A CRITICAL ANALYSIS OF BRISTOL AIRPORT'S EMPLOYEE SURFACE ACCESS HABITS: DEVELOPING STRATEGIC RECOMMENDATIONS FOR REDUCING PRIVATE VEHICLE USAGE

James Risby*, Sam Guest, David Warnock-Smith

School of Aviation and Security
Buckinghamshire New University
Queen Alexandra Road
High Wycombe, England, UK
HP11 2JZ

*Corresponding author (jamesrisby97@gmail.com)

ABSTRACT

Bristol Airport is a regional airport based in the South West of England. It has plans to increase capacity from 10 to 12 million passengers per annum. The airport has planning obligations with North Somerset Council, which include obligations on air quality. One of the airport's challenges relates to surface access and reducing the use of single occupancy vehicles. This challenge is shared amongst most airports globally, many of whom have sought to pinpoint the factors influencing this usage. This research project aimed to find the contributing factors affecting users at Bristol Airport with a particular focus on employees to make strategic recommendations. A mixed method approach, through the use of questionnaires and an employee specific focus group led to findings that indicated common factors amongst employees namely convenience and reliability as the main influences reducing the stress of travel. There were secondary factors such as cost, and family commitments, which was the main differentiator between employee and passenger choice factors as evidenced in the literature. The number of meaningful strategic interventions at Bristol was found to be limited. There is some evidence pointing to the potential popularity of airport employee incentive schemes such as the use of discounted hybrid cars. This would help reduce emissions but not single occupancy private vehicle usage. This research provides Bristol Airport with firm grounds to continue investigating the plethora of factors and possible sustainable strategies to meet their environment related planning obligations.

Key words: Airport surface access, Bristol Airport, regional airports, employee travel

1: INTRODUCTION

Airport surface access relates to the ways in which user groups of an airport be it businesses, employees or passengers, can travel to and from the airport (HAL, 2018). Historically, surface access to airports lacked forecourt management and good public transport. This led to increased congestion around forecourts and poor service (CAA, 2016). Today, surface access is an important aspect of airport operations. Poor surface access can limit growth and prevent a positive end-to-end passenger experience (House of Commons, 2016). It is important to employees too, as good surface access will allow employees to report to work on time (Economic Research Centre, 2003).

As air transport activity grows, the issue of the way employees access airports has become an issue, given the subsequent increase in employee numbers to cater for such growth and the resulting increase in daily staff journeys to and from the airport. Improvements in surface access will allow airports to make sustainable options more attractive, which will enable growth in a sustainable manner (Liverpool John Lennon Airport, 2016). This means that airports must ensure their access strategies suit all users to be successful. As the more under-studied stakeholder group, this empirical research focused primarily on employee factors that affect modal choice using a case study of Bristol Airport. Employees are vital to the operation of the airport and finding ways to make their surface access more sustainable is of significant interest to the sector.

The aim of the research was to critically analyse employee surface access at Bristol airport, acting as a strategic planning case-study to better understand sustainable, integrated transport solutions at regional airports. This was broken down into three empirical objectives: -

- → Measure modal choice behaviour of employees working at Bristol airport
- → Discuss and explore motivations explaining travel habits of employees working at Bristol airport
- → Develop strategic recommendations for Bristol and similar regional airports as they seek to move towards a more sustainable, integrated ground transport offering

Bristol Airport employs as many as 3,918 employees across 54 companies and welcomed 8,232,628 passengers in 2017 (BAL, 2018). In 2017 the airport launched a consultation period where they outlined ‘five pillars’ to meet the airport’s challenges for the future (BAL,

2017 – Figure 1). As such Bristol represents a useful case-study given the presence of numerous regional airports both in the UK and globally operating at a similar scale of operations. In 2019, there was around 40 commercial airports in Europe alone welcoming between 5 and 10 million passengers per annum (ACI Europe, 2019).

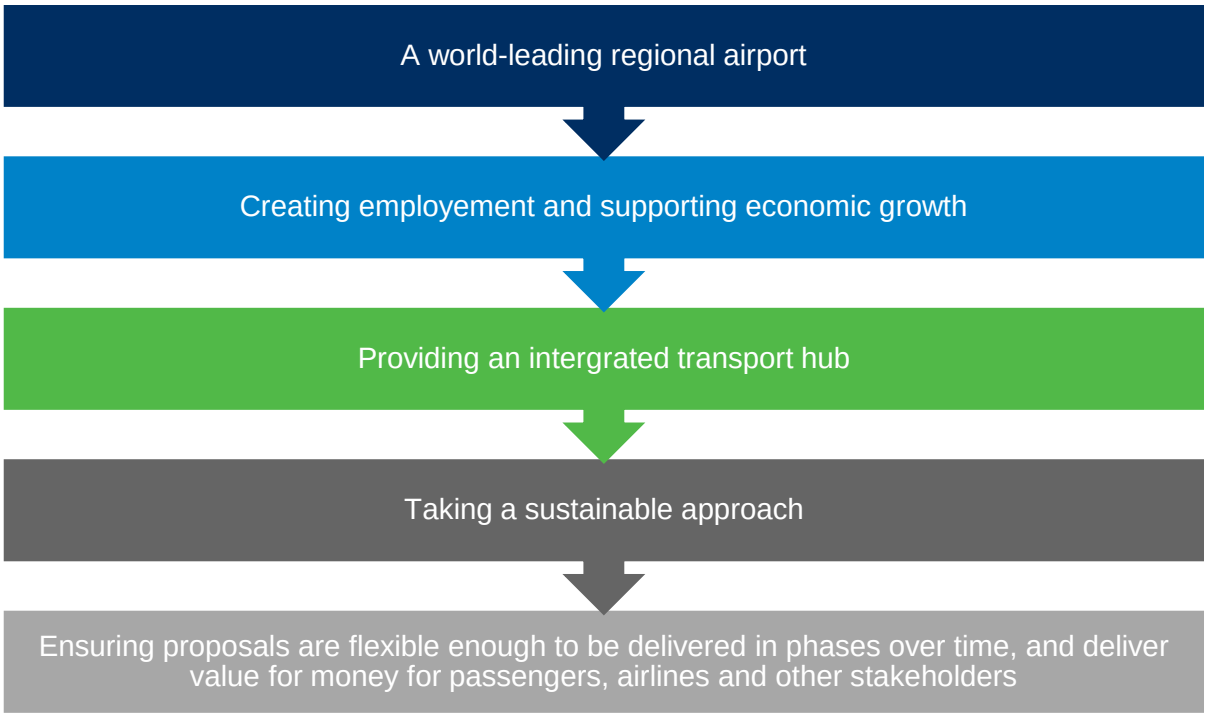

Figure 1: Bristol Airport Five Pillars for the Master Plan (BAL, 2017)

This consultation was launched to gather public views regarding plans to increase capacity to 12 million passengers per annum (BAL, 2018a). The challenge for Bristol is that they are obliged to comply with local planning regulation S106 as determined by North Somerset Council (Preece, 2016). This outlines several agreements between the council and airport developers to mitigate development related impacts when initial planning conditions cannot be met (North Somerset Council, 2016). Bristol therefore has to work within the confines of these planning obligations to ensure community endorsement and approval.

Currently transport options for employees and passengers are limited with no direct rail link, dual carriageway or motorway link (Figure 2). In 2011, 67% of passengers used their own vehicles to access the airport (BAL, 2012). This may hold back the growth of Bristol as it will be unable to accommodate the increased passenger and employee traffic (Airport

Operators Association, 2016). Commonly, surface access at UK airports have been considered as enhanced if they have rail access (House of Commons Transport Committee, 2013; Atkins, 2017).

Figure 2: *Bristol Airport Surface Access - Motorways* (PeterBrett, 2018)

The paper is set out as follows: Section 2 draws on the literature to uncover the common factors affecting modal choice among airport passengers and employees, section 3 details the selected research approach, section 4 contains the main results and discussion of findings and section 5 concludes with some managerial implications and employee focussed surface access recommendations for Bristol and similarly busy regional airports.

2: FACTORS AFFECTING AIRPORT MODAL CHOICE

The factors affecting passenger and employee modal choice can be very different (Losekoot, 2015; Budd, 2013), As air passenger numbers increase, it becomes more important for road and railway connections to increase the comfort of passengers (Stangel, 2018). This suggests that comfort is a factor in surface access choice but many related factors could also be at play such as direct connections, availability, frequency, cost and punctuality/reliability. Airport employees, on the other hand, have been found to focus on levels of accessibility around shift work patterns, and other routine commitments such as school runs, increasing their reliance on single occupancy vehicles (Jones, 2017). However, research is scarce on employee modal choice (Pasha and Hickman, 2017; Tsamboulas et al., 2012). This provides grounds for a more in-depth focus on employees.

Budd et al., (2011) highlighted that airport management believed that (lack of) control over public transport services was a contributor. This is a new factor largely unexplored; however. This study investigates if this applies in the context of employee travel evidence, which can then be contrasted with the more well-documented experience of passengers. Passengers choose rail and bus in accordance with distance, price/value for money, time, and accessibility as key factors (Gatwick Airport, 2016). Gorecka (2016) confirmed that cost and time are major factors. Gatwick Airport (2016) only provides an overview of results so it is not clear as to the representativeness of the data. This research will examine if these factors can also be seen as central to airport employee travel choices.

Business passengers are more likely to want a larger ‘safety margin’, as studies have shown that they are more sensitive to travel time; however, cost is not usually a factor as they do not usually pay for their travel (Harvey, 1986; Tam et al, 2008; Tam et al., 2005; Pels et al., 2003; Zhang and Bian, 2017). This suggests that business passengers may place more weight on different factors in comparison to leisure travellers. Studies show elderly passengers prefer family to take them to the airport. They also prioritise the ability to store luggage on transport vehicles (Chang, 2013). Transport options in the Chang (2013) study included cars, buses and taxis, which is a similar mix for the vast majority of regional airports such as Bristol. Other studies also found the amount of luggage to be a major factor influencing transport choice (Harvey, 1986; Alhussein, 2011; Zhang and Bian, 2017). In contrast other findings show that group size affected public transport modal choice (Gokasar and Gunay, 2017; Gupta et al, 2008). The above studies are all focused on major airports and findings which may not be

reproducible for regional airports. They have also used logistic regression modelling, which can over-emphasise results assuming perfect conditions (i.e. service delivery is not considered).

Secondary research from Humphreys and Ison (2005) and more recently supported by primary findings in Ji et al., (2017) found that time, cost, punctuality, reliability and convenience were priority determinants of airport modal choice among passengers. In the case of the former a sample was taken from the UK and the latter, Shanghai, China but with both having similar findings suggesting it is possible that key determinants can be unaffected from country to country and airport to airport. Ji et al's, (2017) use of two surveys from 2005 and 2014 highlighted that the main influencing factors have stayed largely the same over this period. Humphreys and Ison's (2005) study was more static but included a broad range of UK airports (including Bristol). This study will add in-depth reasoning and an employee travel focus to the literature.

Kouwenhoven (2008) states that accessibility is important and implies that congestion gets worse when public transport is limited, though reliability can be affected adversely by congestion (Scottish Government, 2003). This was something that was not investigated by Kouwenhoven (2008). On the other hand, awareness of the available transport options could be a factor (CAA, 2016a; Transport Focus, 2019). The CAA (2016a) looked into this and found that 65% of their respondents felt that they were aware of all transport options and that lack of awareness is not an issue. In contrast Transport Focus (2019) reported that creating awareness of other transport options would break negative stigmas of modes and is a possible solution. These sources prompt the need to further investigate factors such as accessibility, awareness and congestion to ascertain their effects on modal transport.

Any meaningful modal shift may depend on the presence of rail connections. This is supported by Pereira, et al, (2016) with 84.1% of respondents stating that they would change to rail over bus and private car provided it was fast, easy to access and inexpensive. However, this study did have conflicting results as passengers also ranked private vehicle travel as a preferred option and this did not determine the effect of number of stops or interchanges on transport choice. Interchanges can be a barrier to regional airports like Bristol, where rail transport requires at least one change at Bristol Temple Meads onto a bus (BAL, 2018a). Akar (2013) had also previously found that direct rail was is a strong alternative to driving if the mode was available. Therefore, a lack of direct rail links could be seen as major impediment to modal shift.

Employees form a significant part of total airport surface access. Approximately a third of people accessing airports are staff (Button, 2017; Humphreys and Ison, 2005). BAL (2018a), for example, found that private vehicles were dominant among this group (84%) and bus second (9%). The survey highlighted that there was an increase in employees using public transport from 4% to 9% between 2014 and 2017. However, this represents a fall from 2012 (10%), highlighting the difficulty in employees being able to commit to using public transport and justifying the need to formulate additional strategies. Similarly, from 2015-2016, Birmingham Airport saw a rise in car modal share from 69% to 76% with a 2% increase in rail and a 9% decrease in bus usage (JMP Consultants, 2016). This shows that commitment to using public transport modes varies considerably. As these studies have been mainly quantitative, there is a lack of reasoning thereby presenting an opportunity for a qualitative case analysis.

Primary factors identified by staff are reliability and travel time (Budd et al., 2016; Coogan, 2008). Suggestions for reduced single occupant journeys include vehicle share schemes e.g. a dedicated staff bus would be a plausible solution as it could run at times not served by public transport. Employees are striving for regular transport to the airport that is reliable, cost effective and well suited to 'out of hours' shift work (Ryley et al., 2013; Ricard, 2012). This suggests that varied start times may be a plausible explanation for the lack of commitment to public transport. A mixed methods study found the following choice factors: cost, flexibility, duration, income and perceived image of a specific mode could affect modal choice (Tsamboulas et al, 2012). These findings were set in a Greek context so it would be important to ascertain views from commuters in other countries to see if results are replicated.

Studies have shown that some factors are specific to employees. Alkaabi's (2016) mixed methods study on Dubai International employees' mode choice found that monthly income, employment status, car sharing, and car parking permits all played a part in the decision-making process. It also found that employees would appreciate assistance in finding car sharing partners. Additionally, the limited quantity of staff parking, the irregularity of travel patterns to the airport e.g. cabin crew, can affect modal choice and increase reliance on private cars (Coogan, 2008).

There are possible choice factor similarities with passengers too: comfort, frequency and accessibility being commonly cited criteria of importance, though it is worth noting that previous studies have not been specific to regional airports or factored in direct rail links. There

are grounds for further testing to determine if there are specific factors for employees over the general factors found for passengers, particularly in a regional airport context.

There is also a body of evidence on general workplace travel planning. The main focus has been on findings ways to encourage more sustainable and healthy ways of traveling to and from the workplace using organisationally embedded rather than reactive approaches (Roby, 2010, Winters et al., 2017). In a global review of travel plans De Gruyter et al. (2016) found that post-implementation, the number of car driver trips reduced by between 10 and 20% points, though measurement improvement was also recommended. Given that these plans have invariably focus on urban and brown/greenfield sites, scarce account has been taken of the need often to commute further to outlying areas where regional airports are frequently located, or of the round-the-clock operational hours of airports or indeed of the multiple employers all with varying travel policies based on-site.

3: RESEARCH APPROACH

This research employed a mixed-methods approach, which combines quantitative and qualitative methods allowing for more complex phenomena to be investigated (Halcomb and Hickman, 2015).

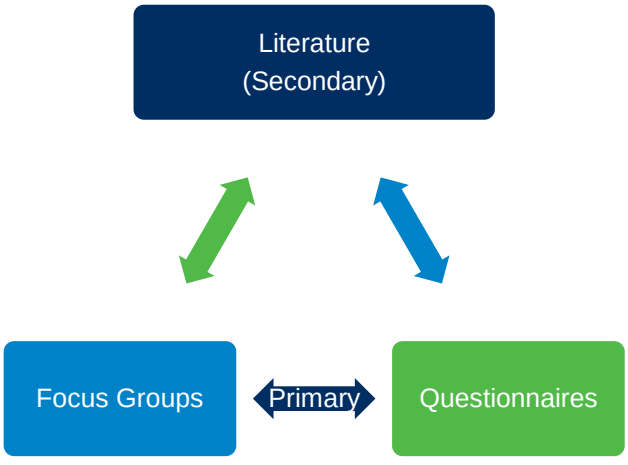

Figure 3: Triangulation approach

This approach also allowed for triangulation (Figure 3) enhancing the amount of supporting evidence in the research. This approach used two airport employee focussed research methods: questionnaires (quantitative) and focus groups (qualitative).

For the questionnaire, mainly closed questions were used and for ease of interpretation, derived from existing literature. Likert scale-based questions were adopted. The more in-depth reasoning regarding how modal choices could be changed were also fed into the questionnaire design in the shape of closed questions used to clarify preferences and barriers that came up in the focus groups. The questionnaire presented the following transport mode factors to the participants (Table 1):

Table 1: Transport modal factors presented in the questionnaire

Factors	Present in the Employee Questionnaire
• Frequency	✓
• Waiting time	✓
• Familiarity of the transport choice	✓
• Distance to be travelled	✓
• Cost	✓
• Value for money	✓
• Luggage storage	
• Travel time (time taken to travel to/from the airport)	✓
• Transport choices on Offer	✓
• Reliability	✓
• Convenience	✓
• Accessibility	✓
• Comfort	✓
• Discounts	✓
• Access to different airport areas	✓

The questionnaire was carried out one month prior to the focus group (February 2018) to ensure that data was stringently analysed and the most insightful questions were formulated for the focus group. A random selection of all employee types were recruited using stratified sampling

with a random selection selected for participation from each strata (Singh and Mangat, 1996). 59 responses were received, representing around a quarter of Bristol airport staff (Bristol Airport, 2020).

To ensure effective questionnaire design, a pilot study was also carried out. The feedback from this process led to changes in readiness for the main collection phase. Likert scales were originally inconsistent between questions, for instance, which led to confusion. Thus, the main questionnaire contained a standardised ranking scale for all questions using a Likert scale.

The Focus Group with airport employees was designed to discuss in-depth issues around flexibility and time efficiency in relation to access. Focus Groups are well suited to support questionnaires as they allow for a more exploratory approach and researchers have the ability to respond to participants' answers (Morgan, 1997). This research required Focus Groups to be supplementary to questionnaires with the focus on finding ways of reducing employee private vehicle transport to Bristol airport.

One potential issue with Focus Groups is that dominant members can influence views and cause bias. This was mitigated through analysis of speech (Kitzingler and Barbour, 1999; Krueger and Casey, 2015) and through moderator control and recognition of times where answers could be influenced in the analysis. Other considerations include when the focus group was held and duration of the session to ensure participants felt they had time to focus. The decision was to hold an hour-long session in March 2018, which was highly supported by the participants. Careful planning and advanced notice was provided alongside the airport's Surface Access Manager to ensure that no further complexities were met. The focus group was mainly carried out with BAL employees all of whom worked in management or supervisory roles in the following areas: Landside Development, Airport Planning and Sustainability. The responses provided were determined to be honest and provide and accurate reflection of true BAL employee opinions.

The questions asked in the focus group built on the results from the questionnaire i.e. if some results prompted additional investigation, then the focus group was used to find out more detail. An example question in this regard was

"What really underpins your behaviour and motives towards modal choice?"

The questions were situational and centred around identifying behavioural motives and factors behind modal choice, how possible incentives could assist with modal choice shift and how the use of technology can influence modal choice.

Judgement or gateway sampling was used for the focus group, where the sample is usually selected by an expert to make sure it is representative (Beri, 2008). In the case of this research this function was carried out by the Bristol Airport Surface Access Manager. This allowed for more relevant data to address specific management issues (Wegner, 2008). The risk of bias from not selecting a random sample was mitigated by ensuring that the gatekeeper selected a quota of people for the Focus Group with a range of roles, shift patterns and length of service.

From an ethics perspective participant consent was obtained from Bristol Airport ensuring that participants clearly knew what the research was about and their role within it as well as the guarantee of anonymity during the research reporting process. For this reason it was not possible to divulge full details of each focus group participant.

The focus Groups were analysed through transcription[1]. Vaughn et al, (1996) explained that this must be done as soon after the Focus Groups as possible as this will improve accuracy and can be verified. Therefore, notes and recordings were taken with participant permission during the focus group session. The analysis then identified any themes and patterns in the transcript data, either from specific individuals or from group consensus. This avoided looking at the discussion from a single point thereby providing a holistic view.

[1] Full transcript is available from the corresponding author on request.

4: RESULTS AND DISCUSSION

4.1 Model choice behaviour of employees (questionnaire)

Socio-attribution questions are summarised in Table 2. 76% of sampled employees work with 3rd party companies and 24% were directly employed by the airport versus a population split of 79% and 21% respectively (Bristol Airport Annual Monitoring Report 2018). Income levels of the sample before tax were also quite evenly spread. With regards to age and gender, there was a balanced spread to reflect the various stages of career and lifestyle both of which could influence travel decisions. There was also a good spread of working age groups amongst the respondents. Moreover 54% of the respondents were female and 46% male.

Table 2: Summary of questionnaire attribute question results

Gender	**Percentage of sample**
Male	46%
Female	54%
Employer	
3rd party employer	76%
Direct employee	24%
Income group	
£20,000 or below	32%
£20,001 to $40,000	46%
£40,001 to £60,000	16%
£60,001 and above	6%
Age	
18-25	26%
26-35	26%
36-45	21%
Over 46	27%

Moving onto the subject related questions, 43% of respondents stated that they start work between 06:01 and 12:00 hrs with only 14% saying they start between 18:00 and 00:00 hrs.

66% of all sample journeys to work arrived between the hours of 06:00 and 18:00 hrs (Figure 4).

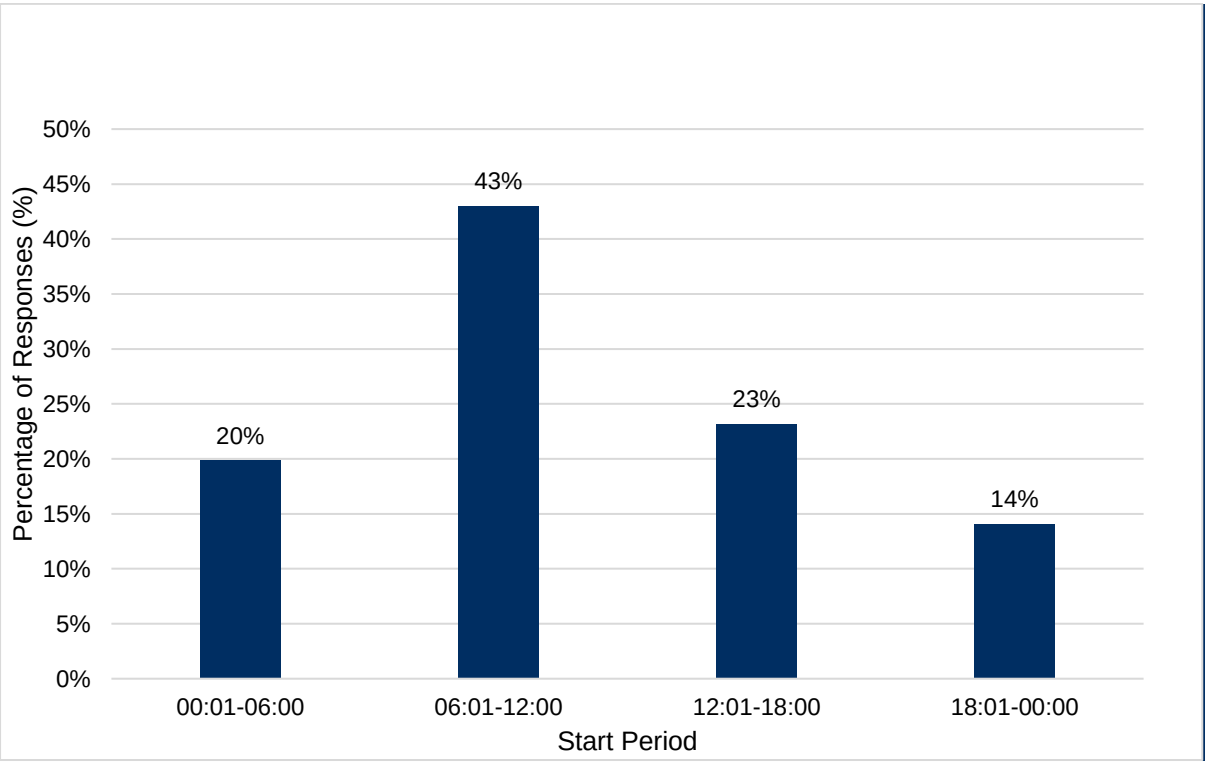

Figure 4: Time that sampled employees start work

With respect to mode choice, 'Own Vehicle' was most dominant with 86% of responses (Figure 5), followed by 8% for 'Bus'. The lowest responses were under the 'Other' category (2%), which was 'vehicle provided by employer' and 'taxi'. In comparison with passengers, as expected there is a much lower percentage of drop-offs (3%) given this constitutes a regular work/commute pattern for individuals. Train is not currently an option at Bristol Airport, though it is technically possible for some workers to use rail for part of their door-to-door journey and change to private vehicle/taxi/bus, though the time/cost time penalty in doing so would render this as a very unlikely access method.

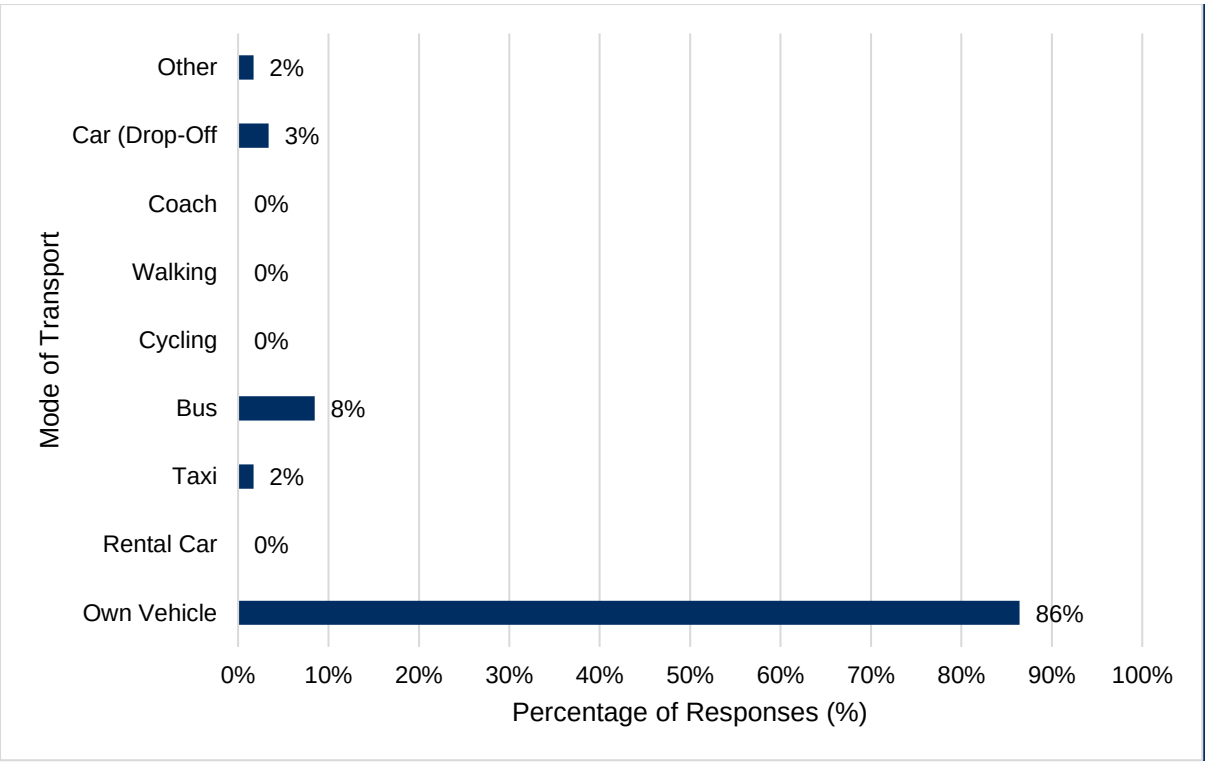

Figure 5: Main modal choice of sampled employees

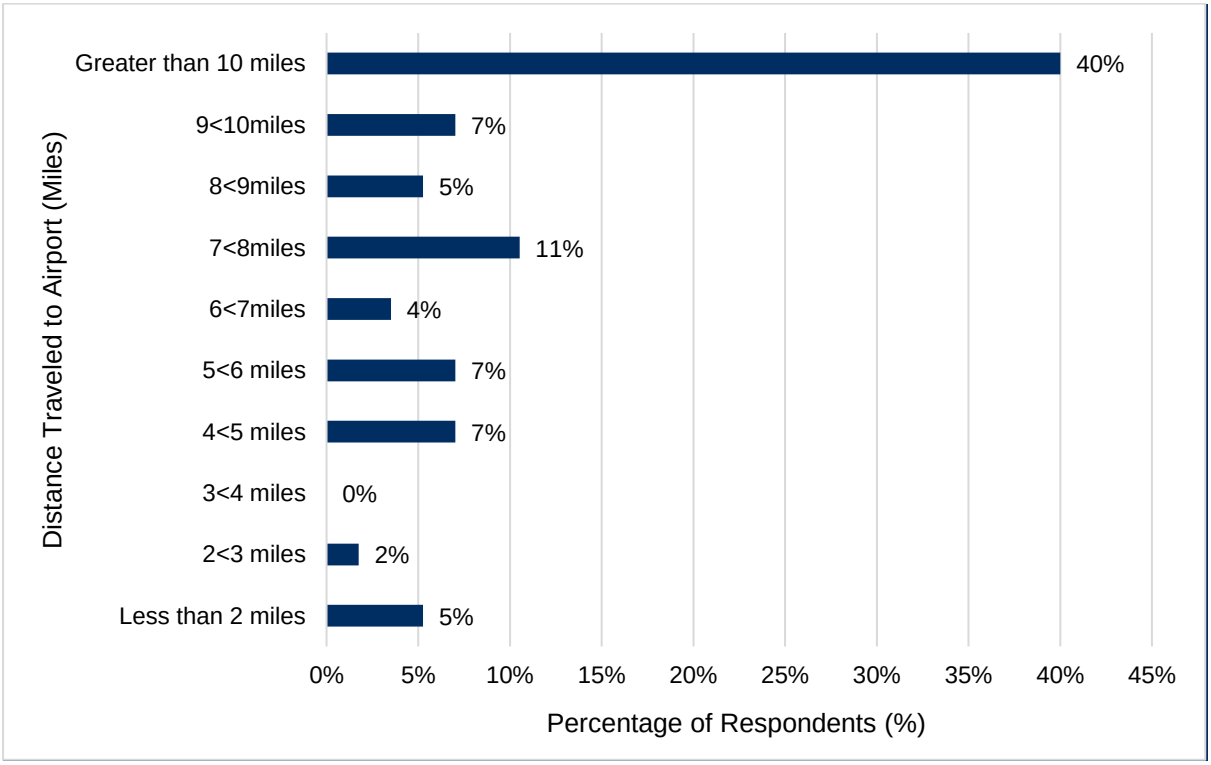

Figure 6: Place of residence distance to the airport

When resident distance from work is factored in (Figure 6), a possible factor explaining the high private vehicle usage is that a large percentage of respondents that live more than 8 miles

from the airport (52%). This combined with the airport's more rural location to the South West of the city, appears to be making private vehicle usage a more attractive option. Figure 7 names the locations of employee residences in the surrounding areas.

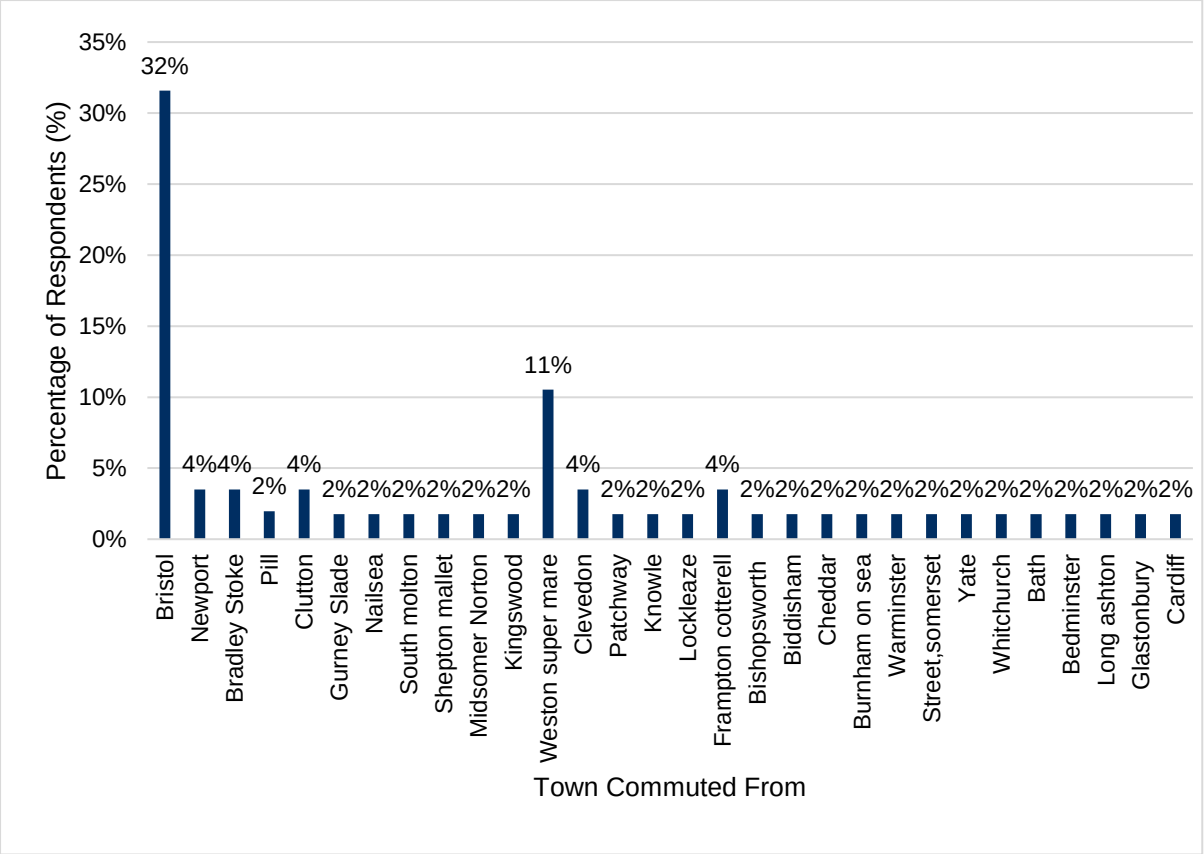

Figure 7: Location of airport employee residence

Note: Location names shown on regional map in Figure 14

Bristol itself and Weston Super Mare are the two most frequent places of residence of the questionnaire respondents, with some workers commuting from South Wales (Newport/Cardiff).

One of the pivotal questions related to the importance that employees placed on a variety of common factors influencing model choice (Figure 8), among the sample, the factors of greatest importance ('Very Important' and 'Important') were 'Frequency' (93.22%), 'Convenience' (91.52%), 'Travel Time' (89.93%) and 'Reliability' (88.13%). The least important factors were considered to be 'Access to other areas of the airport' (49%) and 'Discounts' (46%). If these results are combined with the observation that 98% of respondents said that they like to be in full control of their travel, then it becomes apparent why the choice of private vehicle is quite so prevalent amongst the sampled airport employees.

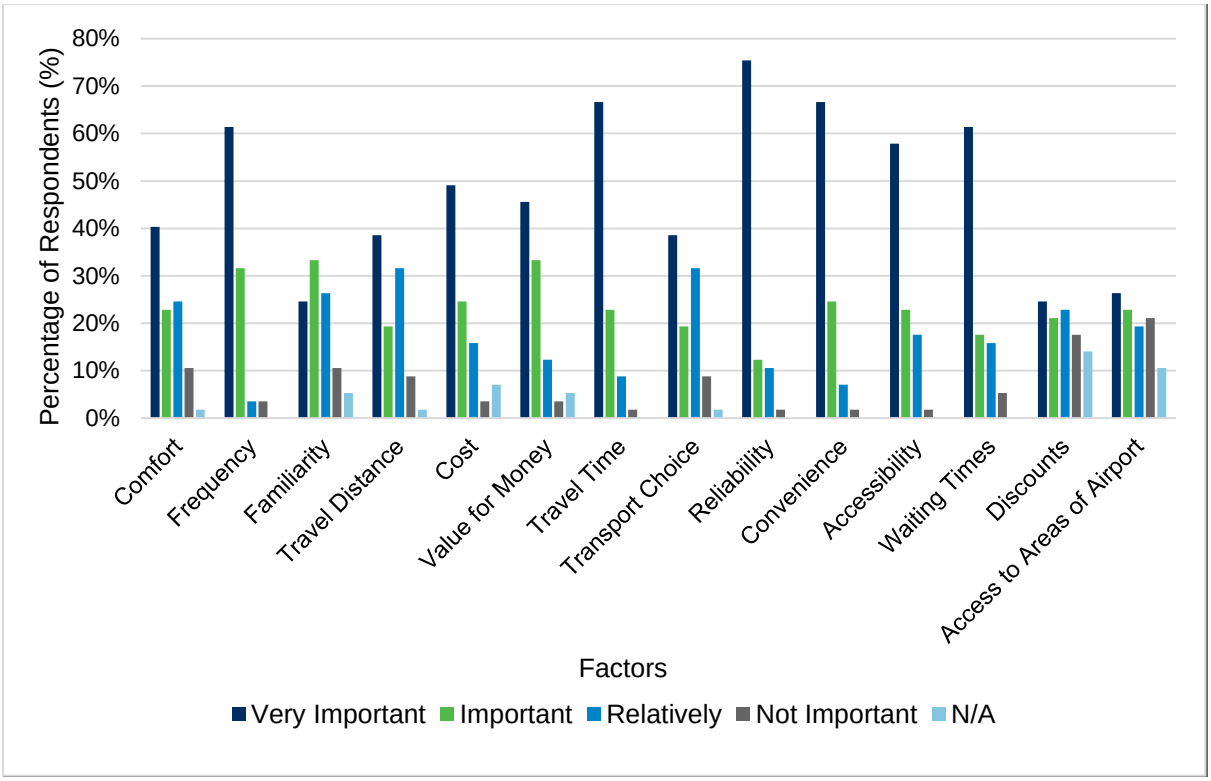

Figure 8: Importance placed on a range of modal choice determining factors

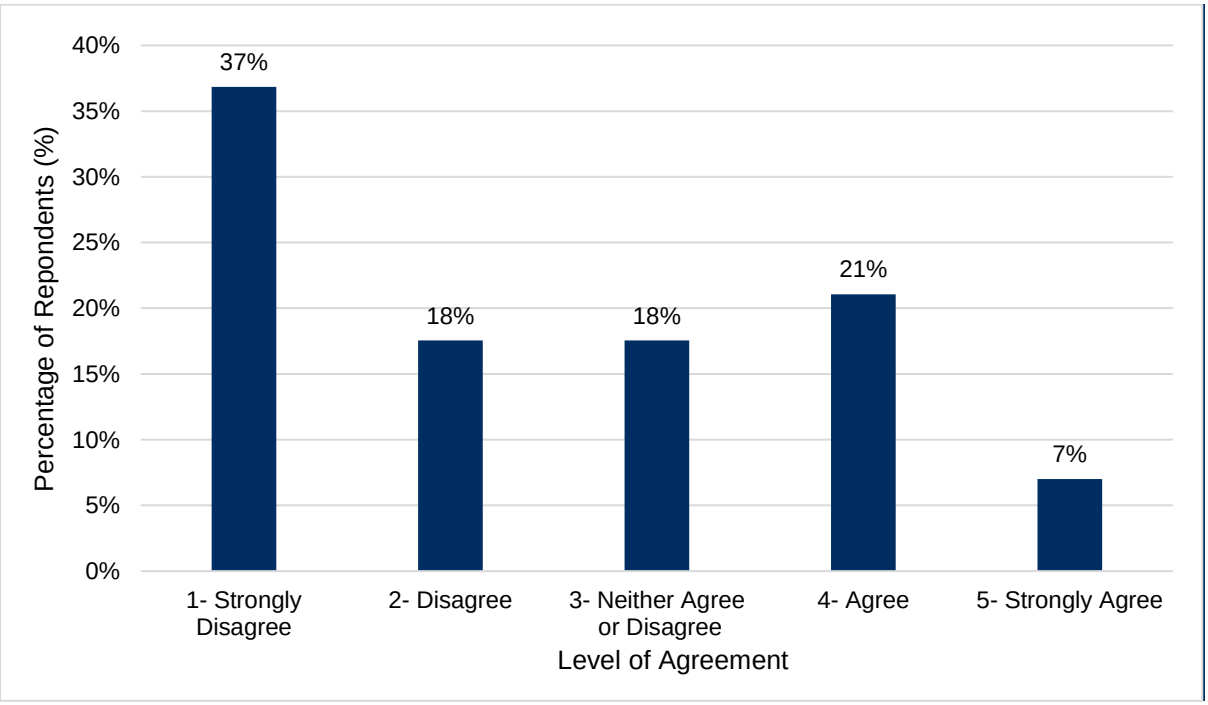

Figure 9: Impact of work hours on modal choice: *"Would flexible working hours make using alternative means of transport more likely?"*

In terms of encouraging modal shift, the first proposal was to look at the possible effect of flexible working hours (Figure 9). Only 28% of respondents agreed or strongly agreed that flexible hours would make using an alternative means of transport more likely. It would follow that the constants of airport location versus distance to place of residence have a more significant bearing on choice than shift flexibility.

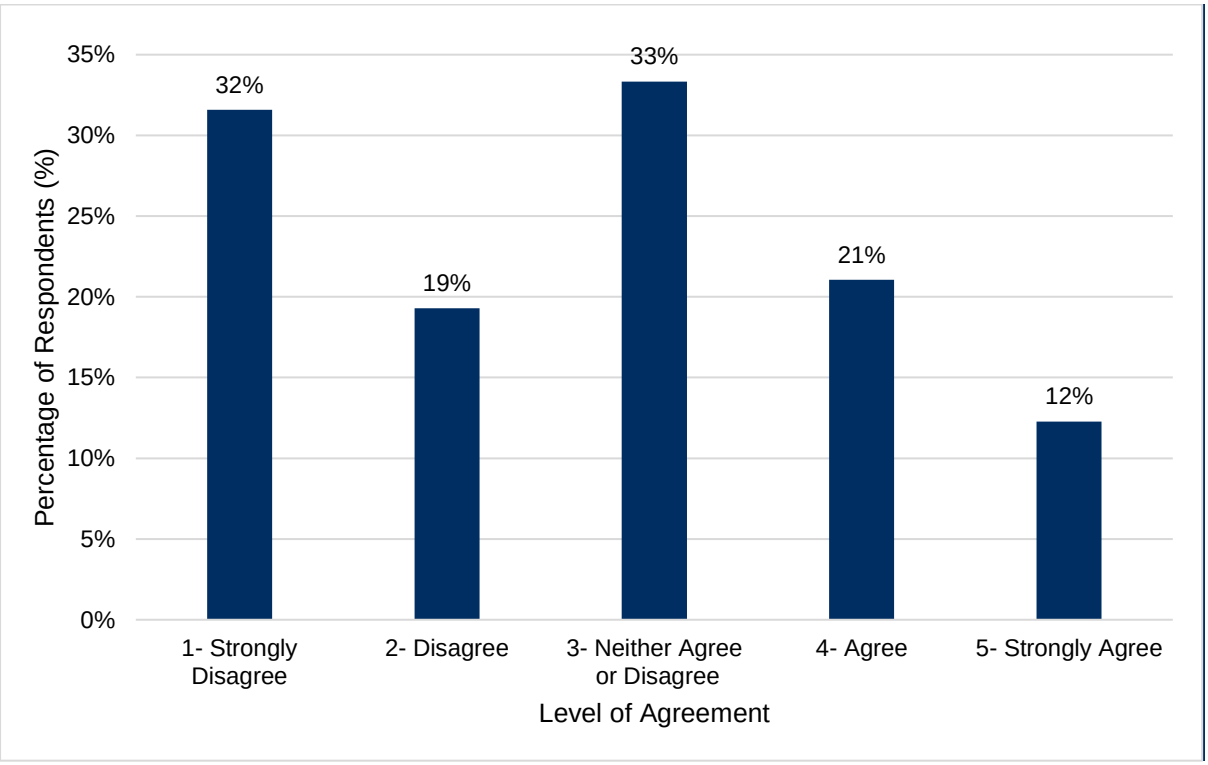

Figure 10: Employee view on whether they thought they had a reasonable choice of transport options from home to airport

Only 33% of all respondents felt that they had a reasonable choice of transport options from home to airport. This may indicate a possible propensity to choose other modes if suitable alternatives were available (Figure 10).

Based on the literature a number of bivariate relationships between responses to different questionnaire questions were examined. Choice of transport mode was compared against a selection of respondent attributes including employee type (Figure 11), age (Figure 12), and income levels (Figure 13). Figure 11 shows that all public transport use was amongst 3rd party workers, with an albeit lower number of direct airport employees in the sample choosing private vehicle, single occupancy journeys. This could be partly explained by the generally more generous parking arrangements that are often afforded to airport staff versus those staff that work for 3rd party companies though arrangements clearly vary from airport to airport (see Focus Group analysis for discussion related to Bristol Airport).

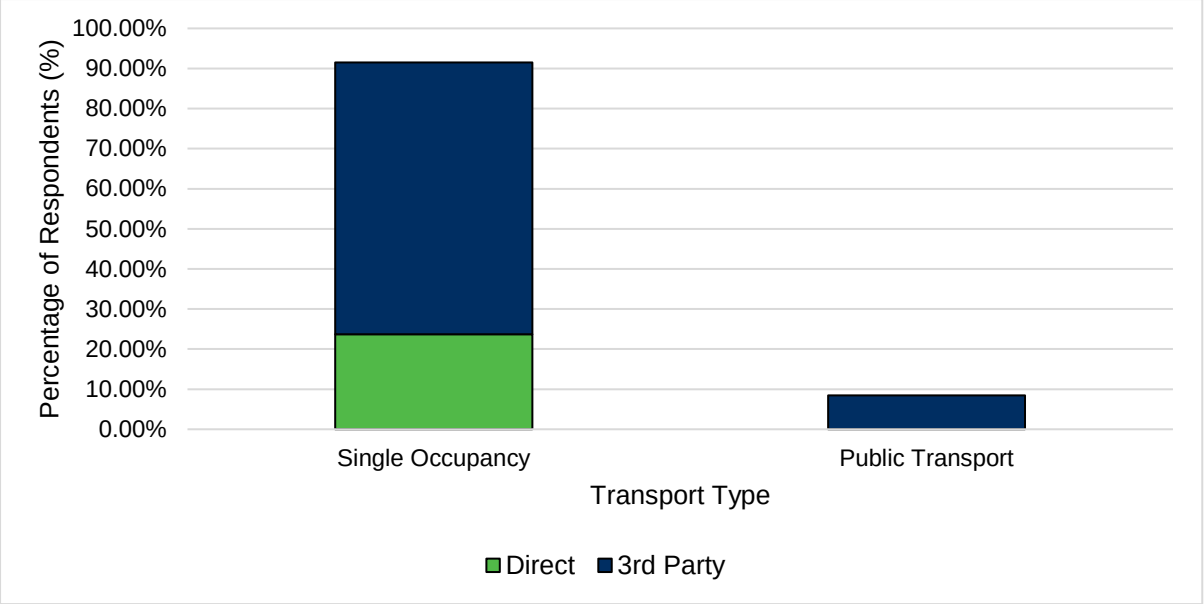

Figure 11: Employment type and transport choice relationship

There does appear to be some pattern between the age of respondents and transport choice with primarily older employees sticking to their single occupancy private vehicles completely. There is a greater albeit still minor propensity to try public transport options among younger employees. This could be due to concerns over mobility and accessibility for older employees.

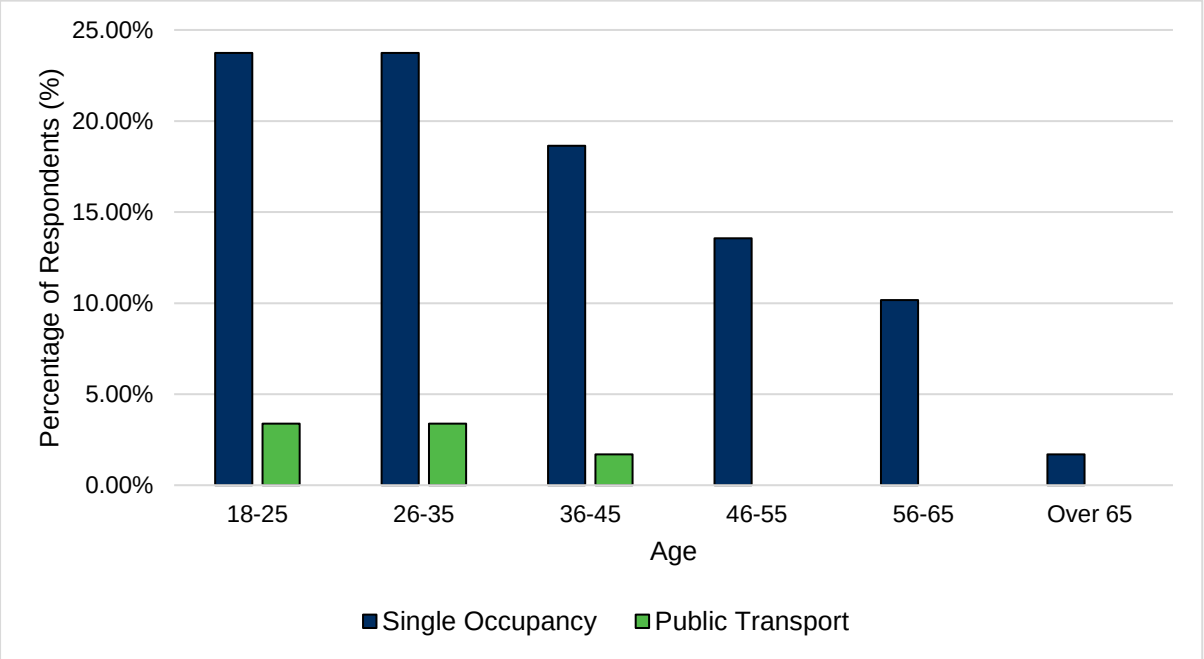

Figure 12: Age and transport choice relationship

Finally, Figure 13 suggests that there is a relationship between income and transport choice with some evidence of public transport selection among lower income earning airport workers.

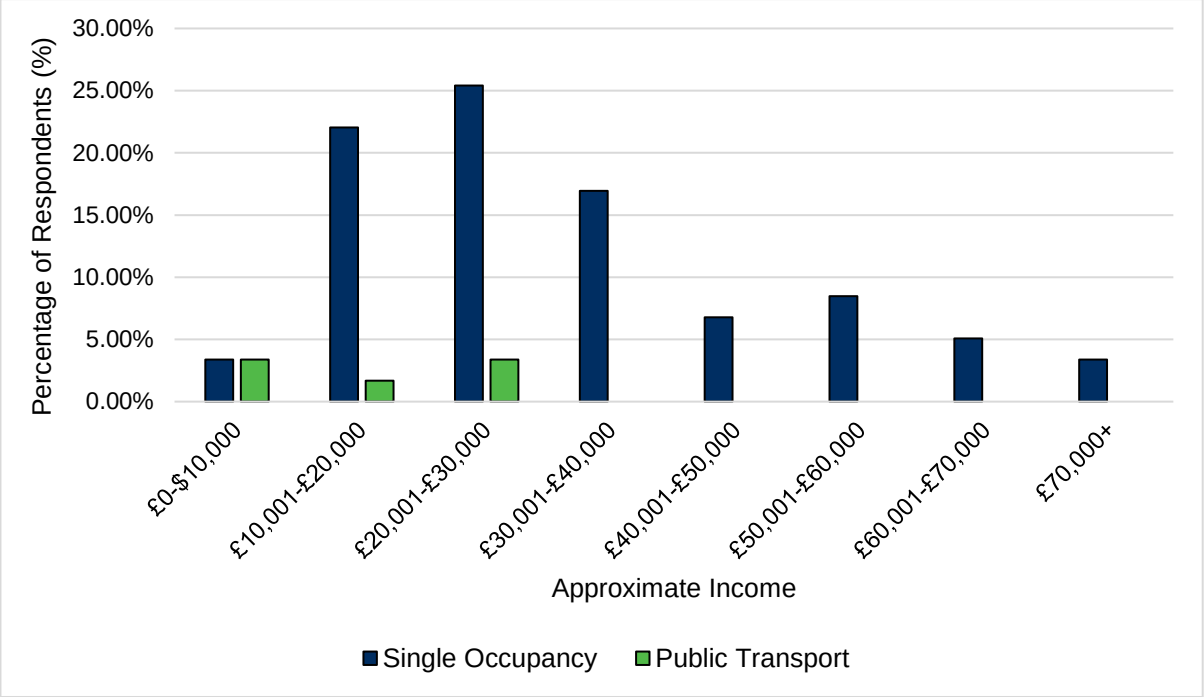

Figure 13: Employee income and transport type

4.2 Factors underpinning modal choice at Bristol (incorporating focus group results)

The literature is clear that there are differences between the motives of passengers and employees (Losekoot, 2015; Budd, 2013), some of which have been reflected in questionnaire responses in this study. Convenience, reliability and travel time, however, appear to be the main factors that mutually had the largest impact on both passenger and employee modal choice.

The focus group was dominated by participants B, D and E who provided the most input; however, this was determined to not have drastically affected the outcomes as other participants did not significantly change their opinions. The mix of participants was beneficial with participants A and E having family, B being pro-car, C being pro-public transport and D having experience of both public transport and car for commuting.

Bristol airport recently implemented a bus service between the designated staff parking area, the admin building and terminal building. Literature suggests that park and ride has been considered as an incentive at airports in the past for employee surface access (Richard, 1995; Humphreys and Ison, 2005). However, the focus group revealed that this would lead to the issue of increasing employee total transport time, which would have to be accepted if there was no other onsite parking. Additionally, a respondent stated *"we still have a lot of business partner employees. So, pilots and air hostesses"*. Literature suggests that up to 90% of employees can be third-party at airports (Ison et al., 2008). The survey in this study also suggested that third-parties are a big part of the employee mix. Despite third-party employees being under-represented in the focus group, the results show that modal shift is often more difficult with the directly employed, especially in cases like Bristol where park and ride options are available for direct employees.

Employees at Bristol mostly used 'Own Vehicles' with buses being the second most popular. This was also the case in the focus group. The findings of BAL (2018a) shows that 84% of employees used own vehicles and 9% buses. BAL (2012) also found that 67% of passengers used own vehicles and 13% used public transport which, generally supports the idea that it is more difficult to encourage employees to change their commuting behaviour.

When asked to provide information on what would change employees' modal choice, two respondents stated, *'if public transport was more reliable with timing'*. Other responses

included*, "the quicker I can get here the better", "driving to work is the quickest and easiest" and "in terms of convenience I don't have to wake up [and say] I'm gonna miss my bus"*. Participants were also asked about reliability of transport services stating,*"can't bare waiting for buses"* and that they *"can rely on [themselves]"*. This suggests that airport management could underestimate the importance of service and possibly convenience when estimating the amount of modal shift possible with employees at regional airports, which reduces the effectiveness of strategies as implied by literature (Kazada and Caves, 2007). Also, the findings support that employees are striving for reliable transport (Budd et al. 2016; Coogan, 2008; Ryley et al., 2013; Pasha and Hickman, 2016; Ricard, 2012). This case study adds weight to frequency and travel time as highly important to employees, which suggests that the bus services were not frequent enough. Therefore, frequent inclusive of weekend and evening bus services maybe more effective in encouraging modal shift amongst employees.

Interestingly, the focus group highlighted that accessibility is an issue with respondents stating, *"there is no public transport",* another stating *"there isn't a direct bus"* with one even stating that it *"would be two buses, an hour on each bus"*. This agrees with another respondent who stated that they would have to walk through multiple roads to get to the bus stop and that they would have to use a *'different bus service'*. Others stated that *'improved travel times from Bristol City Centre'* was an issue as *'this takes longer than driving'*. The most apparent quote was *'buses run from Weston, Bath and Bristol but not from commuting towns'*. This shows that the factors are travel time and accessibility. This supports the literature stating that own vehicles are often relied upon due to poor accessibility (Jones, 2017). The need for improved travel times, shows that congestion could also be a factor to reliability (Budd et al, 2016; Coogan, 2008; Avon Local Councils Association, 2015; North Somerset Council, 2016). BAL (2012) quote that local investments of £197 million into bus transit routes have been made yet results from the focus group suggest that these are not beneficial to Bristol Airport, at least from an employee perspective.

To further demonstrate that accessibility is a major issue, Figure 14 below depicts participant locations and bus routes offered to the airport at 08:00 hrs on a Monday (in 2019).

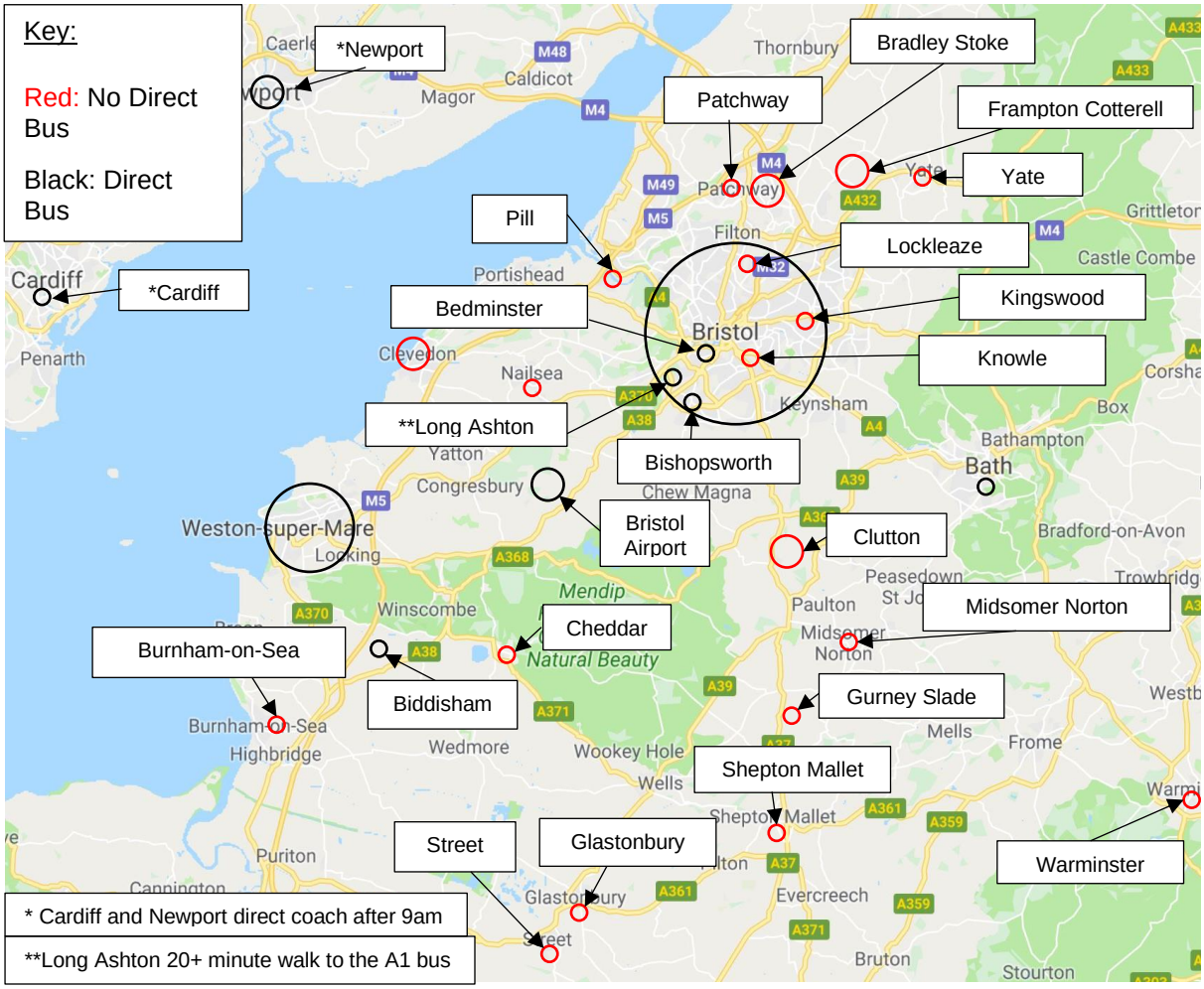

Figure 14: Employee town locations and direct bus accessibility (Authors, 2019)

The lack of direct routes suggests that interchanges could adversely affect the appeal of this modal choice. This is supported by the focus group when asked about a park and ride system to which respondents replied, *"it's the same as moving from here to Silverzone, it [will become] an extension where I leave 20 minutes earlier".* However, one stated *"I know of one person who definitely left because of staff car parking"*. This also indicates that direct connections can help modal shift; but there is still the risk of losing employees if parking was moved away as a public transport prioritisation measure, which makes park and ride less feasible. Nevertheless, the level of 'directness' is vital to employee modal shift at Bristol airport.

Related factors emerged from the focus group, with respondents stating, *'family situation'* and another stating *'child care drop-off prevents alternative options'*. One respondent added that *"I have to drop my son to nursery"*. This shows that employees are affected by different personal factors to passengers, aligning with the literature from the Jones (2017). It also

highlights the poor flexibility of public transport to cater for these types of personal issues, which have been highlighted in literature (Tsambouloas et al, 2012). Furthermore, Liverpool John Lennon Airport (2016) stated that the increase in private vehicle usage was due to increased travel distance by employees. However, travel distance was of lower importance to employees in this study (57.63%). This shows that at Bristol airport door-to-door travel time and personal commitments are more significant influencing factors than distance.

Alkaabi (2016) found that help to find a car share partner was important and it was evident from the focus group and literature that Bristol do offer this help through an application called Liftshare (BAL, 2019). The response to the success of Liftshare was that it can be *"difficult to get a decent uptake"* and they *'couldn't get a match'*. This shows that even if help is provided, Alkaabi's (2016) recommendation is limited as a match is still reliant on employees signing up to the service and depends on the proximity of fellow employees in addition to the alignment of shift patterns between car sharing colleagues. The opportunity for regional airports here may be lower than major airports as employee concentration in residential areas is a factor for car sharing being a success.

Comfort was a key contributor to own vehicle usage. This was found when a respondent stated, *"I don't want to get in your car and listen to your music"*. This demonstrates a big limitation to car sharing that personal comfort is a big part of transport choice. This shows that comfort was a factor (Humphreys and Ison, 2005; Ji et al, 2017), although, this may be a secondary factor as suggested in Figure 8. Thus, Bristol may have to look at other strategies to find a solution for modal shift.

The element of control was found to be a factor in passenger modal choice (Budd et al, 2011). The focus group evidence supports this suggesting it was a recurring theme among employees. One respondent stated *"like fair enough traffic on the roads you can't control but you are in a state of control so you can control what happens to you"* when asked about transport as another passenger stated, *"It's like you say, it's the control thing"* when asked about reliability. This is evidence that in this respect Budd et al's, (2011) findings apply to employees and not just passengers.

Reliability has been identified as an important factor; therefore, it is important to investigate whether congestion affects this. Reports stated that bus services were experiencing reliability issues due to congestion (Avon Local Councils Association, 2015; North Somerset Council, 2016; Scottish Government, 2003). Congestion is blamed on a lack of dual carriageway or rail

access (Atkins, 2017; House of Commons, 2016; Ch2m Hill, 2016). Kouwenhoven (2008) suggests that accessibility to public transport is important as this can reduce congestion. This study's data shows that congestion has no effect on modal choice when compared to the transport used to access the airport with 31.58% having a neutral view. The focus group identified that a bus user felt *"the only problem is the traffic in the city centre that sometimes is at Temple Meads".* This adds knowledge that congestion is not a primary factor in modal choice despite the fact that reliability issues might be due to congestion (Avon Local Councils Association, 2015; North Somerset Council, 2016; Scottish Government, 2003). A lack of dual carriageway or rail access has the potential to exacerbate the congestion issue, however, (Atkins, 2017; House of Commons, 2016; Ch2m Hill, 2016). Thus, lack of infrastructure to/from Bristol is a longer term barrier to modal shift. Further evidence from the focus group suggests that if a respondent *"was going to be off the road for six months… [they] could get the bus"* others stated that they would *'car share'*. This shows firstly a strong preference for private vehicles and secondly that indirect multimodal options involving rail are rarely considered at all, further demonstrating the possibility that direct transport is almost an indispensable requirement, suggesting that large city findings that a single interchange does not affect demand (London Travelwatch, 2015) does not apply outside large cities with highly developed transport infrastructure, especially with respect to regional airport hinterland areas.

4.3 Addressing the challenges to sustainable transport airport strategies

The questionnaire and focus group took advantage of the possibility of determining whether airport policies can lead to modal shift (Ionescu, 2017). Rewards/incentives were tested to see if it has contributed to modal shift. Redeemable points for using the bus *"can be [perceivably], unfair"*, according to a focus group participant. When discussing targeted buses with a points scheme, respondents stated that *"it's always going to come back to convenience"* and that incentives *"wouldn't be enough"* to create a change. This shows that the type of reward and incentive would need to be thought through carefully.

On the other hand when asked about the removal of employee parking one stated *"I would have to consider whether I could work here"*. However, employees were asked about whether a discounted hybrid car would appeal to them to see if this would make a difference. One respondent stated *"yeah, I would consider it"* another stated, *"you're retaining the convenience*

and you're getting a benefit". This shows that this is a possible solution to reduce emissions related to private vehicle usage. This contradicts literature stating that sustainable transport measures will reduce private car usage (Luton Airport, 2018), but supports that certain well thought out rewards/incentives provide possibilities for modal shift (Humphreys and Ison, 2005). However, it is the quality of strategies that is important (Kazada and Caves, 2007). Clearly, reduced parking would be unpopular (Ricondo and Associates, Inc; DMR Consulting and Resource Systems group, Inc, 2010). Both pieces of literature were supported in the focus group showing that the quality of strategies must match convenience levels of using a car. There are thus many factors that must be considered to overcome the challenges that airport managers face (Losekoot, 2015; Budd, 2013; Jevons et al, 2018).

Focus group participants were asked if they would use an application that collects employees and organises vehicle needed. Responses suggested that it *"would be able to collect more people".* However, suggestions for being paid to pick people up proved popular only *"if it proved some sort of a way cheaper"*. Nevertheless, travel planning is being used in regional airports (Newcastle Airport, 2018; Leeds Bradford Airport, 2016; Cornwall Airport, 2015) but to date mainly for passengers only. Employees would only find this beneficial with reduced costs, supporting literature stating the importance of cost rewards for car sharing (Ryley et al., 2013; Pasha and Hickman, 2016; Ricard, 2012; Humphreys and Ison, 2005). This also supports the idea that monetary benefits can be a valuable strategy (Newcastle Airport, 2018; Leeds Bradford Airport, 2016; Cornwall Airport, 2015). Whilst this may not drastically reduce congestion, it will reduce emissions outputs, which could help meet its planning obligations.

Employees were asked if they would consider changing if buses were hydrogen/electric powered. Responding to further recommendations for modal shift, an employee stated *'I drive a hybrid vehicle… so I have a balance of reliability yet lower my emissions'*. This shows that hybrids or alternatively powered public transport vehicles may not provide a shift incentive to employees. Gatwick Airport (2018) have been trialling hydrogen buses, which are not effective in modal shift but innovative solutions like this could be more attractive to passengers (Gosling, 2008). However, the responses show that private vehicles are seen as more reliable.

Employees were asked about their desire to use environmentally friendly transport. Unlike evidence from passengers in the literature, employees answered strongly for 'Disagree' and 'Neither Agree or Disagree' options. One focus group respondent stated that if there were options that had comparative journey times then they *"would consider environmentally*

friendly" transport. Another stated *"I was working in the city centre and I cycled"* and continues to say driving to the airport has made it easier and that they save *"more than 2 hours every day"*.

The literature indicated that the South Bristol Link (SBL) could improve active transport with walking and cycling infrastructure included (West of England Councils, 2017). Insights into active transport were found throughout the focus group. One respondent stated, *"the A38 is quite frightening as a road"*. Another stated it would take them *"roughly an hour and half to two hours"* to get to Bristol airport with another respondent who tried this and *"was absolutely destroyed"*, suggesting that the attractiveness of this option is still quite low.

The focus group highlighted that topography is a limitation as one respondent stated, *"I think geographically it is where the airport is"* with another stating, *"Brockly Hume is too dangerous a road*". The focus group does indicate that active forms of accessing Bristol airport are at least being considered by employees. However, despite the SBL, participants still contend that roads near the airport are dangerous or challenging suggesting more infrastructure needs to be put in place around local roads to make active modes more attractive.

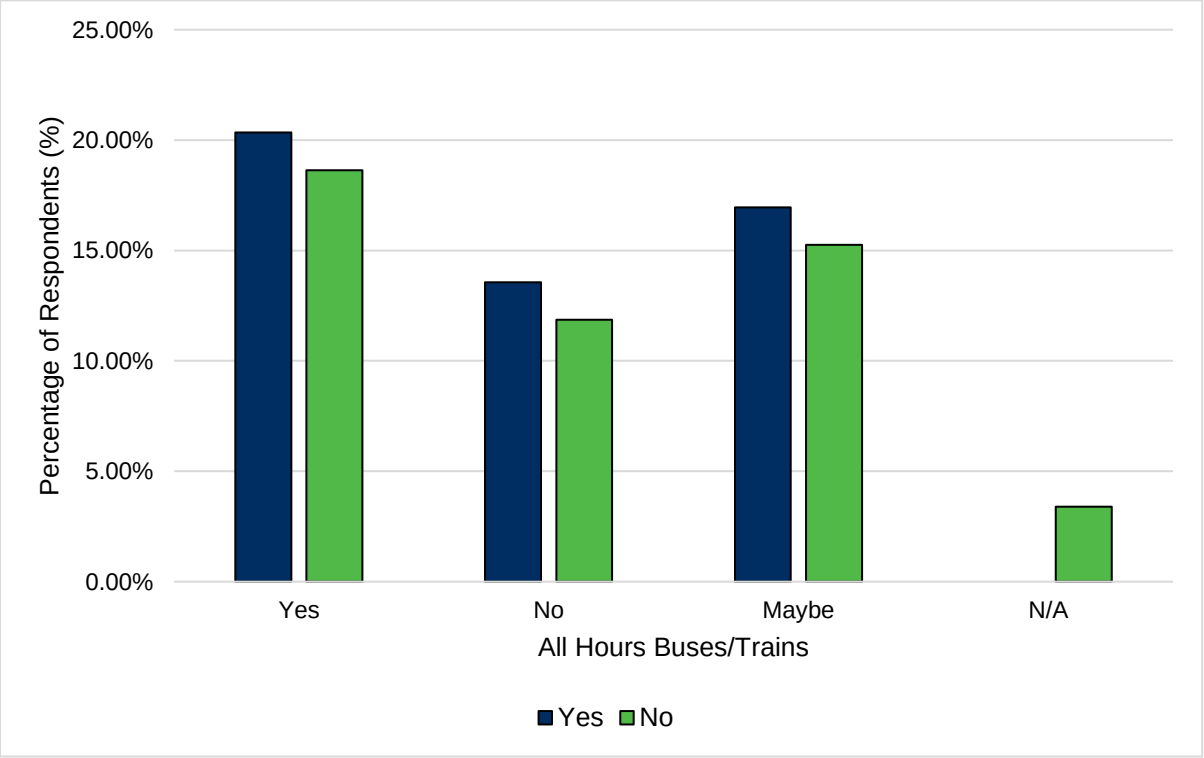

Figure 15: 24-hours bus/trains and multiple start time (yes/no) relationship

Literature stated 24-hour transport would be beneficial to modal shift (Ryley et al., 2013; Ricard, 2012). However, cross tabulation of 24-hour transport and multiple job start times shows that only 20% would mode switch (Figure 15). Interestingly, many of those who do not have multiple start times through the week responded fairly positively to 24-hour transport with 18% stating 'Yes'. Nevertheless, there is not enough evidence from this Bristol study to support the effectiveness of a 24-hour service at Bristol (Ryley et al., 2013; Ricard, 2012).

5: CONCLUSIONS

The literature showed that there is limited deep understanding of the factors affecting surface access for employees at regional airports and that the approach by major and regional airports for encouraging modal shift should be different as well as for passengers and employees. Throughout the literature, convenience, reliability, cost/value for money and time were identified but lacked substantiation for regional airport employees.

By the use of effective data collection through an employee questionnaire and focus group at Bristol airport in the UK, the following findings have been determined: The dominant common factors for employee modal choice were convenience and reliability. While previous studies have shown that from a passenger perspective this was found to be due to family, luggage and post-trip needs such as journey times to get home, for employees it was found that choice was linked to personal situations and issues around accessibility, time and flexibility. Control was a factor that has not really been considered previously and was shown to be a contributory factor of the high observed levels of car usage found for Bristol airport employees.

Strategies used to date for regional airports like Bristol airport are insufficient as it was found that all suggested methods for modal shift proved either unpopular or had a low impact at Bristol. The evidence suggested that employees view sustainable transport options generally more negatively than passengers particularly at regional airports where there is naturally a more limited choice of onward transport options. In addition, the topography of an airport like Bristol, limits the scope of more active transport sustainability strategies and contrasted with some of the more general workplace travel plan evidence which has hitherto omitted a focus on regional airports. There were some signs of increased employee awareness of active transport alternatives and airport incentive schemes for employees to use hybrid or electric vehicles were found to be the most popular alternative from the employee perspective.

Although this type of measure would not reduce single occupancy private vehicle usage, it could have a positive impact on access and ground based emissions and help to improve local air quality. It was also found that providing park and ride facilities for airport staff may reduce congestion nearer the airport terminal areas but in fact encourages further use of private vehicles whilst reducing employee satisfaction levels rather than acting as a disincentive.

Further research should centre on repeat data collection from regional airports like Bristol to cover different seasonal periods to see if this makes a difference to employee transport choices. The ability to generalise to regional airports of a similar scale to Bristol is limited by the in-depth qualitative nature of this study. Also, this study lacked additional insights from third-party employees but only in the focus group stage, due to a lack of access and availability. Further work should look to account for 3rd party employer follow up insights to build on those already provided by 3rd party employees in this research. It was clearly indicated in this study's survey results, for example, that 3rd party employees show a slightly greater disposition towards alternative transport modes, which could be due to not having the same on-site parking benefits as direct employees of Bristol airport.

REFERENCES

Airport Operators Association. (2016) *Connecting the UK's Economy: How better access to airports can boost growth*. Available at: https://www.aoa.org.uk/wp-content/uploads/2016/11/AOA-Connecting-the-UK-Economy.pdf (Accessed: 23 December 2018).

ACI Europe. (2019), Airport Traffic Report 2019, Available to Members only [Accessed on 14/05/2021].

Alhussein, S. (2011) 'Analysis of ground access mode choice King Khaled International Airport, Riyadh, Saudi Arabia', *Journal of Transport Geography*, 19(6). pp. 1361-1367.

Alkaabi, K. (2016) 'Modelling travel choice behaviour of airport employees for commuting to work at Dubai International Airport, UAE', *WIT Transactions on Ecology and The Environment*, 210(1), pp.577-589. Available at: https://www.witpress.com/elibrary/wit-transactions-on-ecology-and-the-environment/210/35970 (Accessed: 21 December 2018).

Atkins. (2017) *West of England Joint Transport Study.* Available at: file://stu01fs/Homes/21421195/Downloads/JTS_Final_Report.pdf (Accessed: 27 December 2018).

Avon Local Council Association. (2015) *ALCA North Somerset Group AGM.* Available at: http://www.avonlca.org.uk/Avon-Local-Councils-Association/UserFiles/Files/Area%20Groups/North%20Somerset/ALCA%20-%20ATF%20report%20June%202015C.pdf (Accessed: 21 December 2018).

BAL. (2019) *Staff Travel.* Available at: https://www.bristolairport.co.uk/about-us/careers/staff-travel (Accessed: 28 January 2019).

BAL. (2018) *2018 Operations Monitoring Report.* Available at: https://www.bristolairport.co.uk/~/media/files/brs/about-us/environment/2018-operations-monitoring-report.ashx?la=en (Accessed: 20 December 2018).

BAL. (2018a) *Development of Bristol Airport to Accommodate 12 mppa. Draft - Workplace Travel Plan 2018.* Bristol: Bristol Airport Limited.

BAL. (2017) *Bristol Airport seeks public views as it plans for the future.* Available at: https://www.bristolairport.co.uk/about-us/news-and-media/news-and-media-centre/2017/11/bristol-airport-seeks-public-views-as-it-plans-for-the-future (Accessed: 7 April 2019).

BAL. (2012) *Bristol Airport: Surface Access Strategy 2012-2016*. Bristol: Bristol Airport Ltd.

Beri, G. (2008) Marketing Research. New Delhi: McGraw-Hill Education (India) Private Limited. Fourth Edition.

Bristol Airport (2020), Our people, Available at: https://www.bristolairport.co.uk/about-us/who-we-are/our-people. Originally accessed on 3rd Feb 2020.

Bristol Airport Annual Monitoring Report (2018), Amazing journeys start here, Available at: https://www.bristolairport.co.uk/~/media/files/brs/about-us/bristol-airport-annual-monitoring-report-2018v2.ashx?la=en.

Budd, L., Budd, T. and Ison, S. (2016) 'Improving the environmental performance of airport surface access in the UK: The role of public transport', *Research in Transportation Economics,* 59(1), pp.185-195.

Budd, T. (2013) *An examination of passenger surface access travel behaviour.* Available at: https://dspace.lboro.ac.uk/dspace-jspui/bitstream/2134/13568/3/Thesis-2013-Budd.pdf (Accessed: 18 December 2018).

Budd, T., Ison, S. and Ryley, T. (2011) 'Airport surface access in the UK: A management perspective', *Research in Transportation Business and Management,* 1(1), pp.109-117.

Button, K. (2017) 'The other side of an airport's two-sided market: issues in planning and pricing airport surface access', *European Journal of Transport and Infrastructure Research*, 17(4), pp. 442-456.
CAA. (2016) *Submission by the Chartered Institute of Logistics and Transport to the CAA consultation on Issues affecting passengers' access to UK airports: a review of surface access.* Available at: https://www.caa.co.uk/WorkArea/DownloadAsset.aspx?id=4294982952 (Accessed: 3 May 2019).
CAA. (2016a) *Consultation on issues affecting passengers' access to UK airports: a review of surface access CAP 1364.* Available at: https://www.caa.co.uk/WorkArea/DownloadAsset.aspx?id=4294982957 (Accessed: 21 December 2018)
Ch2m Hill. (2016) *Bristol South West Economic Link Option Development Report*. Available at: https://s3-eu-west-1.amazonaws.com/so-welep-uploads2/files/Place/Bristol%20South%20West%20Economic%20Link%20Option%20Development%20Report.pdf (Accessed: 21 December 2018).
Chang, Y. (2013) 'Factors affecting airport access mode choice for elderly air passengers', *Transport Research Part E: Logistics and Transportation Review*, 57(1). pp. 105-112.
Coogan, M. (2008) *Ground Access to Major Airports by Public Transportation*. Washington D.C.: Transportation Research Board.
Cornwall Airport. (2015) *Cornwall Airport Newquay Masterplan 2015-2030*. Available at: https://www.cornwallairportnewquay.com/uploads/downloads/Cornwall-Airport-Newquay-Masterplan-2015-2030.pdf (Accessed: 20 December 2018).
De Gruyter, C., Rose, G., Currie, G., Rye, T., & Van de Graaff., E (2018), Travel plans for new developments: a global review, Transport Reviews, 38:2, 142-161, DOI: 10.1080/01441647.2017.1322643
Economic Research Centre. (2003) 'Airports as Multimodal Interchange Nodes', *European Conference of Ministers of Transport: One Hundred and Twenty Sixth Round Table on Transport Economics.* Paris, 20th-21st March. Paris: Economic Research Centre, pp. 123. Available at: https://www.itf-oecd.org/sites/default/files/docs/05rt126.pdf (Accessed: 12 March 2019).
Gatwick Airport (2016) *Consultation on Issues affecting passengers' access to UK airports: a review of surface access (CAP1364).* Available at: https://www.caa.co.uk/WorkArea/DownloadAsset.aspx?id=4294982957 (Accessed: 19 December 2018).
Gokasar, I. and Gunay, G. (2017) 'Mode choice behaviour modelling of ground access to airports: A case study in Istanbul, Turkey', *Journal of Air Transport Management*, 59, pp1-7.
Gorecka, A. (2016) 'Factor influencing passengers' choice of transport mode to Warsaw Chopin Airport', *Logistics and Sustainable Transport*, 7(1), pp. 51-57.
Gosling, G. (2008) *Airport ground access mode choice models, ACRP Synthesis Report 5.* Washington, D.C: Transportation Research Board of the National Academies.
Gupta, S., Vovsha, P. and Donnelly, R. (2008) 'Air Passenger Preferences for Choice of Airport and Ground Access Mode in the New York Metropolitan Region', *Transportation Research Record: Journal of the Transportation Research Board,* 2042, pp.3-11.
HAL. (2018) *Our Approach to Developing a Surface Access Strategy.* Available at: https://www.heathrowconsultation.com/wp-content/uploads/2018/01/6747-Expansion-Surface-Access-v7-72dpi.pdf (Accessed: 5 March 2019).
Halcomb, E. and Hickman, L. (2015) 'Mixed Methods Research', *Nursing Standard: promoting excellence in nursing care,* 29(32), pp. 41-47.

Harvey, G. (1986) 'Study of Airport Access Mode Choice', *Journal of Transportation* Engineering, 112(5). pp.525-545.
House of Commons. (2016) *Surface Transport to Airport*. Available at: https://publications.parliament.uk/pa/cm201516/cmselect/cmtrans/516/516.pdf (Accessed: 12 March 2019).
House of Commons Transport Committee. (2013) *Aviation Strategy.* Available at: https://www.aef.org.uk/uploads/Transport_Committee_airport_capacity_report.pdf (Accessed: 23 December 2018).
Humphreys, I. and Ison, S. (2005) 'Changing airport employee travel behaviour: the role of airport surface access strategies', *Transport Policy*, 12(1), pp.1-9.
Ionescu, G. (2017) *Transportation and the Environment*. Oakville: Apple Academic Press, Inc.
Ison, S., Humphreys, I., Francis, G. and Rye, T. (2008) 'Airport Car Parking Management: Issues and Policies', *Transportation Research Board 87th Annual Meeting.* Washington, 13-17 January. Available at: https://trid.trb.org/view/847759 (Accessed: 18 December 2018).
Jevons, D., Hoe, T. and Shepherd, M. (2011) 'Understanding customer preferences for airport access: Implications for forecasting', *Airport Management*, 5(3), pp.226-238.
Ji, F., Hangfei, L. Yidian, N. and Shengzhong, H. (2017) 'Share Ratio Change of Public Transport in Airport Landside under the Background of Car Population Rapid Increase—A Case of Shanghai Pudong International Airport', *Transportation Research Procedia*, 25(1), pp. 92-102.
JMP Consultants. (2016) *Travel Plan Monitoring Report from Birmingham Airport, Solihull*. Available at: https://www.birminghamairport.co.uk/media/3393/birmingham-airport-travel-plan-monitoring-report-final-2016.pdf (Accessed: 23 December 2018).
Jones, R. (2017) *The role of improving surface access to enable airports to compete and grow.* London: Department for Transport.
Kazada, A. and Caves, R. (2007) *Airport Design and Operation.* Bingley: Emerald Group Publishing Limited.
Kitzingler, J. and Barbour, R. (1999), *Developing Focus Group Research: Politics, Theory and Practice.* London: SAGE Publications Ltd.
Kouwenhoven, M. (2008) The role of accessibility in passenger's choice of airports. Available at: https://www.oecd-ilibrary.org/transport/the-role-of-accessibility-in-passengers-choice-of-airports_235278552305 (Accessed: 21 December 2018).
Krueger, R. and Casey, M. (2015) *Focus Groups: A Practical Guide for Applied Research*. Singapore: SAGE Publications Asia-Pacific Pte. Ltd. Fifth Edition.
Leeds Bradford Airport. (2016) *Route to 2030 Strategic Development Plan- Surface Access Strategy.* Available at: https://www.leedsbradfordairport.co.uk/about-leeds-bradford-airport/development (Accessed: 20 December 2018).
Liverpool John Lennon Airport (2016) *Surface Access Strategy*. Available at: https://www.liverpoolairport.com/media/1945/ljla-asas-issue-5-july-2016.pdf (Accessed: 12 March 2019).
London Travelwatch. (2015) *Living on the edge: The impact of travel costs on low paid workers living in outer London.* Available at: http://www.londontravelwatch.org.uk/documents/get_lob?id=4100&field=file (Accessed: 21 December 2018).
Losekoot, E. (2015) *Factors influencing the airport customer experience: A case study of Auckland International Airport's customers.* Available at: https://core.ac.uk/download/pdf/56365093.pdf (Accessed: 18 December 2018).

Luton Airport. (2018) *London Luton Airport Surface Access Strategy 2018-2022*. Available at: https://www.london-luton.co.uk/corporate/lla-publications/surface-access-strategy (Accessed: 19 December 2018).
Morgan, D. (1997) *Focus Groups as Qualitative Research*. California: SAGE Publications, Inc.
Newcastle Airport. (2018) *Masterplan 2025*. Available at: https://www.newcastleairport.com/media/1289/new-master-plan.pdf (Accessed: 20 December 2018).
North Somerset Council. (2016) *Development Contributions Supplementary Planning Document.* Available at: https://www.n-somerset.gov.uk/wp-content/uploads/2015/12/development-contributions-supplementary-planning-document.pdf (Accessed: 22 December 2018).
Pasha, M. and Hickman, M. (2016) *Airport Employees Ground Accessibility: Review and Assessment*. Available at: https://atrf.info/papers/2016/files/ATRF2016_Full_papers_resubmission_105.pdf (Accessed: 21 December 2018).
Pels, E., Nijkamp, P. and Rietveld, P. (2003) 'Access to and competition between airports: a case study for the San Francisco Bay area', *Transportation Research Part A: Policy and Practice*, 37(1), pp.71-83.
Pereira, A., Oliveira, L. and de Souza, A. (2016) 'Changing the road transport for a rail transport to access a Brazilian Airport', *The Journal of Transport Literature,* 10(2), pp.15-19.
PeterBrett. (2018) *Figures & Drawings.* High Wycombe: PeterBrett.
Preece, S. (2016) *Response to consultation on issues affecting passengers' access to UK airports.* Available at: https://www.caa.co.uk/WorkArea/DownloadAsset.aspx?id=4294982946 (Accessed: 13 April 2019).
Ricard, D. (1995) 'Challenges in Developing an Airport Employee Commute Program: Case Study of Boston Logan International Airport', *Transportation Research Board, 1506,* pp. 70-81.
Ricard, D. (2012) *Exploring Airport Employee Commute and Parking Strategies.* Washington, D.C.: Transportation Research Board of the National Academies.
Ricondo and Associates, Inc., DMR Consulting. and Resource Systems Group, Inc. (2010) *Handbook to Assess the Impacts of Constrained Parking at Airports*. Transportation Research Board: Washington D.C.
Roby, H. (2010). Workplace travel plans: past, present and future. Journal of Transport Geography, 18(1), 23-30.
Ryley, T., Elmirghani, J., Budd, T., Miyoshi, C., Mason, K., Moxon, R., Ahmed, I., Qazi, B. and Zanni, A. (2013) 'Sustainable Development and Airport Surface Access: The Role of Technological Innovation and Behavioural Change', *Sustainability,* 5(1).
Scottish Government. (2003) *Barriers to Modal Shift*. Available at: https://www2.gov.scot/Publications/2003/09/18178/26365 (Accessed on: 11 December 2018).
Singh, R, and Mangat, N. (1996) *Elements of Survey Sampling.* Berlin: Springer-Science+Business Media, B.V.
Stangel, M. (2018) *Airport City- an Urban Design Question*. Gliwice: Helion.
Tam, L., Tam, L. and Lam, W. (2005) 'Analysis of Airport Access Mode Choice: A Case Study in Hong Kong', *Journal of the Eastern Asia Society for Transportation Studies,* 6(1), pp. 708-723.

Tam, M., Lam, W. and Lo, H. (2008) 'Modeling air passenger travel behavior on airport ground access mode choices', *Transportmetrica,* 4(2). pp.135-153.
Transport Focus. (2019) 'Coach industry can do more to attract new passengers, says watchdog', *Transport Focus,* 1 March. Available at: https://www.transportfocus.org.uk/news-events-media/news/coach-industry-can-attract-new-passengers-says-watchdog/ (Accessed: 3 April 2019).
Tsamboulas, D., Evmorfopoulos, A. P., & Moraiti, P. (2012) 'Modeling airport employees commuting mode choice', *Journal of Air Transport Management*, 18(1), pp.74–77.
Vaughn, S., Schumm, J. and Sinagub, J. (1996) *Focus Group Interviews in Education and Psychology.* California: SAGE Publications, Inc.
Wegner, T. (2008) *Applied Business Statistics: Methods and Excel-based Applications.* Cape Town: Juta and Co. Second Edition.
West of England Councils (2017) *South Bristol Link: What and Why*. Available at: https://www.n-somerset.gov.uk/my-services/parking-travel-roads/roads/road-improvement-schemes/sbl/ (Accessed: 17 December 2018).
Winters, M., Buehler, R., & Götschi, T. (2017). Policies to promote active travel: evidence from reviews of the literature. Current environmental health reports, 4(3), 278-285.
Zhang, L. and Bian, T. (2017) *Forecast of Large Airport Access Mode Choice Based on Nested Logit Model.* Available at: https://ascelibrary.org/doi/10.1061/9780784480915.459 (Accessed: 20 December 2018).