarded as a special case of ranking, where only two items are ranked at a time.

There is seldom a single, clear-cut choice of a scale for any given question or information requirement when composing a questionnaire. Thus, it is important to list a set of rules that dictate exactly what scale should be used in each situation, even if every circumstance could be anticipated. Yet clearly, some scales are easily identified as potential tools for some common information needs and questions, and there are often other scales that are clearly inappropriate.

When designing our questionnaire we tried to view the questionnaire itself, in three main parts; the introduction, the body of the questionnaire, and the conclusion. In the first part we described the purpose of the inquiry and included only questions that are fairly quick and easy to answer, avoiding any questions that may be delicate or sensitive to respondents. The respondents get the feeling they have done a lot very quickly and easily. Once started, they are likely to continue. The body of the questionnaire is the middle part and it contains questions that deal with the substance and detail of the survey topics. The third part was reserved for kinds of questions that measure the attributes and characteristics of the respondents, demographic and biographic questions. The reasons for putting these questions last are compelling. By this time the respondents have become familiar with the inquiry, they have more trust and are less likely to be skeptical or uncooperative than at an earlier point. Second, some respondents may terminate at this point or refuse to answer some of the items. Nevertheless they have provided the bulk of the data and their responses to the earlier items in the body of the questionnaire may still be usable.

In order to address all the passengers we have created two versions, separate for leisure and business passenger both containing 14 questions. The questionnaire had to be available in English and French version. Another step forward was collecting and processing data and to decide what method will be used to approach the respondent. The target population was clear from the beginning; the aim was to address passengers open to air/rail competition, given the choice to travel either by high-speed train or airplane. The only way to succeed and collect significant number of responses was a self-administered questionnaire, when the questionnaire is presented and briefly explained to the respondent by someone and then the respondent is left alone to complete the questionnaire. This method of data collection ensured a high response rate, accurate sampling and a minimum of interviewer bias, while

providing necessary explanations (but not the interpretation of questions) and giving the benefit of a degree of personal contact.

1.5 Thalys & Eurostar

Lisbonne & Paris Roissy CDG

The aim of the questionnaire was to address passengers exposed to the choice to undertake their journey by either high-speed train or airplane.

The two main railway operators were contacted during an early stage of the questionnaire design. Both Thalys International and Eurostar have granted authorization to undertake the questionnaire on board of trains for the length of 4 days on Paris-Amsterdam/Brussels and on Paris – London route. We have agreed that business passengers will be approached half an hour before the end of the journey so they can enjoy their meal without being interrupted. We can conclude that both Thalys and Eurostar passengers were very collaborative. It was easier to approach passengers traveling on early morning trains, afternoon passengers were more reluctant to cooperate.

Questionnaires were designed and analyzed using software called PERSEUS, dedicated for questionnaire design and analyses. It proved to be a very user friendly, easy to learn and undertake any changes. The only big drawback of the software was the data input. Since it was a survey conducted via email, we were not able to fetch the responses automatically. Questionnaires had to be handled as an interview, which required a manual input of all responses to the database as if filling out more than 900 questionnaires; an extremely time consuming task.

In case of air transport the form of the questionnaire had to be adjusted, ensuring that the time to fill out the questionnaire is significantly shorter. We have focused on key questions identified from our experience with high-speed train passengers. Most of our attention was focused on terminal 2B and 2D because the majority of the flights at these terminals are short-haul.

Airport questionnaire distribution was different from railways, due to dynamic environment and additional stress in airport terminal. Questionnaires have been collected both in boarding gates and check-in areas (for detailed data on response rate and incomplete samples see table 1).

	sample	response rate	incomplete samples	valid samples
Thalys	455	68%	19%	260
Eurostar	436	74%	17%	276
Paris CDG	260	87%	5%	215
Lisbon	206	85%	8%	162

Table 1. Questionnaire data

2 Passengers' Preferences

2.1 Rail Passenger Preferences

According to prior analyses [2], we have assumed that the most important travel attributes that influence passenger choice of air and rail were:

- ticket price
- travel time
- access to airport or station
- schedule & frequency
- punctuality & reliability
- on-board comfort
- luggage handling

For more detailed analyses we have compared several categories of passengers: business with leisure passengers; frequent with not frequent passengers; different genders and different nationalities.

Figure 1 show the statistics performed on the responses collected on Thalys and Eurostar. According to responses considering the entire sample population, there are three major categories of importance that affect choice of transport mode:

- the first category of attributes that more than 60% of the population assigned as very important were; *ticket price, travel time, access to the airport or station,*
- the second categories of attributes with certain significance were; *comfort on-board, schedule & frequency and walking & waiting time*
- the third category of attributes that proved to have little or no impact on passengers' choice between travel modes were; *on-board services and luggage handling.*

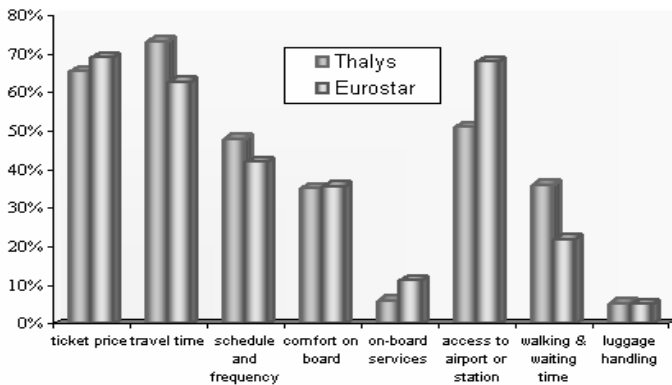


Figure 1. Comparison between Thalys and Eurostar passengers

There is a significant difference in travel factor preferences when comparing business with leisure or frequent with not frequent passengers (as figure 2 shows more that 87% of the frequent travellers were travelling for business). As seen on Figure2 the breakdown between business and leisure passengers was practically equal.

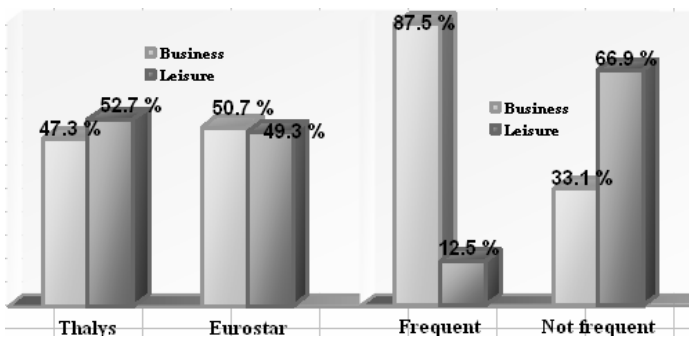


Figure 2. Railway passengers

For passengers travelling only on few occasions a year, *price* was a very important factor, as opposed to frequent travellers that assign more importance to *time*, *access to station* and *comfort on-board*.

Figure 3 illustrates travel preferences between genders and the results resemble the difference between frequent and not frequent passengers. Women find price more important than men, they are ready to trade a reasonably cheaper ticket for a longer journey and slightly less comfort.

It is interesting to notice that almost 10% of women are afraid to fly. Despite the fact that it is not a high percentage, fear can be a strong incentive for choosing rail transport. One of the most counter-intuitive factors was the luggage handling. We assumed that railway passengers are less sensitive about it, hence choosing rail transport, but airline passengers might consider luggage handling as an

important factor. Our assumptions proved to be wrong, only 3% more airline passengers considered luggage handling as one of the most important factors when choosing their travel mode.

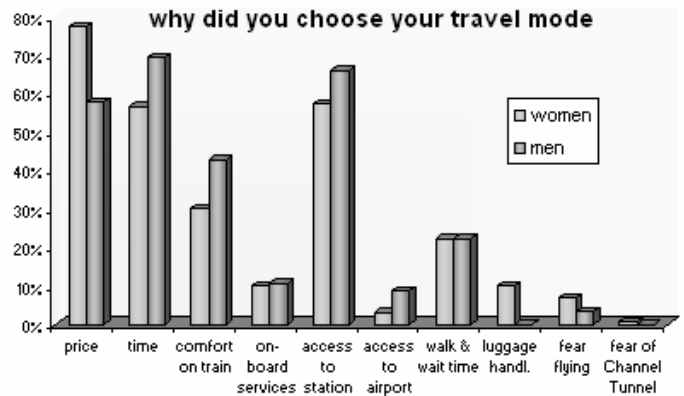


Figure 3. Differences in gender

A similar feature is identified comparing English and French customers, however in this case the difference in sensitivity to the ticket price is much more significant than in previous examples. Almost 20% more UK than French respondents base their choice of transport mode on the price of the ticket. Unlike the French customers that seem to be more sensitive to the access to the airport, see Figure 4.

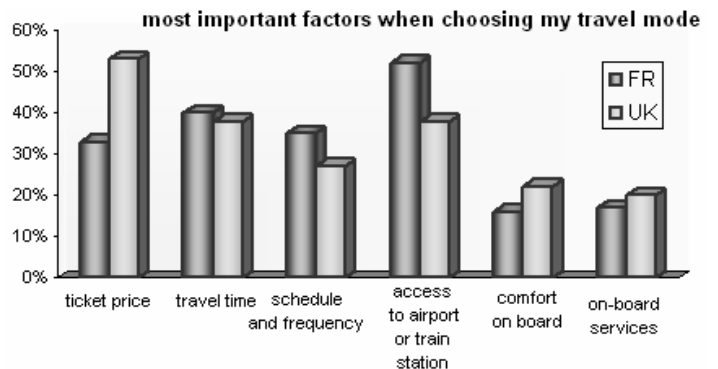


Figure 4. Differences between French and English passengers

Another counter-intuitive result was discovered comparing frequent travellers (travelled more than 6 times a year) and not frequent travellers (less than 6 times). In case of 'not frequent' travellers *ticket price* showed to be the most important attribute that significantly influences passenger modal choice, much more than in the case of frequent travellers (as seen in Figure5). We assumed that frequent travellers should be more sensitive to price since they spend a larger amount of total budget on travelling than passengers travelling only on several occasions. On

the contrary it was the schedule & frequency and on-board comfort that decided frequent passengers' inclination towards certain mode. Presumably this feature is due to the fact that most of the frequent travellers are not paying for their travel ticket since the majority of frequent travellers are travelling for business (see Figure2).

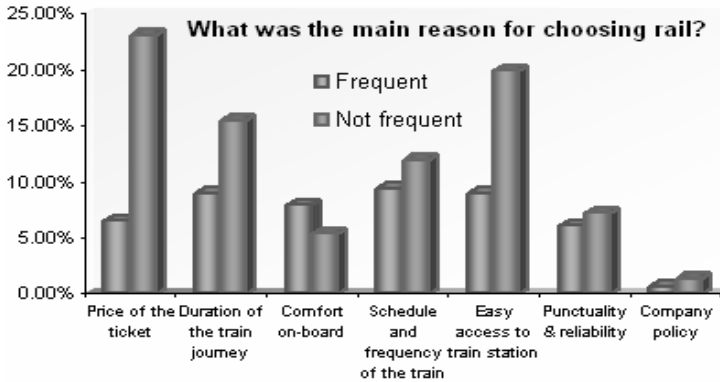


Figure 5. Differences between frequent and not frequent passengers traveling by rail

2.2 Air transport passengers

Unlike in case of Thalys and Eurostar passengers, between Roissy CDG and Lisbon Airport passengers there was a very slight difference in travel preferences. This similarity is due to the fact that airline business is a very homogeneous world offering often identical services (meal on plane, newspaper, frequent flier points, friendly attendants), while often using the same type of aircraft on medium-haul trips. Figure 6 outlines some major differences in air and rail passengers' preferences; however a further analysis is needed to discover possible relationship in passengers' travel choices.

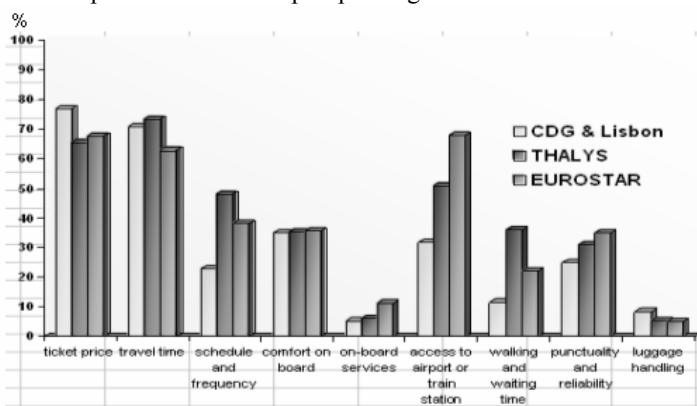


Figure 6. Differences between air and rail passengers

Both air and rail passengers agree that the most influential factors are ticket price and travel time. Although they seem to strongly disagree about the importance of the access to the airport or train station, walking & waiting time and schedule & frequency. As already mentioned luggage handling proved to be less important as we assumed in the beginning of the survey and surprisingly on-board services had no or very low impact on passengers' travel choices.

2.3 General behaviors

In order to learn more about passenger behaviors we have listed a series of events related to traveling. We used the verbal frequency scale that indicates how often an action has been taken.

The questionnaire has revealed many interesting findings (see Figures7 below).

- only 7% of respondents would be always willing to pay more for a train ticket than for the flight ticket, what might prove to be a burden especially in case of Eurostar where the rail ticket is often more expensive than air ticket
- 64% travellers find connection issues always and often very important, and the same percentages of travellers are used to waiting at airports longer than 1 hour before the time of their scheduled flight
- opposed to that 55% of respondents arrive at the train station less than 1/2 hour before their scheduled train departure time
- as much as 66% always and often base their choice of transport mode on total travel time
- 34% strongly deny willingness to spend money for luggage check-in at a railway station (service exists at Leipzig-Hale airport)
- 35% of travellers find connection issues always very important and 21% of respondents would pay extra charge for luggage to be delivered to their domicile, after they conducted their multimodal journey

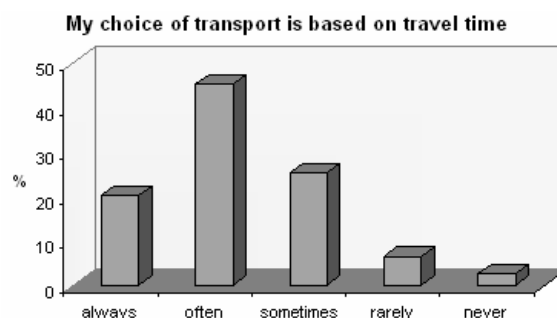
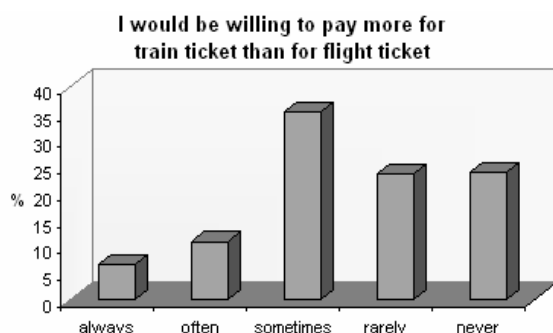
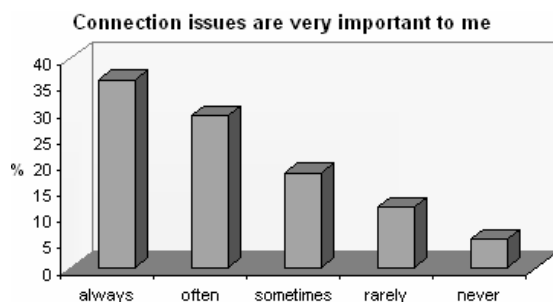


Figure 7. General passenger travel behavior

3 Barriers of intermodality

Intermodal experience in Europe confirms that barriers of intermodality could be sorted into three categories all directly or indirectly related to passengers. The three categories are legal issues, distribution and passenger information and operational integration.

Concerning legal issues the relationship and contractual agreements between airlines, railway operators and airports do not necessarily meet passenger interest in case of death or injury, loss or damage of baggage, delay or cancellation. It is inevitable to identify the identity of the carriers assigned to bear liability for the passenger and his baggage. For time being this problem is not yet solved. Passengers will be reluctant to travel on

intermodal journey if their own safety and the safety of their luggage will not be guaranteed. It is sufficient to have one major accident/incident and passengers will incline to optional transport modes.

When talking about distribution and passenger information the problem is to make the sale/purchase of air rail products technically feasible for air/rail operators, travel agencies, web sites vendors and final customers. Another goal is to make sales people (travel agencies, rail and air operators) and final customers aware of air rail services For time being location codes used by Global Distribution System (and air industry in general) are IATA 3 characters codes, but the number of IATA location codes that are still available is limited, not more than a few thousands for all needs. Increasing the number of possible codes would mean increasing the number of characters per code; modifying coding structures would cost hundreds of millions of €1. Who should pay the cost, air or rail? Railway operators and airlines/airports might agree to cover the cost of infrastructure by raising the price of intermodal tickets. As demonstrated before ticket price is the No.1 driver and integrated ticket price increase can have a counter effect on passengers' interest.

Unfortunately ticket distribution problems will negatively reflect passenger use of intermodal travel. According to the results of the questionnaire 38% of frequent travelers purchase their train tickets using travel agencies, however the distribution of such tickets will not be feasible without full integration of air and rail data (see Figure 8).

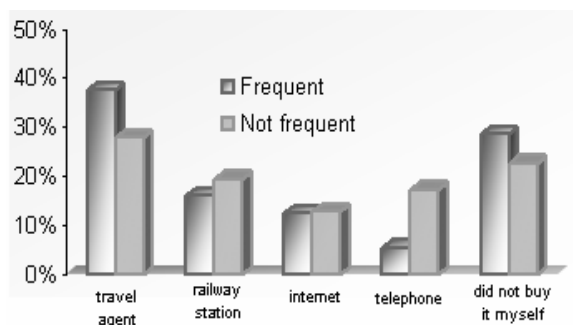


Figure 8. Rail ticket purchase

The third constraint is operational integration.; in order to achieve a well established intermodal solution it is necessary to link air and rail inventory and distribution systems, introduce check-in onboard of trains, assure luggage compartments with container transportation logistics on board future European high speed trains and information systems and internet based intermodal platforms in order to disseminate information for the whole travel chain, in

addition to the Computer Reservation System, which only inform from station to airport (and vice versa).

If the integration is improved it will reflect better comfort on-board and noticeable increase of passenger services offered by operators. Comfort proved to be a major incentive for both air and rail passengers (see Figure6)

4 Low cost and Intermodality – fighting over passengers

One of the most frequent questions concerning intermodality issues is the relationship between low-cost carriers (LCC) and high-speed trains (HST), or rather the influence of low-cost carriers on the evolutions of intermodal transport.

LCC's segment is increasing rapidly; there were 75% more flights by "low-cost" carriers in Jan-August 2003 than in the same period in 2002 [6]. A similar rapid growth applies for the high-speed train operations and infrastructure. Since 1990 the high-speed train operations in Europe have more than tripled. This sudden increase of passenger traffic can be explained by increased mobility of passengers. LCC and HST opened new possibilities also to passengers with lower income, offering cheap tickets, great comfort and reasonable travel time.

Most certainly these two competitors seem to have more in common than one would imagine. Both systems have dense network with lot of point to point liaisons. The network is mainly concentrated on Western Europe, in case of LCC it is UK, Italy, Germany, Spain, Ireland, and France. More than half the total of low cost movements is generated by less than 3 LCCs. There are many players today and only two are really making money, according to last figures Ryanair and Easyjet operated more than 51% of the total LCCs movements [6].

From countries mentioned above, Germany, France, Italy and Spain have well established high-speed train operations, as a matter of fact these countries account for 95% of European high-speed train infrastructure. Concerning high-speed train operations, the French SNCF and German DB operates more than 82% of total passenger km's in Europe.

The development of LCCs has driven the development of secondary airports in around major European capitals. A few LCCs however made the choice to count on major airports such as Amsterdam, Paris CDG, Munich, etc, to propose an alternative to the traditional full-service carriers. Same characteristic is valid for high-speed train market. Over the last ten years, progress has already been made in the integration of air and rail, in terms of rail

access to major European airports. LCC are mainly focused on short, medium haul flights and do not interfere on the long haul market. Needless to say that a HST journey will be interesting to passengers if it will not exceed more than 3 hours of total travel time, otherwise a daytrip will not be feasible.

Based on the market similarities it is reasonable to conclude that low-cost carriers stand in close competition with HST operators fighting for the same category of passengers, and not only leisure passengers. A significant change of preferences was observed in case of individual business travellers, becoming extremely cost sensitive on very short haul flights and switching to low cost carriers, while many corporate business travellers have to follow company policy and travel by high-speed train if there are existing services. Most of this information was gathered from passenger comments they wrote down, when asked about their business travel preferences. Surprisingly 3% more airline business travellers than airline leisure travellers considered ticket price as one of the major decision making factors. In case of railway passengers the figure was inverse, 10% more leisure travellers than business travellers found price a decisive factor.

In case of transfer passenger the way to overrule LCC's might be as simple as offering a combined air-rail journey including luggage transfer, guaranteed minimum connection time, integrated ticket, bonus point and fresh coffee on board of high-speed train. Concerning point to point travel the competition between LCC and railway operators will be much more tangible. Questionnaire results clearly point out the two main decision making factors: price and time. If the train ticket and flight ticket will both be in the same price range the fastest transport mode will take the leading role. LCC still prefer to fly from secondary airports; a solution which is not only time consuming but also fairly uncomfortable, considering the low quality services secondary airports offer; great example is Paris Beauvais.

5 Demand model

We all know that models are only simplified representations of reality which can be used to explore the consequences of particular policies or strategies. When modelling choice made by passengers we need to take into considerations several variables. Logit models have been widely used in the analyses of the choice. The most common variables used in the models analysed before are:

- travel time
- travel price
- schedule & frequency
- travel purpose

- possibility of using another mode (car)
- direct vs. indirect routing
- generalized time of travel
- weighted measure of air flight time
- measure of the need to interchange

Numbers of analyses done in the past suggests that both logit (mode choice) and an econometric (regression) approach are valid for estimating the effect of the high-speed rail on air demand. The choice depends on the availability of data. In order to implement the results of the questionnaire into the model we will use logit model of individual choice. This model uses the relative attractiveness of each of a set of options to predict, for each option, the probability of an individual choosing it.

6 Future work

To simulate a European transport network and possible modal split we will need to take into account passenger behaviour, existing and forecasted high-speed train infrastructure and among many other things the situation in air traffic in relation to congested airspace and airports. Based on recent examples in Europe we assume that there is a high possibility in achieving significant en-route and airport capacity improvements, while satisfying passengers needs at the same time. Thanks to intermodal transport some congested hub airports will be able to free as much as 10% of their runway capacity. In Spain, the replacement of Madrid/Barcelona and Valence/Barcelona services by HST could free up to 19% of the runway slots at Barcelona (data source: Network, Capacity and Demand Planning, EUROCONTROL Experimental Centre).

However the future evolution of integrated transport networks will most likely depend on the airlines willingness to co-operate with railway operators. Examples show that some airlines will prefer to maintain air services on certain city-pairs (Madrid-Barcelona with 64 flights a day) while competing head to head with railway operators. In order to keep up with competition and attract more passengers airlines will need to operate smaller aircraft with higher frequency; resulting in more aircraft flying in the European sky each with less seats on-board. Needless to say this kind of outcome will put more pressure on air traffic services and create additional problems in the future. Hence intermodality will have an inverse effect, causing more congestion and delay. In order to better understand the impact of intermodal transport on air traffic different scenarios will have to be considered. The success of intermodality and hopefully the possibility of easing congestion will

depend on passengers' willingness to experience new way of travelling, operators' willingness to co-operate and most of all the influence of low-cost airlines and their future evolution.

7 Conclusion

Passenger travel preferences vary depending on nationality, purpose of travel and even age. Based on questionnaire results we can conclude that it is very challenging to find a common denominator that can describe in details the most significant transport factors. However 60% of the passengers agreed that travel time, ticket price and access to the airport or station are the three main decision factors. About 40% of all passengers consider on-board comfort, schedule & frequency, punctuality & reliability and walking/waiting time crucial when choosing between different transports modes, while on-board services and luggage handling have little or no influence on passengers. Some factors proved to be important only to a small group of people, although they can be very influential; fear of flying or fear of crossing the Channel Tunnel (Eurostar) will certainly strongly influence passengers' inclination towards the competitive mode.

After opening Eurostar services the behaviour of French travellers have not changed significantly, opposed to English customers that formed most of the train population. Our questionnaire has resolved that UK passengers are much more price sensitive than French customers. Similar differences in behaviour have been discovered when comparing men with women and frequent with not-frequent travellers. No matter how big the differences are, price and time proved its priority in every comparison.

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Keywords

Inter-modality, air-rail, high-speed train, air transport demand reduction, passenger travel preferences, demand model, travel factors, questionnaire.

Biography

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