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KISS AND FLY – A STUDY OF THE IMPACTS AT A UK REGIONAL AIRPORT

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Abstract

In the light of the forecast growth in air transport the UK Government has placed a requirement on all airports with substantial air transport movements to implement surface access strategies. The emphasis of surface access policy has been to increase the proportion of people arriving at airports by public transport by a variety of means such as managing parking supply and pricing and improving public transport. The extent to which these policies will be effective will depend on a number of factors such as the quality and availability of the alternatives, the availability of competing off-site parking and the extent to which kiss and fly is feasible.

This paper reports on two studies of passenger access to Leeds-Bradford International Airport in the summers of 2004 and 2005. The airport has an aspiration to increase public transport use to the airport from its current level of 3% to 10% by 2010. The principal means by which this is currently planned to be achieved is through the expansion of scheduled bus services to Leeds, Bradford and Harrogate.

The 2004 study found that 49% of passengers were dropped off at the airport by friends and that the potential for larger quantities of people to reach the airport by conventional bus services was limited. The 2005 study investigated the extent to which these kiss and fly journeys generate extra travel on the road network. The results show that for an airport with around 2.5 million passengers the Kiss & Fly journeys are creating an extra 19.4 million kilometres, an increase of 36% over the distance that would have been travelled if people had driven and parked. The paper concludes that a charge levied on all vehicles accessing the airport, similar to a congestion charge, is likely to have the greatest impact on travel behaviour and will have a far greater impact on the environment than the current emphasis on public transport improvements and parking restrictions.

1. Introduction

In 2003, the UK Department for Transport set out a 30 year framework for air transport and airport development. The policies are based on underlying (unconstrained) demand growing from 2003 levels of 20 million passengers per year to somewhere between 400 and 600 million passengers per year by 2030 (DfT, 2003). Whilst the high-profile debate has centred around the proposed expansion of the major London airports of Heathrow, Gatwick and Stansted, the White Paper also underlined the Government's "wishes to encourage the growth of regional airports in order to support regional economic development, provide passengers with greater choice, and reduce pressures on more over-crowded airports in the South East" (*Ibid.*, p10).

As reviewed in Dennis (2004), the principal growth in aviation in recent years has been through the low-cost market. Low-cost operators achieve lower per-seat mile costs from, amongst other things, operating out of cheaper secondary airports. In the UK, this has led to rapid expansion smaller

airports such as Luton, East Midlands and Leeds-Bradford international airport as well as the creation of a new airport at Doncaster Finningley.

The Transport White Paper (1998) states that those airports which have 1,000 or more scheduled and charter passenger air transport movements (PATMs) per annum will be required to set up Air Transport Forums (ATFs) and prepare Airport Surface Access Strategies (ASASs) with the following objectives (DfT, 1999):

1. "To draw up and agree challenging short and long term targets for decreasing the proportion of journeys to the airport made by private car while increasing the share of journeys made by other modes including buses and coaches, trains and light rail, taxis and private hire vehicles and combinations of these modes.
2. To devise a strategy, the Airport Surface Access Strategy for achieving those targets, drawing on the best practice available. Where appropriate, this should cover the management of traffic on local and trunk roads providing access to airports as well as promoting alternatives to the private car.
3. To oversee implementation of the strategy." (p2)

Humphreys and Ison (2003) reviewed the ASAS' produced by the main UK airports, the current percentages of public transport usage at each airport and the targets set. Figure 1 shows the current size of the airports (in terms of million passenger movements per annum) and the public transport mode shares at the time of the most recent publicly available surveys.

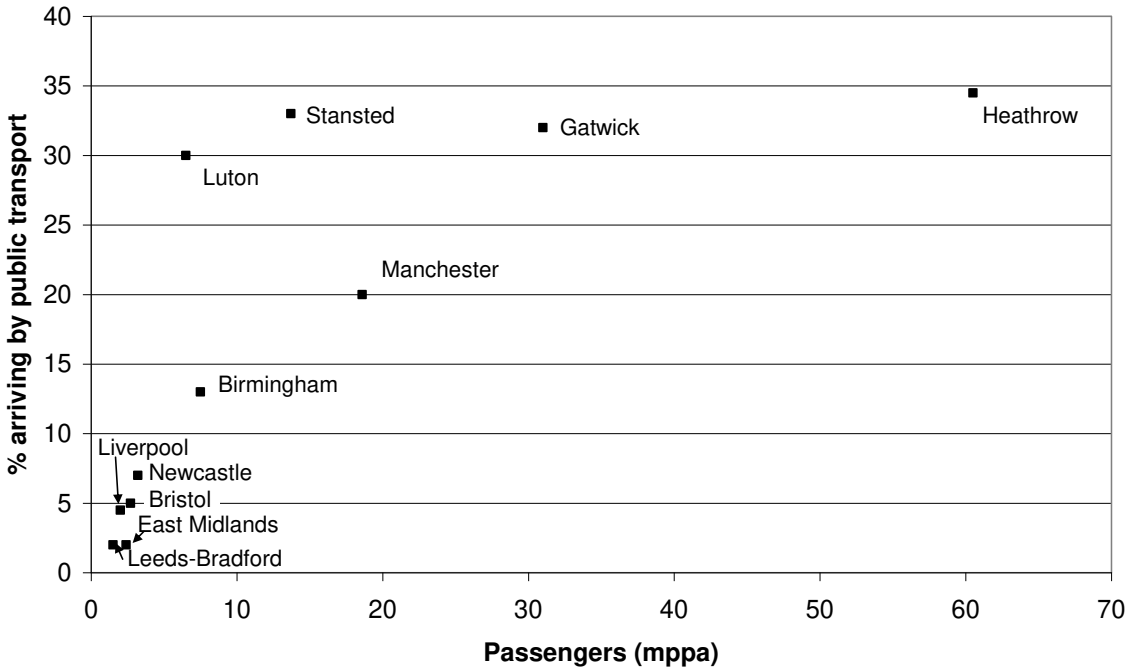


Figure 1: Airport size and public transport mode share (Adapted from Humphreys and Ison, 2003)

The London airports all have a high mode share as a result of the high quality and comparatively dense public transport networks that serve the large London catchment area. The degree of congestion on the road networks also makes public transport (particularly rail) a competitive access mode with respect of journey times. Outside of London, public transport mode share increases broadly in line with size of airport.

Table 1 below summarises the targets for increased public transport mode share set by the airports. Leeds-Bradford International airport has an aspiration of 10% public transport mode share by 2011 (LBIA, 2005). The 2003 Air Transport White Paper estimated that Leeds-Bradford might expand to 7mppa by 2030. The trend from Figure 1 would suggest that were the growth to 2030 to be linear, the airport would be around 4mppa by 2011 and a 10% public transport mode share would be well in excess of the performance of other similar sized airports. The figures from Liverpool John Lennon also suggest that a similar step-change in performance is required there.

Table 1: Surface Access Targets (Humphreys and Ison, 2003)

Airport	Passengers 2002	Targets for Passenger Surface Access
Heathrow	63,000,000	40% passengers accessing via public transport by end of 2007, with longer term aim of 50%
Gatwick	30,000,000	40% passengers accessing via public transport by 2008
Stansted	16,000,000	exceed forecast of 36% passengers accessing via public transport when airport reaches 25mppa
Edinburgh	6,906,731	25% passengers accessing via public transport by 2007
Luton	6,500,000	30% passengers accessing via public transport
Bristol	3,446,000	car passenger journeys to make up 91.3% of total modal split by 2005/6
Liverpool	2,836,000	10% passengers final mode access via public transport by 2005 (12% by 2008)
Aberdeen	2,546,357	7% passengers accessing via public transport by 2007
Leeds Bradford	1,530,000	10% passengers accessing via public transport by 2011

In 2004 Leeds-Bradford International airport agreed to conduct a survey of passengers to further inform the development of its surface access strategy (Muir, 2004). At the time of the survey, the airport was served by two bus routes, one from Leeds City rail station and one from Bradford. Services are half hourly throughout the day but do not start early enough to get shift workers to the airport. A third service on a less frequent basis has recently been added from Harrogate. These services are part funded by the airport with support from the West Yorkshire Passenger Transport Executive and (in the case of the Harrogate service) North Yorkshire County Council.

In line with previous studies at the airport and recommended practice, a survey of outbound passengers was conducted (Monteiro and Hansen, 1996; Psaraki and Abacoumkin 2002; and Pels et al., 2003). Information was collected on "passenger characteristics, surface access mode choice and reasons, and passenger perceptions and conditions under which passengers would use public transport as a future access mode" (Muir, 2004, p28). The surveys were conducted in the Food Hall on the land-side of the airport. Surveys were self-completion with returns made to a survey office in the Hall. The surveys were conducted during the first week of July and different data collection periods were selected to ensure a complete and representative coverage of departing flights (Taylor et al., 2000). It is recognised that there is not really a "typical week" at an airport and that ideally the survey should be repeated at different times of the year. However, by picking a non school holiday period, best efforts were made to avoid skewing the data in this regard (*Ibid.*). 300 usable questionnaires were returned.

It proved difficult to determine the extent to which the 2004 sample was representative of the typical passenger profile from Leeds-Bradford International as since the previous survey in 2000, two new low-cost airlines have established services from the airport, in particular Jet2.com. The proportion of scheduled international traffic has risen from 28% in 2000 to 58% in 2004 with corresponding reductions in the relative importance of domestic scheduled and charter flights. Table 2 shows the geographic distribution of passengers which give confidence to the broadly representative coverage of the survey (although it is worth noting that the arrival of Jet2.com appears to have attracted people from a wider catchment area). "14.6% of passengers travel(led) for business reasons, 61% for leisure, 20.3% are visiting friends or relatives (81.3% if combined with leisure), and 12% for other reasons, including educational trips and emigration. 48.5% of passengers are male and 51.5% female. 88.7% of passengers sampled are car owners" (Muir, 2004, p40).

Table 2: Geographic Distribution of Respondents

	Passengers from Planning District %		
Planning District	**1993**	**1999**	**2004**
Bradford	19.3	15.5	13
Calderdale	2.4	2.7	1.3
Harrogate	11.6	9.1	6.7
Kirklees	0.05	3.3	3.3
Leeds	42	38	38.8
Wakefield	5.3	4.6	8.7
Other North Yorks.	9.5	11.1	11.7
South Yorks.	4.6	4.7	4.3
Total passengers - Yorks. & Humber	**94.75**	**93.1**	**89.6**
Total passengers - outside Yorks. & Humber	**5.25**	**6.9**	**10.4**
Total passenger numbers	**700,000**	**1,362,887**	**2,424,000**

Table 3 shows the total mode split estimated from the survey data and Figure 2 shows how this varied according to user category.

Table 3: Mode Share Estimate

Car – Parked at Airport	Car-Parked Offsite	Car-Dropped Off	Taxi	Bus	Rail	Other
21%	9.3%	49%	16.3%	2.3%	0.3%	1.6%

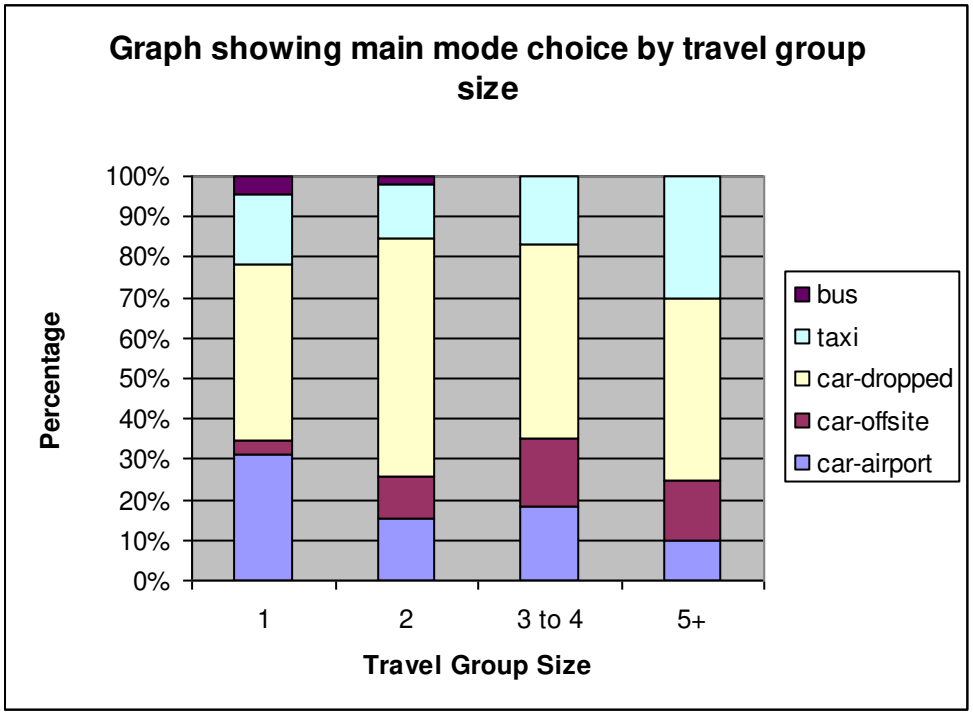


Figure 2: Mode Choice by travel group size

Muir's work concluded that whilst airports that grow beyond 2mppa begin to be able to support dedicated bus services (Kazda and Caves, 2000) there is limited scope to increase the public transport mode share due to the difficulties in passengers with luggage reaching the bus system in the first instance and their preference for reliability and speed over cost. It is important to recognise the purpose behind the public transport target – i.e. the need to minimise the environmental, congestion and safety consequences of passengers accessing the airport. Whilst the focus of policy at airports typically surrounds how to set up and manage the parking policies within the airport to encourage mode shift (without denting an important income stream) it is clear from the Leeds-Bradford survey that almost 50% of passengers accessing the airport are doing so without paying for parking or using public transport – they are getting lifts to the airport. The double journeys associated with these trips create more problems for the surrounding traffic network than does a return journey to the airport with parking. A further survey of passengers was therefore conducted in 2005 with a view to investigating in more detail the travel characteristics of these kiss and fly journeys and to examine the sensitivity of Kiss and Fly passengers to a range of alternative solutions (Kamal, 2005). The following sections describe that study and present a sample of results.

2. Kiss and Fly Survey at Leeds-Bradford International Airport

In July 2005 a second survey of passengers was conducted at Leeds-Bradford International Airport (*Ibid.*). Several important differences can be noted from the 2004 survey:

- 2 surveys were administered – one for passengers parking at or near the airport and one for passengers dropped off or using public transport (bus, taxi, rail)
- Questions were asked about the lift-givers and their actions after the drop-off
- Questions were asked about awareness of costs and of alternative modes of transport
- Additional information was gathered about how passengers had accessed the airport on previous trips.
- The survey was administered in the check-in halls as well as the Food Hall in an effort to remove any potential bias in not picking up business passengers

327 usable questionnaires were obtained over a one week period. The characteristics of the responses are shown below in Table 4. Around 4% of users access the airport by bus (LBIA, 2005). Bus respondents are not included in the tables below.

Table 4: Summary Characteristics from 2005 survey

Journey Purpose	**% of respondents**
Employer's Business	19.9
Leisure	54.1
Visiting Friend/Relatives	16.8
Other.	7.3
Missing (No Response).	1.5
Mode to airport	**% of respondents**
Car Parking At the Airport	19.3
Car Parking -Off Site	11.9
Dropped Off by Friends/Relatives	41.9
Dropped Off by Taxi	22.9
Dropped Off by Hire Car	3.4
Dropped Off by Hotel Escort	.6

The % of passengers travelling on business was higher at 19.9%, than the 2004 survey and this partly acts to explain the slightly lower mode share of "dropped off by friends/relatives" (41.9% compared to 49%) whilst taxi mode share is 6.6% higher.

Due to the limited responses from people returning hire cars or dropped off by hotel escort these modes are excluded from the subsequent analysis. Table 5 shows the average distance travelled to the airport by mode (N = 301 usable responses).

Table 5: Average Distance between passenger origin and airport by mode

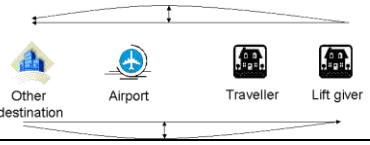
Mode	Number of respondents	Average Distance (miles)	Standard Deviation Distance
Park on-site	59	39.1	36.0
Park off-site	38	38.6	26.2
Dropped off by friend/relative	133	25.4	21.9
Taxi	71	15.5	17.2

A one way ANOVA comparing distance travelled for different journey purposes (business, visiting friends and relatives, leisure and holiday) did not show any significant differences between journey distance ($F(4, 292) = 0.564$, $p>0.05$). A one way ANOVA comparing the distance travelled by access mode found significant differences between groups ($F(3, 297) = 12.6$, $p<0.05$). Levene's test of homogeneity of variances showed the variances to be significantly different which makes the selection of post-hoc tests more limited. The Games-Howell test indicates differences that there are no statistically significant differences between distance for Park-on and Park-off site but that Dropped-off by friends/relative is significantly different to both of these groups and to the taxi group. It therefore appears that the access modes (car park, drop off and taxi) are operating on average for different markets differentiated by distance to the airport.

3. Extra distance generated by Kiss & Fly

Despite the identification of the origins of passengers and their lift-givers, and the identification of the lift-givers subsequent destination, a number of assumptions still have to be made about the complex trip chains to enable an estimate of the extra distance travelled to be made. In making this estimate it was decided to take cautious assumptions. Table 5 explains the assumptions made.

Table 5: Kiss and Fly Assumptions

Journey Type	To airport	Return	Schematic
Park at airport[1]	D_{ha}	D_{ha}	
Dropped off friend/relative as part of existing planned journey	$(D_{hlht} + D_{hta} + D_{adl}) - D_{hldl}$	$(D_{hlht} + D_{hta} + D_{adl}) - D_{hldl}$	
Dropped off friend/relative as completely new journey	$2*(D_{ha} + D_{hlht})$	$2*(D_{ha} + D_{hlht})$	
Taxi	D_{ha}	D_{ha}	

[1] Where journeys started at the office parallel assumptions were made about office-airport as home-airport

Park at off-site parking	D_{ha}	D_{ha}	

D_{hta} = Distance home of traveller to airport

D_{hldl} = Direct route distance home of lift giver to lift giver's destination

D_{adl} = Distance from airport to lift giver's destination

D_{hlht} = Distance from home of lift giver to home of traveller

D_{de} = Detour distance to give lift over and above that from a journey direct to destination by lift giver

Where:

$D_{de} = (D_{hlht} + D_{hta} + D_{adl}) - D_{hldl}$

In particular, we regard the assumptions made that the return journey for those dropped off as part of a trip-chain of an existing journey to also be returning home as part of a trip chain and that taxi trips create no extra distance to be very conservative (as private hire vehicles taken to the airport typically move to their next job empty and hackney carriages from the airport are unlikely to return full to the airport).

The questionnaire asked passengers to make direct estimates of D_{hta}, D_{hldl} and D_{de}.

For the calculations that follow, a passenger throughput of 2.4mppa is assumed at LBIA and the percentages of each mode found from the July 2005 survey are assumed to be representative of the year-round average.

Table 6: Calculation of total distance travelled

Type	% Respondents	Average Group Size	Mode Share %	Annual Trips	Return Distance Origin – Airport (miles)	Extra Distance (miles)	Return Distance Total (miles)	Extra Distance (miles)
Park on-site	23%	1.75	15.6	213548	78.2	-	17395277	
Park off-site	15%	2.4	13.9	139270	77.2	-	11199636	
Drop-off	33%	3.1	39.6	306395	50.8	60.8	16213379	15192064
Taxi	29%	2.4	26.9	269256	31.0	-	8694725	
Bus	-	1	4.0	96000	14.0	-	13440[2]	
Total	100	2.5	100	967157			53516457	19389031

The table shows that a staggering 19.4 million extra miles are travelled every year as a result of people getting lifts to the airport rather than driving and parking. This equates to an extra 36.2% extra distance travelled. Whilst the focus of Surface Access Strategies has been on increasing the proportion of people accessing the airport by public transport it appears that this has ignored an altogether bigger problem of extra mileage.

[2] For buses it is assumed that only 1% of the mileage travelled by the passenger is attributable to the milage total. Whatever assumptions are made the distance travelled by bus remains small in comparison to other modes so this should not affect the overall robustness of the findings.

4. Mode Choice Motivations

Previous studies (Harvey 1986, Gosling 1997, Kazda & Caves 2000, Mandle et al 2000) have identified the following factors as most important in determining access mode:

- Cost
- Availability of mode
- Distance of airport from trip origin/ destination
- Length of individual elements of the transportation process (for example, waiting time, number of changes, transportation time etc…)
- Reliability
- Ease of using mode (in terms of baggage handling, level of comfort, availability of information)
- Time of travel

"The extent to which these factors affect mode choice depends on the passenger type and other airport specific local issues" (Muir, 2004, p7). The survey therefore asked respondents to indicate the importance of a number of different aspects of their journeys to Leeds Bradford International as shown in Figure 3.

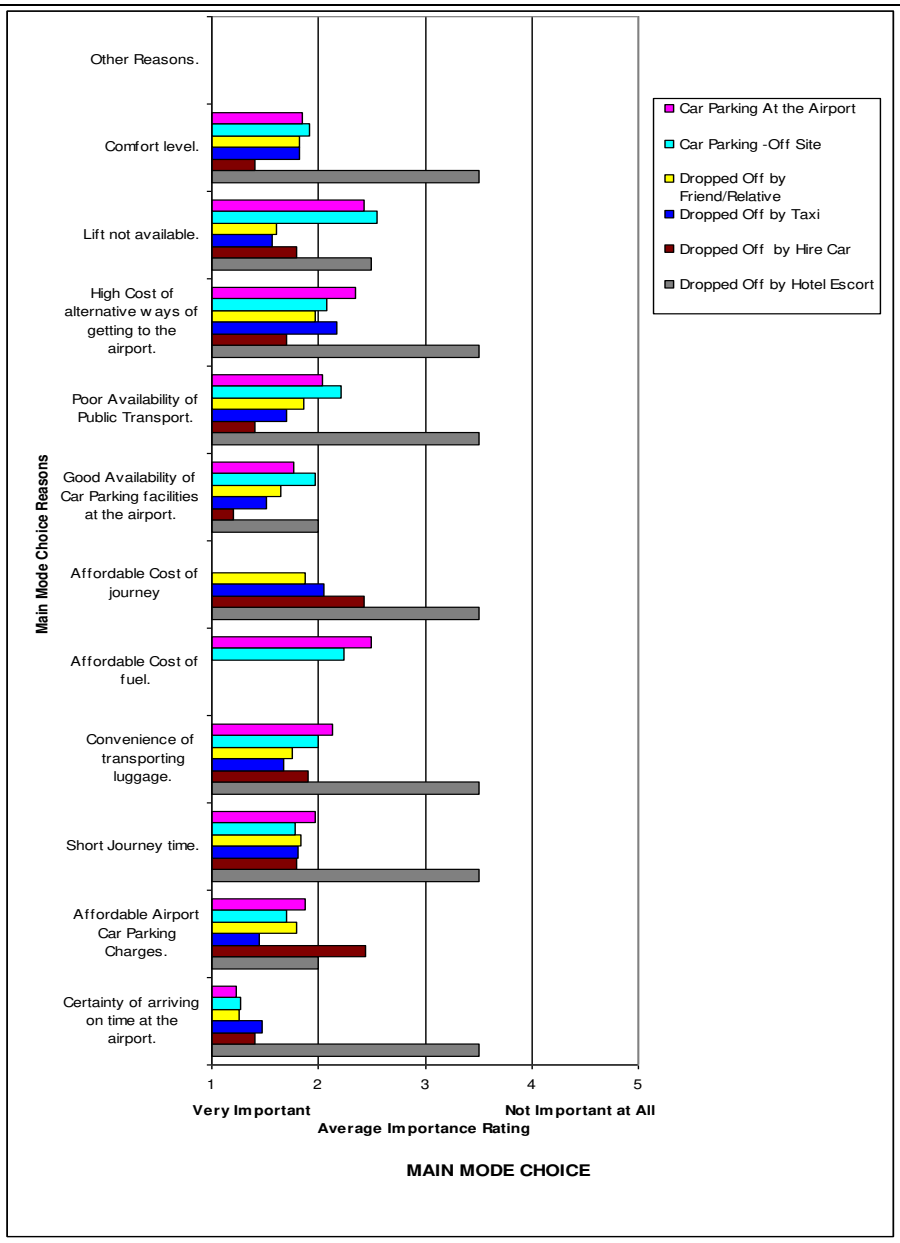


Figure 3: Importance of journey aspects in mode choice

Statistical differences are found between those people dropped off and those parking at the airport for 'lift not available' (as would be expected) and 'convenience of transporting luggage' which is more important for those people dropped off at the airport frontage. An analysis of business and leisure travellers found that business travellers are less sensitive to the problems of carrying luggage, again as expected. It was also found that leisure travellers are more concerned about the certainty of arriving on time at the airport than business travellers. This may reflect the flexibility of the tickets booked or the more regular experience of business travellers in arriving at the airport.

Respondents were asked to declare how likely they were to use a series of mode choice options when next accessing the airport. The results are presented below in Figure 4 split by responses for drivers and respondents that had been dropped off. Car Drivers are very likely to drive next time. The next most likely option is to be dropped off. Those that had been dropped off are very likely to be dropped off again next time but if not, their next preferred mode is clearly the car.

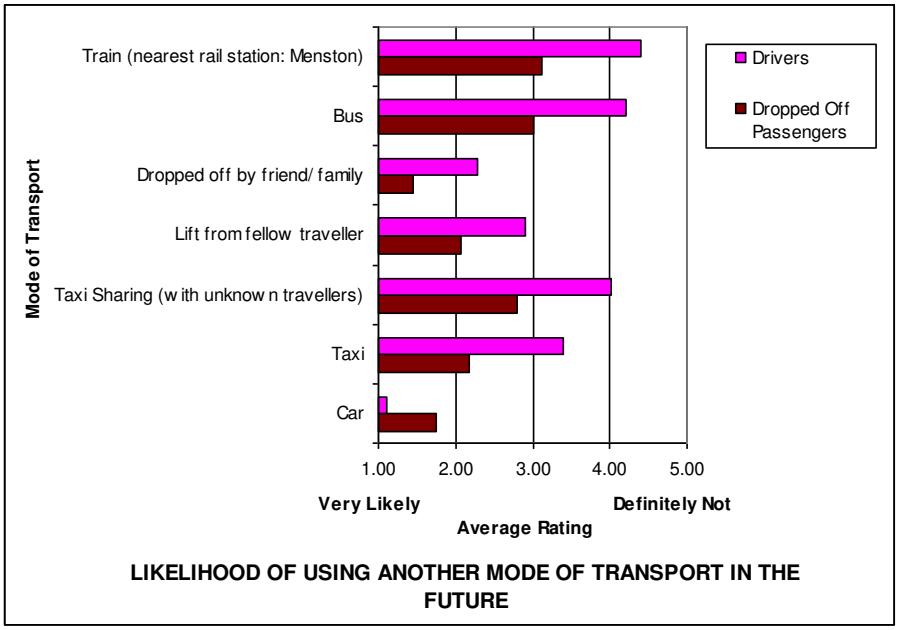


Figure 4: Likelihood of using different modes to access airport in the future

Passengers were also asked how they had come to a decision about how to access Leeds-Bradford International for the journey that they had just taken. The responses are shown in Figure 5.

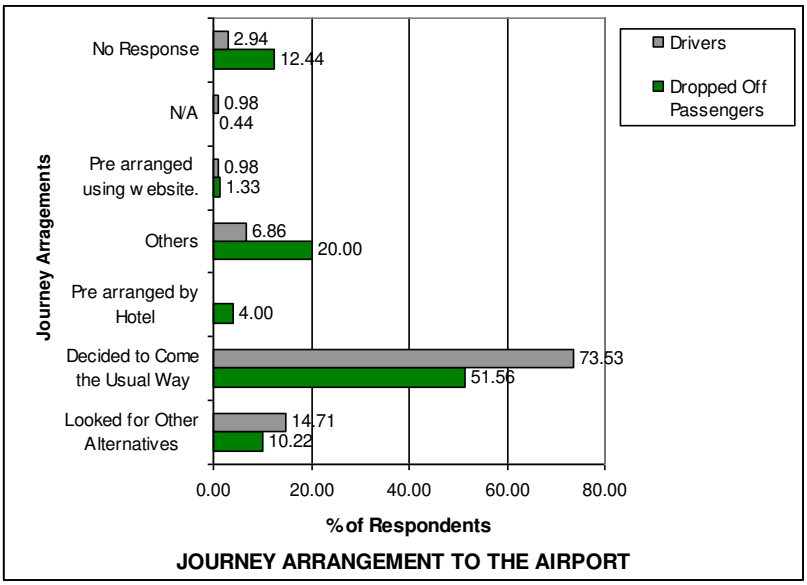


Figure 6: How journey arrangements to the airport were determined.

Whilst it is clear that habit is a key motivator, there are still between 10 and 15% of passengers that looked at other alternatives when making their decisions.

5. Potential Solutions

The airport has a number of key goals to satisfy:

- It wishes to increase public transport use to the airport.
- It wishes to reduce cars being driven to the airport
- It wishes to remain accessible

- It needs to ensure that car parking is providing a steady income stream as car parking and retail are the primary income sources for smaller regional airports.

Muir (2004) concluded that improvements to bus services alone would be unlikely to achieve the 10% public transport target by 2011. The most fruitful avenue for attracting more users by public transport would be to offer services from the significant catchment areas to the North East of the airport such as Harrogate and York. Since the 2004 survey a new 90 minute service from Harrogate has been started 'Bus 2 Jet'.

The airport has a car parking strategy to "regulate the growth of both long and short stay car parking in line with the airport's growth has been developed. Whilst encouraging the use of public transport is essential, it is also important to ensure that access by car is suitably catered for (and that double journeys by being dropped off and picked up are avoided). A proportion of the revenue generated by car parking is being fed back into public transport initiatives" (LBIA 2005).

It appears from the data collected in these surveys that the most likely response of car drivers if deciding not to drive will be to arrange a lift. Any measures that further restrict parking provision or increase parking charges are likely to result in increased kiss and fly. This would appear, from the calculations in Section 3 to be a far worse environmental bad (excluding land-take[3]). Subsidising parking to make it cheaper and therefore to reduce the relative attractiveness of being dropped off could reduce kiss and fly but would work against the longer-term aims of increased public transport usage and would also dent this important income stream.

Charging all vehicles accessing Leeds Bradford International would therefore appear a more suitable proposition. This would ensure that those people being dropped off faced a substantial financial penalty for so doing. This would serve to discourage kiss and fly and would provide a source of income to the airport to invest in public transport alternatives. Those people parking could potentially have this fee subtracted from the cost of parking so overall parking costs are not raised further. The impacts on and responses of off-site parking providers might need to be investigated to prevent drop offs occurring outside the airport perimeter. The airport has begun to go down this route by setting aside a designated express pick up area which charges £0.5 for every 10 minutes of waiting. Drop-offs however, remain free.

Another potential solution could be in the form of shared taxis (common in many Asian and South American countries) or Demand Responsive Transport services (as at Newcastle Airport). Figure 4 shows that passengers are more likely to consider a shared taxi than to consider taking a bus. Given the generally low awareness of shared taxis in the UK this is perhaps encouraging. Not much information is available on the success of shared taxis schemes to airports. Lessons can be learnt from a shared taxi scheme from the rail station in Ipswich, England, which was abandoned after it failed to attract any significant number of passengers. "However, an evaluation (Hollings, D. and Ingwood, H., 1989) suggests that this was due to poor marketing and organization, rather than fundamental obstacles to taxi sharing. The main problems were found to be ignorance of the scheme's existence, the psychological barrier of asking the driver to arrange a shared ride, and the perceived low probability of finding other passengers with whom to share. The report calculates that depending on the fare structure, demand would in fact have been sufficient to operate the scheme. It recommends the use of fare zones to reduce the cost uncertainty for passengers, and clear labelling of destinations" (SPUR 2001). Given the relatively small proportion of people actively seeking alternative ways of accessing the airport for each journey, it would be essential for the scheme to be given a very high profile by the airport and the airlines. It would be advantageous if the three taxi companies that form the airport taxi association could run or work in tandem with such a scheme.

6. Conclusions

The principal policy aims of surface access strategies to small regional airports are to increase the percentage of passengers accessing by public transport. This was initially seen as mass transit but has now expanded to also include taxi journeys (although the mileage savings for a return taxi

[3] It seems reasonable to exclude land-take at this stage as there are no multi-story car parks at Leeds Bradford International and any extra provision could be made without new land-take.

journey over a drive and park trip are not convincing). The principal policy tools at the airports' disposal are improving public transport, typically the bus, and managing demand for parking space.

This study has reported on an investigation at Leeds Bradford International airport which found that over 40% of passengers are getting dropped off with an associated extra 36% of total distance travelled to the airport generated over and above that which would be produced by drive and park journeys. Whilst public transport improvements may attract smaller numbers of passengers along the key routes they operate along, regional airports often create local but dispersed markets with uneven demand profiles which limits the opportunities for the bus. Restricting parking spaces and raising charges makes public transport relatively more attractive but, for the reasons set out above, is only likely to have a marginal effect on mode share. However, it could have a potentially significant and, in terms of extra miles travelled, strongly negative impact on the proportion of people accessing the airport through a lift.

The most compatible policy tool with both the transport and financial aims of the airport appears to be for some sort of cordon charge for entering the airport which is also therefore paid by people being dropped off. Concerns would legitimately exist that establishing such a charge at Leeds Bradford could compromise the position of the airport with respect to its competitors for low cost travel e.g. Teeside or Robin Hood airports. It does have the advantage however of creating an extra income stream for the airport. A less contentious and probably less effective alternative measure may be to establish a car sharing or demand responsive bus service system. Such systems are likely to be better focussed to the demand characteristics of smaller regional airport than a large network of conventional bus services.

The issue of kiss and fly to airports has not been well researched. This paper has shown that, for one case study regional airport, the emphasis on promoting public transport per se rather than tackling excess mileage has led to some very unfavourable outcomes. Far greater benefits will accrue to the environment, congestion and safety if the double journeys generated by Kiss and Fly can be reduced than could be made from small mode shifts to public transport (however desirable these may be).

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