A Theoretical Framework for the Brazilian Airline Competitive Market Environment

Dr. Hugo Ferreira Braga Tadeu
School of Business Administration, Centro Universitário UNA and Dom Cabral Foundation
Rua Bernardo Guimarães, 3071 – Santo Agostinho – Belo Horizonte, 30140-083, BRAZIL
E-mail: hugo.tadeu@una.br

Dr. Jersone Tasso Moreira Silva
School of Business Administration, FUMEC University
Av. Afonso Pena, 3880 – Cruzeiro – Belo Horizonte, 30310.009, Minas Gerais, BRAZIL
Tel: +55-31-3269-5230, E-mail: tasso@fumec.br

Abstract: the purpose of this article is to elaborate a theoretical model that has adherence with the airlines companies’ experiences. The objective of this paper is to help in the search of the necessary conditions to overcome the competition with appropriate pricing and consistent profits in this market. When looking at the Brazilian market, this study is appropriate due to the accelerated growth of this sector. The methodology is based on a literature review in which the proposed model will be obtained from a database involving academic articles, dissertations, theses and books. This article is to contribute in the analysis of the necessary conditions for the longevity of airlines companies. Finally, the originality of this work lies in the proposal of a theoretical model as a profit function in market dynamics. This model can be applied by any management of airline companies.

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1. Introduction

The Brazilian airport sector has been growing 10% every year, according to IATA (2010), requiring appropriate terminals, adequate numbers of routes for the volume of passengers and airlines companies for the long-term demands.

However, this datum does not represent a new phenomenon since it has been widely analyzed for some years by logistics airport experts with a widespread concern about the capacity of the management sector and associated innovations. For this reason, due to its long-term growth, it is essential to understand competition, the prices charged by airlines and the necessary conditions to achieve profits according to the market’s behavior.

This article focuses on a literature review about competition, prices and profits in the Brazilian competitive environment which will generate enough information enabling to propose an empirical profit model, with identified proposals and possible suggestions for the Brazilian airline market as segment of the national economy. The originality of this study is based on a literature review with a conceptual focus on the studied themes and proposed model. The Brazilian airline market share is basically divided into two airline companies in which TAM has 45% and GOL 44% of the market, respectively (ANAC, 2010). In other words, the Brazilian airline market is a typical duopoly competitive one.

The proposal for the development of this article originated from a series of studies conducted by authors, such as Gillen (2006), Silva (2010), in which the significance of the concepts of
competition, prices and profits were elucidated, especially for its relevance to the aviation market. Studies were conducted by Silva (2010) using different approaches such as, semi-structured interviews with Brazilian airport industry experts, reviews and literature comments.

The rest of this article contains four sections: the coming part is a literature review, followed by the part of methodology; based on the solid review, a theoretical model is presented in section 4, and, conclusion is drawn with some suggestions at the end.

2. Literature Review

Daniel (2001) proposes an airport infrastructure analysis through an interesting question: is it possible to analyze the competition, prices and profits of the airlines companies? Following this question another one can be made: Is it possible to verify a series of studies on the proposed themes for the Brazilian case? Several studies on competition can be presented, such as, Levine (1987), Borenstein (1988), and Morrison & Winston (1989). As for prices, there were studies such as Daniel (1991, 1992 and 1995), ending with the texts on profit, according to Buchanan (1969), Bruns et al. (2002), and Brueckner (2001, 2002 and 2003).

According to Tadeu (2010), there are some necessary conditions for evaluating the competition, prices and profits, in the Brazilian case, such as follows:

"The change in the airports organization, expressed by an evolution in the roles that they play and in the basic aeronautical infrastructure financing models, changing from simple airports to complex multifunctional systems. Nevertheless, there are difficulties to be overcome in the process of implementing this development model, which involves aspects such as regulation, competition, pricing and profit "(p. 29).

2.1 Competition

For Ferreira & Oliveira (2006), air transport is dynamic and correlated with economic behavior and also provides flexible exchange of people and cargo around the world. In Brazil, this kind of transport is relevant not only because of the continental distances, but also because of the inefficiencies in the highway, railway and waterway transportation systems.

Historically, airport transportation in Brazil has been going through a series of changes in terms of its regulatory aspect, facilitating the development of a more competitive environment with new firms’ entry. This has encouraged them to act on strategy and less on the operational expenses conditions.

According to ANAC (2010), the Brazilian aviation market was genuinely composed by companies that opted in having a differentiation, or being classified as Full Service Carriers (FSCs), such as Varig, VASP and Transbrasil. However, the market had low competitiveness, high prices, and a satisfactory profit for the companies, but the consumers had to pay for expensive tickets. But, according to Barat (2007), the process of trade liberalization and national economic growth, stimulated the entry of low-cost airlines in the market, or Low Costs Carriers (LCCs) with a lean management structure, which resulted in cheaper tickets.

As a result, Tadeu (2009) suggests that the immediate response of the FSCs was to adopt a strategy towards improving existing services, with the development of loyalty programs, better aircraft indoor comfort, improving in-flight services and formatting alliances. Ott and Patino (2011) discussed deeply the airline alliances as an instrument for market integration. For these firms, the passengers’ appropriate profile was that of an executive, with higher demands than the tourists, that could afford more expensive tickets, but this took time and was a value-added operation.
To Pedrinha (2000), the only way to ensure a competitive market with benefits for the consumers to have a government’s direct action, in the specific case of Brazil, by ANAC (National Agency of Civil Aviation), regulating the frequency of routes, prices, available seats and other related indicators, thus punishing companies that contravene the rules. According to Forsyth et al. (2010), competition is established based on the entry capacity of new airlines, however, it is government’s responsibility to avoid predatory pricing policies, such as entry barriers.

The fundamental conditions for maintaining competition in the airport sector can be presented as follows: (i) antitrust policy, (ii) prices analysis and (iii) cartel.

2.1.1 Antitrust Policy

For Porter (1990), the rightful functioning of an antitrust policy should start from the applied price supervision in order to avoid short term losses and even the withdrawal of a company from the market. Therefore, the starting point consists in analyzing the behavior of the dominant company in search of possible consumers’ advantages or disadvantages.

According to CADE (2011), the competition analysis pervades the prices’ behavior up to the adoption of the sophisticated game theory models in search of a perfect balance of the business strategies, avoiding in this manner an abusive behavior. Corroborating this, it is possible to understand the competition supervision improvement process in Brazil. This is the result of the economic openness, the stabilization economic policy program of 1994 and the Law No. 8.884/1994, Lovadine et al. (2006).

Antitrust policy for the airport sector can be conducted through prevention actions, evaluating potential mergers, acquisitions and price processes, such as the recent case of the merging negotiation processes between the Chilean LAN and Brazilian TAM which is still under review by the regulatory officials and its potential impacts on the consumer market. According to CADE (2011), the ideal conditions to maintain the market’s full functionality are: (i) free competition among its agents, (ii) conduct control, (iii) price, and (iv) the enterprises’ financial performance so they have business longevity. Therefore, predatory policies associated with low prices, the use of computerized reverse tickets and even an excessive concentration of power in the airports (such as slots distribution) can be characterized as illegal action if encouraging excess capacity.

According to Oster & Strong (2001), the airport sector presents a unique behavior and special features in a strategic point of view, having as its central issue the price analysis versus competition. Pricing strategies can be harmful to the market, inhibiting potential entrants. However, it is possible to evaluate the airline companies’ behavior identifying its inappropriate actions and thereby avoiding possible damage to entrants. In the Brazilian case, it is possible to observe that there are inadequate pricing policies followed by the LCCs and the business operations related to the excess capacity in airports such as São Paulo, Rio de Janeiro and Belo Horizonte, according to Domingos et al. (2004).

2.1.2 Price Analysis and Inadequate Policies

One of the most recurrent strategic actions used to inhibit competition, in the airport sector, is the practice of inadequate pricing which is far below the industry standards. It is observed that low prices can be the result of an airline’s positive action in terms of cost control, routing, intensive use of technology and adequate staff allocation. However, according to Oster & Strong (2001), there are numerous examples of airlines that use low-cost strategies with very low prices and threatening the market’s functionality.

A price can only be regarded as legitimate if it does not threaten other airlines companies or generates large profit to the operator. Otherwise, it is characterized as an inadequate policy leading to government actions to avoid a possible monopoly.
It is possible to notice that certain conditions must be observed for a possible monopoly in the airport sector, such as: financial benefits, tax and airports operations with high passenger movement. To Edlin & Farrell (2004), there are good prices practices that are not characterized as inadequate policies or monopoly, such as: high prices with low service quality and little competition, low fares, caused by low cost and offers. For the authors, prices above the cost can also harm consumers by limiting the competitive action.

2.1.3. Cartel
To CADE (2011), cartel is defined as a set of tactical agreements between market competitors, involving pricing and distribution in attempt to increase profits. Still, there are other factors that can determine the formation of cartels such as market concentration and costs homogeneity.

In the specific case of the airport sector, some particular conditions are decisive to create a cartel formation, such as: (i) coordinated actions between firms, involving promotions and offers, (ii) booking ticket control system, (iii) control over the information service, guaranteeing the communication’s quality and, (iv) ability to exercise bargaining with suppliers.

The cartel's negative behaviors are harmful to consumers, and for this reason it is the defence supervising agencies the responsibility to control the airport’s operations, being those the CADE and ANAC.

A recent research conducted by Tadeu (2009) and Silva (2010), indicates that agreements between airlines (code share) are not beneficial to consumers or avoid the risk of forming cartels. Several examples in the history of Brazilian aviation can be presented as, for example, the recent agreements between TAM Linhas Aereas, TRIP and Passaredo, as well as between GOL and smaller companies. These agreements were intended for future connections to regional airports and to the Brazilian average distance aviation. These practices can be configured as being beneficial to the companies, but with the risk of an inappropriate conduct formation with reduced competition and higher prices.

Other recent aspects of the Brazilian market, especially after the entry of GOL, is that LCC involved coordinated policies to reduce or increase prices, changes or cancellations of flights. As the market is in open to the expansion of routes and to the entry of new firms, the definition of cartel needs to be carefully defined, because as Lovadine et al. (2006) say, there can be interdependence between firms that results in a non-cooperative equilibrium or Nash equilibrium for markets with few competitors and organizations.

In markets with the existence of a non-cooperative equilibrium, the upraise phenomena of rising prices by a certain company can be followed by other companies, as a parallel move, but not structured and coordinated. That is, each airline is free to decide its best pricing policy and its short and long term decisions.

2.2 Price Formation
The Brazilian airlines price formation stems from recent studies proposed by Palladino (2005), seeking to evaluate possible strategies and service differentiation between FSCs and LCCs. The author proposes a methodology for analyzing the Brazilian airlines price formation, specifically from GOL and TAM, using collected data by the ANAC and econometric models to estimate its long-term trend. In this case, the price analysis is an important factor to determine policies and inadequate cartel formation.

In general, the airlines pricing formation is considered strategic to its long-term survival. According to the IATA (2010) and IPEA (2010), the aviation industry in Brazil grew 10% annually, compared to 7% of the entire economy. This information represents that the passengers’ demand is greater than the services capacity offered by the airline companies.
As a result, the air tickets prices have been increasing slowly and that is harmful to competition. It is known that the airport sector behavior is directly linked to economic performance and income growth, as proposed by Shumpeter (1997).

Studies by Starkie & Yarrow (2008) and World Bank (2010), indicate that air traffic is growing at higher rates than income during periods of economic growth, especially the tourism sector in detriment to the business.

Recent observations of the Brazilian market, conducted by Tadeu (2010), indicated that there are problems such as: overcrowded airports, airlines problems ending with flight cancellations, fines and the possibility of reduction of the air network due to the growth of the Brazilian aviation in recent years.

The aviation market can be divided between FSCs and LCCs companies. Through the entry of LCCs, the aviation market watched the advent of the internet ticket sales, lower prices with valued shares in the stock market and high occupancy rates. For Palladino (2005), in average, LCCs firms have been presenting superior financial performance if compared with the FSCs. In this model it is possible to observe the entry of new competitors.

In response, the FSCs are using a variety of services, diversifying schedules, improving board services, among others. The direct result would be a benefit to the yield management of these companies and a satisfactory pricing policy. However, according to Evans & Kessides (1993), airlines should note the specific characteristics of its market such as positioning, customer profile, money exchange and suppliers before determining the price.

However, for Borenstein (1989), potential scale economies can influence the airlines prices. Operations from the hubs, such as Congonhas Airport (São Paulo) and Santos Dumont Airport (Rio de Janeiro) can determine the price increase, regardless flights being unidirectional or multidirectional.

There are two possibilities for the Brazilian airlines prices evaluation: (i) business environment and (ii) tourism.

(I) Business environment: the typical business passenger’s behavior involves buying tickets at least a week in advance, staying up to one week at the destination. Many trips occur in groups, with preference for FSCs due to flight schedules, despite the premium price offered by LCCs.

(II) Tourism: Passengers travels in association with tourism agencies, choosing LCCs due to the lower price. They purchase their tickets thirty days in advance with options of flights during the weekends.

For Berry (1990), the airport sector price composition indicates that, in average, the FSCs prices are superior to the LCCs. According to Tadeu (2009), TAM prices are, in average, 20% higher than its direct competitor GOL, especially in the routes to São Paulo. It is also possible to observe that the connecting flights have prices higher than the non-stop ones, with the leadership of TAM in this criterion.

Some important observations regarding the fares should be taken into consideration, Evans & Kessides (1993). Routes that have higher frequencies tend to have higher prices due to the dominance effect, being a negative aspect to the competition and quality. Long journeys have higher prices if compared to those of short duration. Tickets sold for the dawn and evening departures are priced higher than the morning period.
3. Methodology

The used research method was bibliographic, in general, using a set of techniques for qualitative and quantitative research, respectively, to meet the proposed objectives. Initially, the research was conducted on the topics of “competitiveness”, “prices” and “profits” through the virtual library of the University of British Columbia, Canada. Search results showed academic papers, dissertations, thesis, as well as applied case studies discussing the American and Canadian realities.

Later, it was necessary to expand the research to other bibliographic bases, such as the CAPES’ (Coordination for the Improvement of Higher Education, in Brazil) portal, in search of academic references about the same themes, but within the Brazilian market applications.

This search strategy database yielded total of 64 articles, two essays, three books and 13 theses. All the papers used vary from 1989 to 2010 including academic authors and executives from different parts of the world.

Patton (2002) suggests that research occurs in three stages: data collection, analysis and conclusions done during the research. Finally, the set of articles, dissertations, theses and books were carefully analyzed in order to extract the necessary concepts.

4. Theoretical Model

The company's profit formation for the airport sector is the direct result of competition and pricing policy, Silveira (2003). Therefore, the existence of oligopolies and the possibility of free price competition as an alternative for passengers are determinant factors. The purpose of this session is to present a model associated with the previous topics in order to attend a profitable businesses airport.

The legislation flexibility is another important aspect which contributes to the entry of new businesses and services diversity. To Combes & Linnemer (2000), investments in airport infrastructure can increase competition inside the sector by reducing the potential for possible inappropriate policies.

Therefore, the purpose of this session is to present an empirical model of previous topics in order to be able to show a profitable way for the airport companies. Finally, we present the conclusions and recommendations.

Considering that: (a) aviation market operates according FSCs and LCCs business and (b) an operator \( i \) versus an operator \( j \), with their routes and flexible schedules changes, it is assumed than the following demand system:

\[
q_i = \alpha_i p_i^\gamma p_i^{-\beta_i}, \quad q_j = \alpha_j p_j^\gamma p_j^{-\beta_j}
\]

where \( q_i \) and \( p_i \) are the quantity and price for companies \( i \); \( q_j \) and \( p_j \) are the case for companies \( j \). \( \alpha_i \) and \( \alpha_j \) are the demands for companies \( i \) and \( j \), respectively, \( \beta_i \) and \( \beta_j \) are the price elasticity for companies \( i \) and \( j \), respectively, while \( \gamma \) is the cross price elasticity for companies \( i \) and \( j \).

According to Dixit (1979), it is also assumed that there are different products, tickets offers, airfares, different airports choices, the distance between them and possible competition with other transport modes. Therefore, the differentiation in search of profits can be expressed as follows:
\[ \theta = \frac{\gamma^2}{\beta_i \beta_j}; \gamma = \theta(\theta, \beta_i, \beta_j) = \theta^{0.5} \beta_i^{0.5} \beta_j^{0.5}; 0 < \theta < 1 \] (2)

Equation (2) is a proposal of Singh & Vives (1984), in which \( \theta \) is the market heterogeneity in relation to different products offered, assuming 0 and 1 values.

For \( \theta \) equal to 0, the significance are independent markets and heterogeneous.

For \( \theta \) equal to 1, the significance are substitutes markets and homogeneous.

Considering costs aspects, according to Caves (1984), impacting airlines companies profit can be shown as:

\[ TC_i = FC_i + \frac{q_i \gamma^2}{2}; FC_i > 0 \] (3)

where \( TC_i \) is the total cost of airline \( i \), \( FC_i \) is the fixed cost and \( \frac{q_i \gamma^2}{2} \) is the return elasticity factor in relation to the market demand.

Equation (3) implies the marginal cost

\[ c_i = \frac{dTC_i}{dq_i} = \varphi q_i \] (4)

Through equation (4) and according to a hypothetic company \( i \) and considering a general situation:

\[ \pi = p_i q_i (p_j, p_j, \alpha_i, \beta_i, \theta) - TC_i \left[ q_i (p_j, p_j, \alpha_i, \beta_i, \theta), FC_i, \varphi \right] \] (5)

Equation (5) shows the airlines companies profit with the given importance to associated analysis in relation to the integrated market dynamics and not only for isolated companies.

However, through studies conducted by Gibbons (1992), we find that the equation (5) presents the possibility of maximization under conditions of price competition and for adequate profits. To this assumption, it is proposed an optimization function (6), following the optics "Bertrand-Nash," which:

\[ \text{Max}_{\pi_i} \rightarrow \frac{d\pi_i}{dp_i} = 0 \rightarrow \frac{dq_i}{dp_i} p_i + \frac{dp_i}{dq_i} q_i - \frac{dTC_i}{dq_i} \frac{dq_i}{dp_i} = 0 \] (6)

Since the central goal of the airlines is the profits maximization, it is proposed the tickets pricing, such as:

\[ q_i + q_i p_i - q_i c_i = 0 \rightarrow p_i = c_i - \frac{q_i}{q_i} \] (7)

However, according to equation (1), equation (7) can be represented as:

\[ \frac{q_i}{q_i} = \frac{\alpha_i p_i^{-\beta} p_j^\gamma}{(-\beta_i p_i^{-1})\alpha_i p_i^{-\beta} p_j^\gamma} = p_i \frac{\beta_i}{\beta_i} \] (8)

Inserting equation (8) in (7), we have:

\[ p_i = c_i + \frac{p_i}{\beta_i} \rightarrow p_i = 1 \left( 1 - \frac{1}{\beta_i} \right) c_i, \quad \beta_i > 1 \] (9)

Substituting (4) and (1) in (9), the outcome is:
\[
\beta_i = 1 \left( 1 - \frac{1}{\beta_i} \right) = \frac{\beta_i}{\beta_i - 1} \tag{10}
\]

And therefore, after simplifications, we get:

\[
p_i = \Omega^{\beta_i} p_j^{\beta_j} \tag{11}
\]

Equation (11) represents the best price for an airline in a competitive environment. However, according to the model proposed by Nash for competitive environments, there is an equilibrium model, \( W \), specified as

\[
\begin{align*}
W & = \left\{ p_i = R_i(p_j) \Omega_i^{\beta_i} p_j^{\beta_j} \right\} \\
& = \left\{ p_j = R_j(p_i) \Omega_j^{\beta_j} p_i^{\beta_i} \right\} \tag{12}
\end{align*}
\]

Simplifying algebra \( W \) by \( p_j \) in \( R(p_i) \) and therefore, adopting the Nash’s model of equilibrium and the equation (2), we have:

\[
\left\{ p_i^*, p_j^* \right\} = \left\{ \Omega_i^{\beta_i} \Omega_j^{\beta_j} p_i^{\beta_i} p_j^{\beta_j} \right\} \rightarrow \left\{ \Omega_i^{\beta_i} \Omega_j^{\beta_j} p_i^{\beta_i} p_j^{\beta_j} \right\} \tag{13}
\]

In this case, equation (13) becomes the price solution in the airlines competitive market with the freedom to take decisions about the tickets’ value. However, to ascertain the profits, some algebraic steps are necessary. In other words, substitute equation (3) in equation (5) and substituting therefore all equations of (10) to (13), than profits can be determined by:

\[
\pi_i^* = \Omega_i \Omega_j \ln(e^{\beta_j}) \Omega_j \ln(e^{\beta_i}) \tag{14}
\]

Thus, after the literature review, applied mathematical models and their empirical applications, it is observed that profits are a function of competitive environment, prices and fixed costs, in which they must be managed to be able to obtain the equilibrium point.

5. Conclusion and Suggestions

This paper intends to make a literature review on competition, prices and profits directly related to the Brazilian market conditions, and tries to present suggestions correlated with its national economy.

The results from the literature review have shown the importance of the airlines management in the profit pursuit. More specifically, the analysis identified that the explored concepts can result into appropriate conditions for the airlines management.

The implications for further research include studies related to new targeted models taking into consideration behavioural aspects and the price competition among airlines, FSCs and LCCs, including profit maximization proposed by the Nash equilibrium.

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