GROUND ACCESS MODE CHOICE FOR TWO MAJOR AIRPORTS IN SOUTHERN BRAZIL

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ABSTRACT

This paper aims to present a study on ground access mode choice for Brazilian airports. To this aim the Multinomial Logit (MNL) choice model was used. A survey was carried out at Salgado Filho and Hercílio Luz airports, two of the major airports in southern Brazil, to calibrate an MNL choice model. The results show the predominance of private cars as the mode choice for passenger arrival or departure, followed by taxis, out of the alternatives chosen for ground access by air passengers. The models used were composed of the variables: travel time and cost of mode alternatives or cost divided by family income, which show statistical consistency and coherence in the signs of their coefficients. It is expected that these models will be of use to urban planners, in studies relating to other Brazilian airports with similar characteristics.

KEYWORDS

Airport ground access mode; multinomial logit choice model.

1. INTRODUCTION

In general, airports are complex systems, some of the reasons being the diversity of their users: passengers and the people accompanying them, air company crew and administration staff, visitors etc., the inter-relations between them and the different modes of transport used for arrival at and departure from airports.

Airports are one of the principal Traffic Generator Centers in urban areas and, as a consequence of the great number of road trips which they attract, they cause a significant impact on the ground access system and need a high number of parking space.

The mode choice is one of the most important stages in transport planning and is fundamental in the study of the demand for ground access to airports, permitting an adequate dimensioning of the ground access for these projects, as well as providing alternative means to attend the demand for ground access to airports, along with the diverse transport facilities which they require.

Thus, this study aimed to investigate the ground access modes of air passengers to Brazilian airports, with a case study of Salgado Filho - Porto Alegre and Hercílio Luz - Florianópolis airports, through the calibration of the Multinomial Logit model, from surveys and making use of data obtained from interviews in the research carried out by Goldner (2002), at the airports mentioned.

2. MOTIVATION

Specifically, due to its Traffic Generator characteristic the airport is an attracter and generator of ground trips, causing in many cases, flow and safety problems in the surrounding traffic.

Along with this marked characteristic, is the fact that most Brazilian cities have transport planning deficiencies, worsened by a growth in urban populations and car fleets in recent years.

It can be observed that transport problems in ground trips have increased significantly, with implications also for the flying part of the trip, resulting in possible delays and discomforts for passengers prior to their take off.

Also, in the expansion or construction of a new airport, the land accesses normally demand the application of significant investments in the expansion of the road system or the building of overpasses, which is another reason for this study to be carried out.

A prior knowledge of the choice of ground access mode on the part of the transport planner, and the consequent forecast of the number of car trips, allows an estimate to be made which is more realistic to the demand, as well as the appropriate planning of parking lots, taxi stands, spaces for pick up and drop off points along the curb, bus stops etc.

In relation to the use of the Logit model, this has been shown over the years to be one of the most efficient tools in the study of mode choice, according to the disaggregated approach. Thus, the application of the Logit model to the study of mode choice at Salgado Filho and Hercílio Luz airports represents a powerful instrument in planning, given the importance of these airports in the Brazilian scenario, and more specifically, in southern Brazil.

Recent construction works of great importance have been carried out with interventions in the road access, in relation to the construction of the new passenger terminal at Salgado Filho airport and the project for the expansion of Hercílio Luz airport where the design of a new passenger terminal is in its final stages.

It is believed that these studies on mode choice will assist in the verification of the estimated demand and the performance levels of the road system, and will enable the monitoring of the future growth in demand. Also, the models developed and the experience acquired may aid in the study of other Brazilian airports with characteristics similar to those analyzed here.

3. BASIS FOR RESEARCH

The mode division, mode choice or mode partition may be defined as the proportional division of the total trips made by people, out of the different modes of travel, as described by Bruton (1979). That is, it can be expressed numerically as a fraction, ratio or percentage of a total number of trips.

Among the choice models used in transport planning, the behavioral models should be highlighted, which seek to establish cause and effect relations between the principal attributes of transport systems and the possible decisions to be adopted by the user. These causal relations are established through the consumer economics theory, associated with the concept of utility (function utility).

One of the most well known and used disaggregated behavioral models is the Logit Model, which has been exhaustively detailed by Domencich and Mac Faden (1975) and presented in the international literature by Ortuzar and Willusen (1990), as well as by Neves (1990) in the Brazilian literature.

In relation to studies on mode choice at airports, Ruhl and Trnavskis (1998) have established a relation between the mode of transport chosen and the annual volume of passengers, for a sample of American airports, showing the predominance of car trips, which represent around 90% for airports with a million or less passengers per year, 83% for those between one and ten million passengers per year and 73% for those with more than 10 million passengers per year.

Keefer (1966) studied trips originating from or destined for ten American airports. For the latter, in trips destined for the airport, the proportion of journeys by 'car as driver' varied between 52% and 82% and of trips by 'car as passenger' varied from 16% to 42%. The proportion of trips by public transport varied from 0% to 14% and those by taxi were 1% to 4.1%. He also studied the

mode choice by sub-dividing the sample according to the trips made to airports by staff, visitors and air passengers, and also by the user's gender.

In relation to the mode of transport used in the ground journey, most of the staff's trips were made by 'car as driver', and the percentage varied from 68% to 91%. The percentage of journeys by 'car as passenger' was low, from 5% to 22%. For the journeys of visitors by 'car as driver', these varied from 16% to 38%, while that for visitors by 'car as passenger' varied from 54% to 83%. For the air passengers the average was 66% by 'car as driver', with a variation from 39% to 84%. By 'car as passenger' the average was 27%, with a variation from 8% to 49%.

Public transport (including limousines and intercity buses) basically served the air passengers resident in the city, rather than non resident, with an average around 5%. Taxis represented, however, a higher proportion in the latter case, of 10%.

Regarding the mode of transport by user gender, for men the predominance was by 'car as driver', an average of 77% with a variation from 72% to 89%. Only 18% used the 'car as passenger' and 6% public transport (including taxis). In this research, women used more the 'car as passenger' (51%) more than the 'car as driver' (35%). Their use of public transport was almost 10%.

With regard specifically to the study of the mode of ground access to airports through the application of the Logit model, Harvey's study (1986) on the airport of San Francisco should be highlighted. The aim of the author was to study the characteristics of the access mode for local residents who were air passengers. The analysis showed that the air passengers are highly sensitive to the access journey time. Separate models were developed for business and non business trips. In the study, with the application of the Multinomial Logit model, five alternative ground access modes were considered: car as driver, car as passenger, local public transport, public transport exclusive to the airport and taxi.

Another study to highlight in relation to this subject is the work of Monteiro and Hansen (1996), who studied three airports located in San Francisco Bay, with the application of the Hierarchical Logit model in the selection of the airport and the Multinomial Logit model for the study of the mode of access to the international airport of San Francisco. The study took into consideration the purpose of the trip (business and non business) and the place of residence (resident or non resident in the city) in the model development. They studied six alternative modes of road access: car as driver, car as passenger, taxi, van, public transport exclusive to the airport and local public transport.

The Multinomial Model was applied in Brazil for the analysis of the choice of air corridor between Rio de Janeiro and São Paulo in a study carried out by Del'Valle y Araújo (1988), as part of a final course project at the Instituto Tecnológico de Aeronáutica (ITA - Technological Institute of Aeronautics). In his study, he tried to obtain the function of the choice, in the connection between origin and destination, made between the ground access mode and the departure and arrival airports of the passengers of the air transport linking Rio - São Paulo, taking into account gender, purpose of the trip and passenger's income, along with the travel costs and times for the respective modes of ground access (arrival and departure).

4. SAMPLE CHARACTERISTICS

The raw data for the calibration of the models was obtained from interviews with users of Salgado Filho airport, located in the city of Porto Alegre, and Hercílio Luz airport in the city of Florianópolis, carried out in the research: "An analysis of airports as Traffic Generator Centers" of Goldner (2002). Most of the data obtained through the questionnaires can be used in this study with regard to the mode choice, giving continuity to this line of research.

4.1. Salgado Filho airport

For the Salgado Filho airport the sample studied comprised 400 interviews (August and September 2000), of which 44% were departure passengers and 23% were arrival passengers at the airport, the rest being passengers in transit, staff, visitors and accompanying people. Domestic flights represented the majority of the total passengers, with 83.29%. The main purpose of the trips was business, representing 61.77%.

Of the 400 interviews, only departure and arrival passengers at the airport were selected, which represented a total of 257 interviews. The mode choice of passengers observed in the sample is presented in the following table.

Table 1: Mode choice of passengers – Salgado Filho

Mode (%)	Car as driver	Car as passenger	Taxi	Public Transport
Business	12.20	46.70	38.30	2.80
Non Business	6.50	57.10	28.60	6.50
Total	10.50	49.81	35.41	4.28

As can be seen above, the main means of transport used by the passengers at Salgado Filho airport was the 'car as passenger', followed by taxi.

4.2. Hercílio Luz airport

For Hercílio Luz airport the sample also comprised 400 interviews. Two hundred for the peak period (February 2001) and 200 for the normal period (April 2001). This grouping was made because the city of Florianópolis has an expressive seasonability, due to the increase in tourism in the summer months. Each of these periods had distinct peculiarities. For the peak period, 50.50% of departure passengers, 17% of arrival passengers and 6.50 % of passengers in transit were observed, the rest of the sample being made up of staff, visitors and accompanying people. For the normal period there were 57.07% of departure passengers, 19.70% of arrival passengers and the remainder represented 23.23%.

Of the 400 interviews carried out 267 air passengers were selected, including both peak and normal periods. The distribution observed by means of ground transport by passengers is shown in the following tables.

Table 2: Mode choice of passengers – Hercílio Luz, peak period

Mode (%)	Car as driver	Car as passenger	Taxi	Public Transport	Van
Business	18.2	51.5	30.3	0	0
Non business	10.5	49.5	23.2	10.5	6.3
Total	12.5	50.0	25.0	7.8	4.7

Table 3: Mode choice of passengers – Hercílio Luz, normal period

Mode (%)	Car ass driver	Car as passenger	Taxi	Public Transport	Van
Business	19.7	28.9	40.8	6.6	3.9
Non business	15.9	47.6	25.4	7,9	3.2
Total	18.0	37.4	33.8	7.2	3.6

Table 4: Mode choice of passengers – Hercílio Luz, global period

Mode (%)	Car as driver	Car as passenger	Taxi	Public Transport	Van
Business	19.3	35.8	37.6	4.6	2.8
Non business	12.7	48.7	24.1	9.5	5.1
Total	15.4	43.4	29.6	7.5	4.1

It can be seen that for the passengers of Hercílio Luz airport the principal means of transport was 'car as passenger', followed by taxi. However, an exception is the business trips during the normal period, where the taxi is the principal means of transport and for the total sample, where the taxi has a slightly higher percentage of use.

In relation to the average family income for both airports, grouped by means of transport, the values found are shown in the following table.

Table 5: Average family income for passengers by means of transport.

Average Income (R$/month)	Car as driver	Car as passenger	Taxi	Public Transport	Van	Total
Salgado Filho	6,126.69	5,519.76	5,665.40	4,361.84	-	5,585.53
Hercílio Luz	4,048.46	3,215.54	3,411.73	3,384.29	4,488.82	3,466.59

Remark: September 2000 – 1USD$=R$1.843 and April 2001 – 1USD$=R$2.184

In general, it is observed that the family income of the passengers of Salgado Filho airport is at least 50% higher than that of Hercílio Luz airport, not only in the total but also in grouping by means of transport used, with the exception of public transport where the income was only 28% higher.

5. MULTINOMIAL LOGIT MODEL

5.1. Putting together the database

Based on the questionnaires, two-phase charts were created. In the first phase, from all of the interviews only air passengers (departure or arrival) from the two above mentioned airports were selected, who used the following means of transport: car as driver, car as passenger, taxi, bus or van. In the second phase, charts were created taking into account the reason for traveling, subdivided into two types: business and non business.

In order to calibrate the model and to process the data collected in the interviews with the passengers of the respective airports, worksheets were designed to obtain the values for the variables travel time (T) and travel cost (C) or the cost over income (C/I), corresponding to the alternatives of means of transport used and rejected by the individual.

Thus, the length of the trip was the first item taken into account. It was obtained by measurements taken on city maps of Florianópolis and Porto Alegre, through the software Autocad, the respective distance from the origin of the trip, represented by the address supplied by the interviewee, up to the airport for the departure passenger, or from the airport up to the travel destination in the case of the arrival passenger, not only inside, but also outside, the metropolitan area where the above mention airports are located.

From the distance obtained in kilometers, measured on the map, and the travel time (in hours), taken directly from the questionnaire, the travel speed average was calculated through Equation 1, for each individual, by mode of transport as was the average speed for the sample, also by mode.

$$\bar{v} = \frac{\text{Distance}}{\text{travel time}} \qquad \text{[Km/h]} \qquad (1)$$

5.1.1. Travel Cost (C) variable

In order to carry out the calibration of the Multinomial Logit model, considering the travel cost as one of the variables studied, it was necessary to estimate the value not only for the alternative chosen by the user to get to the airport, but also the cost of the alternatives rejected, that is, the costs of the other means of transport which could have been used as the chosen option for the access mode.

Since the study considered five transport alternatives: car as driver, car as passenger, taxi, bus and van, it was necessary to present the costs of these alternatives, whether they were chosen or not.

The calculation of the cost (C) for the car mode, for a one-way trip, was obtained through the product of consumption per kilometer (LKM), distance traveled (Km) and the fuel prices (R$/Lt), added to the parking fee. The fuel consumption in liters per kilometers traveled was obtained through Equation 2, which was developed for national cars, in a study carried out by Santos (1980).

$$LKM = 1{,}26643 / V_{avg} - 0{,}00029 \times V_{avg} + 0{,}09543 \qquad (2)$$

where LKM: fuel consumption per Km [Lt/Km]
V_{avg} : average speed of the journey [Km/h]

In order to obtain the total cost of the car alternative, the cost of the parking, given by the interviewee or obtained from the table supplied by the parking administration company at each airport, was also considered, for parking lots both inside and outside the airport, according to whether the parking was of long or short term duration, for situations of car as driver or passenger, respectively.

For the individuals who arrive at the airport by taxi, the estimated travel cost adopted was the value which would be paid as the fare, given by the meter values, indicated in Table 6.

Table 6: Value of Taxi Fares

Airport	Cost of taxi - Fares CT (R$)	Price per Km Driven PKD (R$/Km)	Meter M (R$)	Return R (R$)
Hercílio Luz	CT= PKD x Distance + (M+R) *	1.07	2.14	4.28
Salgado Filho	CT= PKD x Distance + M **	1.29	2.58	-

Source: (*) Núcleo de Transportes de Florianópolis (Transport Nucleus of Florianópolis - period 01 to 05/2001)
(**) Associação de Transportes da Região Metropolitana de Porto Alegre (Transport Association of the Metropolitan Region of Porto Alegre - period 07 to 09/2000)

The meter value considered was from 06:00 to 22:00 which was the time for which the research data was obtained.

In the case of the bus as a rejected alternative the respective costs were obtained through the fares applied during that period, supplied by the organs responsible, taking into account the place of origin and the airport destination. Their calculation took into account the number of bus line trips estimated for arrival at the airport and the corresponding fares for each one.

In the case of the individuals traveling from other cities of the states (outside the metropolitan region), the trip was considered in two phases: the first, the trip made by bus to the bus station in the city where the airport is located, and second, from the bus terminal to the airport, carried out by rented car, taxi, local bus or van, according to the cases cited by the passenger in the interview.

The cost corresponding to the rejected van alternative, in the case of the individuals who would carry out the trip by this means, was given by the applied rental rate in the region for this type of transport, obtained through a survey of several companies offering this service.

5.1.2. Travel Time (T) variable

In a similar manner, the value for the travel time variable was presented for the chosen alternative as well as the rejected alternatives.

In relation to the travel time, for individuals whose choice was the car, this was obtained directly from the questionnaire, converting the information from minutes into hours. The same journey time was considered for the choices taxis and vans. The inclusion of this latter mode in the approach to equal times is appropriate, because in these cases the type of van which works as tourism transport or is rented, and not the form of transport which has stops along its route, was adopted.

For the individuals who would chose the bus as the means of transport for arrival at the airport, the travel time was obtained through the distance of the trip to the airport and the average speed of the bus along the route, also including the extra time estimated for waiting at the bus stop.

In order to calibrate the Multinomial Logit model, out of the classic variables given for travel cost (C) to be included in the model, its replacement by the variable (C/I), defined as the travel cost divided by the family income for the individual, was also evaluated. According to studies carried out in developing countries, this variable has been shown to be more explicative than simply using the travel cost (see Goldner, 1994). Thus, in the worksheet the C/I variable was multiplied by 100 to obtain higher numbers, with a decimal scale factor in the elimination of zeros.

It should also be noted that, in order to design the worksheets they were divided into the categories 'Business' and 'Non Business', according to the purpose of the air trip, and for the specific case of Hercílio Luz airport they were subdivided into peak (January and February) and normal (March and April) periods. For Salgado Filho airport this division was not necessary, since the period in which the research was carried out covered the normal period (August and September) because this airport does not have such an accentuated seasonability as the one previously mentioned.

5.2. Model Specifications

Five transport alternatives were studied: first - car as driver (driver), second - car as passenger (passenger), third - taxi, fourth - bus and fifth - vans. Thus, the theoretical model calibrated had the following specification:

$$Ui = \beta i0 + \beta 1\ Ti + \beta 2\ C/Ii \qquad (3)$$

where Ui: utility function of the alternative chosen as mode of transport,
Ti: travel time from origin to airport or from airport to destination,

C/Ii: travel cost/family income or simply cost of trip (C).
β : model coefficients.

Thus, the following Utility Functions can be written:

$$U\ driver = \beta_{10} + \beta_1 T_1 + \beta_2\ C/I_1 \quad (3.1)$$
$$U\ passenger = \beta_{20} + \beta_1 T_2 + \beta_2\ C/I_2 \quad (3.2)$$
$$U\ taxi = \beta_{30} + \beta_1 T_3 + \beta_2\ C/I_3 \quad (3.3)$$
$$U\ bus = \beta_{40} + \beta_1 T_4 + \beta_2\ C/I_4 \quad (3.4)$$
$$U\ vans = \beta_{50} + \beta_1 T_5 + \beta_2\ C/I_5 \quad (3.5)$$

5.3. Model Estimation

Several modeling attempts were made, using the software ALOGIT (Version 2.15) for the calibration, developed by Hague Consulting Group. Taking into consideration the two airports, the total number of models tested was more than one hundred. From the total models obtained in the study with coherent results, the best ones were selected, which were shown to be statistically reliable, that is, with the expected signs (negative) of the variables (T and C or C/I) and passing the Student's t-test, as will be discussed after the presentation of the tables with the respective models.

Table 7: Models for Salgado Filho airport by purpose of trip

Global period – variable T and C/I x10²								
Purpose	Size	ρ^2	β 10	β 20	β 30	β 40	T	C/Ix10²
Business	180	0.1608			0.8510		-7.2080	-2.2620
					(4.7)		(-3.7)	(-5.1)
Non Business	77	0.1968			0.6989		-1.7680	-2.2880
					(2.3)		(-1.9)	(-4.0)
Total	257	0.1598			0.8451		-3.9950	-2.2740
					(5.4)		(-3.9)	(-6.5)
Global period – variables T and Cost								
Purpose	Size	ρ^2	β 10	β 20	β 30	β 40	T	Cost
Business	180	0.1788			0.9928		-8.0220	-0.0682
					(5.2)		(-4.0)	(-6.0)
Non Business	77	0.4636	6.6800		5.3920		-3.4650	-0.4870
			(3.6)		(4.8)		(-2.6)	(-5.3)
Total	257	0.1948	0.7721		1.4710		-4.7480	-0.1154
			(2.0)		(5.7)		(-4.4)	(-6.2)

Note: number of sample alternatives is 4. The alternative van was not observed.
Student's t-test statistics in brackets. Size = size of the sample.

Table 8: Models for Hercílio Luz airport by purpose of trip

Global period – variable T and C/I x10²									
Purpose	Size	ρ^2	β 10	β 20	β 30	β 40	β 50	T	C/Ix10²
Business	109	0.1576			1.4440			-6.5690	-0.9937
					(5.2)			(-2.7)	(-4.4)
Non Business	158	0.0731			0.3561			-4.9940	-0.2871
					(1.6)			(-3.5)	(-2.7)
Total	267	0.0993	-0.4121		0.6351			-5.9710	-0.4625
			(-2.2)		(3.6)			(-4.5)	(-4.7)
Global period – variables T and Cost									
Purpose	Size	ρ^2	β 10	β 20	β 30	β 40	β 50	T	Cost
Business	139	0.1223			1.7860			-5.7650	-0.0671
					(5.1)			(-3.3)	(-4.5)
Non Business	128	0.1266			1.4550			-5.6040	-0.0697
					(4.4)			(-3.8)	(-5.3)
Total	267	0.1799		1.1340	1.9590			-2.1520	-0.0508
				(6.6)	(7.3)			(-2.1)	(-4.5)

Note: number of sample alternatives is 5.
Student's t-test statistics in brackets

Table 9: Models for Hercílio Luz airport by purpose of trip

Normal Period – variables T and C/Rx10²									
Purpose	Size	ρ^2	β 10	β 20	β 30	β 40	β 50	T	C/Ix10²
Business	76	0.1869			1.8250			-4.4750	-1.0660
					(5.1)			(-1.9)	(-4.0)
Non Business	63	0.3390						-10.2200	-0.4140
								(-2.9)	(-2.6)
Total	139	0.2004		0.9966	1.7770			-3.1350	-0.7359
				(4.2)	(6.3)			(-1.9)	(-4.5)
Peak period – variables T and C/I x10²									
Purpose	Size	ρ^2	β 10	β 20	β 30	β 40	β 50	T	C/Ix10²
Non Business	95	0.0444						-3.5100	-0.1106
								(-2.4)	(-1.3)
Total	128	0.0550			0.2943			-4.3650	-0.1856
					(1.3)			(-2.7)	(-1.6)

Note: number of sample alternatives is 5.
Student's t-test statistics in brackets

The models shown in Tables 7-9 all have negative signs for the T and C/I or C variables, which shows them to be correct, since they refer to desutilities, that is, as time (T) and cost over income (C/R), or cost (C) increased the utility decreased.

In general, the models found for the Salgado Filho airport were better than those for Hercílio Luz, in relation to the "ρ^2" value. For Salgado Filho airport the "ρ^2" values found were between 0.16 and 0.46. In the case of Hercílio Luz airport the "ρ^2" values found were between 0.04 and 0.34.

In all of the equations the coefficient of the travel time (T) variable was higher than that of the cost/income (C/I) or cost (C), demonstrating the importance of this variable in the model, as a weighting in the choice of the individual. The exception was in the equation for Salgado Filho airport for the non business trips, in the total sample, in the case of the variable C/I.

The models were shown to be statistically reliable in relation to the student's t-test, giving a value higher than 1.9 in most cases, representing a confidence level of 95%. There were exceptions in the case of Hercílio Luz airport, for the models in the categories of non business in the peak period, non business in the total period and the total sample in the peak period, with a confidence level of 80%, that is, a student's t-test value of 1.30.

Of the most important limitation of the research is the fact that it was not possible to distinguish between passengers who were resident and those who were non resident in the city and metropolitan region where the airport is located.

Grouping was possible for passengers whose trip an origin or destination in the city and metropolitan region and those whose origin or destination was outside the city, for example, other cities in the state.

The percentage of trips to or from other cities was small in both the samples studied, around 15%. For this reason these trips were considered together with the others and may have caused distortions in the results acquired, since they tend to increase the average time and cost of the trip of the samples as a whole.

As a suggestion to improve the models, as a way of improving their performance, the following suggestions are made: a) test the use of the databases of business and non business in a single database, accompanied by a Dummy variable (business=1 and non business = 0); b) remove from the sample the data for trips not originating from the city and metropolitan region where the airport is located and carry out the model calibration only for trips with the origin or destination in this city; c) test the use of other variables and grouping, such as gender and passenger income range.

With the exception of the Del'Valle y Araujo study, in which the considerations differ from this study, there are no similar models of choice mode resulting from other studies in Brazil, it is difficult to evaluate with more criteria the models obtained in this research. The Brazilian reality differs significantly from the American reality where there are more examples of this type of study, which makes comparative analysis difficult. Only the continuity of this line of research and the search for its improvement will allow more consistent models and results to be obtained.

6. CONCLUSIONS

According to observations revealed in this study, the models obtained through the calibration of the Multinomial Logit Model are shown to be statistically reliable, and the variables: travel time (T) and cost over income (C/I) are representative of the ground access mode choice.

The sample selected included only air passengers, embarking or disembarking at the airport and it was clear that the main means of transport to the airport is the car as passenger, that is, there is an accompanying person who drops off and picks up the air passenger at the airport. In second place is the choice of taxi, which has a more evident use when the purpose of the trip is business.

It is believed that a knowledge of the mode choice stage, as well as the models obtained, is of great importance to the country's transport planners, since, although there are many of these studies for airports abroad, there are not many applications of the Logit model to the study of ground access mode choice for Brazilian airports.

Thus, it is expected that this study will act as an important analysis tool for the planning of the road access system for airports, as well as the transport facilities, such as parking lots, drop off and pick up points, among others. An appropriate knowledge of this stage and its more realistic treatment, aims to better the conditions of flow, security and accessibility of traffic to Brazilian airports. This contributes in a certain way to bettering the quality of the airport service, as well as that for the population of these urban areas in which the airport is located.

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