London Luton Airport Staff Travel Survey

Quantitaive Analysis

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London Luton Airport's Staff Travel Survey – Quantitative Analysis

Understanding the travel behaviour of London Luton Airport (LLA) staff is crucial for promoting sustainable travel practices. The aim of quantitative analysis is to find influencing factors in choosing sustainable transport modes compared to car and provide practical recommendation for sustainable behaviour change to shift staff from car to more sustainable modes.

1. Data and Sample

The required staff travel data were collected by the Surface Access Team at LLA, resulting in a total sample size of **1,402** participants. However, a significant portion of the participants lacked socio-demographic information (522 participants), and 144 participants did not provide consent for their data to be used.

During the data cleaning process, we first removed participants who did not specify their main mode of commuting, those who did not give consent, and those with missing socio-demographic information. This cleaning process resulted in a final sample size of **863** responses (in terms of sample that we decided to take forward). Table 1 shows the detailed characteristics of the sample.

Table 1. Sample characteristics

		N	Marginal Percentage
Commute_MainMode_4Cat)	Car (all fuel types)	556	64.4%
	Public Transport (Bus, Rail)	154	17.8%
	Micro Mobility (Walk, Cycle, Scoot, Motocycle, Moped)	15	1.7%
	Multimode (Car+OtherModes)	138	16.0%
Female	Male	486	56.3%
	Female	377	43.7%
Ethnicity_White	Non-white	256	29.7%
	White	607	70.3%
Car_Acce_Ownership	No	146	16.9%
	Yes	717	83.1%
Veh_Acce_Ownership_Multimodal	No	715	82.9%
	Yes	148	17.1%
StaffTravelCard_Possession	No	716	83.0%
	Yes	147	17.0%
Work_Company	Other companies	499	57.8%
	LLA Operations Limited	364	42.2%
Depart_22pm-6am	No	622	72.1%
	Yes	241	27.9%
Cycle-to-work_Scheme	No	591	68.5%
	Yes	272	31.5%
Liftshare_Scheme_Interest	No	605	70.1%
	Yes	258	29.9%
Work_f_Home	No	638	73.9%
	Yes	225	26.1%
Valid		863	100.0%

As seen in Table 1, the final sample of 863 valid responses from the LLA staff travel survey reveals interesting insights into the age and gender distribution of the participants. The data shows a fairly balanced gender representation, with **females** making up **44%** and **males 56%** of the sample.

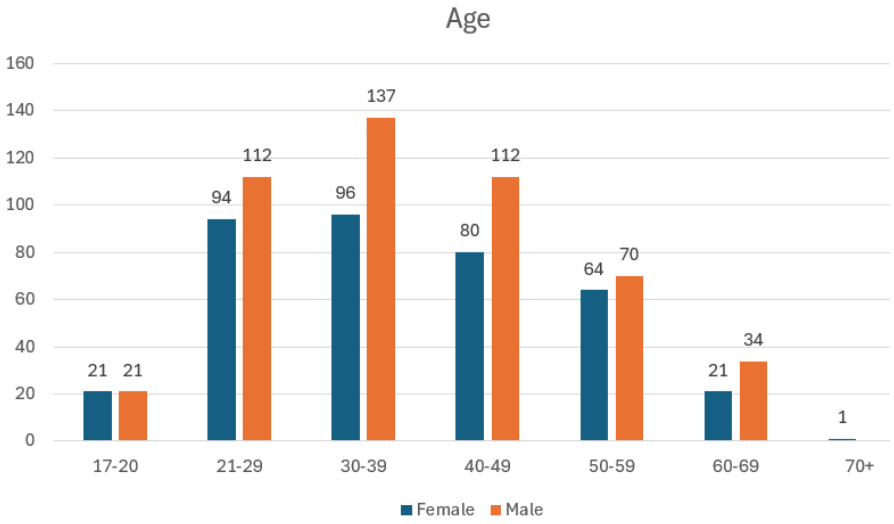

Figure 1. Age groups categorised by gender

In terms of age distribution, the **30-39 age group is the largest age group** (27% of the total sample) followed by the 21-29 age group (23.9%), 40-49 age group (22.2%), 50-59 age group (15.5%), and the 60-69 age group (6.4%). The youngest age group, 17-20, comprises 4.9% of the sample. This distribution highlights a diverse workforce at London Luton Airport, with a significant representation across various age groups and a slightly higher proportion of male participants.

The commute travel time data for the LLA staff provides a detailed look at how long employees spend traveling to work, broken down by gender, as seen in Figure 1.

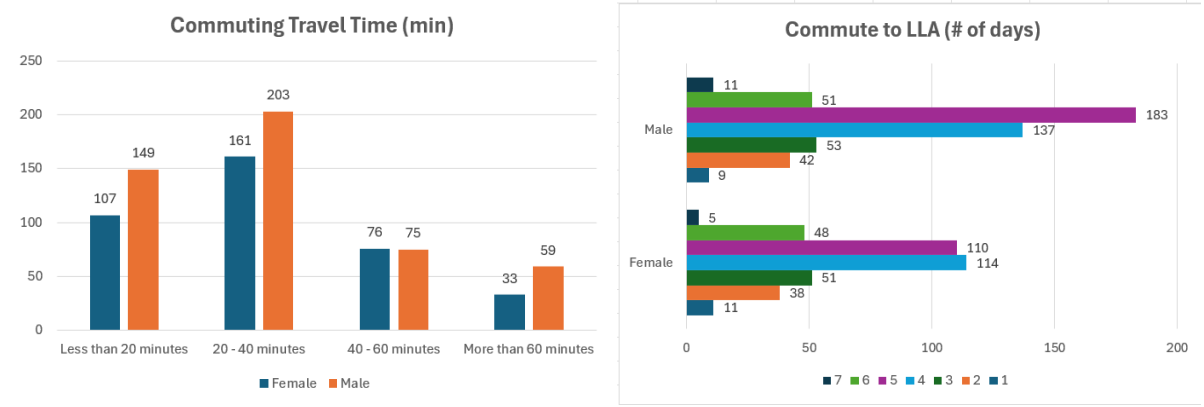

Figure 2. a) commuting travel time (minutes), b) number of commuting days.

Figure 2a indicates that the majority of the staff (71.9%) have a commute time of 40 minutes or less, with a slightly higher number of males having shorter commutes compared to females. The data also highlights that a smaller portion of the workforce (10.7%) endures a commute of over an hour, which could be a point of consideration for workplace policies aimed at improving employee well-being and productivity.

Figure 2b shows that most staff members (63.03%) commute to LLA four or five days a week, with a higher number of males commuting five days a week compared to females. The data also highlights that a smaller portion of the workforce commutes less frequently, which could be due to part-time work schedules or remote working arrangements.

Figure 3. a) Monthly travel cost (£), b) Monthly parking cost (£).

Below are other characteristics regarding the sample:

Staff Travel Card Awareness and Possession

A significant majority of the sample (61.1%) are aware of the staff travel card. Despite high awareness, only 17.0% of our sample actually possess a travel card. This indicates a gap between awareness and actual usage that could be addressed through targeted initiatives.

Interest in Airport Lift-share Scheme

About 30% of the sample (115 females and 143 males) expressed interest in the airport lift-share scheme, suggesting a potential for increased participation if the scheme is promoted effectively. However, 48.8% of the sample (169 females and 252 males) are not interested, which highlights the need for understanding and addressing the barriers to participation.

LLA DART (Direct Air-Rail Transit) Awareness and Usage

A high percentage of staff (75.4%) are aware of the LLA DART system, with 294 females and 357 males knowing about it. Despite this awareness, only 16.6% of the staff use the LLA DART, with 63 females and 80 males utilizing it. The majority (83.4%) do not use the system, indicating a significant opportunity to increase usage through targeted campaigns and incentives.

Only a small fraction of staff use the LLA DART frequently, with 5.3% using it 4+ days a week and 1.9% using it 3 days a week. The majority of the staff (83.4%) never use the LLA DART, which suggests that there are significant barriers to its adoption that need to be addressed.

2. Method

For quantitative analysis, a statistical analysis method i.e. Multinomial Logistic Regression (MLR) is used to model outcomes with more than two possible discrete outcomes. In the context of our study on sustainable travel behaviour change among LLA staff, MLR can help identify the factors that influence different travel behaviours.

In this project, main transportation modes that staff use for commuting to work was selected as the dependent variable. To make analysis easy to interpret, we categorised transportation modes into four categories as follows:

1. **Car (all fuel types)**: 64.4% of respondents primarily commute using cars.
2. **Public Transport**: 17.8% of respondents use public transport.
3. **Multimode**: 16.0% of respondents use sometimes car and sometimes other modes, or more than one mode for commuting to work).

4. **Micro Mobility (Walk, Cycle, Scooter, Moped, Motorcycle)**: Only 1.7% of respondents use these micromobility modes, indicating very low adoption.

Cars (particularly single-occupancy vehicles) are typically considered the least sustainable commuting mode. In this project, **Car (All Fuel Types)** was selected as a reference category in MLR analysis because selecting **car** as the reference allows us to measure how other, more sustainable modes (e.g., Public Transport, Micro Mobility, Multimode) differ relative to car use. Therefore, we can:

- Measure the likelihood of individuals using sustainable modes (Public Transport, Micro Mobility, Multimode) relative to car use.
- Identify significant factors influencing shifts away from car dependency, which is often the primary goal in sustainable travel behaviour studies.

In this project, key independent variables are Socio-demographic characteristics, Employer and Work Schedules, Sustainability-Related Schemes, and Work from Home (WFH).

- **Gender**: Male: 56 %, Female: 44 %
- **Ethnicity**: White: 70 %, Non-white: 30 %.
- **Car Access/Ownership**: Yes: 83 %, No: 17 %.
  High car ownership suggests significant car dependence.
- **Multimodal Vehicle Ownership**: Yes: 17 %, No: 83 %.
  Most respondents do not own or access to more than one vehicle potentially limiting flexibility.
- **Staff Travel Card Possession**: Yes: 17 %, No: 83 %.
  The low possession rate of travel cards might reduce the likelihood of using public transport.
- **Employer**: LLA Operations Limited: 42 %, Other Companies: 58 %.
- **Shift Work (22:00–06:00)**: Yes: 28 %, No: 72 %.
  Almost 30% of respondents work night shifts, which could affect access to public transport or preferences for private modes.
- **Cycle to Work Scheme**: Yes: 31.5%, No: 68.5%.
  About one-third of respondents are enrolled in this scheme, showing some interest in cycling.
- **Lift-share Scheme Interest**: Yes: 20 %, No: 70 %.
  Low interest in LLA lift-share schemes suggests that uptake might need incentives or awareness campaigns.
- **Work from Home:** Yes: 26 %, No: 74 %.
  A quarter of respondents has the possibility to work from home.

3. Results and Recommendations for Travel Behaviour Change

The **Goodness-of-Fit metrics** in logistic regression, specifically the Pearson Chi-Square and Deviance, evaluate how well the model fits the data by comparing the observed and predicted values. Both the Pearson and Deviance statistics indicate a good model fit (P-value > 0.05). Other tests result such as Cox and Snell, Nagelkerke, and McFadden R-Square also proof that the model fits well and explains a significant portion of the variability in the outcome.

The **Likelihood Ratio Tests** provides key information about the significance of each predictor variable in our multinomial logistic regression model. According to this test, **significant predictors** are Monthly travel cost, Ethnicity, Car Access/Ownership, Multi vehicle Access/Ownership, Staff Travel Card Possession, Cycle to work scheme subscription, and interest to use lift-share scheme. **Non-significant predictors** are Age, Gender, Disability, Access to DART, Employer (company), Departure time (between 22:00 and 6:00), possibility to work from home.

The **Parameter Estimates** provides detailed insights into how different predictors influence the odds of choosing each alternative mode of transport (**Public Transport, Micro Mobility, and Multimode**) relative to the reference category (**Car**). Here is a breakdown of the key points for interpretation:

1. Public Transport (Local Bus, Coach, Train):

- **Monthly Commuting Cost (B = -0.318, Exp(B) = 0.728, p < 0.001)**:
  - Higher commuting costs significantly reduce the odds of using public transport. Lowering costs (e.g., subsidies) could increase adoption.
- **Commuting Travel Time (B = 0.540, Exp(B) = 1.716, p = 0.001)**:
  - Longer travel times increase the odds of using public transport, suggesting that some users may prefer public transport for longer commutes (potentially for comfort or cost savings).
- **Car Access/Ownership (B = 5.582, Exp(B) = 265.521, p < 0.001)**:
  - Car ownership dramatically increases the odds of sticking to car usage, underscoring the challenge of shifting car owners to public transport.
- **Staff Travel Card Possession (B = -1.523, Exp(B) = 0.218, p < 0.001)**:
  - Not having a staff travel card significantly reduces the odds of using public transport. Promoting travel card possession could encourage a shift.
- **Cycle to Work Scheme (B = 1.104, Exp(B) = 3.017, p = 0.003)**:
  - Participation in the scheme increases the odds of using public transport, indicating that such programs may enhance broader sustainable travel habits.

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2. Micro Mobility (Walk, Cycle, Scooter, Moped, Motorcycle):

- **Monthly Commuting Cost (B = -0.421, Exp(B) = 0.656, p < 0.001)**:
  - Higher commuting costs reduce the odds of using micro-mobility options, similar to public transport.
- **Car Access/Ownership (B = 7.594, Exp(B) = 1985.608, p < 0.001)**:
  - Car ownership has an overwhelming negative impact on the likelihood of adopting micro-mobility, which is consistent with the dominated car use.
- **Multi-vehicle Access/Ownership (B = -2.862, Exp(B) = 0.057, p = 0.007)**:
  - Not having access to different means of transport strongly reduces the likelihood of choosing micro-mobility, highlighting the importance of making such vehicles available.

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3. Multimode (Car and Other Modes):

- **Monthly Commuting Cost (B = -0.113, Exp(B) = 0.893, p = 0.010)**:
  - Higher costs slightly reduce the odds of using multimodal transport.
- **Car Access/Ownership (B = 2.438, Exp(B) = 11.454, p < 0.001)**:
  - Car ownership increases the odds of using multimodal transport, likely because car users are more likely to combine car trips with other modes.
- **Ethnicity (B = 0.680, Exp(B) = 1.975, p = 0.005)**:
  - Being White increases the likelihood of using multimodal transport, suggesting demographic differences in preferences.
- **Staff Travel Card Possession (B = -1.474, Exp(B) = 0.229, p < 0.001)**:
  - Not having a travel card significantly reduces the odds of multimodal transport use, as with public transport.

- **Cycle to Work Scheme (B = 0.691, Exp(B) = 1.997, p = 0.011)**:
    - Participation in this scheme increases the likelihood of using multimodal transport.
- **Interest to Use Lift-share Scheme (B = -0.588, Exp(B) = 0.555, p = 0.010)**:
    - Lack of interest in lift-sharing reduces the odds of multimodal transport use, suggesting such schemes can support multimodal shifts.
- **Work from Home (B = 0.655, Exp(B) = 1.925, p = 0.034)**:
    - Working from home slightly increases the odds of using multimodal transport, possibly due to a more flexible schedule enabling diverse transport choices.

Summary of Key Influencers and Recommendations for Behaviour Change:

- **Target High-Impact Factors**:
    - **Cost and Travel Time**: Offer subsidies or discounts for sustainable modes such as public transport and micromobility modes and improve travel time efficiency through dedicated infrastructure or priority measures (e.g., bus lanes).
    - **Car Ownership**: Develop policies to reduce dependence on personal vehicles, such as parking fees or incentives for non-car ownership.
- **Promote Multimodal Transport**:
    - Increase the availability and visibility of multimodal options, such as bikes and scooters, and integrate them with public transport, particularly for suburban and rural staff.
    - Improve the integration of transport modes (e.g., park-and-ride, and park-and-pool schemes).
- **Expand Staff Travel Card Programs**:
    - Increase adoption through awareness campaigns or incentives.
    - Encourage staff travel card use by subsidising or automating distribution, particularly among staff who currently rely on cars.
- **Enhance Lift-Share and Cycle to Work Schemes**:
    - The Cycle to Work and Lift-share schemes have low engagement. Improving communication, offering financial benefits, and incorporating these into workplace policies could boost participation.
    - Invest in cycling infrastructure and continue promoting participation.
    - Highlight environmental and financial benefits to increase participation in these schemes.
- **Address Ethnic Differences**:
    - Conduct follow-up studies to understand barriers or preferences in different demographic groups and tailor interventions accordingly.
- **Improve Public Transport Accessibility**:
    - Though not statistically significant, accessibility improvements (e.g., route coverage, frequency) may still have a practical impact on adoption. Only 17.8% of respondents use public transport despite its potential for sustainability. Addressing barriers such as schedule alignment with shifts, affordability, and coverage might help.

- **Promote Micro Mobility:**
    - With just 1.7% adoption, targeted infrastructure (e.g., safe cycling paths) and incentives (e.g., discounts on e-scooters) can increase micro-mobility use.

- **Target Night-Shift Workers:**
    - Ensure that public transport options are available late at night or provide employer-sponsored shuttles for this group.