ERASMUS UNIVERSITY ROTTERDAM
Transport Economics

BOB Airport Accessibility Pilot

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Preface

The BOB project is an Accompanying Measure under the European Commission's Fifth Framework Programme for Research, Technological development andDemonstration, Competitive and Sustainable Growth Programme, Key Action 2 'Sustainable Mobility and Intermodality', co-ordinated by the Directorate-General for Transport and Energy (DG TREN). BOB was carried out in close cooperation with the Thematic Network BEST (www.bestransport.org).

The BOB consortium consists of NEA, co-ordinator (NL), OGM (B), FAV (D), TOI (NO), CERTU (F), Warsaw University of Technology (PL), INECO (E) and Erasmus University Rotterdam (NL). The BOB Airport Accessibility Pilot Coordinators were:

- Peran van Reeven, Jan-Jaap de Vlieger and Vladimir Karamychev, Erasmus University (Netherlands), responsible for the technical content of the Pilot.
- Beatriz Pelaez and Lucy Gordon, OGM (Belgium), responsible for the overall management of the Pilot, and
- Miguel de Bernardo, INECO (Spain), responsible for the compilation of the individual airport reports presented in Annex 2 of this report.

The coordinators would like to express their thanks to all (direct and indirect) participants in the Pilot for their contribution and support:

- Mr. Klaus Albrecht, Federal Ministry of Transportation (Germany)
- Mr. Guillaume Allimant, Lyon-Saint Exupery Airport (France)
- Ms. Silvia Arceci, Bologna Airport (Italy)
- Mr. Didier Aujouannet, Paris Airports (France)
- Mr. Alexandre Blaquière, SMTC, Syndicat Mixte de Transports en Commun de l'agglomeration toulousiane (France)
- Mr. Stefano Baronci, ACI Europe (Belgium)
- Mr. Claus Bruun, Copenhagen Airport (Denmark)
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- Mr. Holger Kraft, German Airport Association (Germany)
- Mrs. Nicola Hooper, BAA Heathrow (United Kingdom)
- Mr. Krzysztof Jaroszkiewicz, Polish Airports State Enterprise (Poland)
- Mr. Sjoerd de Lange, Schiphol Group (The Netherlands)
- Mr. Mike Jones, Vale of Glamorgan Council (United Kingdom)
- Mr. Bob Longworth, Manchester Airport (United Kingdom)
- Ms. Silvana Marelli, Milan Airport (Italy)
- Mr. Peter Morris, International Air Transport Association
- Mr. Hans van Oel, Schiphol Group (The Netherlands)
- Mr. Mieczyslaw Reksnis, City of Warsaw (Poland)
- Mr. Francisco Salazar de la Cruz, Aeropuertos Espanoles y Navegación Aérea (AENA) (Spain)
- Mr. Andrew Sharp, International Air Rail Organisation (United Kingdom)

1 Methodology

1.1 Pilot objective

The overall objective of the pilot has been to assess the use of benchmarking as a tool to improve airport accessibility. In particular, the results of the pilot have been used to identify effective policy measures for ensuring sustainable airport accessibility. Furthermore, the pilot has acted as a laboratory to test in practice the recommendations produced by BEST -Benchmarking European Sustainable Transport - a project related to BOB under the European Union's Fifth Framework Programme for research and development[1].

Participants that have contributed to the pilot include representatives of airports from Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Poland, Spain, the Netherlands, and the United Kingdom, and representatives of ministries of transport in Germany, the Netherlands, and the United Kingdom, as well as a local public authority in Poland. The Airports Council International - Europe (ACI Europe) and the International Air Rail Organisation (IARO) were also involved in the pilot.

1.2 Process followed

Meetings

Five meetings were organised in the framework of the BOB airport accessibility pilot project. A preliminary meeting was held on September 27, 2001, followed by the official kick-off meeting on November 16, 2001. During these meetings, the European Commission representatives and the pilot participants discussed their ideas and concerns with regard to the pilot, and agreed on the objective of the pilot. The next step was to identify airports with examples of good practice in airport accessibility and airports facing challenges in this area in order to increase the number of participants in the pilot exercise. Thanks to some suggestions made by ACI Europe and IARO, more airports were successfully contacted and invited to participate. Following the establishment of the pilot group, available data was identified in order to select the proper indicators and the final areas of benchmarking within the one-year period of the project.

During the first two meetings and the first working meeting on January 24, 2002 at Brussels airport, the scope of work was defined (see below). In the fourth meeting at Copenhagen airport on May 14, 2002, each airport was asked to prepare a short description of their airport and city based on the indicators discussed at the meetings, and to elaborate working documents that identified specific information on measures and policies in order to enable an analysis of the effects of measures and policies on indicators. Descriptive reports (see annex 2) were made with the aim of understanding the access system to every participating airport.

[1] More information is provided on the project website: www.bestransport.org

The format used for each airport was:

- an introduction;
- general information about accessibility: access by road, rail, parking lots, parking fees, future plans;
- information about modal split;
- policy context: responsibility, financial structures, specific accessibility policies, innovative plans.

During the final meeting on September 13, 2002 at Schiphol airport in Amsterdam, gaps in the data collected were identified and the work still to be done was presented. The focus of the remaining work was on the collation and analysis of indicators and the identification of good practice for further study including transferability of practices.

Guided tours were organised by the airport companies hosting the meetings (Brussels International Airport, Copenhagen Airports and Schiphol Group), enabling participants to experience at first-hand the approach taken by other airports to accessibility. During all meetings the participating airports presented specific measures and policies related to airport accessibility.

A lot of meeting time was dedicated to working groups in order to get as much input from participating airports as possible. Topics discussed included the scope of work, the selection of indicators and the identification of good practice.

Scope of work

During the first and second meetings, the concept of airport accessibility was discussed. The aim was to come to a common understanding of airport accessibility and define the scope of the work to be carried out in the pilot exercise.

It was decided that the focus of the exercise should be on the sustainability of land access to airports, in accordance with the Key Action on Sustainable Mobility and Intermodality of the European Union's Fifth Framework Programme for research and development. At the meeting on January 24, 2002, it was agreed to concentrate the project on two main areas: airport surface access strategies and air-rail intermodality. As the project proceeded, the scope of air-rail intermodality was broadened to include policies to promote other sustainable modes of access to the airport for both passengers and employees. Hence, the central focus has become the promotion of airport access by collective transport (consisting of bus and rail modes), cycling and walking, and car sharing.

1.3 Benchmarking

1.3.1 The benchmarking methodology[2]

Application

Benchmarking has long been recognised as a useful management tool. Xerox was the first major company to develop the use of benchmarking in 1979 and by 1992,

[2] For this paragraph, relevant sections have been edited from the Benchmarking Guide for the Transport Sector, BEST project, 2002 (soon to be published on the BEST website, www.bestransport.org)

65 percent of Fortune 1000 companies were using some form of benchmarking (Bartol and Martin 1994). A year later, MIT's Commission on Industrial Productivity found that almost all successful US companies were benchmarking (Karlöf and Östblom 1993). By 1994, this was also true of 78 percent of The Times Top 1000 companies in the UK (Barnes 1999).

Process

The term benchmarking is, however, often incorrectly used. Benchmarking is not simply a process of data collection and analysis, used to rank different levels of performance (for example of different organisations, companies or countries etc.), nor is it a process of sharing ideas and practices with others working in the same field. Indeed, data collection, comparison and sharing information are all elements of the benchmarking process. However, a rigorous benchmarking process is a much more comprehensive process which is motivated by a desire to improve and which leads to the implementation of changes: "Benchmarking is the art of finding out (…) how others do something better than you – so that you can imitate – and perhaps improve – upon their techniques" (Main 1992). It is "the search for industry best practice that will lead to superior performance" (Camp 1989). Benchmarking is best described as a *learning process*. It is a rigorous and systematic process of assessment, comparison and implementation leading to improvement.

Steps

Numerous benchmarking methodologies have been developed, catering for the specific context in which the exercise is carried out (see e.g. Camp 1998, ECMT 2000). There are, however, a number of basic principles that underlie any benchmarking process. These can be described in the following 5-step approach (Fearnley 2002):

1. *Know yourself*. The first step is a thorough self-analysis. In order to improve your performance you need to know where you stand: What are we doing that is of prime importance to us? How do we do it? What are our strengths? - and so on. Any attempt to carry out a benchmarking exercise without first having the answers to such questions will result in failure. In this phase you identify the subject to be benchmarked, and identify partners. Further, the 'topic' has to be, and seen by the organisation to be, in an area that is important to the achievement of key goals.

2. *Compare indicators*. The second step is to compare indicators, either with other organisations or internally in your own organisation. You do this in order to identify gaps between your organisation and others, and to establish a benchmark, that is, an indication of a standard of excellence in your field. A challenge in this phase is to obtain and gather data, which describes the gap in performance between you and the others in a consistent, neutral and reliable way, and which can point to possible reasons for the performance gap.

3. *Analyse differences*. When a benchmark is established, the third step is to identify reasons for this performance gap, and analyse the underlying best practice, i.e. how they have reached the superior performance level. This could be organisational structure, practical solutions etc.

4. *Action*. Having analysed the best practice of others, the fourth step is to develop action plans, and implement them. The goal is to match or exceed the benchmark level of performance identified in the previous steps, i.e. to adopt best practice in your own organisation.

5. *Monitor*. Progress has to be monitored and your performance relative to best practice must be updated. Otherwise you may be moving in the wrong direction. This fifth phase implies that benchmarking is a continuous process.

The benchmarking process provides a rigorous, step-by-step approach to bring about improvement. Any 'shortcuts' taken invariably lead to guesswork and assumption replacing facts. This leads to recommendations for change being riddled with holes.

The commitment of all participants in a benchmarking exercise is essential as benchmarking is not an easy or quick process that brings immediate results. Participants must have full understanding of the requirements of the process and terminology used (figure 1.1 lists some common benchmarking terminology) and a willingness to improve in order to enable the process to work successfully.

The fourth step – implementing changes – emphasises the importance of the active support of the organisation. Real, active support from management with sufficient seniority to authorise, implement and finance the recommended changes is a prerequisite for successful benchmarking. Without that, the process is likely to fail (Leonard 2001).

Figure 1.1 Benchmarking terminology

Benchmarking is a *process*. It is the means by which we attempt to locate a level of performance in a certain area that is superior to ours, then to change the way we do certain activities in order to improve our performance. **A benchmark** is a standard of excellence or achievement against which other similar things must be measured or judged. Something that is worthy of emulation. **Best practice** is the means by which the benchmark level of performance is achieved. **To benchmark** is to undertake a benchmarking exercise

Source: Adapted from Leonard (2000, p. 2)

1.3.2 Benchmarking policy

The basic principles of benchmarking are the same when applied to any topic or sector, and there is no obvious reason why transport policy requires a different methodological approach. However, transport is a complex sector, especially in the context of sustainable transport which requires several different factors to be taken into account (environmental, social and economic). This complexity may require a less quantitative approach which involves a qualitative assessment of policy and performance in addition to quantitative measures (Fearnley et. al, 2002).

Comparing policies (i.e. the policy measures proposed) is not in itself a valuable process. One should either benchmark the impact of certain policy elements or instruments (relating these to objectives and outcomes) or the process that leads to certain results in the area to which the policy applies. This can be done by making high-level objectives (e.g. air quality) operational by breaking them down into more

concrete goals (e.g. CO2-reduction, vehicle exhaust improvement, etc.) that can form a basis for comparison.

Some degree of similarity in *objectives* of the policies investigated reduces the complexity of the exercise and increases the value of its results. For example, Central and Eastern European Countries (CEEC) share many transport policy challenges with European Union (EU) countries. However, CEEC policy objectives and circumstances, and therefore policy priorities, differ. This is of crucial importance when identifying 'best in class' policies. Even when objectives of participating countries or regions are similar, the complexity of external conditions makes it difficult to foresee the impact of policy measures in another context[3].

1.4 Approach taken in pilot

Specific circumstances

The following specific circumstances have been taken into account in the process of defining the approach taken in the BOB airport accessibility pilot:

- Limitations resulting from the unavailability of data, lack of time and lack of resources. These three factors are related in the sense that the lack of time and resources required the use of data 'off the shelf" – it was not possible to develop indicators that required extensive data collection efforts.
- The likeliness that the desire to benchmark airport accessibility-related policies would most likely require the definition of very specific indicators for which data is not readily available.
- The complexity of processes, practices and policies related to airport accessibility.
- The intention to explore the possibilities for standardisation in data collection among European airports.
- The desire to identify good practice through benchmarking at the strategic / policy level.
- The desire to deliver concrete results and a point of departure for the development of European Union airport accessibility policy or guidelines.
- The need for a long-term approach when setting up an effective benchmarking exercise.

Approach

The approach was aimed at exploring the application of each step of the benchmarking methodology to be able to draw conclusions with respect to each step. Although it was recognised that steps are interdependent, an approach was taken that gave optimal attention to each step individually.

For each of the steps, the following activities have been carried out:

1. *Know yourself*. Each airport has written a background document in which it described the access system to the airport.

2. *Compare indicators*. From the descriptive airport background documents, data was extracted for a number of identical indicators for each airport. On the basis of an

[3] For more information about benchmarking policy, see chapter 6 of the Benchmarking Guide for the Transport Sector (soon to be published on the BEST website, www.bestransport.org)

econometric analysis, conclusions were drawn with respect to comparability between airports and possible relations between indicators.

3. *Analyse differences*. On the basis of the comparison of indicators (step 2), best performers can be identified. Given the likeliness of fundamentally differing circumstances between airports, it seemed likely that in this specific case best performers could not necessarily be identified on the basis of indicator comparison. Therefore, best or good performers were identified using a more qualitative approach by asking participating airports to identify good practice. Key characteristics of these practices were described.

4. *Action*. Having analysed the best practice of others, the fourth step is to develop action plans, and implement them. In the pilot, a methodology for transferability of good practice was provided to participating airports, enabling them to explore how action might be taken with regards to transferring the good practice identified.

5. *Monitor*. The fifth step (monitoring progress and updating performance) will be left for future action. An important issue to be discussed however is how the benchmarking exercise can be continued in future and what is expected by participating airports and the European Commission.

1.5 Contents

This report comprises six chapters. Chapter 2 describes step 1 of the benchmarking process. In chapter 3, the approach taken to the second step (analysis of indicators) is described and the results are provided. Chapter 4 describes a number of good practices (step 3). Chapter 5 provides the methodology for the transfer of good practices (step 4). Finally, chapter 6 draws conclusions and gives recommendations for future steps.

Sources

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2 Inventory of airport accessibility

2.1 Relevant indicators

Categories of indicators

To be able to benchmark, at least two categories of indicators need to be included in the analysis:

1. Indicators that relate to the specific issue under investigation (in this case airport accessibility).

2. Indicators that characterise the object of study (in this case: airports) in general terms, that allow to put the indicators related to the specific issue under investigation into proper perspective.

Indicators per category

In the background document and from discussions in pilot working meetings, indicators to be included in the analysis have been suggested. Indicators in the first category (indicators that directly relate to accessibility and mobility) can be subdivided in the following sub-categories:

- Indicators related to modal split;
- Indicators related to public transport (availability / time / costs);
- Indicators related to private transport (parking places / time / costs).

The 'general' indicators in the second group consist of:

- Indicators related to airport traffic and employment (e.g. number and type of passengers, number of employees);
- Indicators related to the location of the airport (e.g. catchment area, distance to city centre).

The process of the selection of indicators was complicated by two factors. In the first place, the indicators needed to be available off-the-shelf, i.e. based on readily available information. Secondly, since the aim was to compare various airports, data for an indicator had to be available for a significant number of participating airports.

The full list of indicators in each category for which data has been collected for each participating airport (subject to data availability) is included in annex 1.

2.2 Airport reports

Descriptive reports

Descriptive reports were made with the aim of understanding the access system to each participating airport. The scheme for each airport was:

- an introduction;
- general information about accessibility: access by road, rail, parking lots, parking fees, future plans;
- information on modal split;
- policy context: responsibility, financial structures, specific accessibility policies, innovative plans.

The reports are included in annex 2.

Summary of data

Annex 3 contains an overview of all key indicator data collected for the participating airports.

3 Analysis of indicators

3.1 Approach

The analysis of the data collected from airports has been twofold:

Mathematical dependence

First, mathematical dependence has been established between variables. There are two distinct dependent variables. These are modal split of passengers that use collective transport (i.e. bus and rail modes) and the equivalent modal split for employees. The objective of the BOB airport pilot is to understand how these modal splits can be improved through benchmarking. Consequently, it is necessary to have an understanding of the main influencing factors for these modal splits. This has been achieved by running regressions of the two dependent variables against the remaining 29 variables in order to identify the limited set of variables that best explain the respective modal splits.

Regressions

Second, a number of regressions have been run on economically intuitive relationships between modal splits and some ratios of variables. Regressions have been run with the modal split of passengers that use collective transport as dependent variable and the following ratios as independent variables:

- private car travel time - off peak/travel time fastest public transport mode
- private car travel time - peak/travel time fastest public transport mode
- parking fee passengers short-term/city centre price fastest public transport mode
- parking fee passengers long-term/city centre price fastest public transport mode
- parking fee passengers short-term/parking fee passengers long-term
- private car travel time - off peak/private car travel time – peak

Similarly, regressions have been run with modal split of employees that use collective transport as dependent variable and the following ratios as independent variables:

- parking places employees/number of employees
- private car travel - peak/travel time fastest public transport mode
- private car travel time - off peak/travel time fastest public transport mode
- private car travel time - off peak/private car travel time - peak

3.2 Results

Mathematical dependence

The analysis of mathematical dependence has focused on the modal split of passengers that use collective transport. The number of airports that were able to provide data on employee travel was too limited to allow for any methodologically sound analysis. Most airports simply did not have employee data available.

The analysis of modal split of passengers that use collective transport resulted in a statistically significant relationship between modal split of passengers that use collective transport (MSP) and the following independent variables:

- total number of passengers in millions (P)
- percentage of business passengers (BP%)
- number of long-term passenger parking places in thousands (LPP)
- number of short-term passenger parking places in thousands (SPP)

This relationship basically forecasts what modal split can be expected on the basis of the size of the airport (i.e. number of passengers), its clientele (leisure versus business travellers), and the relative quality of collective transport vis-à-vis private car and taxi as reflected by the number of short-term and long-term parking places. The outcome of the regression equation estimations (performed with ordinary least squares) is:

MSP =	53.26+	1.21 P –	0.48 BP% –	1.13 LPP –	4.69 SPP
	(0.01)	(0.12)	(0.54)	(5.53)	(0.16)

R^2 = 77, nr. of obs. = 14, F-stat = 7.64 (p-value = 0.57%)

The p-values are in brackets below the estimated coefficients. The p-values indicate the possibility that the coefficients differ from zero just by chance. Lower p-values imply a higher significance. A rule of thumb is that these values should be below 5%. The R^2 indicates the closeness of fit in terms of the percentage of the variation in the dependent variable that is explained by the independent variables. The set of independent variables explains 77% of the variance, leaving only 23% unexplained. The F-statistic is a general test that all coefficients in the equation are zero. This test is rejected well below the 1% significance level (in casu 0.57%), indicating that it makes sense to analyse the relationship by means of the regression equation above. The full analysis can be found in table 3.1 on the next page.

This regression equation has been established in a number of steps in order to reduce the number of regression equations that need to be run. A table was established with the correlation coefficients between all 31 variables (see annex 4). From this table, variables were removed that were binary (e.g. existence of metro line), had less than 10 observations, and that were highly correlated to other variables (e.g. number of true origin/destination passengers and total number of employees are highly correlated with total number of passengers). Subsequently, regressions were run against the remaining variables. The set of two variables that appeared to offer the best explanation of modal split of passengers that use collective transport were the total number of passengers and the percentage of business passengers. In a next step, all variables that were removed from the table were moved in again, and variables were added to the regression that best explained the error between actual modal split and predicted modal split. This resulted in the addition of the number of long-term parking places for passengers and the number of short-term parking places for passengers.

Table 3.1 Regression analysis

Airport	Passengers - total	business passengers	Parking places - passengers long term	Parking places - passengers short term	Modal split - collective transport - passengers	Pred	err	t	p-value
Paris Charles de Gaulle	48.2	39	3000	13100	33	28.01181	4.988186	0.764877	23.20%
Berlin-Schoenefeld Airport	2.2	18	5230	170	51	40.61946	10.38054	1.591729	7.30%
Vienna Airport	11.9	45	9732	708	26	31.82928	-5.829278	-0.893849	19.73%
Brussels Airport	19.6	66	4473	5785	15	13.19171	1.808293	0.27728	39.39%
Munich	23.6	45	10708	3095	35	33.67032	1.329677	0.20389	42.15%
Dublin Airport	14.3	25	14610	3800	22	24.2966	-2.296602	-0.352156	36.64%
Bologna Marconi Airport	3.5	42	4100	250	25	31.60584	-6.605838	-1.012925	16.88%
Milan Malpensa Airport	18.6	34	4940	3600	37	37.01828	-0.018277	-0.002803	49.89%
Warsaw Okecie Airport	4.7	57	700	1000	25	26.19069	-1.190693	-0.182578	42.96%
Manchester Airport	19.6	66	9201	5375	13	9.789599	3.210401	0.492276	31.72%
London Heathrow	60.5	38	6000	12500	35	42.79082	-7.79082	-1.194627	13.14%
Copenhagen Kastrup Airport	18.1	58	4206	274	42	41.36341	0.636589	0.097613	46.22%
Amsterdam Airport Schiphol	39.5	50	10000	6000	45	37.66158	7.338415	1.125257	14.48%
Dusseldorf	15.4	36	5393	5033	19	24.96059	-5.960592	-0.913984	19.23%
	k	1.208519671	-0.478425659	-0.001126424	-0.00469177	53.26118			
	se	0.260395956	0.131362914	0.000511889	0.001054718	7.635285			
	t	4.641084642	-3.642014665	-2.200522676	-4.44835989	6.975663			
	P-value	0.12%	0.54%	5.53%	0.16%	0.01%			
	R	77.25%							
	F	7.639098141							
	SE	6.52154896							
	P-value	0.57%							

It should be noted that not all airports were incorporated in the analysis. The missing airports were not able to generate the necessary data on all four explanatory variables on modal split. From the full analysis, it is also possible to identify the relative performance of airports. A positive difference between actual modal split of passengers that use collective transport and the predicted modal split shows that an airport has a higher modal split than is explained by the regression equation. Similarly, airports that have a negative difference have a lower modal split than predicted. Table 3.2 summarizes the hierarchy in performance of airports.

Table 3.2 Difference from estimated modal split

Airport	Difference (%points)
Berlin	10.38054
Amsterdam	7.338415
Paris	4.988186
Manchester	3.210401
Brussels	1.808293
Munich	1.329677
Milan	0.636589
Warsaw	-0.01828
Dublin	-1.19069
Vienna	-2.2966
Dusseldorf	-5.82928
Bologna	-6.60584
Heathrow	-7.79082

From the table, it can be concluded that Berlin performs very well with a more than 10%points higher modal share of collective transport than expected from the model, that Warsaw is doing more or less exactly as indicated by the model, etc. However, these results should be interpreted with a lot of care given the quality of the data used. The measurement of modal split is not standardised between air-

ports. Consequently, for some airports the indicated modal splits may be higher or lower than the figures given, if the same measurement system would have been used by all airports.

Economically intuitive relationships

Only the relations explaining modal split of passengers that use collective transport have been analysed due to (too) restricted data availability on employees. However, none of the regressions resulted in statistically significant relationships. Basically, there are too many variables that influence the quality of the collective transport system around an airport. Naturally, every quality variable has an impact on the modal split. However, the impact of every such variable on the modal split of the collective transport system as a whole is rather small and, consequently, cannot be identified. Distinguishing the modal split for every mode can solve this problem. However, too little airports were able to provide this information. Variables such as frequencies, travel time and prices are also not uniformly measured. The data provided covers a large number of lines and destinations with different frequencies, travel times and prices, making it difficult to generate data that is comparable between airports. This makes a sound analysis difficult, especially due to the limited number of participating airports and the non-availability of time series. Work has still to be done in the definition and measurement of the quality of the collective transport system around an airport.

In order to give some intuition on the relative performance of airports (as indicated in the previous table 3.2), the available variables that involve quality parameters of the collective transport system are plotted in a radar diagram. These quality parameters are:

- Q: off-peak time ratio, i.e. private car travel time - off peak/travel time fastest public transport mode
- Q: peak time ratio, i.e. private car travel time - peak/travel time fastest public transport mode
- Q: short-term price ratio, i.e. parking fee passengers short-term/price fastest public transport mode to city centre
- Q: long-term price ratio, i.e. parking fee passengers long-term/city centre price fastest public transport mode
- Frequency of rail (express link) to city centre
- Frequency of rail (express link) to region
- Frequency of bus to city centre
- Frequency of bus to region

The performance of airports on these quality parameters is normalized on a scale from –1 to +1. Figures 3.1a and 3.1b show radar diagrams for the 'high performing' airports and the 'low performing' airports respectively.

Figure 3.1a High-performing airports radar diagram

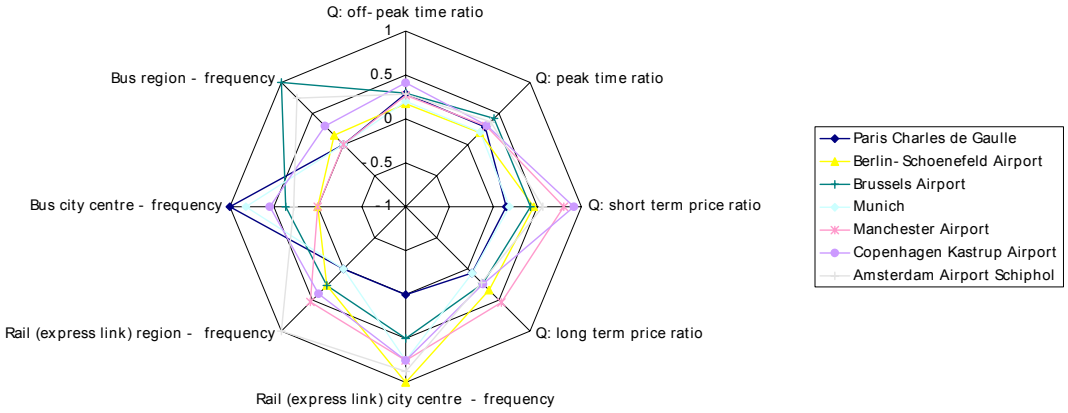
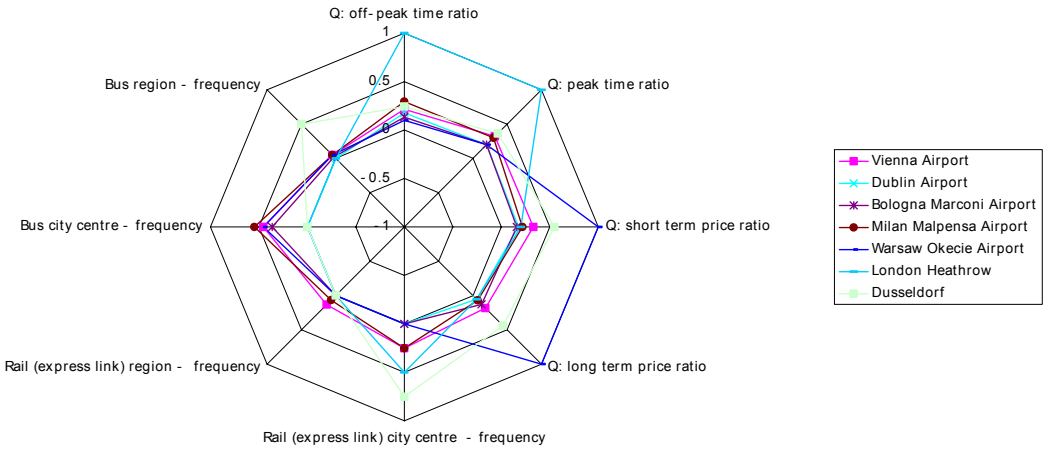


Figure 3.1b Low-performing airports radar diagram



Comparison of both diagrams gives an interesting result. The high-performing airports have a collective transport system that is more focused on frequency than on travel time and price. Four out of the top-five airports, i.e. Berlin, Amsterdam, Paris, and Brussels, show the highest frequency to the city centre by rail, to the region by rail, to the city centre by bus, and to the region by bus respectively. Given the better performance of Berlin and Amsterdam compared to Paris and Brussels, it can also be concluded that rail transport is more favourable to a higher modal split of passengers that use collective transport than bus transport. On average, the low performing airports have lower collective transport frequencies and seem to be focused more on travel time and price of collective transport compared to the private car.

3.3 Relevance of results

The regression equation on the modal split of passengers that use collective transport suggests that airports and the European Commission should focus accessibility policies on reducing the number of short-term parking places for passengers. The number of short-term parking places can be considered a measure for the relative performance of collective transport compared to private car use. Airport investments in parking are largely demand driven. A high quality collective transport system will prevent travellers from coming to the airport by car. This quality is relative to the quality of private car transport. For example, if access to the airport is heavily congested, collective transport will also be used more frequently and demand for parking will be low. The independent variables *total number of passengers* and *percentage of business passengers* can be considered control variables. These two variables categorise or group airports on a like-to-like basis. The number of long-term parking places for passengers is also of interest but has a much lower coefficient. The commercial interests of airports will prevent a decrease in long-term parking. Long-term parking is an important source of revenue for airports due to a favourable utilisation factor compared to short-term parking. Simply said, long-term parking places are used 24 hours per day while short-term parking places are only used for half the time (only during the day).

This result generates an interesting general objective function for airports. Airports that reduce demand for short-term parking essentially increase the modal split of passengers that use collective transport. The number or short-term parking places is a control variable for airport management contrary to modal split. Parking is one of the core businesses of airport organisations, and is an area that needs a strategic redefinition in the sense that airports need to become aware of the necessity to reduce short-term parking in their own interest (lower profitability than long-term parking) and those of society (increasing collective transport usage). Demand for short-term parking may be replaced by more profitable long-term parking on the one hand, and more intense collective transport usage on the other. Hence, the main question becomes:

How can airports reduce passengers' demand for short-term parking?

As noted, the demand for short-term parking places is an indicator that represents the quality of private car transport in relation to the quality of collective transport. Hence, the number of parking places can be disentangled into factors that relate to the quality of private car use and the quality of collective transport. The influence of these factors on modal split can only be discovered through better quality of data.

It has only been possible so far to make a first analysis of why some airports have a higher (or lower) modal split than predicted by the regression equation. This analysis of deviations is especially important in order to identify good practice. Besides, it also contributes to identifying bottlenecks that prevent an increase in modal split in favour of collective transport. It has been illustratively shown that good performance of airports relates to the frequency of collective transport. Airports with relatively high frequencies in one or more modes of collective transport perform better than expected on the basis of the regression equation. Frequency appears to be more significant in increasing collective transport usage than other collective transport aspects such as price and travel time.

3.4 Conclusions

The analysis of indicators is like an onion. Basically, in the analysis carried out, the first layer of the onion has been peeled off, generating some rather aggregate results. The low quality of available data prevents a deeper, more detailed analysis of the factors that underlie the accessibility of airports. A lot of factors influence the accessibility of airports due to its complexity. Any methodologically sound analysis will need to disentangle the complex structure of interferences between variables, because, simply said, everything influences everything. Besides, it has to suppress the non-accurateness of the data due to non-uniform measurement of variables by airports. This problem (or challenge) can only be resolved by better data. This involves:

- Participation of more airports
- Harmonised definition and measurement of variables (e.g. modal split, catchment area)
- Collection of variables over the years in time series
- Desaggregation of data (e.g. modal split per mode (!), travel behaviour by type of airport user (leisure passenger, business passenger, employee, etc.))

An improved data set would allow for the identification of more detailed and specific relationships between modal split and independent variables, especially those involving quality aspects of the collective transport system. Every increase in level of detail, i.e. every additional layer of the onion that can be peeled off, increases the significance of the results. The more detailed the outcomes, the more useable the results are for airports in improving their performance. Detailed identification of weaknesses through benchmarking allows airport management to make investments where they contribute most to airports' effectiveness without wasting resources.

Benchmarking that will generate highly significant results for airports basically requires a data collection framework in which as many airports as possible participate, and which is maintained for years. Clearly, the essence of success is in the quality of data.

4 Good practice

4.1 Introduction

The following descriptions of good practice were proposed by the airports participating in the pilot. It must be noted that these practices were not identified as a result of the comparison of performance indicators. The practices were proposed because they were considered successful, innovative, and interesting.

In section 4.2, employee mobility management at Amsterdam airport (Schiphol) is discussed. It is a partnership between government, airport operator, airport-based companies and suppliers of transport services aimed at facilitating commuter travel and reducing car use.

Section 4.3 describes the Heathrow Area Transport Forum, a regular liaison group involving the local transport authority, transport operators and businesses in order to find ways in which surface access, both to the airport and within the surrounding area, can be improved. Such Forums have been established throughout the UK. The Heathrow Forum is one of the first that has been established. Similar platforms can also be found in, for example, France.

Green commuter plans for employees at Manchester Airport are described in section 4.4. In section 4.5, the Transport Fund at Heathrow airport is presented. Sustainability partnerships at Brussels airport are described in section 4.6. Finally, section 4.7 presents aspects of air-rail intermodality and terminal integration.

4.2 VCC-Schiphol

4.2.1 Introduction

The Schiphol VCC (Vervoer Coördinatie Centrum) assists Schiphol-based companies and employees in finding optimal solutions for commuter travel from and to Schiphol. A specific aim is to reduce (individual) car use to control congestion and air pollution.

The centre was founded in 1990. Companies that want to use the services of VCC and participate in consultations must register as members and pay membership fees. Four groups of stakeholders participate in VCC: Schiphol-based companies, Schiphol Group (the airport operator), government, and transport providers. VCC is a non-profit organisation. Its core activities include:

- Consultancy for companies at new airport locations to improve accessibility
- Consultation with stakeholders
- Information provision and communication, aimed primarily at employees directly and participating companies
- Encouraging and facilitating carpooling
- Coordinating wholesale contracts with transport providers
- Specific measures such as promoting scooter use and vanpooling
- Complaint handling

Over the last couple of years, car use by Schiphol employees has remained more or less stable. This can be considered a success, given that the trend in the Netherlands is towards more car usage. The quality of public transport provision and facilities for sustainable individual modes of transport such as cycling have improved.

VCC employs three persons and has a total yearly turnover of approximately €175.000.

4.2.2 Context

Central Government is encouraging 'Mobility Management', defined as measures aimed at reducing individual car use. Throughout the Netherlands, there are several VCC organisations that assist companies in setting up and carrying out mobility management. VCC-Schiphol was one of the first, established in 1990.

Mobility in the Schiphol areas has increased considerably in the previous decade. During this period, the number people employed at the airport has increased from 35.900 to 53.900, and the number of non-transfer air passengers handled at the airport has increased from 11 to 23 million. Road and public transport accessibility have been considerably improved. New train tracks and connections were added, new bus lines were created, the airport transport hub (integrated in "Schiphol Plaza") was opened, and cycling was given special attention.

Other players involved in ground transport in the Schiphol area include the Schiphol Group, Dutch railways (NS), central government and local government.

The policy of Schiphol Group is primarily aimed at ensuring a high level of accessibility by discouraging the use of individual car transport, making optimal use of existing transport facilities and developing new facilities within land use constraints.

The added value of VCC is the role it plays in stimulating companies and employees to change their travel behaviour on the one hand (push) while on the other hand enabling these parties to express shortcomings in the system and giving follow-up (pull).

4.2.3 Implementation

Parties involved

Four (groups of) parties participate in VCC-Schiphol.

Government

The government supports VCC in order to contribute to the achievement of its overall transport policy objectives to reduce congestion and air pollution. Mobility management is an important means of doing this. Government (since the year 2000 local government, previously central government) financially contributes to VCC and participates in consultation.

Schiphol-based companies

Schiphol-based companies have an interest in ensuring good airport accessibility in general. However, a much more direct benefit to companies lies in ensuring good accessibility for their employees in terms of reliability (staff can be at work on

time), convenience (contributing to favourable working conditions) and low transport costs.

Schiphol-based companies can sign up as Members of VCC in return for a financial contribution of €2.50 per employee. The minimum total contribution for every company is €50.00 (excluding V.A.T.), i.e. the equivalent amount for 20 employees. During 2001, 67 companies representing 42.300 employees (80% of the total workforce of Schiphol-based companies) had signed up as Members.

Schiphol Group

For Schiphol Group, VCC is one of the 'instruments' to implement its accessibility policy, aimed at ensuring a high level of accessibility particularly by discouraging the use of individual car transport. Besides, Schiphol Group is one of the Schiphol-based companies itself with an interest in good accessibility.

Transport providers

Although not directly participating in VCC, transport providers are 'natural' partners of VCC with a commercial interest in stimulating use of their services.

Organisation

VCC is organised as a foundation. Companies that want to make use of VCC services can become Members in return for a financial contribution. Companies and their employees can then make use of VCC services and products, participate in consultation and appoint board members. In the board, the president and treasurer are appointed by Schiphol Group, the vice-president by KLM (airline company and largest employer), and the two remaining positions by other companies. The board coordinates the work of VCC that is carried out by three dedicated employees. The office is centrally located at the airport. The financial statement for 2001 and 2000 is as follows in table 4.1.

Table 4.1 Financial statement VCC-Schiphol

Amounts in euro	2001	2000
Income		
Contribution by Members	65.756	59.754
Contribution Schiphol Group	56.723	56.723
Sales of products/services	44.034	41.389
Interest	7.300	
Total	173.813	157.866
Spending		
Staff	90.087	72.795
Housing	23.402	22.316
Office supplies	9.621	6.954
Other costs (incl. Promotion)	10.625	10.927
Reservations	40.078	44.874
Total	173.813	157.866

Activities

Core activities of VCC include:

Consultancy

Companies can consult VCC for advice on improving accessibility to their location. This is especially relevant for companies that settle at newly developed airport locations.

During 2000 and 2002, VCC has developed an accessibility plan and has promoted the improvement of public transport with regard to the Schiphol South-East and Schiphol-Rijk locations. This has resulted in two new bus services. For PTT Post (national postal service provider), VCC has distributed some 700 information packages about transport facilities to and from the airport.

VCC has created a database with data from many companies (number of employees, location of employees) that support the development of accessibility plans.

Consultation

VCC is an active partner in consultation with the airport authority (VCC participates in a Traffic Working Group), transport providers and government. This helps it to carry out improvements and have a good overview of developments.

Information provision and communication

Information provision and communication, aimed primarily at employees and participating companies, is key to giving insight into the various possible transport options and changing mobility patterns. Communication channels include the VCC website, brochures for employees and two-monthly 'Management Letters' sent to Member companies.

Carpooling

VCC coordinates the use of carpooling. It assigns dedicated parking spaces to employees that have signed up as 'carpool teams'. Currently, some 3300 employees are frequent car-poolers. More than a hundred 'teams' are on a waiting list.

Transport wholesale contracting

Companies can participate in the transport wholesale contract scheme in cooperation with NS Business Services. Their employees can then travel by public transport at reduced rates. Total turnover within the scheme is some 2 million euro.

Specific measures

VCC is involved in a wide range of specific activities to reduce individual car use. For example, it has negotiated attractive scooter leasing arrangements and coordinates a system of 'vanpooling' in which employees themselves operate a van for collective transport.

Complaint handling

Employees can approach VCC with their complaints about public transport provision. VCC approaches the appropriate party with the complaint. In this way structural shortcomings can also be easily detected.

Information provision

About 3000 times a year VCC is approached directly by employees for personal public transport travel advice.

4.2.4 Results

The success of VCC-Schiphol can be measured taking two approaches. When looking at specific measures and membership of companies, it is clear that there is a clear need for the services of VCC. Since 1997, the number of companies that have become Members has risen from 45 to 67, and the number of employees these companies represent has risen from 34.800 to 42.300.

Judged on the basis of changes in the modal split, the following picture emerges (table 4.2):

Table 4.2 Schiphol employee modal split

Mode	1996	1998/1999	2000/2001
Car, alone	55.4%	55.5%	54.7%
Car, as passenger	3.3%	2.1%	2.1%
Car, as carpooler	13.4%	11.2%	12.8%
Total car	**72.0%**	**68.8**	**69.6**
Train	13.3%	14.8%	13.4%
Bus	6.1%	6.8%	7.9%
Total public transport	**19.4%**	**22.6%**	**21.1%**
Motorbike	2.3%	2.1%	2.8%
Bicycle / moped	5.4%	6.3%	6.4%
Other	0.8%	0.3%	0.1%
Total	**100%**	**100%**	**100%**

Source: Schiphol Mobility Studies 1996, 1998/1999, 2000/2001

Individual car use has remained more or less constant over the years. This is remarkable, as car use in society as a whole has risen during this period. It is even more remarkable for the Schiphol situation in which more and more employees are having irregular working times for which public transport and carpooling could be seen to be less well suited. Rail transport in the Netherlands has recently been facing severe quality problems, which might explain its lowered share during the last two years. Bus transport has shown a sharp increase during this period, due to a large extent to the opening of new lines and the Schiphol Sternet bus service in which VCC was involved. It must however be noted that changes in model share are affected by many factors and parties as a result of which the exact contribution of VCC is difficult to assess.

4.2.5 Evaluation

VCC-Schiphol shows the added value of a central platform for employee mobility management complementary to other efforts in the field of airport accessibility.

VCC is heavily characterised by co-operation. Whereas the joint interest of all involved is clear, recent years have shown that the willingness to contribute financially to VCC has weakened, especially from the side of government and Schiphol Group. This has put pressure on the functioning of VCC in terms of staffing and activities. Government has virtually stopped its financial contributions awaiting a new agreement with VCC-Schiphol. Schiphol Group is closely monitoring its indirect contribution to VCC by either stopping or charging for administrative, per-

sonnel and communication support. Its dependence on a wide range of parties has both contributed to the success of VCC, but has also made it vulnerable.

Sources

- www.vcc-schiphol.nl
- VCC annual report 2001
- Schiphol Group annual report 2001

4.3 Heathrow Airport Transport Forum

4.3.1 Introduction and context

Urban transportation planning fails to take into account some of the particular characteristics of airports in land-side transport terms. Airports are (expected to) develop into multi-modal transport hubs that serve both the airport and the wider region. A strategy is required that places the airport in the role of multi-modal transport hub within its regional context.

Airports in the UK have found it beneficial to set up a regular liaison group, by means of a forum partnership, with the local transport authority, transport operators and businesses in order to find ways in which surface access, both to the airport and within the surrounding area, can be improved. In addition, other options such as car sharing and cycling that can reduce car dependence are considered. Several examples of such forums now exist at Heathrow, Manchester, Gatwick and Stansted. Each of these has issued, after consultation with the key players in their region, a five Year Access Strategy setting out commitments, objectives and targets. Twenty-seven airports in the UK are now setting up and operating their own Forums. The Heathrow Area Transport Forum was established in 1995.

4.3.2 Implementation

Parties involved

It is appreciated that no single party can change the way in which people travel, and that an area-wide approach involving all stakeholders is needed. The Heathrow Area Transport Forum has nearly 70 organisations from both the public and private sector (local authorities, operators, companies and environmental groups) that are actively involved.

Public sector

The work of the Forum is affected by a wide range of national and regional government policies, some of which are highlighted here.

The Mayor of London's transport strategy, implemented by Transport for London, is focused on the development of high levels of public transport access to London's airports. It considers the Airport Transport Forum a key partner in this effort.

All local highway authorities in England are required to develop five-year local transport plans providing integrated transport strategies for their area. The plans must also consider the special transport needs of organisations in the area includ-

ing airports. The link between the local plans (in the case of London 'Local implementation Plans') and the airport's strategy are the Five Year Airport Surface Access Strategies that feed into the Local Transport Plan.

Regional Planning in the South East of England is carried out in a framework for the longer term (up to 2016) with the aim of preparing local authority plans. It also forms the basis for other strategies and programmes such as the SEEDA (South-East England Development Agency) Regional Economic Strategy and the preparation of local transport plans by local authorities. The Forum contributes to this and other planning initiatives. SEEDA's director of infrastructure and regeneration is a member of the Forum Steering Group, as the head of regional transport planning of SEERA (South-East England Regional Assembly), the body responsible for regional planning and transport strategy in the South-East of England.

The PPG13, a policy document aimed at integrating planning and transport at national, regional and local level, seeks to integrate planning and transport at national, regional and local level to promote more sustainable transport for people and freight. It forms an important basis for improving mass transport and other sustainable modes around Heathrow.

The Government's Air Transport White Paper envisions airports as efficient multimodal transport interchanges and considers Heathrow as one of the major ground transport hubs. The Forum fully supports this vision and continues to develop Heathrow as a ground transport hub that currently has two rail links to London, five railway stations on site and the busiest bus and coach station in the UK.

Private sector

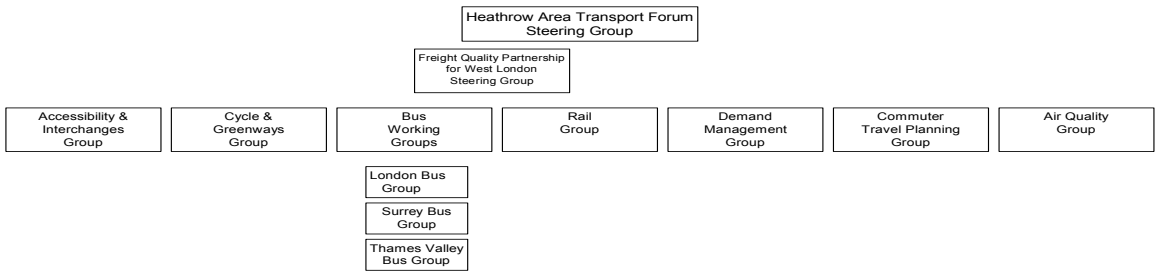
Private sector members include airport-based companies (airlines, handlers, …) and companies involved in the provision of ground transport in the Heathrow Area (e.g. bus companies, railway companies). The Forum's work is heavily involved with that of the airport operator BAA Heathrow.

Organisation

Structure

The Forum's organisation is headed by the Steering Group (figure 4.1). Under the Steering Group, there are Working Groups that focus on specific topics. Currently there are seven Working Groups. The Freight Quality Partnership is a newly established initiative aimed at facilitating freight transport.

Figure 4.1 Heathrow Airport Transport Forum organisation



Steering Group

The Steering Group is the executive power of the Forum and is indicative of the partnership which has been developed between private sector companies and public sector parties in the Heathrow Area.

Working Groups

The seven Working Groups of the Forum represent the core centres of activity. The Members of the Working Groups are those people and organisations experienced at getting things done in their respective areas.

Activities

Process

In areas affected by the Forum, short and long-term targets are agreed on, a strategy is devised to achieve the targets set, and implementation is overseen and monitored. Examples of targets set in current and previous Five Year Surface Access Strategies include:

- Bus & Coach: BAA has prepared a strategy for providing on-airport bus priority
- Cycling and walking: Double the number of employees from the 1999 figure of 1.3% cycling to work at Heathrow, by the end of 2002.
- Managing demand: To increase the number of registered car sharers to 2000, with 65% actively sharing cars at least once a week by March 2003.

The focus of the various Working Groups is to:

Demand Management Group

- Look at ways in which the travel habits in the Heathrow area can be altered to be in line with the aspirations of the Forum.
- Analyse corridors where there are high concentrations of employees, not just airport workers but those of local authorities and other major employers.
- Address key issues, for example: if there is high public transport accessibility on a travel corridor, why are people still driving? And, what is likely to make people travel by public transport and leave their cars at home?

Cycle/Greenways Group

- Ensure that a network of routes is developed in the Heathrow area along which cycle and pedestrian access is as convenient as possible.
- Work to ensure that cycling initiatives being pursued on-airport are linked with the initiatives of the local authorities off-airport.

Bus Working Groups

- Review existing bus services, ridership, infrastructure and publicity in respect of those bus routes serving Heathrow, and identify where gaps exist.
- Establish a clear set of objectives for determining where and when improvements could or should be made.
- Review the criteria for determining when and where improvements could or should be made.
- Identify priority areas for action by the group, specifically concerning service improvements, infrastructure, bus priority, publicity and ticketing.
- Establish targets to monitor the effectiveness of the Group and develop work programmes, incorporating appropriate reviews.
- Fulfil these functions within the framework of the Forum, and the context of wider Heathrow surface access proposals.

Rail Group

- Review and consider the various rail studies which BAA plc, together with others, has undertaken at Heathrow.
- Facilitate the consultation regarding the development of public transport facilities within the proposed Terminal 5 development.

- Consult with key stakeholders on other strategic transport issues such as ticketing and information systems, and the development of Passenger Transport Information services at Heathrow and the surrounding area.

Commuter Travel Planning Group

- Give follow-up to the emphasis placed on travel planning by DTLR by funding travel plan coordinators and the new requirements of PPG13 (policy document aimed at integrating planning and transport at national, regional and local level)

Air Quality Group

- Address environmental issues, specifically air quality.
- BAA itself has a strategic plan to improve air quality (the five year Air Quality Strategy, published in 2000) that goes beyond airport-related issues. BAA is for example encouraging the use of alternative fuel for cars and buses.

4.3.3 Results

In terms of modal split, there has been a steady decline in the use of private car and hire car to and from Heathrow – from 38.1% and 5.1% in 1996 to 35.6 and 3.2% in 2001. Bus and tube (metro) use has also decreased in relative terms, from 16.5 and 15.8% in 1006 to 13.4% and 13.1% in 2001. The fast Heathrow Express rail service to downtown London is used by 12% if business travellers and 4.3% of leisure travellers. All in all, public transport usage is currently at 35% with a target of 40% in 2007 and 50% in the longer term.

Achievements to date include projects such as M4 Spur Bus Lane, Feltham and Reading Railair services, support of local bus services such as 555/6/7 and 285, Free Travel Scheme, Airports Travelcard, Central Bus Station Phase II Development, Travel Plan development.

Future planned investment includes T5 PTI, Central Bus Station PTI, Phase II development of Surface Access Management System which will expand the system to incorporate a environmental database, on-airport bus priority measures, improvements to on-airport cycle facilities and infrastructure, refurbishment of Hatton Cross (currently underway), and the establishment of a car share database.

4.3.4 Evaluation

The Forum plays a key role in bringing together all involved in surface access to Heathrow. To provide an assessment of the opinion of individual stakeholders, more information is required. Users are appreciating the improvements in surface access to Heathrow. BAA Heathrow as one of the driving forces behind the Heathrow Area Transport Forum, has received the 2001 AA (Automobile Association) Award for its innovative approach to surface access and its investment in road and public transport from the UK's largest association of transport users.

Sources

- BAA Heathrow (2002), Heathrow Delivering for London & the Regions, A surface Access Strategy for Heathrow – the next five years / Annual Progress report
- BAA (2001), Heathrow Airport Transport Forum – profile.
- Duff, Alistair (2001), The use of Airport Transport Forums to Develop Airport as Multi-Modal Transport Hubs which Provide Sustainable Transport Alternatives to the Car for Employees and Air Passengers

4.4 Green commuter plans at Manchester airport

4.4.1 Introduction

Manchester airport published its Green Commuter Plan in 1998. The plan specifically addresses how public transport ridership by employees (17.500 in total at the airport on-site, employed at more than 250 companies) can be increased and how reliance on cars by airport employees can be reduced. Following the plan, a wide range of initiatives has bee introduced to offer a greater choice for commuter travel such as car pooling, cycling and the use of bus and train. The approach taken of 'evolution' not revolution, in trying to change modal split, following the idea that a lot of small changes can make a big difference. The overall target set for the Green Commuter Plan was to reduce the proportion of staff travelling by car from 88% in 1998 to less than the national average (which was 70% in 1998) by 2005. Currently, employees account for a third of the 50.000 daily vehicle trips to the airport.

4.4.2 Context

Manchester Airport published its first Ground Transport Strategy in 1997. In 2002 it published a draft of a revised strategy for consultation in which the progress made since 1997 is reviewed and priorities for future work are set out. In 1997, a target was set to achieve 25% of all trips to the airport to be made by public transport in the year 2005. This is a challenging target, considering that in 1994 public transport ridership was only 12% and 19% in 2000. Combined with the growth in air travel, the number of public transport trips made has risen from 2.4 mln. to 4.9 mln. annually. Manchester airport considers reliable and high-quality surface access as a prerequisite to secure growth of the airport as a whole.

UK government stimulates the development of airports as multi-modal nodes. The 1998 Transport White Paper actively promoted the integration of airports in wide networks with an emphasis on rail connections. It also required airports to develop transport strategies to increase the use of public transport. Airport Transport Forums have been established involving all partners. The Manchester Airport Ground Transport Strategy was considered Best Practice in the White Paper.

The first Greater Manchester Local Transport Plan (2000-2005) is now in its third year of implementation.

4.4.3 Implementation

Parties involved

The plan has been developed by the Local Transport Plan Steering Group, a partnership bringing together all the 10 districts of Greater Manchester, the Passenger Transport Executive and the airport. The plan links to some of the elements of the airport's accessibility strategy such as rail travel, the metrolink extension, measures to encourage 'green travel', and bus priority measures on airport routes.

The airport authority has installed a Ground Transport section that manages the implementation of the Green Commuter Plan and other ground transport initiatives.

The Ground Transport section hosts an annual Airport Transport Forum, a quarterly Ground Transport steering group, and attends a quarterly airport consultative committee. For employees it hosts a quarterly Service Partner Commuting Forum. Externally it attends the North West Regional Assembly Planning Forum, The Grater Manchester Rail Forum, the Local Transport Plan Steering Group, the Hearts and Minds Transport Group, and The Travel Coordinator Network

Organisation

The Ground Transport section is within the Planning and Environment department of Manchester Airport plc. The section involves a:

- Ground Transport Manager – responsible for Strategy
- Transport Policy Advisor – responsible for monitoring and research
- Travel Plan Facilitator – responsible for employee travel planning

Activities

The Green Commuter Plan has proposed eight areas of attention to reduce car use by people that commute as a single person in their own car, for each of which an illustration of possible measures is given:

- *Travelling by car* – even though the aim is to reduce car use, the airport gives attention to car commuting as an important means of transport for many employees. It is investing in road infrastructure to reduce a number of bottlenecks and improve information provision about road congestion. Car pooling is promoted through setting up car sharing schemes and providing attractive parking spaces for car sharers. At railway stations with an airport service, car parking facilities are improved in co-operation with the railway service and infrastructure providers.
- *Travelling with others* – Developing collective ways of transport for a group of employees for which regular bus or train services are not an option.
- *Travelling by bus* – Developing the bus network, raising service standards and building the Skyline brand that is owned by the airport authority. Improve integration of the bus network with other public transport services.
- *Travelling by rail* – In co-operation with train operators, opening new destinations, and increasing frequencies on existing routes. Improving bus feeder services, information provision, and parking and waiting facilities. Developing a more flexible ticketing system. Providing interest-free loans to employees. Extending the Metrolink to the airport.

- *Travelling on two wheels* – Upgrading the cycling network, improving cycle storage and maintenance facilities and providing changing and shower facilities to cyclists.
- *Travelling on foot* – For employees living in the direct vicinity of the airport - improving safety of footpaths, improve signposting.
- *Changing the way of work* – Promoting working from home where possible to reduce commuter travel.
- *Business travel* – Reviewing policies on business travel by airport employees, aimed at promoting the use of public transport. Improving information provision about public transport and reviewing policy on 'free parking vouchers' to encourage visitors to come to the airport by public transport.

To raise awareness, the airport communicates to employees in four ways:
- Using all channels of information provision including the employee newspaper, internet, intranet and the distribution of information leaflets and poster across the airport.
- Appointment of a Green Commuter Co-ordinator whose role is to promote and encourage green travel.
- Holding two annual travel awareness days and participating in national campaigns.
- Holding quarterly Service Partner Commuting Forums with the major airport companies

Measures taken so far include:
- Providing discount to employees on bus and rail fares.
- Improving quality, frequency and expansion of public transport services plus more convenient connections and timings to suit the needs of shift workers. The airport authority is funding the local bus network to support the provision of services in the early morning, late evening and weekends.
- A matchmaking for car sharers.
- Interest-free loans for travel season tickets.
- A people carrier service for transporting staff from areas not well-served by public transport.
- A cycle centre for cyclists with showers, changing areas and repair and maintenance facilities.
- Setting up of a Bike Users Group (BUG) to combat bicycle theft, share information and plan for the future.
- A car club scheme where staff can hire a car at reduced rates to save the expense of being a full-time car owner.
- Flexible working arrangements for staff including a nine-day fortnight and homeworking opportunities.
- The proposed extension of the Metrolink system into Manchester airport.
- Development of the airport rail station into a multi modal transport interchange for all bus, rail, coach and eventually Metrolink services. The Ground Transport Interchange (GIT), due to open June 2003, is expected to strongly contribute to raising public transport usage.
- A cap on staff car parking (4.200 places), increased charges to employers and relocation of staff parking to the site periphery, to discourage car use.

The progress achieved is monitored through regular surveys among airport employees. There is a 6-month survey using a random sample of employees with a target 90% response rate. The results allow to adapt and tailor plans in response to needs and changes in behaviour.

4.4.4 Results and evaluation

The approach taken, aimed at raising employee awareness and providing alternatives for employees to be used voluntarily, has proven to be successful. The Green Commuter Plan set a target for employee travel to reduce car commuting to below 70%. In 1996, car usage percentage was 83%, in 2001 it was 73% (excluding carpooling and car passengers). Bus ridership has increased from 4% to 7%. (table 4.3).

Table 4.3 Employee modal split

Mode	1996	2001
car driver alone	83%	73%
car as passenger	3%	6%
car with passenger	6%	4%
bus/coach	4%	7%
bicycle	2%	2%
motorcycle/moped	1%	1%
walking	0%	1%
train	1%	1%
other	1%	4%

In 1992, only 10% of employees used collective transport.

The funding of the local bus network by the airport authority has generated steady growth and an extensive range of services. Operators have invested in new vehicles, and currently, alternatives to conventional bus routes are being investigated. The Bike User Group has over 700 members, and 3% of workers now cycle to work.

In future, targets set in 1997 and 1998 may prove to be insufficient to guarantee accessibility of the airport in the longer run. If it is to grow to 40,7 million air passengers a year in 2015, the share of public transport in the total number of trips will have to rise to 40%. Instead of fixed percentages, it might be appropriate to link public transport mode share targets with one covering the ratio of vehicle trips to the number of air passengers.

The cost of employee car parking permits has risen from £150 (pounds sterling) in 1997 to £275 (pounds sterling) in 2001. However, raising employee parking fees has not resulted in a major reduction of car use. Parking fees are in most cases paid by employers and thus raising them does not result in a direct incentive for employees to use public transport. The relocation of staff parking has however resulted in a rise of public transport use. As employees now have to take a bus to reach the central terminal area, using public transport for the entire journey has become relatively more attractive.

Key issues for the future include:

- Car use by employees will need to be contained by providing sustainable alternative modes of access.
- A high proportion of shift workers dissipates travel throughout the day, but a lack of critical mass in some areas and times of the day makes conventional public transport harder to plan and provide without subsidy.
- Other parties should be involved and major employers should be targeted to prepare their own travel plans.
- Improve travel co-ordination.

- Seek commitment by other businesses in the airport area and seek synergies.
- Incentives for green travel are often taxable, whereas workplace parking is not – the airport authority continues to lobby for a taxation system that favours and encourages sustainable travel.

All in all, progress over the last years has been remarkable and significant. The Manchester Airport Green Commuter Plan has received awards from both the Institute of Logistics and Transport and the Association of Commuter Transport, further underlining its achievements.

Sources

- Manchester Airport Ground Transport Strategy Review, Bob Longworth, Manchester Airport PlC (2002)
- www.manchesterairport.co.uk - press releases and other information
- Manchester Airport Green Commuter Plan, Manchester Airport, 1998

4.5 Heathrow Airport Transport Fund

The Transport Fund was established in April 1997 and is financed through an increase in public car park charges and a contribution from staff car parking. In addition to the £1,60m - £1,80m per annum that this produces, £0.5m from Heathrow Airport's revenue expenditure budget is also incorporated within the Fund, resulting in a total budget of over £2m annually per annum.

The primary purpose of the Transport Fund is to commit expenditure towards projects designed to increase public transport accessibility and reduce car dependency that would not have been able to proceed without this investment.

The Fund is managed through a Board, whose membership is represented by key areas of the business, who work to ensure that issues such as customer service and local community needs are embraced.

Members are:
- Andrew Dryland (chair) - Director of Planning & Environment
- Phil Lightowler (secretary) - Transport Strategy
- Nicola Hooper - Transport Strategy
- Eryl Smith - MD, Terminal 5
- Paul LeBlond - Group Rail Strategy
- John Dewey - GM, T2 and Ground Operations
- Toni Ball - Head of Service Delivery, T2
- Guy Sutherland - Finance
- Jayne Luiting – Retail

Some of the achievements of the Transport Fund include:
- Funding of the Heathrow Free Travel Zone - a scheme providing free public transport for all passengers on buses covering the Central Terminal Area, Terminal 4, the Cargo area, Hatton Cross, Harlington Corner and the Bath Road.
- £ 5m. investment in bus and coach services serving the airport leading to a significant reduction in employee car drivers to LHR and a corresponding increase in public transport usage over a five-year period.

- Introduction of the Feltham Rail-air service.
- M4 spur (the first bus lane on a UK motorway, responsible for taking up to 13 million car users off the roads every year.)
- A GIS South-East Airport Surface Access Management System (received an award for innovation).
- Intranet-based Journey Planner for airport staff.
- Capacity and quality enhancements to the Heathrow Interchange.

Sources

- Copied from BAA (2001), Heathrow Airport Transport Forum – profile.
- Additional input from BAA Heathrow

4.6 Sustainability partnerships at Brussels airport

Introduction

At Brussels airport, a partnership has been established between industry, airport authorities, government and railways to achieve more sustainable mobility from and to the Brussels International Airport.

Context

Brussels International Airport is not only one of the gateways to Belgium's capital city, but is also one of the country's leading generators of employment. Brussels airport was ranked as the eleventh European airport for passenger traffic in 2000 and was ranked fifth on the freight chart. Its central position, its continuous expansion, the growing importance of Brussels as the 'capital of Europe' and the general economic development of the surrounding region will boost the importance of the airport even more.

However, the increasing traffic congestion threatens the accessibility of the airport and as a consequence the development of the airport and its surrounding region. A better rail service for the airport will not only improve accessibility, but also take away some of the pressure on the surrounding road network, such as the Brussels ring road. This will benefit the entire Brussels region.

Less than 7 % of commuter journeys to and from the airport are made by bus or train. Following the example of other airports abroad, Brussels aims at a 38/62 modal split of collective / individual transport by 2010. The Belgian railways intend to cover some 30 % of all traffic to and from the airport. The increased market share and the expected growth of overall traffic imply that the number of passengers travelling to the airport by train will multiply by five.

Measures

In order to achieve this goal it is necessary to take a series of coherent measures:

- trains offering adequate comfort and luggage facilities,
- price measures, such as allowing passengers holding a plane ticket to take the train, which could be financed by slightly increased airport taxes,
- clear information in various languages.

Increasing the number of direct connections from different regions in the country is one of the key solutions in this respect. This measure has already been implemented in some cases and has boosted rail travel between the airport and a number of cities that were given a direct connection.

The various parties concerned came together in 2001 to determine which direct rail links would best meet customers' demand, and also what additional rail infrastructure would be required. It was an open and constructive dialogue that involved all the partners concerned.

BIAC (Brussels International Airport Company), which is the official operator of the national airport, managed to convince most of the companies based in the airport zone to provide staff data, such as their place of residence, their mode of transport and their work system to a central database, which is accessible to public transport companies within a geographic information system (GIS). This database provides detailed information about approximately 70 % of all airport personnel.

Information about the origin and the destination of airline passengers is based on the results of a survey commissioned by BIAC in June 1997. Based on this fairly accurate data it was possible to draft a transport plan and to analyse what additional infrastructure would best meet the needs of potential passengers.

As the improved accessibility of the airport has a considerable effect on mobility in Flanders and as the Flemish regional authorities issue the building permits required, the Flemish Region analysed the impact of different line trajectories for the new infrastructure on the basis of a multi-modal traffic model.

The entire project led to an optimisation process that took into account the wishes of the various partners and aimed at minimising journey times and costs, and maximising direct services for potential customers in order to positively affect the modal split.

Essential conditions for the partnership to be effective can be summarised as follows:

- there needs to be a willingness to co-operate from all parties in order to achieve one common aim;
- it is necessary to prioritise the public interest as much as possible: primary and secondary objectives have to be set;
- it is necessary to assess whether the objectives have been achieved or can be achieved;
- studies to aid decision making should be drafted by the Research and Development departments of the various partners; private consultants may be involved to bring in extra know-how and IT support;
- these studies have to be drafted in an atmosphere of confidence: all options have to be debated;
- studies need to be fully based on correct information; setting up uniform databases within a GIS is time-consuming but absolutely essential;
- a partnership does not end when a study is concluded. The actual work starts here, with the implementation, the follow-up and modification of the project.

Results

By 2010, in accordance with the proposed airport transportation plan, it is expected that direct rail services will be offered at maximum 5km from a person's home or destination for about 50 % of all traffic to and from Brussels International Airport. This share is currently less than 9 %.

This example of good practice shows a partnership of industry, airport authorities, government and railways that has led to a proposal of a demand-oriented operational scheme that:

- Determines the necessary infrastructure, taking into account technical and environmental aspects;
- Combined with other measures, should shift the modal split of traffic to and from the airport from 7/93 to 38/62;
- Also generates positive effects for other domestic passengers.

Sources

Edited from Vanhove, Johan (2002), Partnerships between industry, airport authorities, government and railways to achieve a more sustainable mobility from and to the Brussels International Airport. www.ecomm.be/ab47

4.7 Air-rail terminal integration

Introduction

Connection of airports to the rail network is considered one of the most effective measures to increase public transport ridership and increase the quality of public transport to airports. One of the key issues is the degree of integration of the air terminal with the rail terminal. Integration is gaining in importance as airports become connected to high-speed rail networks, allowing passengers to continue their air journey by rail to other European cities.

Three levels of integration of air and rail terminal can be distinguished:

- High degree of integration – the air and rail terminal are virtually one. Seamless connections from one mode to another are possible.
- Medium degree of integration – the rail terminal is adjacent to the air terminal. Both terminals are in easy reach (walking distance) of one another.
- Low degree of integration – there is a rail terminal at the airport, but it is not within walking distance from the air terminal.

During the BOB airport accessibility pilot, site visits were organised to three airports, all of which have a high level of air and rail terminal integration: Brussels, Copenhagen and Amsterdam.

The integration of air and rail terminal is considered good practice as it best facilitates the interchange between plane, train and other public transport. In a study of IARO (International Air Rail Organisation), good practices in the field of air-rail

intermodality have been presented. This section highlights a number of the good practices identified during BOB pilot site visits.

Examples of good practice

Brussels airport

In the terminal of Brussels Airport, four languages are used in signage and other forms of information, which is a rather unusual situation. Whereas the use of Dutch is obligatory by (local) law, French and German are used out of courtesy to the French- and German-speaking communities in Belgium. The English language was added for the benefit of English-speaking passengers that visit the airport. All four languages are used in signage at the airport. To improve the clarity of the information, the same pictograms are used in signage and printed information

At the airport, the train timetable is shown on screens in the airport terminal. It shows the end destination of trains as well as intermediate stops. Some room for improvement was noted when it comes to information provision at the train terminal, which was in either Dutch or French only.

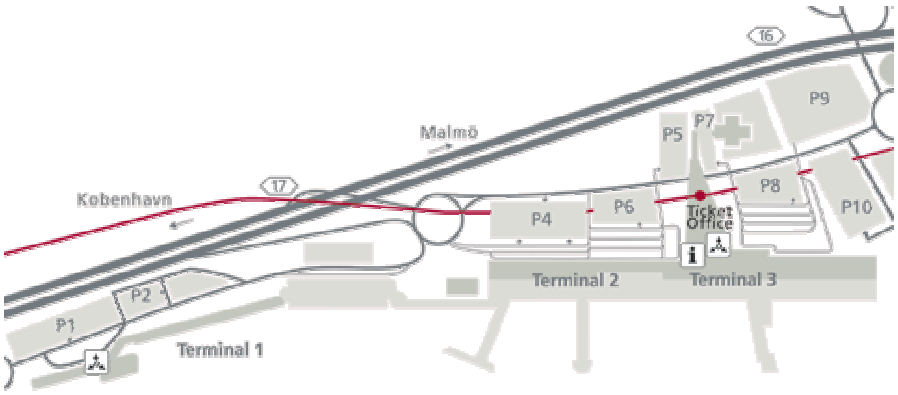
The train station itself is a terminus with three platforms. Four trains an hour link the airport with the capital with all trains stopping at the Brussels North, South and Central station. There are direct links to Ghent, De Panne and Mons. From the Brussels stations, connections can be made to all other destinations.

Copenhagen airport

During the visit to Copenhagen airport, all principal points of entry to the airport (by taxi, train, bus, bike, etc) were visited.

Access to and from the train station to terminal 3 of the airport was considered to be very good (see figure 4.2). In addition to the lay-out, the interior design played a role in this: a striking black pathway leads passengers from the arrival hall right to the train ticket offices. The ticket office is located in terminal 3 above the railway station. There are lifts and travolators between the rail platforms and terminal 3.

Figure 4.2 Copenhagen airport rail station



Access from terminals 1 and 2 is not as easy as it involves a longer walk. Alternatively, passengers can use the free shuttle bus which runs between terminal 1 and terminal 3.

In the IATA (International Air Transport Association) Global Airport Monitor, in which airport services are tested by passengers on a five point scale, Copenhagen

performs particularly well in relation to the aspect of *Signposting* where it scored highest in the category of airports with annual traffic of 15 mln. passengers and higher (4,2 on a 1 to 5 scale).

Whereas the Global Airport Monitor does not cover air-rail (terminal) integration in particular, aspects that might prove worthwhile to include in the analysis of air-rail terminal integration are for example:

- Ease of finding your way through airport / signposting
- Flight information screens
- Availability of trolleys for baggage
- Cleanliness of airport terminal
- Ground transportation to/from airport
- Sense of security
- Ambience of the airport

These aspects are currently monitored and reported quarterly.

Madrid airport

A new intermodal node incorporating a metro link between the city centre (Nuevos Ministerios) and Madrid airport started operating in May 2002. The new metro station provides connections to the railway network (commuter trains) and has an in-built taxi rank and bus stops. A particularly innovative feature of the metro station is the provision of full check-in facilities for air passengers. It is possible for passengers to check in their baggage and obtain a boarding card at the metro station and then travel baggage-free to the airport in 12 minutes, paying 0,95 EUR for a single ticket (per person). The baggage is transported by metro to the airport with security inspection at the airport. The frequency of metros is 5-6 minutes during peak travel times and 5-8,5 minutes during off-peak travel times. The construction and operation of the airport metro link in Madrid were made possible due to an agreement between the regional government - the Autonomous Community of Madrid - and the national government - the Ministry of Transport and Public Works (Ministerio de Fomento). The project was financed by the Autonomous Community of Madrid which is the main stakeholder in the Madrid public transport authority (Consorcio de Transportes). The operation and management of the check-in area in the metro is the responsibility of AENA (Spanish Association of Air Transport) that invests in equipment - counters, electronic information system, security system, etc. - and charges air carriers for the use of its services.

IARO best practice report

Specifically in relation to air-rail terminal integration, IARO mentions the following best practices:

- information and ticket sales geared to the needs of airport users – e.g. the use of pictograms, real-time information systems, on-platform help like a telephone information system, call buttons for porters, easy-to-use automatic ticket vendor machines;
- level access from train to platform;
- luggage services that enable travellers to check-in their luggage at rail stations or have it collected at home, thus facilitating the transfer at the air terminal.

Sources

- Air Rail Links – Guide to Best Practice, IARO (1998)
- Reports of BOB airport accessibility pilot benchmarking meetings
- www.cph.dk
- IATA Global Airport Monitor: Customer Satisfaction, presentation by Peter Morris (IATA) and Bo Haugaard (Copenhagen Airport), BEST Conference, January 2001.

5 Transferring good practice

5.1 Methodology

The methodology presented here to enable the transfer of good practices identified in another organisation to one's own situation is based on the approach developed by the Centre for Management and Policy Studies (CMPS), which is part of the UK Government Cabinet Office.

The CMPS has produced a workbook on International Comparisons in Policy Making[4] in which it identifies five stages in the policy making process:

- Agenda setting: defining issues, acknowledging them as required action, formulating the problem.
- Objective-setting: establishing objectives, defining outcomes and outputs.
- Choosing policy instruments: determining what actions will have the desired effects; devising and deciding the means by which objectives will be delivered.
- Implementation: putting into effect the means by which objectives will be delivered.
- Evaluation: assessing what actually happened, and the extent to which the objectives have been met.

For each step, information is required, for both the comparator and the own situation, about the actors involved, the policy arena, institutions, interests and ideas, and constraints and pressures. This approach should bring forward all relevant differences and commonalities between the comparator and the own situation, enabling to make a judgment whether identified good practices can be transferred to the own situation, and if so, how. The questions to be answered, all of which are included in the CMPS workbook, are quite numerous and detailed. Here a selection of the most relevant questions has been made. Most questions have been copied directly from the CMPS workbook and some have been combined or interpreted and rephrased.

[4] For more information: www.cmps.gov.uk/policyhub

Stage 1 - Agenda

The situation of the comparator:	Own situation:
- What was the problem or issue or idea that was to be addressed?	- What is the problem or issue or idea that is to be addressed? - How similar or dissimilar is this to the comparator? - How critical do you judge any dissimilarities to be?
- What led to this being identified as a policy issue? - What factors opened a window of opportunity for this issue to be addresses?	- What led to this being identified as a policy issue? - What factors opened a window of opportunity for this issue to be addresses? - How similar or dissimilar is this process to that which took place at the comparator? - How critical do you judge any dissimilarities to be?
- Which individuals or organisations were decisive or highly influential in defining the issue and bringing it to the policy agenda?	- Which actors are involved in the home context? Are they the same actors? Are their roles similar? - What might be the influence of differences?
- What were the explicit or implicit interests, ideas, ideologies and values of the actors involved and of society at large, in relation to the issue?	- How similar or dissimilar is the environment of interests, ideas, ideologies and values in the home context? - Do you expect differences to have a critical effect on the future development of the policy?

Stage 2 - Objectives

The situation of the comparator:	Own situation:
- Were the intended outcomes of the policy explicitly identified and agreed? If so, what were they and how were they identified?	- To what extent have goals or objectives already been established for the outcomes or outputs of any policy related to this issue? If so, how? - What are similarities or dissimilarities compared to the comparator? How critical do you judge these?
- Were specific stakeholders identified and consulted for the policy? - Who decided on the objectives of the policy? - Did stakeholders have a common view with regard to objectives? If not, why not? (e.g. differing ideas, values, interests, roles)	- What consultation has there been or will there be with stakeholders? - Do stakeholders have, or are expected to have, a common view with regards to objectives? If not, why not? (e.g. differing ideas, values, interests, roles) - Do you expect differences with the comparator to have a critical effect on the future development of the policy?

Stage 3 - Instruments

The situation of the comparator:	Own situation:
- What possible courses of action were considered as means of delivering the objectives? How were they generated and by whom? - Were stakeholders consulted? - Which options were chosen and why? Was the choice between options affected by explicit or implicit interests, ideas and values of actors involved?	- How dependent is the choice of instruments on existing policies? - How is the mechanism for consulting stakeholders functioning? - Who will decide, and how, on the choice of instruments? Do you expect the choice between options to be affected by explicit or implicit interests, ideas and values of actors involved? - Do you expect differences with the comparator to have a critical effect on the process of choice of instruments?

Stage 4 - Implementation

The situation of the comparator:	Own situation:
- How was the chosen policy instrument implemented? (actions, arrangements for oversight, control an maintenance, securing of accountability)	- Which legal powers, financial and other resources, and technical capability are available to implement the policy? - What would the consequences and risks of imitating the process employed by the comparator be?
- Which individuals or organisations were involved in the implementation of the policy? - What were their interests?	- Would the equivalent individuals or organisations be involved in the same way? - Do you expect stakeholders involved to have the same interests? - Do you expect differences with the comparator to have a critical effect on the implementation of the policy?

Stage 5 - Evaluation

The situation of the comparator:	Own situation:

- What evaluation of the policy has been carried out?
- What evidence is available about:
  o the impact of the policy and the extent to which it met expectations;
  o the economy and efficiency of management;
  o unforeseen consequences, adverse effects;
  o the effectiveness of instruments used.
	- What lessons should be learned about policy design and implementation form this evaluation?
	- In considering of learning from this example, how confident are we that to be in possession of all available evidence about its efficiency and effectiveness?

- Are all stakeholders satisfied with the outcome and are have their interests been met? - Have modifications been made to the original policy following the evaluation?	- What pressures are there to imitate this policy regardless of adverse evidence? - Would it be possible to modify or abandon the policy if the findings suggest this?

Stage 6 - Synopsis

The next step would be to re-examine the differences between the comparator and the circumstances in the home situation. This should lead to a clear picture of factors, in either the own organisation or in the wider policy context, that would affect the way in which a policy would operate in the home situation.

It will allow one to assess whether the policy of the comparator, or any particular aspect or component of it, can be a source on which to base the policy to be developed in the home situation. The degree to which it can be used can be:

- high – the policy model at the comparator can directly be imitated without or with a limited number of modifications;
- medium – the policy model at the comparator can serve as a source of relevant policy lessons (e.g. the nature of problems, possible ways of solving them) without serving as a direct model to imitate;
- low – the policy model at the comparator can serve as a source of inspiration about the directions in which or the means by which policy might be developed.

On the other hand policies that are in no way suitable for transfer, or for which insufficient information is available to draw solid conclusions on, can be identified and put aside.

5.2 Application

No transfer of good practice has been carried out in the pilot project. This is beyond the scope of the pilot in terms of timing. It is however hoped that airports will be encouraged by their participation in the pilot to assess how some of the 'good practices' brought forward during the pilot exercise could be transferred to their own situation.

6 Conclusions and recommendations

6.1 Conclusions

The BOB airport accessibility pilot was successful in creating, for the first time, a network of airports that had never met in this kind of structured format to exchange ideas and experiences on airport accessibility. Airports that have participated in the pilot exercise have expressed enthusiasm about taking part in a group that enables them to compare performance and share good practices in the field of airport accessibility with other airports.

Need for co-operation

The main participants in the BOB airport accessibility pilot were representatives of airport authorities or airport associations, as these were considered key actors in the area of airport accessibility. However, the pilot exercise showed that airport authorities felt that they had limited control of issues relating to landside accessibility and needed better control over this (strategically) important issue.

The issue of airport accessibility is one that involves a great number of stakeholders including airport authorities, transport providers, infrastructure providers, local, regional and national authorities, employees, employers, etc. The initiatives of one party are heavily dependent on those of others. Consultation of the participating airports has resulted in the identification of a number of good practices related to airport accessibility. Many practices identified were especially related to resolving the problem of limited control over airport accessibility by some form of co-operation between actors in order to be able to address effectively the accessibility of the airport. The strength of these good practices, such as those in the UK (airport transport forums), the Netherlands (VCC-Schiphol) and Belgium (Brussels airport sustainability partnership) is that they provide the structure in which all relevant actors involved co-ordinate measures to improve airport accessibility.

In particular we can point at the UK situation where parties involved in transport to and from the airport (including the airport authority, transport operators, employers, regional authorities), co-operating in airport accessibility forums, are required by law to develop accessibility plans, set targets and work towards meeting them. In order to tackle complex issues such as airport accessibility in which many parties are involved, airport forums provide a very strong mechanism to bring the relevant parties together and jointly work towards solutions.

Need for data

The lack of co-ordination was also evident in the data collection. The benchmarking exercise was restricted to the use of readily available data. However, the process of collecting information revealed that a lot of data was not easily accessible. At many airports, it took quite a while to gather the requested information because it was not easily accessible to the airport representative. It had to be gathered from a variety of parties and sources where it was not always clear who could provide what information.

The results of data collection showed great differences in the level of detail of information that was available. The focus of the pilot has been the factors that determine modal split of passengers on the hand and modal split of employees on the other. However, the number of participating airports able to provide data on modal split of employees was limited, preventing an econometric analysis of the

factors that determine the travel behaviour of employees. Especially with regard to the objective variable, sufficient level of detail is necessary in order to analyse the travel behaviour of different collective transport users. Besides the distinction between passengers and employees, it would also be interesting to distinguish between leisure and business passengers, a distinction that is not commonly made. The impact of quality aspects and price are currently obscured by the aggregation of travel behaviour of different user categories that may react quite differently to these variables.

This problem was exacerbated by the fact that some airports were not able to separate modal split according to different modes of collective (and also individual) transport. On the basis of the current data set, it is only possible to analyse the impact of a specific quality aspect of one mode on the modal split of collective transport system as a whole. This impact will be too small to observe in a quantitative analysis.

Another likely problem with regard to data is the non-harmonised definition and measurement of variables, such as modal split and catchment area. This creates 'noise' in the data in the sense that data becomes more difficult to compare between airports. Some work will need to be done to make the definition and measurement more precise. The outcomes of the analysis will then increase in level of detail. A larger number of participating airports would also be beneficial in this respect. A final issue is the non-availability of time series of data. In order to be able to understand how airports have developed and to determine the effect of measures taken on, for example, modal shares, the need for time series of data is evident. The availability of time series of data was poor, not only with regard to modal split, but also with regard to the quality of the transport system (service levels, prices, etc).

Due to these data problems, the analysis only allowed for the analysis of modal split of passengers that use collective transport at the highest level of aggregation. More significance and practical relevance for airports can only be realized by improving the data collection through:

- Disaggregated data (e.g. modal split per mode (!), travel behaviour by type of airport user (leisure passenger, business passenger, employee, resident/non-resident, etc.))
- Harmonised definition, measurement and reporting of variables (e.g. modal split, catchment area)
- Participation of more airports
- Collection of variables over the years in time series

Improvement in the data collection in all these four areas will increase the level of detail in the outcomes considerably. More detail makes the information more relevant and useful for airports. Identification of detailed relative strengths and weaknesses allows airport management to make investments where they most contribute to airports' effectiveness without wasting resources and to learn from specific good performance by other airports.

The way forward

Airports have expressed the need for a structure in which airports can compare their performance with others that have similar problems and in which they can learn from others and exchange good practice. Experience in other benchmarking initiatives has shown that a benchmarking network only starts to deliver concrete output in the course of time. However, this process can be accelerated considerably.

The co-operation of airport authorities, transport providers, infrastructure providers, local, regional and national authorities (local/regional/…), employees, employers, etc. at an airport is considered highly important in the identification and realisation of measures to improve the land-side accessibility of airports. Single actors simply have too little control over this issue. Hence, it is worthwhile to assess whether airport transport forums could play a role beyond the UK and how the European Commission could promote their establishment on a compulsory or voluntary basis throughout the European Union.

Airports participating in the pilot expressed their desire for the European Commission to define a clear EU policy on airport accessibility that sets out the Commission's vision and objectives in this area. The airport accessibility issue does not lend itself to the setting of fixed targets or standards for the quality of accessibility and the share of modes on a European level. The circumstances and relevant issues at the various airports vary too much to justify such a rigid approach. Benchmarking is however a suitable tool to assess how policy objectives can be achieved (policy development and implementation). Benchmarking allows for the identification and evaluation of policy measures for improving the sustainable accessibility at airports, both by the removal of bottlenecks and by stimulating/adopting good practices at a European level. Hence, a structure is envisaged in which airports can exchange good practice and discuss the future of European airport accessibility policy with the European Commission. This structure should be built on the basis of airport transport forums in which all key actors participate.

This structure of airport transport forums with an information exchange platform at a European level will also resolve the data problem. Although some work has to be done on the definition and measurement of data, the data problem is mainly one of a missing framework for data collection. Once an agreed framework is in place (with some slight modifications on what is currently available) and data collected from year to year, the generated data will allow for easy analysis with detailed outcomes on relative performances and the success of measures that have been implemented. The collection of data would be a natural task for airport transport forums due to the participation of different actors who could provide the necessary data, the forums' own data needs for the identification and evaluation of measures that improve airport accessibility, and forums' interest in benchmarking performances (also at the European level) in order to identify good practices. The availability of sound and complete data would allow transport forums to carry out their own benchmarking exercises.

With regard to the data to be collected, it is appreciated that the access systems tends to vary significantly among airports. Differences can be found in the variety of modes, pricing structures, frequencies, destinations/reach, parking policies, etc. It is very difficult and time-consuming to collect all this information. Furthermore it is likely that the information actually needed for a particular analysis will not have been defined and collected. It is therefore proposed to refrain from collecting harmonised data related to the quality of the entire airport access system on a permanent basis. When for a (benchmarking) purpose specific information about an aspect of the access system is required, indicators should be defined that best meet the information needs. This information can then be collected. Hence, benchmarking should address partial aspects of the airport access system.

Besides, as was done in this pilot study, a broad description of the access system should be available and updated regularly to allow third parties (e.g. benchmarking partners) easy access to this information. Principally, the airport reports (annex 2)

provide the structure for this information. Annex 5 contains our proposal for a standardised description of airport access systems.

The focus of a continuous data collection scheme should be on the travel behaviour and characteristics of those travelling to the airport. It should give detailed information about the different modes, who uses them, and for what purpose. Agreement should be reached about a harmonised way of defining, measuring and reporting this data, enabling comparison between airports on an equal basis. Annex 6 contains our proposal for a harmonised set of data to be collected on a permanent basis. In the study, no analysis has been made of methods of data measurement and definition. It is however assumed that (significant) differences among airports exist. This also implies opportunities for benchmarking data definition and measurement.

6.2 Recommendations

To the European Commission

Summarising the conclusions in terms of recommendations to the European Commission, an active approach is needed to develop an integrated European airport accessibility policy given the demand expressed by airports and the role of airports in the mobility system. This involves, first of all, the establishment of a framework in which good practices can be exchanged between airports on a more permanent and long-term basis. Secondly, some work has to be done together with the airports on the harmonisation of the definition and measurement of variables that will allow effective monitoring of developments for policy purposes and for purposes of comparison among airports. Our proposal in annex 5 can serve as a starting point for this.

It is recommended that the European Commission considers an integrated approach that solves the need for co-operation and the need for better data, based on the following airport accessibility and benchmarking policy model:

> *Airport accessibility forums are established at airports. In addition, a European 'umbrella' forum is established in which representatives from individual airport forums can meet, together with the European Commission's Airport Policy Unit, at a European level. The European forum has a twofold function. On the one hand it co-ordinates benchmarking and especially the exchange of good practice among the various forums throughout Europe. On the other hand, it is in close contact with the European Commission, providing input to airport accessibility policy, for example by identifying bottlenecks (e.g. in the field of competition, infrastructure). The forum is also responsible for establishing with the Commission the set of data that the forums and the Commission would need for the effective monitoring and assessment of local and European airport accessibility policies. The airport accessibility forums will then act as the necessary framework for the subsequent data collection.*

A first step for the Commission to take towards the implementation of these recommendations could be a Communication on airport accessibility policy that includes guidelines for the (compulsory) establishment of airport accessibility forums and the European platform in which representatives of these forums meet together with the Commission, defining the objectives and tasks of these forums in the light of an integrated airport accessibility policy.

Simultaneously, the Commission could invite airports to discuss the set of data to be permanently collected and its definition.

To airport authorities

Our recommendation to airport authorities that consider benchmarking a potentially valuable tool for improving airport accessibility is to assess their control over airport accessibility issues. If this control is deemed insufficient, airports are encouraged to analyse how the situation can be improved. Suggestions brought forward in this report (airport accessibility forums, mobility partnerships) could feed this analysis.

Airports in general are encouraged to initiate the formation of a benchmarking group that focuses on airport accessibility. The first activity of this group would be to discuss the set of data to be permanently collected and their definition. A first benchmarking exercise should focus on best practice in data collection, leading to a greater level of harmonisation in the method of data collection and reporting.

The collection of data is beneficial for all airports in that it enables comparison of their performance on an equal basis. On the other hand, solving the current shortcoming in data definition and collection will pave the way for effective benchmarking exercises that focus on airport accessibility itself.

The topics for future benchmarking exercises in the field of airport accessibility should be agreed upon bottom-up among the participating airports. Topics should be aligned with the strategic objectives of airports in relation to surface access. Some suggestions from our side to focus on are:

- Incentive schemes to promote employee public transport use, carpooling, etc;
- Information provision about public transport to air travellers upon arrival;
- Passenger and employee parking schemes / policies.

Annex 1 List of indicators for which data was collected

Indictors that directly relate to mobility and accessibility
related to modal split
use of public transport – total (%)
modal split – detailed per mode for total (car, hire-car, taxi/minicab, metro/rail express link, rail, HST, (express) bus/coach, “two-wheelers”, walking, other) (%)
use of public transport – passengers (%)
modal split – detailed per mode for passengers (car, hire-car, taxi/minicab, metro/rail express link, rail, HST, (express) bus/coach, “two-wheelers”, walking, other) (%)
use of public transport – employees (%)
modal split – detailed per mode for employees - car, hire-car, taxi/minicab, metro/rail express link, rail, HST, (express) bus/coach, “two-wheelers”, walking, other
use of public transport (time series 1980-2001) (passengers and employees) (per mode) (%)
related to public transport
metro/rail express link existence (yes/no)
metro/rail express link frequency (/hr off-peak)
metro/rail express link price (euro)
metro/rail express link travel time (min.)
taxi/mini-cab price (euro)
taxi/mini-cab travel time (min.)
(express) bus/coach existence (yes/no)
(express) bus/coach frequency to city centre (/hr off-peak)
(express) bus/coach price to city centre (euro)
(express) bus/coach travel time to city centre (min.)
rail (express link) existence (yes/no)
rail (express link)– number of lines to city centre
rail (express link)– frequency - to city centre (/hr off-peak)
rail (express link)- frequency – to region (/hr off-peak)
rail (express link)- travel time – to city centre (min.)
HST-connection (direct) existence (yes/no)
airport complex bus shuttle existence (yes/no)
airport is a hub for regional public transport (yes/no)
related to private transport (car)
number of vehicle trips
number of car park spaces - total
number of car park spaces – passengers total
number of car park spaces – passengers LT
number of car park spaces – passengers ST
parking fee – passengers LT per day (euro)
parking fee – passengers ST per hour (euro)
private car trip costs (fuel, road pricing) (euro)
private car travel time – off-peak (min.)
private car travel time – peak (min.)
Indicators that characterise airports in general
related to airport traffic and employment
number of passengers handled (mln.)
number of O/D (local demand) passengers handled (mln.)
share of leisure/tourist/VFR passengers (%)
share of business passengers (%)
number of employees
related to the location of the airport
distance to city centre (km.)
catchment area (number of inhabitants within 2 hr drive)
severe congestion of road network around airport (yes/no)

Annex 2 Airport background reports

The airport background reports are not included in this version of the report. Considering the size of the reports (containing numerous graphs and pictures), the final version is provided as a separate annex to this report on CD-ROM and on the BOB pages of the BEST website (www.bestransport.org/bobprocess.html).

Annex 3 Summary of data collected

The table on the next page summarises the information collected for all airports.

Airport	Passengers - total	Passengers - O/D	Number of employees	Catchment area (inhabitants)	leisure/tourist/VFR passengers	business passengers	Distance to city centre / central business district	Modal split - collective transport - passengers	Modal split - collective transport - employees	Parking places - total	Parking places - passengers total	Parking places - passengers long term	Parking places - passengers short term	Parking places - employees
	mln	mln		mln	%	%	km	%	%					
Amsterdam Schiphol airport	39,5	23,2	53.880	12	50	50	15	45	21	25.000	16.000	10.000	6.000	9.000
Barcelona Airport	20,7	17,6	5.000	6	51	49	12	20	n/a	14.509	13.450	0	13.450	959
Berlin-Schoenefeld airport	2,2	2,1	3.000	10	82	18	18	51	n/a	6.200	5.400	5.230	170	800
Bologna Marconi airport	3,5	3,4	6.000	20	58	42	6	25	10	5.100	4.350	4.100	250	750
Brussels airport	19,6	13,9	20.969	10	34	66	12	15	2	22.746	10.258	4.473	5.785	11.793
Copenhagen Kastrup Airport	18,1	12,0	18.000	5,5	42	58	8	42	n/a	7.237	4.480	4.206	274	2.757
Dublin Airport	14,3	14,1	12.500	1,7	75	25	10	22	16	23.770	18.410	14.610	3.800	5.360
Dusseldorf airport	15,4	7,9	13.200	18	64	36	7	19	n/a	13.226	10.426	5.393	5.033	2.800
London Heathrow airport	60,5	41,5	65.000	58	62	38	43	35	20	34.000	18.500	6.000	12.500	15.500
Lyon-Saint Exupery airport	6,0	5,9	5.200	9	42	58	25	15	n/a	8.971	8.138	3.394	4.744	832
Madrid Barajas airport	34,0	20,7	31.883	6	56	44	15	15	n/a	11.721	9.897	2.866	7.031	1.824
Malaga airport	9,8	9,7	3.789	1.3	84	16	8	26	n/a	2.219	1.519	0	1.519	700
Manchester airport	19,6	19,1	17.635	17	34	66	13	13	8	19.230	14.576	9.201	5.375	4.654
Milan Malpensa airport	18,6	12,6	15.000	9	66	34	48	37	n/a	12.340	8.540	4.940	3.600	3.800
Munich airport	23,6	11,8	17.260	12	55	45	29	35	14	20.850	16.200	10.708	3.095	4.650
Paris Charles de Gaulle airpo	48,2	32,7	70.000	18	61	39	25	33	10	19.300	16.100	3.000	13.100	3.200
Toulouse-Blagnac airport	5,4	5,0	3.000	4	39	61	10	8	n/a	7.970	7.570	0	7.570	400
Vienna airport	11,9	4,4	12.000	7,1	55	45	16	26	15	11.140	10.440	9.732	708	700
Warsaw Okecie airport	4,7	4,0	7.500	6,6	43	57	10	25	50	2.600	1.700	700	1.000	900

Airport	Parking fee passengers long-term	Parking fee passengers short-term	Private car travel time - off-peak	Private car travel time - peak	Taxi/minicab city centre price	Metro line to city centre - existence	Metro line to city centre - frequency	Metro line to city centre - price	Metro line to city centre - travel time	Rail (express link) existence	Rail (express link) city centre - frequency	Rail (express link) region - frequency	Rail (express link) city centre - price	Rail (express link) - travel time from city centre
	€	€	min.	min.	€		/hr	€	min.		/hr	/hr	€	min.
Amsterdam Schiphol airport	13,30	3,40	20	35	36	-				+	7	15	2,90	19
Barcelona Airport	9,10	1,30	20	30	15	-				+	2	0	2,16	25
Berlin-Schoenefeld airport	15,00	2,00	20	30	18	-				+	8	4	2,10	31
Bologna Marconi airport	12,00	1,50	15	30	15	-				-				
Brussels airport	12,00	2,10	22	42	30	-				+	4	4	2,40	20
Copenhagen Kastrup Airport	10,75	4,00	20	20	18	-				+	6	6	2,10	13
Dublin Airport	7,00	2,20	20	30	17,5	-				-				
Dusseldorf airport	16,00	2,00	10	20	16	-				+	6	>15	1,75	11
London Heathrow airport	20,80	6,08	60	80	72	+	10	5,80	47	+	4	12	18,70	16
Lyon-Saint Exupery airport	36,84	1,98	30	35	31	-				+	-	3	-	-
Madrid Barajas airport	8,50	1,30	20	35	20	+	6	0,50	20	-				
Malaga airport	8,45	1,14	15	30	15	-				+	2	0	1,00	15
Manchester airport	27,00	4,00	20	30	30	-				+	6	8	2,40	20
Milan Malpensa airport	12,90	4,10	44	60	60	-				+	2	1	9,00	40
Munich airport	12,00	3,00	30	40	55	-				+	6	0	8,00	40
Paris Charles de Gaulle airpo	10,60	2,30	42	55	40	+	9	7,60	39	-				
Toulouse-Blagnac airport	13,00	2,00	15	20	19	-				-				
Vienna airport	11,00	2,00	20	40	30	-				+	2	2	2,90	25
Warsaw Okecie airport	12,50	1,25	15	40	5	-				-				

Airport	HST - connection existence	Bus downtown - existence	Bus city centre - frequency	Bus city centre price	Bus city centre - travel time	Bus region - existence	Bus region - frequency	Apt complex shuttle bus network existence	Explicit regional public transport function (hub)	Severe road congestion around airport
			/hr	€	min.		/hr			
Amsterdam Schiphol airport	+	+	3	2,95	30	+	15	+	+	+
Barcelona Airport	-	+	5	3,30	35	-		-	-	-
Berlin-Schoenefeld airport	+	-				+	3	-	-	-
Bologna Marconi airport	-	+	4	4,50	30	+	0,5	-	-	+
Brussels airport	-	+	4	3,00	25	+	20	-	-	+
Copenhagen Kastrup Airport	-	+	6	2,10	25	+	6	-	-	-
Dublin Airport	-	+	>5	6,00	30	+	>5	-	-	+
Dusseldorf airport	+	-				+	10	-	-	+
London Heathrow airport	-	+	2	12,80	55	+	>10	-	+	+
Lyon-Saint Exupery airport	+	+	3	7,65	30	+	4	-	-	-
Madrid Barajas airport	-	+	2	2,40	30	-		-	-	+
Malaga airport	-	+	2	1,00	20	-		-	-	+
Manchester airport	-	+	>10	2,50	25	+	5	+	+	-
Milan Malpensa airport	-	+	6	4,50	60	+	1	+	+	+
Munich airport	-	+	9	9,00	45	+	>10	-	-	-
Paris Charles de Gaulle airpo	+	+	11	10,00	50	+	>10	+	-	-
Toulouse-Blagnac airport	-	+	3	3,50	20	+	1	-	-	-
Vienna airport	-	+	5	5,80	30	+	1	-	-	+
Warsaw Okecie airport	-	+	5	0,60	40	+	1	-	-	+

Annex 4 Correlation coefficients

The next table gives the correlation coefficients between all variables on which data has been collected. It gives a first insight in the relationship between any two variables on the basis of the data that has been supplied by the participating airports. The size of the value says something on the significance of the relationship. Highly significant correlations (with values from 0.8 to 1) have been indicated in red and moderately significant correlations (with values between 0.6 and 0.8) have been indicated in yellow.

The line and column with the objective variable, modal split of passengers that use collective transport, have been made pink. This line and column were most interesting as they indicate the correlation of modal split with any of the other variables. As shown no single variable has a highly or moderately strong correlation with modal split.

It should be noted that correlation coefficients are not corrected for accidental influences (i.e. correlation with other variables). For example, the table shows that the modal split of collective transport is positively correlated with collective transport prices (hence, a higher price seems to imply a higher collective transport use). However, this can explained as follows: modal split is higher for large airports, large airports are more distant from the city centre, the more distant from the city centre the higher the prices of collective transport.

Nevertheless, as noted, the correlation table gives a first insight in relationships between any two variables, being helpful in finding statistically significant relationships through regression that *are* corrected for accidental influences.

A last remark has to be made with the variables 'metro line to city centre – price' and 'metro line to city centre – travel time'. Correlation coefficients with regard to these two variables show either values of 1 and –1 or no value at all. This is caused by the fact that there are maximally 2 airports that were able to provide data on these variables. Hence, these correlation coefficients do not have any explanatory power.

Correlation table		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
		Passengers - total	Passengers - O/D	Number of employees	Catchment area (inhabitants)	business passengers	Distance to city centre / central business district	Modal split - collective transport - passengers	Parking places - total	Parking places - passengers total	Parking places - passengers long term	Parking places - passengers short term	Parking fee passengers long term	Parking fee passengers short-term	Private car travel time - off-peak	Private car travel time - peak	Taxi/minicab city centre price	Metro line to city centre - price	Metro line to city centre - travel time	Rail (express link) city centre - frequency	Rail (express link) region - frequency	Rail (express link) city centre - price	Rail (express link) - travel time from city centre	Bus city centre - frequency	Bus region - frequency	Bus city centre price	Bus city centre - travel time	Fastest public transport travel time	Fastest public transport price	Fastest public transport average speed
1	Passengers - total	1.00	0.97	0.94	0.69	0.00	0.52	0.32	0.80	0.72	0.06	0.72	0.00	0.71	0.73	0.69	0.71	-1.00	1.00	0.02	0.81	0.78	-0.28	0.60	0.60	0.64	0.44	-0.25	0.65	0.73
2	Passengers - O/D	0.97	1.00	0.89	0.68	0.01	0.48	0.21	0.78	0.70	0.06	0.77	0.04	0.71	0.73	0.66	0.63	-1.00	1.00	-0.04	0.78	0.73	-0.32	0.59	0.50	0.58	0.40	-0.25	0.64	0.70
3	Number of employees	0.94	0.89	1.00	0.62	-0.07	0.42	0.34	0.68	0.60	-0.04	0.60	-0.01	0.59	0.61	0.60	0.60	1.00	-1.00	0.11	0.87	0.65	-0.35	0.51	0.67	0.57	0.39	-0.16	0.56	0.60
4	Catchment area (inhabitants)	0.69	0.68	0.62	1.00	-0.16	0.47	0.16	0.53	0.36	-0.17	0.43	0.29	0.75	0.62	0.64	0.59	-1.00	1.00	0.00	0.47	0.82	-0.33	0.02	0.18	0.65	0.43	-0.32	0.75	0.84
5	business passengers	0.00	0.01	-0.07	-0.16	1.00	-0.16	-0.46	0.19	0.06	-0.20	0.16	0.39	0.10	0.00	0.08	-0.03	1.00	-1.00	0.10	0.22	-0.10	-0.37	0.24	0.48	-0.23	-0.51	-0.18	-0.27	-0.15
6	Distance to city centre / central business district	0.52	0.48	0.42	0.47	-0.16	1.00	0.35	0.45	0.40	-0.02	0.32	0.27	0.65	0.88	0.84	0.91	-1.00	1.00	-0.21	-0.47	0.86	0.56	0.44	-0.15	0.67	0.90	0.36	0.81	0.75
7	Modal split - collective transport passengers	0.32	0.21	0.34	0.16	-0.46	0.35	1.00	-0.06	-0.01	-0.08	-0.21	-0.31	0.32	0.23	0.16	0.31	-1.00	1.00	0.43	0.30	0.23	0.28	0.13	-0.07	0.21	0.36	0.04	0.16	0.27
8	Parking places - total	0.80	0.78	0.68	0.53	0.19	0.45	-0.06	1.00	0.92	0.49	0.65	0.33	0.64	0.62	0.59	0.68	-1.00	1.00	0.16	0.61	0.66	-0.27	0.40	0.80	0.66	0.20	-0.33	0.63	0.63
9	Parking places - passengers total	0.72	0.70	0.60	0.36	0.06	0.40	-0.01	0.92	1.00	0.67	0.64	0.23	0.47	0.54	0.48	0.58	-1.00	1.00	0.14	0.64	0.55	-0.02	0.46	0.50	0.69	0.20	-0.11	0.53	0.43
10	Parking places - passengers long term	0.06	0.06	-0.04	-0.17	-0.20	-0.02	-0.08	0.49	0.67	1.00	-0.03	-0.04	0.10	-0.08	-0.16	0.17	-1.00	1.00	0.08	0.52	-0.03	0.26	0.00	0.24	0.18	-0.26	-0.11	0.10	0.00
11	Parking places - passengers short term	0.72	0.77	0.60	0.43	0.16	0.32	-0.21	0.65	0.64	-0.03	1.00	0.16	0.34	0.66	0.59	0.38	1.00	-1.00	-0.24	0.50	0.46	-0.23	0.35	0.24	0.51	0.39	-0.12	0.46	0.46
12	Parking fee passengers long-term	0.00	0.04	-0.01	0.29	0.39	0.27	-0.31	0.33	0.23	-0.04	0.16	1.00	0.28	0.21	0.24	0.23	-1.00	1.00	0.40	-0.17	0.33	-0.26	-0.27	0.36	0.26	0.09	0.04	0.25	0.25
13	Parking fee passengers short-term	0.71	0.71	0.59	0.75	0.10	0.65	0.32	0.64	0.47	0.10	0.34	0.28	1.00	0.71	0.64	0.78	-1.00	1.00	0.13	0.38	0.85	-0.17	0.32	0.29	0.52	0.41	-0.35	0.75	0.91
14	Private car travel time - off-peak	0.73	0.73	0.61	0.62	0.00	0.88	0.23	0.62	0.54	-0.08	0.66	0.21	0.71	1.00	0.93	0.85	-1.00	1.00	-0.25	-0.51	0.93	0.28	0.68	-0.11	0.79	0.84	0.20	0.89	0.81
15	Private car travel time - peak	0.69	0.66	0.60	0.64	0.08	0.84	0.16	0.59	0.48	-0.16	0.59	0.24	0.64	0.93	1.00	0.79	-1.00	1.00	-0.30	-0.44	0.89	0.27	0.64	-0.02	0.73	0.84	0.27	0.83	0.78
16	Taxi/minicab city centre price	0.71	0.63	0.60	0.59	-0.03	0.91	0.31	0.68	0.58	0.17	0.38	0.23	0.78	0.85	0.79	1.00	-1.00	1.00	-0.11	-0.15	0.91	0.39	0.54	0.21	0.73	0.71	0.11	0.84	0.81
17	Metro line to city centre - price	-1.00	-1.00	1.00	-1.00	1.00	-1.00	-1.00	-1.00	-1.00	-1.00	1.00	-1.00	-1.00	-1.00	-1.00	-1.00	1.00	-1.00	#####	#####	#####	#####	#####	#####	-1.00	-1.00	1.00	-1.00	-1.00
18	Metro line to city centre - travel time	1.00	1.00	-1.00	1.00	-1.00	1.00	1.00	1.00	1.00	1.00	-1.00	1.00	1.00	1.00	1.00	1.00	-1.00	1.00	#####	#####	#####	#####	#####	#####	1.00	1.00	-1.00	1.00	1.00
19	Rail (express link) city centre - frequency	0.02	-0.04	0.11	0.00	0.10	-0.21	0.43	0.16	0.14	0.08	-0.24	0.40	0.13	-0.25	-0.30	-0.11	#####	#####	1.00	0.64	-0.14	-0.21	-0.28	0.47	0.03	-0.37	-0.21	-0.24	-0.19
20	Rail (express link) region - frequency	0.81	0.78	0.87	0.47	0.22	-0.47	0.30	0.61	0.64	0.52	0.50	-0.17	0.38	-0.51	-0.44	-0.15	#####	#####	0.64	1.00	-0.40	-0.56	-0.18	0.55	-0.62	-0.47	-0.64	-0.50	-0.10
21	Rail (express link) city centre - price	0.78	0.73	0.65	0.82	-0.10	0.86	0.23	0.66	0.55	-0.03	0.46	0.33	0.85	0.93	0.89	0.91	#####	#####	-0.14	-0.40	1.00	0.16	0.67	-0.17	0.90	0.83	0.16	1.00	0.95
22	Rail (express link) - travel time from city centre	-0.28	-0.32	-0.35	-0.33	-0.37	0.56	0.28	-0.27	-0.02	0.26	-0.23	-0.26	-0.17	0.28	0.27	0.39	#####	#####	-0.21	-0.56	0.16	1.00	0.49	-0.53	0.19	0.58	1.00	0.16	-0.10
23	Bus city centre - frequency	0.60	0.59	0.51	0.02	0.24	0.44	0.13	0.40	0.46	0.00	0.35	-0.27	0.32	0.68	0.64	0.54	#####	#####	-0.28	-0.18	0.67	0.49	1.00	-0.20	0.67	0.54	0.47	0.55	0.15
24	Bus region - frequency	0.60	0.50	0.67	0.18	0.48	-0.15	-0.07	0.80	0.50	0.24	0.24	0.36	0.29	-0.11	-0.02	0.21	#####	#####	0.47	0.55	-0.17	-0.53	-0.20	1.00	-0.07	-0.46	-0.59	-0.22	0.19
25	Bus city centre price	0.64	0.58	0.57	0.65	-0.23	0.67	0.21	0.66	0.69	0.18	0.51	0.26	0.52	0.79	0.73	0.73	-1.00	1.00	0.03	-0.62	0.90	0.19	0.67	-0.07	1.00	0.61	0.18	0.87	0.63
26	Bus city centre - travel time	0.44	0.40	0.39	0.43	-0.51	0.90	0.36	0.20	0.20	-0.26	0.39	0.09	0.41	0.84	0.84	0.71	-1.00	1.00	-0.37	-0.47	0.83	0.58	0.54	-0.46	0.61	1.00	0.54	0.74	0.59
27	Fastest public transport travel time	-0.25	-0.25	-0.16	-0.32	-0.18	0.36	0.04	-0.33	-0.11	-0.11	-0.12	0.04	-0.35	0.20	0.27	0.11	1.00	-1.00	-0.21	-0.64	0.16	1.00	0.47	-0.59	0.18	0.54	1.00	0.13	-0.26
28	Fastest public transport price	0.65	0.64	0.56	0.75	-0.27	0.81	0.16	0.63	0.53	0.10	0.46	0.25	0.75	0.89	0.83	0.84	-1.00	1.00	-0.24	-0.50	1.00	0.16	0.55	-0.22	0.87	0.74	0.13	1.00	0.84
29	Fastest public transport average speed	0.73	0.70	0.60	0.84	-0.15	0.75	0.27	0.63	0.43	0.00	0.46	0.25	0.91	0.81	0.78	0.81	-1.00	1.00	-0.19	-0.10	0.95	-0.10	0.15	0.19	0.63	0.59	-0.26	0.84	1.00
30	Fastest public transport 1 km cost	0.06	0.10	0.08	0.29	-0.28	-0.08	-0.14	0.19	0.21	0.25	0.00	-0.08	0.09	0.07	0.01	0.04	-1.00	1.00	-0.07	-0.15	0.80	-0.32	0.10	-0.13	0.38	-0.05	-0.02	0.39	0.04
31	Private car average speed off-peak	-0.02	-0.13	0.01	0.03	-0.31	0.64	0.32	0.01	0.00	0.13	-0.21	0.25	0.17	0.24	0.25	0.52	-1.00	1.00	0.00	-0.35	0.31	0.72	-0.08	-0.13	0.23	0.61	0.42	0.30	0.32
32	Private car average speed peak	0.23	0.16	0.18	0.13	-0.40	0.76	0.54	0.13	0.15	0.18	-0.02	0.15	0.42	0.48	0.32	0.68	-1.00	1.00	0.01	-0.35	0.48	0.78	0.20	-0.20	0.37	0.69	0.34	0.49	0.47
33	Q: off-peak time ratio	0.77	0.78	0.62	0.84	-0.02	0.52	0.19	0.62	0.41	-0.06	0.56	0.15	0.88	0.74	0.67	0.64	-1.00	1.00	-0.18	0.28	0.82	-0.37	0.24	0.34	0.54	0.38	-0.46	0.74	0.93
34	Q: peak time ratio	0.75	0.73	0.61	0.83	-0.05	0.38	0.16	0.66	0.41	-0.06	0.54	-0.06	0.79	0.58	0.68	0.55	-1.00	1.00	-0.22	0.44	0.78	-0.43	0.01	0.75	0.41	0.29	-0.56	0.59	0.86
35	Q: short term price ratio	-0.22	-0.18	-0.17	-0.21	0.45	-0.47	0.05	-0.40	-0.50	-0.31	-0.37	-0.02	-0.02	-0.51	-0.47	-0.47	-1.00	1.00	0.52	0.59	-0.57	-0.61	-0.25	0.15	-0.72	-0.44	-0.37	-0.59	-0.23
36	Q: long term price ratio	-0.41	-0.36	-0.33	-0.20	0.37	-0.43	-0.23	-0.48	-0.53	-0.41	-0.30	0.17	-0.30	-0.51	-0.33	-0.56	1.00	-1.00	0.48	0.33	-0.65	-0.47	-0.34	-0.08	-0.62	-0.25	-0.01	-0.56	-0.34

Annex 5 Proposal for a description of airport accessibility systems

The description of the airport accessibility system should be concise, describing the location of airport, how it can be reached (modes), traffic data, a profile of passengers, employment, and the policy context. The formats used for the description of airports in this study provide this information. Building on these, we propose the following format:

Section	Topic	Information
Airport profile	Location	- country and region - distance from major cities
	Passenger traffic	- number of passengers (total and O/D) - evolution of traffic including a forecast - passenger profile (purpose of travel, origin)
	Employment	- number of employees - location of employment
Accessibility	Variety of modes	For each mode: - quality of service (frequency and reach) - pricing structure
	Parking facilities	- number and location (passengers) - number and location (employees) - availability and pricing
Policy context	Responsibility	- parties involved and responsible for airport access
	Accessibility policy	- brief description of overall policy and specific measures, targets

Annex 6 Proposal for permanent modal split data collection

Key to assessing the effectiveness of accessibility policies is information about the use of the various modes available. This holds for purposes of internal assessments, for comparison with others, and for benchmarking exercises alike. The value of this information will considerably increase when data for a number of years available, enabling an analysis of policy effectiveness over time.

Currently, information about modal split/the use of various modes is restricted in a variety of ways:

- In some cases the range of modes is not complete, e.g. hotel shuttle busses are often excluded as a separate category, even though they represent a category in their own right.
- There is no specification as to the type of users for a particular mode or their final destination, e.g. leisure/business passengers, resident/foreigner, downtown/conurbation/region, daytime worker/shift worker).

Accessibility policies will be more successful if they are targeted at specific categories of users (passengers and employees) and the promotion of specific modes in specific directions or routes. More detailed modal split information incorporating a wider range of modes and user details per mode will provide better feedback to design and evaluate accessibility policies. Here, a balance must be found between the level of detail on the one hand and the burden of data collection and collation on the other.

The data collection scheme proposed here focuses on the travel behaviour and characteristics of those travelling to the airport, giving detailed information about the different modes, who uses them, and for what purpose.

The scheme to be filled out by each airport is a matrix with on the one axis the modes and on the other the characteristics of the users.

For the modes, on an aggregate level, the modes as they appear (car/train/metro/bus/motorbike/ bicycle/on foot/other) are distinguished. On a more detailed level, operational characteristics are included – e.g. a bus could be a regular public transport service or a hotel shuttle. To define the full range of options, a cross section of all data reported by airports for this study has been made.

For the user characteristics, the first level of detail distinguishes between employees, air passengers that are residents, air passengers that live abroad, and others (e.g. visitors). On a more detailed level, trip purpose is taken into account (e.g. leisure travel, business travel, changing from non-air to non-air mode, visitor to airport).

A survey, preferably standardised for all airports, should yield the data to fill each of the cells in the table (percentage of total trips made).

User characteristics / Modes		Employee		Resident passenger		Non-resident passenger		Others		
		Regular working hours	Non-regular working hours	Business	Leisure	Business	Leisure	Visitor to airport	Picking up /dropping off others	Changing between non-air modes
Car/mini-van	Car-alone									
	Car-passenger (dropped off)									
	Car-pooling									
	Taxi									
	Rental car									
Rail	High-speed train									
	Long-distance train									
	Local train									
	Rail-express service down-town									
	Metro service									
Bus/ (mini)van	Regular public transport ser-vice									
	Downtown-airport express shuttle									
	Complementary (hotel) shuttle									
	Van-pooling									
	Other restricted access services									
Two-weelers	Motorbike									
	Moped									
	Bicycle									
Other	On foot									
	Other									