LEVEL OF SERVICE EVALUATION AT THE ENPLANING HALLS OF MAJOR BRAZILIAN AIRPORTS

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ABSTRACT

This paper evaluates the level of service at the emplaning halls of major Brazilian airport passenger terminals. The IATA (International Air Transport Association) methodology portrayed at the Airport Development Reference Manual is used to evaluate the necessary area for passengers at the mentioned airport component. To achieve this, current peak-hour movements and passenger characteristics are collected at 17 major airports. Subsequently, necessary versus existing areas is compared for these seventeen airports. This paper has presented that the emplaning halls of major airports in Brazil are a critical element, according to IATA standards. This bottleneck could cause user dissatisfaction and disturb several airport operations. One of the critical airports is São Paulo/Guarulhos airport, since it is the main international gateway in Brazil. In addition to that, São Paulo will host the FIFA Soccer World Cup in 2014. We have provided an alternative to overcome the unacceptable LOS provided at the emplaning hall, which could increment the LOS from “F” to “B” category. Finally, this alternative could be compared to other alternatives, as providing check-in, security inspection or departure lounges areas, which are also operating with low level of services. However, their LOS are not as low as the LOS of the emplaning hall at the mentioned airport.

Keywords: level of service, airports, passenger terminal, departure concourse.

INTRODUCTION

In recent years, structural changes such as commercialization, privatization, and globalization, together with increased competition between airports, have encouraged airports and aviation authorities to place more emphasis on quality (Graham, 2008). In this context, establishing measures to evaluate operational performance of airports is one of the major problems facing airlines and airport operators today (Correia, 2009).

Special consideration must be given to airport level of service evaluations in Brazil. The country will be hosting two important international events: FIFA soccer world cup – 2014 and the Summer Olympic games in 2016. Since several international tourists will be traveling to and within Brazil, the airports must be prepared for these additional passengers. One of the main bottlenecks of Brazilian airports is the emplaning hall, as will be presented in the text.

LITERATURE REVIEW

According to IATA - *International Air Transport Association* (1995), the airport passenger terminal (APT) is the central element for airline users. It consists of a series of processes and is associated with queuing areas, corridors and waiting areas, which may also have complementary activities.

Flows and Components

The terminal area is the major interface between the airfield and the rest of the airport. It includes the facilities for passenger and baggage processing, cargo handling, airport maintenance, operations and administration activities. The passenger terminal system has three major functional areas. These functional areas and the activities that occur within them are as follows (Horonjeff & McKelvey, 1994):

- The *access interface* – where the passenger transfers from the access mode of travel to the passenger processing functional area. Circulation, parking, and curbside loading and unloading of passengers are the activities that take place within this functional area.
- *Processing* – where the passenger is processed in preparation for starting, ending, or continuation of an air transportation trip. The primary activities in this functional area are ticketing, baggage check-in, baggage claim, seat assignment, federal inspection, services and security.
- The *flight interface* – where the passenger transfers from the processing functional area to the aircraft. The activities that occur here include assembly, conveyance to and from the aircraft, and aircraft loading and unloading.

This work intends to evaluate the level of service associated with space available at the emplaning hall (also mentioned as departure concourse), as illustrated in Figure 1.

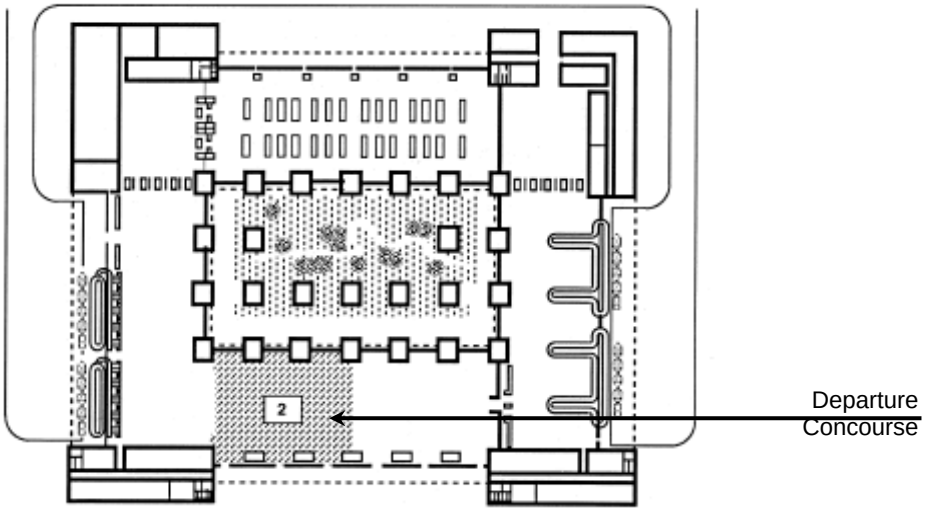

Figure 1 – Departure Concourse (IATA, 1995).

Level of Service and Capacity

According to the ADRM - Airport Development Reference Manual (IATA, 1995), there are six levels of service for airport passenger terminals (Table 1).

Table 1. LOS Standards - IATA (1995).

Legend	Characteristics
A	Excellent level of service; condition of free flow; excellent level of comfort
B	High level of service; condition of stable flow; very few delays; high level of comfort
C	Good level of service; condition of stable flow; acceptable delays; good level of comfort
D	Adequate level of service; condition of unstable flow; unacceptable delays; inadequate level of comfort
E	Inadequate level of service; condition of unstable flow; unacceptable delays; inadequate level of comfort
F	Unacceptable level of service; condition of cross flows, system breakdown and unacceptable delays; unacceptable level of comfort

Table 2 presents the LOS standards in numerical terms.

Table 2.Level of Service Standards in Numerical Terms - IATA (1995).

LOS Standards (Sq. Meter/ Occupant)						
	A	**B**	**C**	**D**	**E**	**F**
Check-in Queue Area	1,8	1,6	1,4	1,2	1,0	System Breakdown
Wait/Circulate	**2,7**	**2,3**	**1,9**	**1,5**	**1,0**	
Hold Room	1,4	1,2	1,0	0,8	0,6	
Bag Claim Area	2,0	1,8	1,6	1,4	1,2	
GIS	1,4	1,2	1,0	0,8	0,6	

The LOS standards “Wait/Circulate” in Table 2 will be employed for the analysis of this work regarding emplaning halls.

PROPOSED METHODOLOGY

This research will evaluate LOS of emplaning halls of airports, which cities will host FIFA world cup games in 2014 (Table 3).

Table 3. – Accumulated Operating Traffic (January to December 2008).

Airport	Total (Passengers unit)*
GRU – São Paulo/Guarulhos International Airport	20.400.304
CGH – São Paulo/Congonhas Airport	13.672.301
GIG – Rio de Janeiro/Galeão International Airport	10.754.689
BSB – Brasília International Airport	10.443.393
SSA - Salvador International Airport	6.042.307
CFN - Tancredo Neves/Confins International Airport	5.189.528
POA - Salgado Filho International Airport	4.931.464
REC - Recife/Guararapes-Gilberto Freyre International Airport	4.679.457
CWB - Afonso Pena International Airport	4.281.354
SDU– Rio de Janeiro/ Santos - Dumont Airport	3.628.766
FOR - Pinto Martins International Airport	3.465.791
MAO - Eduardo Gomes-Manaus International Airport	2.021.668
VIX - Vitória Airport	1.988.447
NAT - Augusto Severo International Airport	1.643.369
GYN - Goiânia Airport	1.554.000
VCP - Viracopos/Campinas International Airport	1.083.878
PLU – Pampulha/ Belo Horizonte Airport	561.189

* Passengers – departure and arrival (plus connection, not military). - Source: INFRAERO.

According to IATA (1995), the necessary area is as follows:

$$A = s(\frac{y}{60})\frac{3\lfloor a(1+o)+b\rfloor}{2}$$

Where:
s= space require per person (m^2)
y = average occupancy time per passenger/visitor (minutes)
a =peak hour number of passengers
o = number of visitor per passenger
b = number of transfer passenger not processed airside

Assuming the connecting passengers do not use emplaning halls, the equation is simplified as follows:

$$A = 0.75\lfloor a(1+o)\rfloor$$

In order to obtain passenger hour movements from annual volumes, we will employ a conversion factor proposed by the Federal Aviation Administration (FAA, 1976), as presented in Table 4.

Table 4. – Assumptions_Number of visitor per passenger.

Range (Passenger/Year)	Conversion Factor(%)
> 30.000.000	0.035
29.999.999 - 20.000.000	0.040
19.999.999 - 10.000.000	0.045
9.999.999 - 1.000.000	0.050
999.999 - 500.000	0.080
499.999 - 100.000	0.130
< 100.000	0.200

We will assume visitor numbers, as portrayed in Table 5. The assumptions are divided by size and characteristics of each airport.

Table 5. – Assumptions_Number of visitor per passenger.

Airport	Visitor per Passenger (unit)
GRU, GIG, BSB, SSA, CFN, CWB, POA, REC, VCP, FOR, MAO, VIX, NAT, GYN	1,5
PLU	1,0
CGH, SDU	0,5

DATA ANALYSIS

Table 6 presents the results of the calculation, according to the methodology previously presented and associated assumptions.

Table 6. – Departure Concourse Area_Actual *vs*. Required.

Airport (IATA Code)	Existing Area (m^2)	Necessary Area (m^2)*
GRU	1,600	**2,314**
CGH	2,780	789
GIG	4,119	3,964
BSB	1,457	673
SSA	2,555	871
CFN	1,000	744
POA	1,220	665
REC	2,280	653
CWB	1,340	394
SDU	1,775	1,402
FOR	1,390	536
MAO	144	**316**
VIX	103	**263**
NAT	750	447
GYN	285	259
VCP	1,150	250
PLU	105	**113**

According to Table 6, four airports demand special attention: GRU, MAO, VIX and PLU, since there is less area than necessary. Special consideration must also be given to GRU (São Paulo/Guarulhos International Airport), since it is the main gateway for international passengers in Brazil. The next section will present a case study for this airport.

CASE STUDY

São Paulo/Guarulhos International Airport is located at the São Paulo metropolitan area, in Guarulhos city. According to Infraero (federal company that manages the 67 major airports in Brazil) data (INFRAERO, 2009), it is the busiest airport in Brazil. It has two passenger terminals under pier configuration. At each terminal side, there is an emplaning hall. For instance, Figure 2 illustrates this area for Terminal II.

According to our calculations, the utilization of the departing hall is around 145%, providing an average of 0.80 m^2 per person in this area. According to IATA (1995), this means LOS "F" or unacceptable.

It is important to mention that the airport administration has been decreasing this area recently in order to provide other uses, as circulation and check-in counters. That might be one of the reasons for the very low LOS provided. In this concern, we will provide next some alternatives to improve the LOS at the emplaning hall.

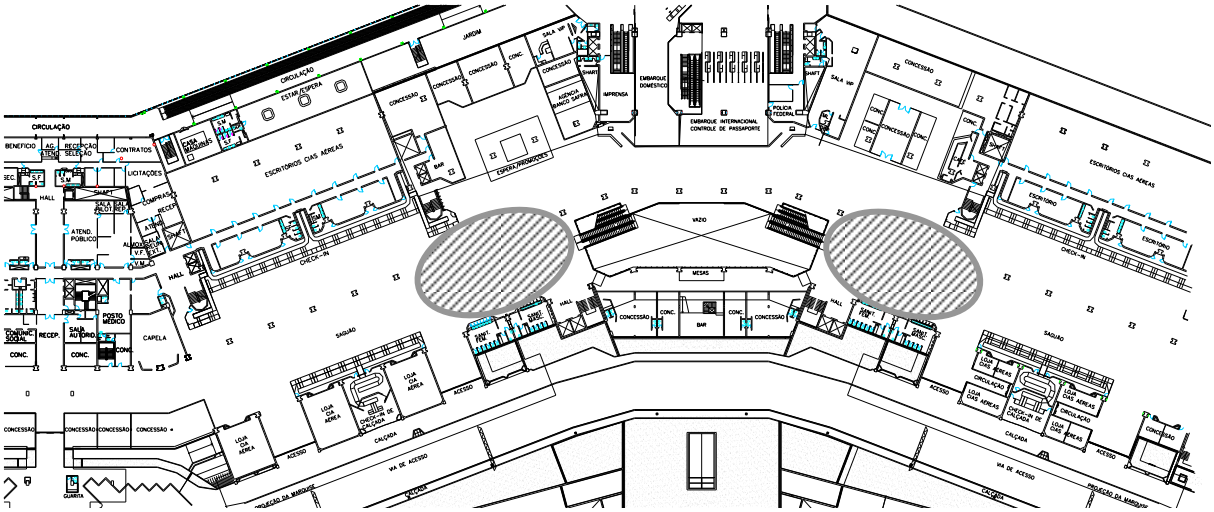

Figure 2 – Existing Departure Concourse_GRU (TPS II).

Our proposal is to occupy an idle area at the emplaning level, designed for terminal aesthetics (Figure 3). By adding this area into the emplaning hall, this area will receive an extra area of 570 m^2 per terminal, which totals 1,140 m^2. This adding would represent 2.20 m^2 per person at the hall, increment the LOS from "F" to "B" category.

On the other hand, according to Bandeira (2007), check-in, departure lounge and security inspection are more important for passengers than emplaning halls. Under this argument, the administration could evaluate using this are for other purposes, including a combination of various uses. However, evaluation of these alternatives are not under the scope of this paper.

Actual – Existing Idle Area	Alternative - Occupation of the Area for Emplaning Hall

Figure 3 – Actual Departure Concourse versus Alternative.

CONCLUSIONS

This paper has presented that the emplaning halls of major airports in Brazil are a critical element, according to IATA standards. This bottleneck could cause user dissatisfaction and disturb several airport operations. One of the critical airports is São Paulo/Guarulhos Airport, since it is the main international gateway in Brazil. In addition to that, São Paulo will host the FIFA Soccer World Cup in 2014. We have provided an alternative to overcome the unacceptable LOS provided at the emplaning hall, which could increment the LOS from “F” to “B” category. Finally, this alternative could be compared to other alternatives, as providing check-in, security inspection or departure lounges areas, which are also operating with low level of services. However, their LOS are not as low as the LOS of the emplaning hall at the mentioned airport.

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