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ABSTRACT

Passenger transportation is the main activity of airline companies in Brazil. In the last five years, this industry has experienced an average growth of 10% in the number of passengers transported per year, according to a study carried out by the Brazilian Development Bank (BNDES). Among other factors, such growth has been the result of increased supply by airlines, especially of inexpensive airline tickets, which has increased the number of customers belonging to broader social classes and eventually changed customer profiles in the country. Besides the internal demands, the industry is expected to meet future seasonal demands, such as the World Cup and the Olympics due to years 2014 and 2016 respectively. Therefore, the airline industry needs infrastructure changes to meet both internal and seasonal demands, which tend to increase over the years. To support this growth, studies are needed to obtain a greater understanding of how to optimize both operations and efficiency along with adequate delivery of airline transportation services in Brazil. Given the current infrastructure, this paper investigates how passengers perceive the quality of services delivered at a particular airport in Brazil. More specifically, this paper assesses airline customers' opinion and expectation regarding the service level at the International Airport Tancredo Neves in Confins, State of Minas Gerais, Brazil. The analysis of structured questionnaires answered by passengers while sitting at the departure lounge shows that the International Airport Tancredo Neves is assessed as providing a good service level despite operating beyond capacity.

Keywords: Air Transportation, Airport, Quality, Service Level

INTRODUCTION

Demand growth and higher use of airports given increased supply by airlines, inexpensive ticket prices, and higher population income have been pointed out as the major reasons for the significant changes in the Brazilian air transportation and in the airport complexes as a whole. Despite increased supply and demand, the capacity of passenger terminals in Brazil has remained stable and usually incapable of meeting both current and potential demands (e.g., international events such as the 2014 World Cup and 2016 Olympic Games) (Medau & Gualda 2010).

Several Brazilian airports have been operating at or beyond capacity, which have important implications on the service levels and quality of both airport complexes and airlines. Service level is a variable related to the customer's perception of how well the services are provided as to the following factors: 1) service quality; 2) time spent on service processing or delivery; 3) comfort and convenience at the facilities; 4) distance from airport entrance to the boarding gates; 5) reliability; 6) accountability; 7) safety; and 8) civility and support from regulators and companies within the airport complex. Such factors can be assessed comparing what passenger terminals and airlines provide (i.e., what the clients receive) with what the clients expect. This provides insightful information on how (dis)satisfied a client/customer is with the quality of the services provided (Correia & Villani 2010, Fitzsimmons 2000, Magri Júnior 2003, Medau & Gualda 2010; Mendonça, 2009, Pereira et al. 2011).

The government, airlines and other companies operating in the airports are not indifferent to the situation, and some improvement initiatives have been applied, such as tendering processes, expansion projects, and new airport facilities. However, some questions remains on the current infrastructure of the airports and particularly on the service levels of the airlines and airport complexes.

An indicative that the need of reforming and expanding the Brazilian airport infrastructure has been an issue of great concern is the fact that three of the major airports in Brazil opened tendering processes in 2012. This shows that the government cannot assume the whole costs of implanting new airport infrastructure, regardless of good economic expectations. Still awaiting the opening of a tendering process aimed at expanding the current infrastructure, the major airport in the State of Minas Gerais, the International Airport Tancredo Neves (AITN), located in the Municipalities of Lagoa Santa and Confins, has been subject to emergency rehabilitations. In 2011 the airport demand increased, but the infrastructure remained the same as in the previous years, as rehabilitation and expansion projects were suspended because of irregularities from the environmental perspective (Lisboa 2011). Against this background, this study consists of an important step to assess the service level at the airport under the current circumstances, namely: unchanged infrastructure since opening in March 1984, and capacity of 5 million of passengers per year versus actual demand of over 7.2 million in 2010 (Infraero 2012).

The study aimed to understand the passengers' perception of the AITN services under these circumstances. Public and private capital has been invested to improve the airport infrastructure and provide for the economic development of the surrounding areas, but as capacity remains unchanged this study investigates: 1) whether the airport services meet the

users' expectations of price, frequency, and variety; and 2) whether these services have quality from the users' standpoint.
A survey was carried out with a structure questionnaire aimed at collecting AITN passengers' perceptions/opinions while waiting for their flight at the departure lounge. The general objective was to use the passengers' overall perception to assess the quality of the services provided by both airlines and the airport as a whole. The specific objectives were: 1) make a profile of the usual AITN passengers (i.e., sex, age, origin and destination, travel objective, transport mode used to reach the airport); 2) identify the better and worse services from the passengers' point of view; and 3) identify areas of improvement in the services provided by the airlines and the airport.
This paper consists of six sections, including this Introduction. Section 2 provides the theoretical underpinnings on service quality, service management, and service level in the context of airports, besides focusing on relevant research carried out in Brazil. Section 3 describes the overall characteristics of the airport. Section 4 describes the research methodology. Section 5 reports on the data analysis and discusses findings. Section 6 includes final remarks, limitations and suggestions for future studies.

THEORETICAL UNDERPINNINGS

Service Quality, Service Management, and Service Level at Airports

Companies of all kinds have adopted a number of quality programs, both for product and services. The reason is that total quality has become a key element to create value and promote customer satisfaction and retention (Kotler & Armstrong 2003:485). As Araújo (2006) points out, quality is the search for perfection with views to pleasing customers that are aware of the variety of products and therefore more critical regarding the services provided.
According to Barros (1996 apud Araújo 2006), quality can be measured from two points of view: 1) the objective point of view (that of the producer, according to whom quality means compliance with production specification); and 2) the subjective point of view (that of the customer and his/her expectations of the product). Both points of views are important, and companies should be aware of how they can meet the customers' expectations to improve how their products and services are perceived by the clients. Importantly, companies should also be aware that expectations might vary significantly, as they are related to past experiences and knowledge of each individual (Lubbe, Douglas & Zambellis 2011; Slack et al. 1996:552).
According to Oliveira, Brochado & Pithon (2010), the operating capacity of an airport (e.g., capacity of the terminal, airlines, and other service providers) can be assessed through quality accreditation. Companies that submit to quality certification are likely to know their limitations better and anticipate the users' needs, including for occasional and/or seasonal events. Companies that do so tend to develop more proactive, rather than corrective management.
A lack of balance between services provided and customers' needs may lead to reduced quality and eventually to reduced service levels. Fitzsimmons & Fitzsimmons (2000) contend

that companies should compare their customers' perception of the service provided and expectation of the service to be provided in order to gain a better knowledge of their satisfaction with the service quality. A service that meets expectation is perceived of as having satisfactory quality; a service that surpasses expectation, as having exceptional quality; and a service that fails to meet expectations is perceived of as having inacceptable quality.

Fitzsimmons & Fitzsimmons (2000) also suggest five dimensions to tap into how customers assess the service quality of a company: 1) reliability (i.e., company's capability of providing the promised service with safety and accuracy); 2) accountability (i.e., company's willingness to support the customers and provide related services timely); 3) safety (i.e., company's competence to deliver the service, civility, and respect with the client); 4) empathy (i.e., company's demonstration of interest in learning from the customers' desires and expectations); and 5) tangibility (i.e., appearance of the facilities, equipment, personnel, and communication materials). Comparing what customers receive and what they desire within these five dimensions provides the level of customer satisfaction with the service quality, which may range from absolutely negative to absolutely positive.

In addition, Lovelock (1995) suggests operational areas that are key for a good service management: 1) improved productivity; 2) capacity management; 3) location; and 4) facility and equipment design. All these areas influence costs and may lead to waste or savings of processes and resources.

Factors that may be used to understand service levels at airports are: waiting time, processing time, distance between facilities, people concentration, and availability of comfort and convenience areas and activities. In addition, Brink & Madison (1995 apud Magri Júnior 2003) suggest nine factors influencing users' perception of the services provided at a passenger terminal: 1) processing time; 2) reliability on the processing time; 3) people's reaction to the overall environment; 4) comfort and facilities; 5) civility of regulators and companies at the airport complex; 6) ticket prices and prices of general services at the airport; 7) passenger profile, and reason of travel; 8) frequency of travels; and 9) expectation of service level.

The ninth factor mentioned above, service level, means a company's meeting product specifications and needs defined by the clients with the pre-established objective of creating values to the clients (Faria & Costa 2005:43). Liou et al. (2011) mencioned that "the passenger's perception of the airport's level of service (LOS) may have a significant impact on promoting or discouraging future tourism and business activities". The International Air Transport Association (Iata 1995) defines service level as a range of quantitative and qualitative assessments of comfort and convenience that translate a company's ability to meet the users' demands.

The analysis of service level must take into account two different parts of the airports: one related to the air service (e.g., landing strips, taxiways, air space), and the other one related to terrestrial services (e.g., passenger terminal, and internal traffic) (Medau & Gualda 2010, Mendonça 2009). Because several services at an airport complex are associated with the passenger terminal, the airport is supposed to be mindful of the interaction of the several processes from the moment a passenger arrives/disembarks to the moment s/he boards/leaves the airport. This is fundamental in coping with the whole dynamics necessary

for passenger arrival, waiting, boarding, and landing without bottlenecks as a means of gaining high service levels. Ford and Dickson (2012) report on "the service sector is dependent upon customers' willingness to contribute their knowledge, skills, and abilities to co-produce the service experiences they want and expect".

Studies developed in Brazil

Correia, Wirasinghe & Barros (2007) developed a study to approach users' perceptions and suggested an overall index to assess the service level of operational components at the International Airport of Guarulhos in São Paulo using a single scale. Bandeira et al. (2008) used some components proposed by Magri Júnior and Alves (2003) to assess the quality of the International Airport Pinto Martins in the Municipality of Fortaleza, State of Ceará, and generate a global measure of the service level at the airport. The components were as follows: 1) parking lot (number of spots); 2) foyer (e.g., clear signs, safety, comfort, availability of trolleys, restroom cleanness); 3) check-in (processing time, and employees' civility); 4) departure lounge (comfort, availability of seats, overall cleanness); and 5) stores (service quality, service variety, and prices). The authors compared the results (obtained for the airport when it was beyond capacity) with those provided in Magri Júnior & Alves (2003), who assessed the airport before it reached it maximum installed capacity. The authors observed a reduced service level, especially in what concerns the check-in processing time and comfort at the departure lounge. Both components were assessed as below average standards.

Following the lines of Bandeira et al. (2008) and Magri Júnior & Alves (2003), Medau & Gualda (2010) carried out a study to investigate the service level at the busiest airport in Brazil, the Airport of Congonhas, in the Municipality of São Paulo. The authors carried out a survey approaching passengers who filled out questionnaires upon boarding the aircraft of a given Brazilian airline. Their results point to good service levels at the airport from the passengers' point of view. Their sample comprised mostly businessmen who checked in at the counter (94 %), and only 3 % of the sample used public transportation to reach the airport. The components that were assigned worst scores were availability of spots in the parking lot and sidewalk space, while the best scores were assigned to civility and processing time at the check-in counter.

Borille et al. (2010) report on the development of a methodology to assess the service level of the Brazilian airports (Guarulhos, Congonhas, and Brasilia) from the passengers' point of view. The study focused on the check-in operations (e-check-in and check-in at the counter) and security check. The authors used Weighted Means and Quintiles to analyze the data, and Multivariate Analysis to compare results. The traditional check-in was classified at the C (good) level in the three airports, and the security check was classified at the D (regular) level at the International Airport of Guarulhos.

Overall, the aforementioned studies point to good service levels at the Brazilian airports. However, a study carried out by the Brazilian Agency of Civil Aviation (Anac) and published in Diário Oficial da União on 31 January 2011 pointed to the need of improvement in all terminals administered by the Brazilian Company of Airport Infrastructure (Infraero). The study assessed the performance of the Brazilian airports based on the international

parameter of Work Loads Units (WLU). It divides the number of embarkations and disembarkations and the number of annual loads with the costs made up of operational, administrative, and financial expenses (Rezende 2011).

THE INTERNATIONAL AIRPORT TANCREDO NEVES (AITN)

The International Airport Tancredo Neves (AITN) is the main airport complex in the State of Minas Gerais. It is located in the Municipalities of Confins and Lagoa Santa, in the Metropolitan Area of Belo Horizonte, 40 km from the state capital, Belo Horizonte. Opened in March 1984 and projected with a capacity of 5 million passengers per year, the airport remained underused for years, as most flights in the region were usually operated via the Pampulha Airport, which is located 8 km from the capital center. This only changed in 2005, when all non-regional flights were transferred to AITN (SEDE 2009). The airport that in 2004 attended to only 388,580 passengers experienced an immediate increase to 2,893,299 in 2005. The installed capacity of the airport was reached in 2008, when it attended to 5,189,528 passengers, and three years later the demand was significantly higher than the capacity (7,261,064 passengers) (Infraero 2012).

The airport relevance has increased since 2005 with the increased number of passengers, and several incentives and proposals have come forth to improve the airport and its surroundings. A set of public works have been carried out in the Metropolitan Area to improve the road access and mobility to the airport, including improvements in the major avenues of the City of Belo Horizonte (Vasconcellos 2001).

The airport now offers several services of public interest, such as: information desk, found and lost, customer support, load terminal, 2,938 spots in the parking lot, 42 check-in counters, and touristic information desk. In addition, the airport complex includes: 1) transportation services (taxi and bus companies, as well as rental car companies); 2) stores (restaurants, snack bars, drugstores and book shops); and 3) bank services.

The airport also hosts services of the following agencies: Juvenile Court, Federal Police, Health Surveillance, and State and Federal Revenue Service. The airlines that currently operate in Confins are: VARIG, TAM, Gol, TAP, Webjet, Copa Airlines, American Airlines, Avianca, Pluna, and Trip. The airport has 9 loading bridges and 9 hard stand positions, which can be used differently according to the aircraft model (INFRAERO 2011).

METHODOLOGY

Data Collection

This paper reports on a case study aimed to approach passengers' perception of the quality of services provided at the International Airport Tancredo Neves (AITN) and by the airlines that operate in the airport. Data collection consisted of applying structured questionnaires from 10 January through 29 June 2011 among passengers sitting at the departure lounge for domestic flights, that is, passengers that had already gone through check in and security

checks and were waiting for their flights. The reason for this choice of sampling is that these passengers were more available to fill out the questionnaires and had already experienced almost the whole airport infrastructure, which thus qualified them better to assess the airport, especially if that was the first time they were using the airport.

The confidence level of the survey was established at 95 % for a sample of 283 passengers and sample error (Cp) of 5.8 %. The sample size (n) was calculated using Equation 1, in which zα/2 is equal to 1.96 (defined for an infinite population).

$$n = \left(\frac{z\alpha / 2 \times 0{,}5}{C_p} \right)^2 \quad (1)$$

The questionnaire and its criteria of assessment were based on a review of the national and international literature on approaching passengers at airport terminals, especially to assess the quality of their service levels (cf. Section 2). In addition, employees of the airport administration participated in a meeting with the researchers and provided the results of previous surveys carried out by third parties at the administration's request. A two-part questionnaire was designed drawing on previous academic and market research, especially Correia et al. (2007, 2008), Fernandes & Pacheco (2008), Liou et al. (2011) and Tam & Lam (2004). These parts were: 1) passengers' profile; and 2) services provided by the airlines and by the airport as a whole.

The questionnaires comprised only close-ended questions. The questionnaire was aimed to be self-applicable, that is, it was supposed to be filled out by the participants without further contact with the researchers (Cooper & Schindler 2003:615). The objective was that the questionnaires could be filled out as quickly as possible. However, the participants were told that they could resort to the researcher if they had any questions and also that they could make suggestions and criticisms on the questionnaire overleaf.

The items included in the first part of the questionnaire to gather information on the passengers' profile were: sex, age group, level of education, main job, and individual income. The passengers were asked about details of their trip (i.e., transportation mode used to reach the airport, use of the parking lot, mode of check-in, reason of the travel, airline, preferences of ticket prices, and perception of the airport occupancy, i.e. used under, at or beyond capacity) and general aspects of travels using the air transport mode (i.e., frequency of travels using aircrafts and experience in other national and international airports). These questions aimed to provide input to compare the passengers' profile with their respective assessments of each feature of the services provided at the airport. Each participant was supposed to check one item for every question related to the aforementioned issues.

The quality of the AITN services was assessed using a non-comparative, balanced 6-point scale as follows: awful, very poor, poor, good, very good, excellent. This is deemed as a forced choice method because there is no neutral option and the participants are forced to opine either positively or negatively (Malhotra 2006:271). However, to account for cases in which a passenger had never used a given service, all questionnaire items provided the option "I have never used".

The questionnaire also included items approaching the passengers' perception of services that are not directly provided by the airport or the airlines, but are part of the airport complex, such as those services related accessibility and mobility to and from the airport. Such items included requisites such as safety, prices and variety of parking services, public transportation, and taxi. Particularly the parking services were approached in terms of available spots, distance to the airport foyer, distance from the cashier to the car, and waiting time at the cashiers (i.e., processing time).

The questionnaire itself did not separated explicitly the services provided by the airport from those provided by airlines and stores. The objective was that the participants should not be leaded to biased responses because of their opinions about this or that agency or company. Nevertheless, the services were segregated for analysis purposes according to airport, airline or store accountability.

The airport services are those related to the facilities (e.g., signs, lights, comfort, cleanness, air-conditioning, and WC hygiene), security, location, and available space, as well as the variety of services provided, processing time at the baggage-handling belt, the security check and X-rays, and available seats and trolleys. The items assessed for the airlines were: processing time, employees' civility, luggage handling, information desk, and complaint services. The items related to the stores operating in the airport were: processing time, civility and, especially, prices.

Data Analysis

The first step of data analysis consisted of organizing and processing data using Microsoft Excel©, SPSS© and Answer Tree© software packages (Cooper & Schindler 2003). Thereafter, the data analysis was divided in three major parts: Part I – descriptive statistics of the passengers' profile and the features assessed in each service; Part II – analysis of user opinion of quality, the variables being grouped per type, per service, and per accountable company; and Part III – analysis of answer trees to assess the relation across variables. The software used in Part III was the Answer Tree©, which generates tree-like classification systems for visualization purposes and eventually allows the researchers to tap into the data more easily.

RESULTS

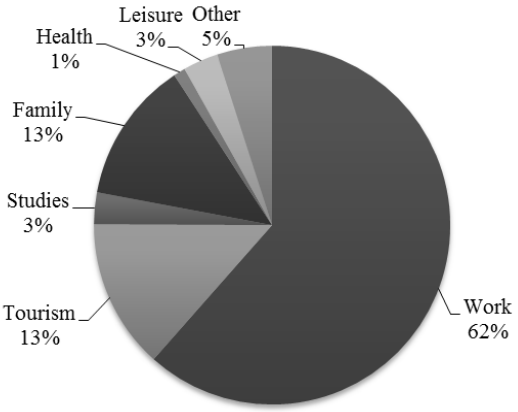
The subsections below report on the results of the data analysis of the two parts of the questionnaire. Subsection 5.1 describes the users' profiles. Subsection 5.2 describes the users' perception of service quality at the airport. Subsection 5.3 correlates passenger profile with user opinion using decision trees.

Users' profile

The descriptive data analysis showed that 60.1 % of the participants were men. The most frequent age groups were 30-39 years (30.4 %) and 18-29 years (30.0 %) old. The

participants' level of education was usually high: 76.1 % have at least an academic degree. Most participants (54.1 %) worked for private companies, and only 1.8 % were unemployed. The most representative individual income groups were: BRL 2,401.00 - 4,800.00 (22.6 %) and BRL 8,001.00 - 14,000.00 (17.7 %).

The frequency of air travels was high for most participants: 23.0 % travel monthly, 20.1 % weekly, and 13.4 % fortnight, that is, 56.5 % board on a plane at least once a month. The transport modes used to reach the airport were: taxi (27.9 %), private car (19.8 %), bus shuttle (11.0 %), and 11.7 % from connections in previous flights. The parking facilities were used by 14.1 % of the participants (78.4 % stated that they had not used it, and 7.5 % did not answer the question). Most participants checked in at the counter (59.7 %), and only 17 % checked in on the Internet. The most common reason of travel was work -- 61.57% -- as shown in Graph 1.



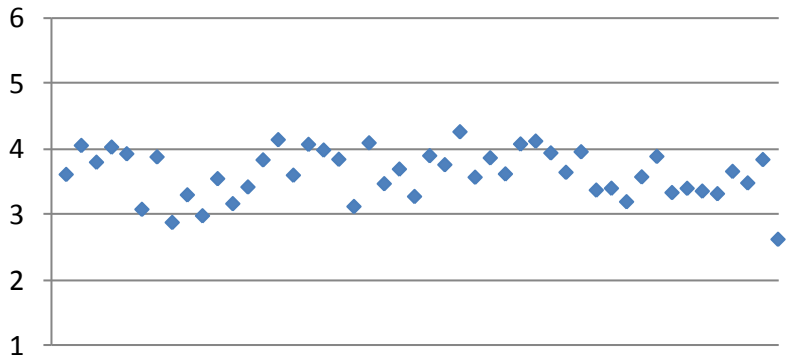
Graph 1: Distribution of reasons of travel

The participants were asked whether the airport was operating under, at or beyond capacity. The results were: under capacity (19.0 %), at the limit (57.0 %), and beyond capacity (24.0 %). The participants were also asked whether they have already been to airports in other countries. Most of them answered positively to this question (76.9 %). This also shows the relevance of studies such as the one herein reported – as Yeh & Kuo contend (2003), passengers can make subjective assessment based on previous experiences at other airports.

Users' opinion of the airport service quality

One of the measures used for analysis consisted of the mean values of the participants' opinions of each item in the questionnaire. Graph 2 provides an overview of how the means range in a scale from 1 to 6. As the graph shows, most means range from 3 to 4, which means they are somewhere along the poor-good continuum. The general mean is 3.6, and the aggregated distribution of the opinions is: awful (5 %), very poor (5 %), poor (17 %), good (41 %), very good (8 %), and excellent (3 %). These percentages correspond to 79 % of the

sample, as sometimes the options "I have never used" were checked or some question were left unanswered.



Graph 2: Distributions of means in each item related to service quality

The questionnaire items were divided in three groups: 1) mobility, containing questions on the parking facilities and available transport modes to reach the airport; 2) facilities and services provided at/by the airport; and 3) areas of the airport used by most passengers from check in to boarding or from disembarking to leaving the complex. Tables 1, 2 and 3 summarize the results for groups 1, 2 and 3 respectively. The percentages include valid answers as well as blank fields and the "I have never used" choice. Column "mean" contains the absolute mean of each item and a three-level scale represented by the symbols "X" (for means between 2.6 and 3.1), "!" (for means between 3.2 and 3.7), and "V" (for means between 3.8 and 4.2). These symbols clearly point to those items that should be deemed as priority.

Table 1 shows the analysis of the mobility group, in which most items were assigned scores below the mean. The items related to the parking facilities were those with worse scores, especially in what concerns price (31 % of assessments ranging from awful to poor) and available parking spots (29 % of assessments also ranging from awful to poor). The most alarming item related to public transportation is that of variety. The taxi service was assessed as poor only in what concerns "price" (40 % of the sample ranging from bad to awful). Most items of Table 1 include high levels of blank fields or "I have never used" options (ranging from 31 to 54 %), which may be an indicative of the low appeal of the services, especially public transportation and parking services.

Table 1: Distribution of the participants' perceptions of the mobility items

	Awful (1)	Very bad (2)	Bad (3)	Good (4)	Very good (5)	Excellent (6)	I have never used or blank		Mean
Public transportation									
Variety	3%	5%	8%	21%	6%	2%	55%	!	3,6
Frequency	1%	2%	5%	25%	7%	4%	55%	✓	4,1
Price	2%	3%	9%	27%	4%	3%	52%	✓	3,8
Safety	2%	1%	5%	28%	6%	4%	53%	✓	4,0
Taxi service									
Variety	1%	2%	10%	45%	9%	2%	31%	✓	3,9
Price	8%	10%	22%	26%	2%	0%	32%	✗	3,1
Safety	2%	3%	10%	42%	8%	3%	32%	✓	3,9
Parking facilities									
Available spots	10%	6%	13%	13%	2%	1%	54%	✗	2,9
Distance	6%	5%	12%	19%	4%	1%	53%	!	3,3
Price	6%	6%	19%	14%	1%	0%	54%	✗	3,0
Safety	3%	5%	10%	22%	6%	1%	54%	!	3,5
Distance to cashiers	6%	3%	16%	19%	1%	1%	54%	!	3,2
Processing time	5%	1%	14%	21%	4%	0%	54%	!	3,4

Table 2 shows the analysis of the items in the second group. The items concerning the airport facilities were assigned scores above the mean. Among the items focused on the airport services, punctuality had a high number of assessments from awful to poor (57 %). This item, however, is influenced by a number of factors that are beyond the control of the airport administration, including the weather and procedures adopted by the airlines. The complaint service was pointed as never used or left in blank by 44 % of the passengers. Among those that have used the service (56), 30 % assessed it as awful to poor.

Table 2: Distribution of the participants' perceptions of the quality of the facilities and services provided at the airport

	Awful (1)	Very bad (2)	Bad (3)	Good (4)	Very good (5)	Excellent (6)	I have never used or blank		Mean
Instalações									
Signs	1%	4%	19%	52%	13%	2%	8%	✓	3,8
Light	0%	2%	8%	63%	18%	4%	6%	✓	4,1
Comfort	2%	6%	30%	47%	7%	1%	7%	!	3,6
Cleanness	0%	1%	15%	56%	16%	5%	6%	✓	4,1
Air-conditioning	2%	2%	13%	56%	15%	4%	7%	✓	4,0
WC cleannness	5%	3%	18%	50%	12%	5%	7%	✓	3,8
Services provided by the airport									
Flight punctuality	14%	10%	33%	35%	6%	1%	2%	✗	3,1
Available trolleys	1%	2%	7%	58%	12%	5%	14%	✓	4,1
Availlable seats	6%	9%	27%	38%	10%	2%	8%	!	3,5
Information desk	4%	4%	18%	46%	8%	2%	18%	!	3,7
Complaint services	6%	6%	18%	22%	3%	1%	44%	!	3,3
Security	1%	4%	12%	55%	9%	3%	16%	✓	3,9

Table 3 contains the item with the worst assessment, the prices of products and services of professionals and stores operating in the airport: 67 % of the assessments range from awful to poor. The services at the departure lounge include several items that had scores below the mean. The security check were the services with the greatest means in the study. The means for the items related to civility equal to 4.0 in all the areas, and the mean of the items concerning service variety correspond to 3.3.

Table 3: Distribution of the participants' perceptions of the quality of the main areas and services of the airport

	Awful (1)	Very bad (2)	Bad (3)	Good (4)	Very good (5)	Excellent (6)	I have never used or blank		Mean
Check-in									
Processing time	5%	6%	19%	47%	11%	6%	6%	✓	3,8
Employees' civility	1%	1%	8%	55%	19%	9%	7%	✓	4,3
Luggage handling	7%	7%	19%	44%	8%	4%	11%	!	3,6
Location	4%	1%	15%	62%	8%	3%	7%	✓	3,9
Available area	4%	3%	29%	47%	6%	3%	8%	!	3,6
X-ray and security check									
Processing time	3%	3%	8%	60%	14%	8%	4%	✓	4,1
Agents' civility	1%	2%	11%	59%	15%	8%	4%	✓	4,1
Processing efficacy	5%	2%	16%	53%	11%	9%	4%	✓	3,9
Departure lounge									
Information desk	5%	4%	16%	40%	8%	2%	25%	!	3,6
Employees' civility	2%	2%	10%	56%	13%	3%	14%	✓	4,0
Available seats	10%	11%	25%	40%	9%	4%	2%	!	3,4
Available area	9%	8%	29%	41%	7%	3%	3%	!	3,4
Service variety	11%	9%	34%	34%	4%	2%	6%	!	3,2
Disembarkation lounge									
Information desk	5%	4%	16%	36%	6%	1%	31%	!	3,6
Employees' civility	2%	1%	14%	49%	7%	3%	24%	✓	3,9
Available seats	7%	7%	23%	30%	4%	2%	27%	!	3,3
Processing time	7%	5%	24%	40%	5%	1%	17%	!	3,4
Access to the arrival h	9%	6%	22%	39%	6%	1%	17%	!	3,4
Stores and restaurants									
Variety	9%	11%	26%	41%	7%	1%	5%	!	3,3
Location	4%	9%	17%	54%	10%	2%	4%	!	3,7
Processing time	7%	6%	21%	51%	5%	1%	8%	!	3,5
Employees' civility	2%	4%	16%	58%	11%	2%	7%	✓	3,8
Price	25%	17%	25%	25%	2%	1%	5%	✗	2,6

Using decision trees to intersect user profile and opinion

The third part of the data analysis focused on applying the decision tree method. The software used for this purpose helped the researchers to tap into useful information that emerges from intersecting users' profiles and opinions of the services. The software supports intensive analysis, but the results herein reported are those deemed as more closely connected with the research context.

Figure 1 represents the tree output for the selection of user sex as target variable. The most remarkable branch of the tree is that related to the reason of the travel, which has two subdivisions (leaves): 1) out of the 173 that were travelling exclusively for work purposes, 76.30 % were men, whereas 2) the women were the majority (65.45 %) among those that were travelling for other reasons such as tourism and leisure. The leaf containing the 173 participants that were travelling exclusively for work purposes also indicates that the men are usually those travelling once a week, fortnight or month (83.72 %), but the women's representativeness increases for travels every three, six or 12 months (45.45 %). These results show that male passengers usually travel at a higher frequency for work purposes, whereas the women usually travel at a higher frequency for reasons other than work.

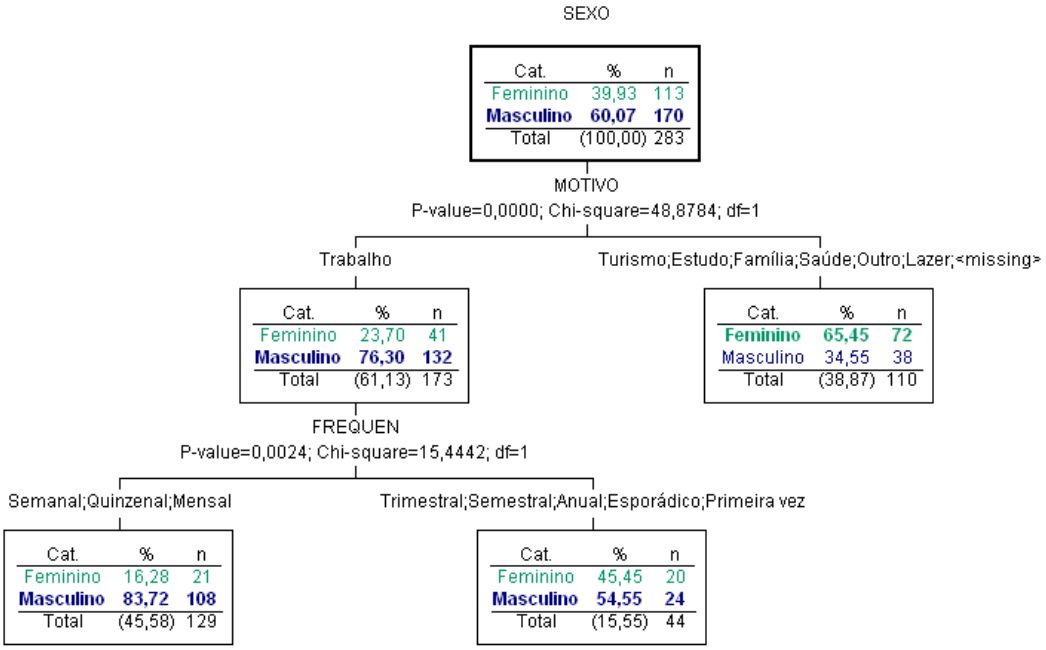


Figure 1: Decision three according to the participants' sexSource: Created by the authors.

Figure 2 shows a tree relating the target variable (individual income) with the other variables of the users' profile. The most relevant items for the tree subdivision was frequency of travel. Among those that travel at a high frequency (fortnight or every week), 51.65 % have an individual income higher than BRL 8,000.00. Among those that were travelling by airplane for the first time, 52.94 % have an income no greater than R$ 1.200,00. This suggests that people with high income tend to travel by plane more frequently. Although this is a considerably predictable result, it is an indicative that an increasing share of the airline market provides for people with low income.

Figure 3 shows a tree relating the target variable (individual income) with the variables concerning service quality. The most relevant ramification is that concerning the check-in time, that is, the processing time. Among those that assessed this service as awful, very poor or poor, 67.50 % have income greater than BRL 6,000.00. This suggests that people with greater purchase power tend to be more critical in what concerns quality in service delivery. Among those that assessed the service as good, very good or excellent or did not answer the question, the income is lower than BRL 6,001.00 for 61.85 % of them.

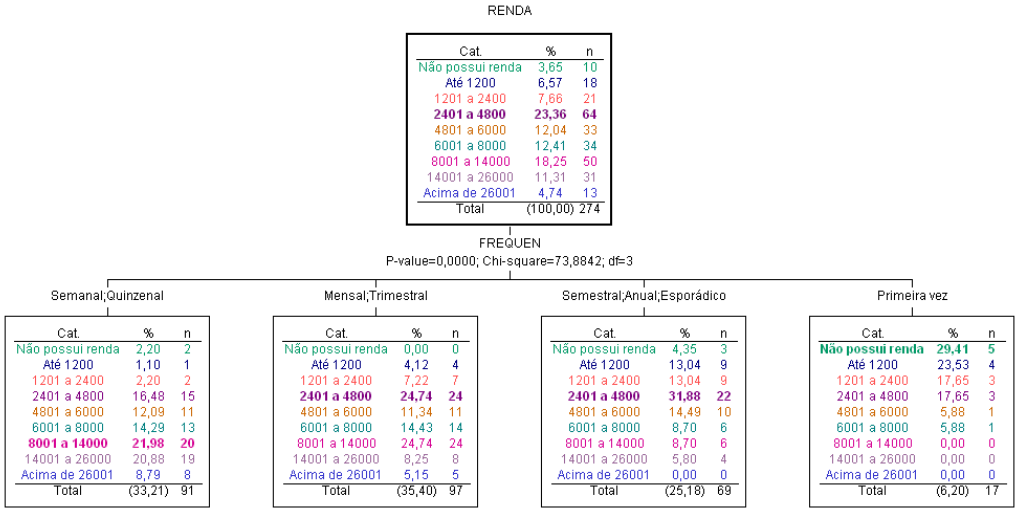


Figure 2: Decision tree for the variable individual income and the other profile variables.

Source: Created by the authors.

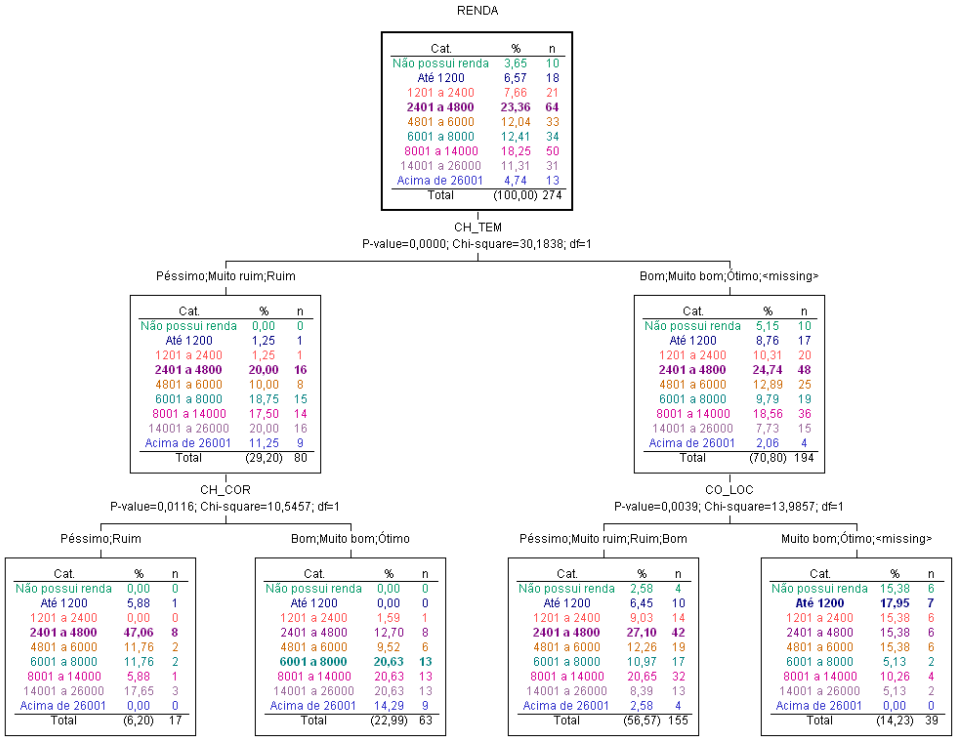


Figure 3: Decision three for the variable individual income and the quality items.

In addition, Figure 3 shows that the node “awful, very poor, poor” for the check-in time is ramified by the item “employees’ civility”, classified as good, very good and excellent by 22.9 % of the participants. This group has individual income higher than the group of those that assessed civility as awful or poor. In the other node for the check-in time, that for “good, very good and excellent” assessments, the ramification is established by the localization of the stores at the airport. In this ramification, the location was assessed as awful, very boor, poor,

and good. The participants with low income, on the other hand, assessed the localization as good or excellent.

FINAL REMARKS

This paper approached the users' perception of the quality of the services provided by the International Airport Tancredo Neves and the airlines operating in the terminal. The approach consisted of surveying passengers at the lounge departure, who were asked to fill out a questionnaire on their profile and perception of service quality at the airport.

Most of the sample consists of men that travel for work purposes and at a higher frequency rate than the women. The women usually work at a lower frequency rate and for other reasons. Most of the sample also includes people with at least an academic degree and individual income ranging from BRL 2,401.00 to 4,800.00 (22.6 %).

The analysis of the passengers' opinions point to satisfaction levels centered around poor and good for most of the items under scrutiny. The overall mean was 3.6, and as shown in Graph 2, there was no significant variation in relation to the means in every item under scrutiny, which indicates some symmetry. Some of these items, however, should be flagged for further analysis as they were badly assessed from the passengers' point of view, such as the prices at the stores and the prices of the taxi and parking services. This result corroborates many other studies according to which prices at the airports and available parking spots are usually assessed as negative factors in the Brazilian airports.

Among the groups 1) mobility, 2) facilities and services provided at the airport, and 3) areas used by the passenger in their way from or to boarding, the first group (cf. Table 1) was the one with the highest number of fields left blank or selections for the choice "I have never used" (53.75 %). This shows that mobility should be flagged for further attention, as people do need a transportation mode to reach this particular airport and no answers or "I have never used" answers are both indicative of no previous experience with one or other transportation mode, especially the public transportation. This result raises the following question: Have people never used the public transport to reach the airport because it does not meet their needs or is it only a matter of preference for individual transportation? Regardless of the answer, this commutation and the services to reach the airport are not accountability of the AITN administration.

In addition, the first group, i.e. mobility to the airport, was assigned with a poor assessment in the item "variety". This is relevant because the process of "popularization" of the airline transportation means a change in the passengers' profile and therefore a need of more variety in the transportation supplies (including various prices) to meet different demands. In other words, increased demand, including of passengers across a wide range of profiles, comes with the need of providing a number of types of transportation to meet the needs of every profile. Furthermore, this result should be further analyzes as to how the airport can cope with the need of variety of transportation in moments of great demands, such as in the cases of the 2014 World Cup and 2016 Olympic Games.

Regarding the second group – facilities and services provided at the airport –, the participants assessed the facilities with good mean scores in several of the items in this group (Table 2). However, the overall mean for the item comfort was 3.6, and 38 % of the

participants assessed the facilities somewhere in the cline from poor to awful. Flight punctuality was also assessed negatively: 57 % of the participants considered this item as poor to awful. This factor, however, maybe dependent on several factors, such as weather, air traffic, and personal delays. This groups also included fields in blank and checks for "I have never used", which can be interpreted in two different ways, that is, a positive and negative interpretation for a rate of 44 % of no answers. In the positive interpretation, most people do not use this service because they do not need it, that is, the service is fully provided for. In the negative interpretation, people do not even dare use these services in order to avoid frustration and loss of time. Conversely, the items security and trolley availability were assessed with scores above 3.9.

In the third group – areas used by the passenger in their way from or to boarding –, the assessments of the X-ray services pointed to over 53 % of good perceptions. The services that should be flagged for further analysis and changes were those in the subgroups: a) check-in (handling baggage and available space); b) departure lounge (information desk, available seats, available space, service variety, processing time, and easy access to the arrival luggage belt; c) stores in the airport (variety, processing time, location, and price).

As pointed out in Section 2.1, a previous study by the National Agency of Civil Aviation (Anac) showed that the AITN should increase its operational performance in 12.64 %. However, the ANAC report did not include an analysis of the quality of the services provided at the airports. This study, thus, provide further information to complement the ANAC research. In addition, this study also shows that there are several services deemed as good from the passengers' point of view, irrespective of the recurrent news on the high dissatisfaction level of the passengers with the services at the AITN. This result seems to suggest the need of approaching a higher number of passengers in order to produce a better assessment of what is subjacent to the reality of the Brazilian airline sector.

This paper also described some studies carried out in different regions of Brazil (Northeast – Fortaleza; Southeast – Sao Paulo and Minas Gerais) and pointing to different characteristics of the airports. However, the results were in general convergent, most of airport services being assessed at good levels from the passengers' point of view.

As Araújo (2006), Mendonça (2009), Fitzsimmons & Fitzsimmons (2000), Ford & Dickson (2012), Liou et al. (2011) and Lubbe, Douglas & Zambellis (2011) contend, one is supposed to compare how the customers expect and perceive of a service in order to gain understanding of their levels of satisfaction. Interestingly, the aforementioned results indicate that the service level has been acceptable even though the airports have been operating beyond capacity and experiencing reduced service levels. Such results raise some questions: Is the Brazilian people likely to "accept" whatever they are "provided"? Is the Brazilian people not critical enough? Is it a mere coincidence of results? Maybe one starting point to explain this is considering that 57.0 % of the participants assessed the airport as operating beyond capacity. This may explain the "good" assessments: many people (43 %) have not yet perceived that the airport is operating beyond capacity, irrespective of studies proving that the current capacity is not enough for the number of passengers and operations (INFRAERO 2012). This suggests that the services have had some limitations, but still are efficient.

This study includes some limitations besides the open questions that it raises and cannot be answered within the scope of the survey carried out. First, the topic is highly subjective, as the passengers' perceptions are influenced by airport conditions that change within and across days, by their state of mind and by their life experiences. Second, the results maybe biased if considering that the questionnaire was not compulsory, and people with lower level of education or lower purchasing power were less willing to participate in the survey.

Further studies should apply the questionnaire at the international departure lounge and other areas of the airport, including attempting to obtain as less blank fields or "I have never used" answers as possible. Further studies should also investigate the reasons for using individual rather than public transportation means and the reasons for using (or not) the information desk and complaint services of the airport. These studies should also aim at a larger sample to identify more properly the passengers with less purchasing power, which are now the new air transport customers. A final suggestion is carrying out a study upon completion of Terminal 1 reformation, in order to have data to compare the users' perception at different infrastructure contexts.

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