THE STRATEGIC VARIANCE ANALYSIS OF LAN AND TAM AIRLINES MERGER IN THE EARLY 2010's

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ABSTRACT

LAN and TAM used to be the flag carriers of Chile and Brazil, respectively until late 2000's in the airline industry. The merger of both into LATAM Airlines was part of the strategy to construct a major regional power of air transportation, an evolution from national companies to a Latin America brand. This research analyzes the merger of LAN and TAM, which in the second decade of 21st Century formed one of the largest passenger air transportation groups. The concept of Strategic Variance Analysis (SVA) is used in some academic environments to evaluate a company's operational revenue in two time periods, in this specific case, 2010-2013. The concept is easy to understand and relates the financial statements with businesses strategies approaches.

Previous studies in the American airline industry have been conducted with SVA method. This paper compares the financial situation of former TAM before the merger (2010), and LATAM (2013), after the merger. The financial, operational, and fuel data are gathered from the National Civil Aviation Agency of Brazil, reclassified, and applied to calculate SVA. Then, as the final conclusion, SVA demonstrates that this merger was good, however it was insufficient to cover the rise in fuel prices during those years.

1. INTRODUCTION

After the September 11, 2001 terrorist attacks, civil aviation faced hard financial moments around the world after. The demand for air transport dropped significantly in the following months due to the fear and uncertainties that surrounded flight security. That triggered a reputation crisis in air transportation market due to aviation security. While new measures were taken by the civil aviation authorities worldwide, aerial activity gradually regrew from the panic.

Even so, traditional airlines that had been in the market for many years, saw their (already harassed) profit margins reducing a lot, while new players arose at that time proposing new business models. Between 2000 and 2020, several of those traditional airlines, in pursuit of survival, merged to form stronger companies, such as Air France and KLM in 2004; Continental and United Airlines in 2010; British Airways and Iberia in 2011; Gol and Webjet in 2011; American Airlines and US Airways in 2013; and Alaska Airlines and Virgin America in 2016 (Table 1).

The low-cost/low-fare airlines model popularization, with an aggressive proposal of low operational costs and offering reduced fare air services, forced not only competition with the traditional companies but also with other means of transportation. The the market itself put pressure on older Airlines to operate in an even more efficient way, and to offer more competitive fares to face the new age, otherwise their market share would tend to decrease due to the low-cost competition.

Fluctuations of oil price directly influence airlines' operating results. In Brazil alone, *ABEAR* (the Brazilian Airlines Association) estimated that in 2012, 37.8% of national companies' operating costs were related to fuel, which was at its highest historically registered value (ABEAR, 2019). That demonstrates the weight this input represents for their balance sheets. The scenario for Brazilian airlines, most of whose revenue is in Brazilian Reals (BRL) whereas the costs are in United States Dollars (USD), is even worse; it means that the exchange rate component implies higher costs and lower profit margins for airlines.

The year 2020 has established a new era in aviation worldwide. The COVID-19 Pandemic, also known as Coronavirus Pandemic, has triggered the worst possible unforeseen scenario for aviation; even worse than the September 11, 2001 attacks. The air transportation market worldwide has been affected by COVID-19. Among the options to survive this hard moment are mergers and acquisitions. In the first semester of 2020, market rumors said that coming examples may be Azul and LATAM, Air Canada and Air Transat, Air Asia and Malaysia Air. Others have filed for Chapter 11 (United States), *Recuperação Judicial* (Legal Recovery – Brazil), Insolvency Law (United Kingdom), or Voluntary Administration (Australia), or the least undesirable option: bankruptcy. Some 2020 airlines with financial issues are LATAM, LATAM Argentina, Avianca, South Africa Airways, Flybe and Virgin Australia.

Merger	Year	Location	Description
Air China, China Eastern, China Southern	early 2000's	China	Ten state-owned Chinese airlines were merged into only three big groups.
Air France–KLM	2004	France and the Netherlands	Two flag carriers consolidated into Air France–KLM Group, keeping both brands.
Lufthansa–Swiss	2005	Germany and Swiss	Lufthansa purchased Swiss.
Cathay Pacific–Dragonair	2006	Hong Kong	Cathay Pacific, a major airline in the Asian market, purchased its competitor Dragonair.
TACA–Avianca	2009	Colombia and El Salvador	Avianca, the flag carrier of Colombia merged with TACA, one of the main airlines of Central America.
Delta–Northwest	2010	United States	Delta purchased Northwest.
United Airlines–Continental Airlines	2010	United States	Two major US airlines merged into a single company, preserving United Airlines name and Continental Airlines logo.
Gol–Webjet	2011	Brazil	Two low-costs airlines, Gol purchased Webjet, keeping only the Gol brand.
British Airways–Iberia	2011	United Kingdom and Spain	Two flag carriers consolidated into International Airlines Group (IAG), keeping both British Airways and Iberia brands.
LAN–TAM	2012	Brazil and Chile	Two major flag carriers merged into LATAM.
Azul–TRIP	2012	Brazil	Azul, a young airline at the time, purchased regional airline TRIP, keeping only the Azul brand.
American Airlines–US Airways	2013	United States	American Airlines merged with US Airways keeping only the American Airlines identity.
Alaska Airlines–Virgin America	2016	United States	Alaska Airlines acquired Virgin America, keeping only the Alaska Airlines identity.

Table 1 – Major airline mergers since 2000.

1.1 Problems and Objective

The main problem of this research is to respond to the following question: how to identify, in an objective way, the causes of LAN (Chile) and TAM (Brazil) merger's synergy (or lack of). Thus, the investigation is into whether this merger was financially successful, and what the causes of success or failure were.

The main objective is to evaluate the merger between LAN and TAM in 2010 using the Strategic Variance Analysis (SVA) method, developed by Horngren et al. (2000) and extended by Sopariwala (2003). The paper is focused on TAM's financial data provided by Brazil National Aviation Agency. LAN data are not used in this study.

Section 1 introduces the scenario of mergers and acquisitions in the airline market, in which LAN and TAM were major South American players at that time. Section 2 is a short story of LAN and TAM merger, focused on financial aspects. Section 3 is a theoretical framework and presents a literature review and goes into greater detail as to how SVA works. Section 4 gathers the necessary data to apply SVA to the LAN-TAM merger according to the concepts learned from the previous section. Section 5 is the final analysis of the operational results of the merger, and what those financial numbers can reveal about what happened during those 3 years. Section 6 is the conclusion and final remarks of the research. Some suggestions are made to apply the same study to other scenarios of recent aviation moments.

2. LAN AND TAM MERGER HISTORY

Both LAN and TAM used to have their differences, due to history, cultural organization, corporate strategies, and target markets. The focus of this study is on the merger period, however Table 2 is a summary of LAN and TAM individual characteristics before the merger.

In 2010, there were six Airlines in Brazil's passenger air transportation market: TAM, Gol, Webjet, Azul, Avianca and TRIP (ANAC, 2010). In August of the same year, the companies TAM and LAN made a public announcement of the merger, integrating both Brazilian and Chilean operations the following year. According to LAN's Vice-President, Enrique Cueto in an interview to a Santiago newspaper, *"in current values (2010), without the synergies, the combined value of both companies is around 11.5 billion dollars"* (Soto, 2010).

Larroulet & Ardiles (2018) summarize the idea behind this phase: *"One brand name, one continent, one network. There is no other airline in the world named after a continent (LATAM), and this makes it easier for passengers to fly across the region. LATAM is very attractive as a partner in Joint Business Agreements (JBAs), and therefore British Airways, American Airlines, or Qatar Airways, for example, are willing to form global alliances with LATAM"*.

Figure 1 shows a panorama of the South and Central American industry before (2010) and after the merger (2013).

In March 2011, Brazil's ANAC approved the merger agreement of both companies; also at that moment, the binding agreement between the Amaro Family (controller of TAM) and the Cueto Family (controller of LAN) was signed to combine both businesses (LATAM, 2019). The competition regulators of both countries approved the merger, although with some restrictions: in September, the *Tribunal de Defensa de la Libre Conpetencia – TDLC* (Court of Free Competition Defense) of Chile, and in December, the *Conselho Administrativo de Defesa Econômica – CADE* (Administrative Council for Economic Defense), of Brazil.

	TAM	**LAN**
Year	1961	1929
Origin	Brazilian Entrepreneur	Military
Range	Regional	National
Merger and acquisitions	Brasil Central LAPSA ABSA Pantanal	Ladeco Fast Air
Creations	TAM Mercosur TAM Cargo	LAN Perú LAN Argentina LAN Colombia LAN Ecuador LAN Express
Controller	Amaro Family	Cueto Family
Alliance	Star Alliance	One World
Focus	Brazil Argentina Paraguay Chile USA (Florida) Europe	Andean America Argentina Mexico USA (Florida and California) Australia/Pacific
Hubs	São Paulo Brasília Rio de Janeiro	Santiago Lima

Table 2 – Summary of TAM and LAN historical analysis.

In November 2011, LAN and TAM signed up in the Securities and Exchange Commission – SEC in the United States, to negotiate shares on the New York Stock Exchange. In January 2012, TAM's shareholders agreed to a shares swap at the rate of 0.9 LANs share for each TAM share (Fernández, 2012). In May of the same year, the *Comissão de Valores Mobiliários – CVM*, Brazil's stock market regulator (equivalent to United States SEC), authorized the swap of shares between the companies.

Finally, on June 22, 2012, the merger was concluded, and **LATAM Airlines Group S.A**. was born, the largest airline of Latin America. Fernández (2012) goes deeper into the chronological order of the happenings of that operation.

The main idea behind that merger can be summarized as:

- Establish a global airline, with a regional identification under the LATAM brand (meaning Latin American Airlines) and international partnerships (American Airlines, IAG and Qatar Airways);
- Increase competitiveness in Latin America against other major groups: Gol, Avianca and Copa Airlines;
- Cost reduction, focusing on fleet standardization and high profit markets (including North America and Europe);
- Invest in Latin American long-term economic growth;
- LAN needed a way to enter the highly regulated Brazilian market, then shared basically between Gol and TAM (Azul and Avianca Brasil were not that big yet).

Nonetheless, the benefits of the merger also brought with them some challenges. Successive economic crisis in South America, instable politics and high rates of poverty must be considered when planning long-term demand. Larroulet & Ardiles (2018) remind us not only of the high boarding fees in the region, and the fact that each country has a different regulatory framework which increases costs, but also that in South America in 2018, the ultra-low-cost model was almost non-existent.

Figure 1 – Major airlines in the South and Central American industry in 2010 (left) and in 2013 (right).

3. THEORETICAL FRAMEWORK

Firstly,n the specific LAN–TAM analysis of Nóbrega et.al (2016) and Melo & Borges (2017), there are only financial outcomes based on stock values, without going deeper into the reasons why the companies came up with those numbers. It would be more relevant to ask, for instance, what the factors that contribute to such numbers are. Did the merger meet its expected objectives?

Schosser & Wittmer (2015) go deeper and state that “LAN followed a multimarket strategy with regional hubs whereas TAM mainly operated the Brazilian market with a traditional hub-and-spoke business model. Hence, LAN generated more than half of its revenues with international flights whereas TAM relied heavily on the domestic market.” This sentence demonstrates that different corporate strategies and/or cultural organization may have a quota of influence along the whole merger transaction. Their conclusions are very interesting because they compare the mergers in North America, Europe and Latin America, considering the possible influence of geographic aspects.
Some mergers and acquisitions studies have not been capable of accurately pointing out the reasons for the differences on financial results between pairs of years (for example).

Thus, SVA – Strategic Variance Analysis – can suggest the corporate strategy to be adopted by a company. The examples of Caster & Scheraga (2011, 2013), Mudde & Sopariwala (2008; 2010; 2014), and Rocha (2020) must be part of the theoretical framework that supports the sutdy.

3.1 Strategic Variance Analysis – SVA

This study adopts the Strategic Variance Analysis (SVA) as the technique to evaluate the difference of a company's financial results between two periods of time (usually years). To reinforce understanding, "variance analysis is the term applied to the process of specifying the reasons why actual profits in any given period differ from the expected or planned level of profits" (Shank et. al., 1977). It is important to highlight that the concept of SVA discussed here, has nothing to do with the traditional concept of variance applied to statistical analyses.

According to Horngren et al. (2000), the SVA considers the details of some strategic components: growth component, price-recovery component, and productivity component. Furthermore, Sopariwala (2003) extends the analysis and includes a fourth component, namely, capacity underutilization.

One of the ideas originating from SVA is to relate what the financial-operational numbers say about a company and its market strategies used in competition. Porter (2008) posited three major strategies to get competitive advantage: a) cost leadership, when a company pursues operational efficiency to lower its costs; b) product/service differentiation, a strategy focused on providing a product or service with qualities that somehow differ from those of the other competitors; and c) niche-seeking, where a small part of consumers, willing to pay higher prices, are seeking specific premium products/services, but are not served by producers/suppliers (this strategy is characterized by low sales volume and high profit margins.

Searches in traditional journal bases and scientific paper indexing services such as Scopus, Web of Science and Google Scholar about SVA return only a few results on the United States air transportation market. Some examples of research that applied SVA: studies produced by Caster & Scheraga. (2011 and 2013), who analyzed the environment of American aviation at that time, when seven major airlines were competing; the same authors also made an analysis of Alaska Airlines strategic transformation in 2010; Mudde & Sopariwala (2008; 2010; 2014) investigated the strategic execution of Southwest Airlines in 2005; they also developed a paper about the American Airlines case; and published a journal article about the US Airways and America West merger. Rocha (2020) applied SVA to the Brazilian airlines merger between Gol and Webjet.

Basically, SVA is a technical evaluation of the operational situation in a certain year in comparison with a previous year (not necessarily the immediately previous year), inspecting the financial-operational numbers of a company. Although Horngren et al. (2000) have developed this SVA concept for the manufacturing industry, Mudde & Sopariwala (2008; 2010; 2014) adapted the framework for the specific issues of the airline industry.

3.2 SVA Components

In the next set of equations, the subscript word *"actual"* refers to the least recent year analyzed, 2010, while the subscript *"expected"* refers to the most recent year, 2013. The word *"expected"* is used instead of the word planned, because the calculated values are not officially provided by the airline, but it is an expectation based on the previous year's numbers.

As mentioned previously, Mudde *et. al.* (2008) explain that the SVA must be done by breaking it down into four specific components. The **growth component** measures the change of operating revenue caused by variations in Revenue Passenger Kilometers (RPK), keeping sales price, input costs and input-output relationships constant). The variance of this component is caused by changes in market share or in market size. This component is calculated by equations from (1) to (4), from year i to year :

a. Revenue effect of the Growth Component:

$$variance_1 = (revenue_i/RPK_i) \times \left(RPK_j - RPK_i\right) \quad (1)$$

b. Fuel cost effect of the Growth Component:

$$variance_2 = (fuel\ cost/liter_i) \times (used\ fuel\ liters/ASK_i) \times (ASK_{i\ (actual)} - ASK_{j(expected)}) \quad (2)$$

c. Flight-related cost effect of the Growth Component:

$$variance_3 = (flight\ related\ cost/ASK_i) \times (passenger\ load\ factor_i) \times \left(ASK_{i\ (actual)} - ASK_{j(expected)}\right) \quad (3)$$

d. Passenger-related cost effect of the Growth Component:

$$variance_4 = (passenger\ related\ cost/passenger\ emplanements_i) \times \left(passenger\ enplanements_{i(actual)} - passenger\ enplanements_{j(expected)}\right) \quad (4)$$

The **price recovery component** evaluates the variance in the operating revenue due to variations in unit input costs and sales price, holding sales unit and input-output relationships constant. Horngren et al. (2000) suggest that this component indicates a product differentiation strategy: a positive value in the component of price-recovery means that the differentiation strategy produced enough power pricing to the company, so that the passengers were induced to pay a higher amount than the increased costs the company had.

This component is calculated by equations from (5) to (6), from year i to year j:

e. Revenue effect of the Price-Recovery Component:

$$variance_5 = \left(RPK_j\right) \times \left(revenue_j/RPK_j - revenue_i/RPK_i\right) \quad (5)$$

f. Fuel cost effect of the Price-Recovery Component:

$$variance_6 = \left(ASK_{j\ (expected)}\right) \times (used\ fuel\ liters/ASK_i) \times \left(fuel\ cost/liters_i - fuel\ cost/liters_j\right) \quad (6)$$

g. Flight-related cost effect of the Price-Recovery Component:

$$variance_7 = \left(passenger\ load\ factor_j\right) \times \left(ASK_{j\ (actual)}\right) \times \left(flight\ related\ cost/ ASK_i - flight\ related\ cost/ASK_j\right) \quad (7)$$

h. Passenger-related cost effect of the Price-Recovery Component:

$$variance_8 = \left(passenger\ enplanements_{j\ (expected)}\right) \times \left(passenger\ related\ cost/ passenger_i - passenger\ related\ cost/passenger_j\right) \quad (8)$$

The **productivity component** is the difference in operating revenue produced by variations in the input-output relationships, making sales price and input costs constant. Horngren *et. al.* (2000) indicate that this component may show a tendency of the company to choose a low-cost strategy. Thus, a positive value in productivity component indicates that the company gets its operating revenue from the increase in productivity. This component is calculated by equations (9) to (11), from year i to year j:

i. Fuel cost effect of the Productivity Component:

$$variance_9 = (fuel\ cost/liter)_j \times \left(ASK_{j(expected)}\right) \times \left((used\ fuel\ liters/ASK)_i - (used\ fuel\ liters/ASK)_j\right) \quad (9)$$

j. Fuel (ASK) cost effect of the Productivity Component:

$$variance_{10} = (fuel\ cost/liter)_j \times (used\ fuel\ liters/ASK)_j \times \left(ASK_{j(expected)} - ASK_{i(actual)}\right) \quad (10)$$

k. Passenger-related cost effect of the Productivity Component:

$$variance_{11} = (cost/passengers\ enplanements)_j \times \left(passenger\ enplanements_{j(expected)} - passenger\ enplanements_{j(real)}\right) \quad (11)$$

Finally, the **capacity underutilization component** measures the difference in respect to the operating income caused by variations of costs of unused capacity between time periods. Sopariwala (2003) proposes that this component shows whether a company achieves success managing its used/unused relationship capacity. This component is calculated by equations (12) to (14), from year i to year j:

l. Variations in flight-related costs relating to unused capacities:

$$variance_{12} = \left(ASK_{j\ (actual)} - RPK_{j(actual)}\right) \times \left((cost/ASK)_i - (cost/ASK)_j\right) \quad (12)$$

m. Variations in flight-related costs of available capacities:

$$variance_{13} = (cost/ASK)_i \times \left(ASK_{i(actual)} - ASK_{j(actual)}\right) \quad (13)$$

n. Variations in flight-related costs of used capacities:

$$variance_{14} = (cost_i/ASK) \times \left(RPK_j - RPK_i\right) \quad (14)$$

If more than one airline is to be compared, it is recommended that the calculated values from (1) to (14) be normalized, dividing the variances by the Revenue Passenger Kilometers (RPK).

4. METHOD AND DATA

In alignment with the studies Caster *et. al.* (2011) conducted, the following information was gathered: **financial data** (revenue and expenses, depreciation, amortization, profit, etc.), **operational data** (revenue enplaned passengers, revenue passenger kilometers (RPK) and available seat kilometers), **fuel data** (total used liters, total fuel cost and average fuel cost per liter). These data are considered sufficient to conduct the analysis.

In order to situate the context in time, a 4 year time frame (2010-2013) was defined for this study: embracing the exact moment of the merger announcement, disclosed in 2010; and the period following the moment when the merger was concluded in 2012. The justification for this period is that the changes triggered by the merger needed a certain time to cause financial and operational impacts in the new company. The SVA is a study of situations at distinct moments (usually years) thus an analysis of the intermediate years was unnecessary.

The primary data sources are the ANAC Air Transportation Annuals (2010, 2013) and ANAC Statistical Data (2010, 2013), both available on the agency's website (only in Portuguese). The date used in this research had to be better organized in several tables, to make it easier to understand the calculation.

Table 3 shows the operational data of the former TAM (2010) and of the current LATAM (2013), while the fuel data for the two years are listed in Table 4. The concept "Enplaned Passengers' considers those who effectively boarded the aircraft and paid for the air ticket. The fuel data used could have been retrieved from the ANP – Agência Nacional do Petróleo (*National Oil Agency*) official website, but the Operational Statement (*DRO – Demonstrativos de Resultado Operacional*) provided the amount of used fuel (in liters) and the total cost spent with fuel. Dividing the first by the second was the way used to come up with the average fuel cost.

	2010	**2013**
Enplaned Passengers	31,515,633	35,902,761
Revenue Passengers Kilometers (RPK)	50,467,259,599.00	59,261,578,110.00
Available Seats Kilometers (ASK)	70,046,837,151.00	74,355,999,311.00

Table 3 – Operational Data, ANAC (2010, 2013).

	2010	**2013**
Used Fuel Liters	2,398,143,381	2,486,504,931
Total Fuel Costs (R$)	**3,374,858,840.00**	**5,278,656,660.00**
Average Fuel Cost (R$/l)	1.40	2.12

Source: *ANAC (2010, 2013)*

Table 4 – Fuel Data, ANAC (2010, 2013).

The financial data obtained from official ANAC Annuals were organized and reclassified in Table 5 according to two major groups: flight related costs (excluding fuel) and passenger related costs. This table is quite similar to the one used by Caster and Scheraga (2011).

	2010	2013
Crew	1,384,702,200.00	1,546,284,400.00
Maintenance	850,197,630.00	1,384,601,190.00
Airport and Air Navigation Fees	593,698,570.00	873,618,640.00
Leasing and Insurance	435,159,850.00	879,470,850.00
General and Administration Expenses	774,345,290.00	1,094,423,600.00
Flight Equipment Depreciation	577,785,770.00	544,245,020.00
Handling, Cargo and Ground Organization	716,700,360.00	902,985,810.00
Flight Related Costs (excluding fuel)	**5,332,591,680.00**	**7,225,631,523.00**
Onboard Services	304,267,100.00	349,673,870.00
Passenger Traffic Organization	1,747,068,690.00	1,758,836,390.00
Passenger Related Costs	**2,051,335,790.00**	**2,108,510,260.00**
Operating Revenue	**10,288,871,650.00**	**13,265,776,270.00**
Operating Expenses	**10,758,784,300.00**	**14,612,796,420.00**
Fuel Costs	3,374,858,840.00	5,278,656,660.00
Flight Related Costs	5,332,591,680.00	7,225,631,523.00
Passenger Related Costs	2,051,335,790.00	2,108,510,260.00
Operating Profit/Loss	**-469,912,650.00**	**-1,347,020,160.00**

Table 5 – Gathered and Reclassified Financial Data (R$), ANAC (2010, 2013).

The expenses were separated into two groups. The first, Flight Related Costs (excluding fuel), includes factors that directly influence the flight costs such as maintenance and ground organization. Although fuel is obviously related to the flight, following Caster and Scheraga's (2010) proposal, this component was considered separately due to the traditionally high proportion of the expenses it represents. The second group, Passenger Related Costs, is limited to onboard services and passenger traffic organization, indirectly related to the flight, but directly related to passengers.

Then, some additional necessary data to run SVA were calculated based on Tables 3, 4 and 5, and displayed in Table 6: average revenue per RPK, passenger load factor, expected available seat kilometers (ASK), average RPK per passenger, expected enplaned passengers, average used liters per ASK, average related costs per ASK, average cost per enplaned passenger, idle or unused capacity (ASK) and expected idle or unused capacity (ASK).

	2010	2013
Operating Revenue	10,288,871,650.00	13,265,776,270.00
Revenue Passenger Kilometer (RPK)	50,467,259,599.00	59,261,578,110.00
Average revenue per RPK	0.204	0.224
Revenue Passenger Kilometer (RPK)	50,467,259,599.00	59,261,578,110.00
Available Seats Kilometer (ASK)	70,046,837,151.00	74,355,999,311.00
Passenger Load Factor (%)	72.05%	79.70%
Expected Available Seats Kilometers (ASK)		82,250,628,900.00
Revenue Passenger Kilometer (RPK)	50,467,259,599.00	59,261,578,110,00
Enplaned Passengers	31,515,633	35,902,761
Average RPK per Passenger	1601.34	1650.61
Expected Enplaned Passengers		37,007,493
Used Fuel Liters (l)	2,398,143,381	2,486,504,931
Available Seats Kilometer (ASK)	70,046,837,151.00	74,355,999,311,00
Average Used Liters per ASK	0.0342336	0.0334405
Flight Related Costs	5,332,591,680.00	7,225,631,523.00
Available Seats Kilometers (ASK)	70,046,837,151.00	74,355,999,311.00
Average Flight Related Costs per ASK	0.0761	0.0972
Passenger Related Costs	2,051,335,790.00	2,108,510,260.00
Enplaned Passengers	31,515,633	35,902,761
Average Cost per Enplaned Passenger	65.09	58.73
Revenue Passenger Kilometer (RPK)	50,467,259,599.00	59,261,578,110.00
Available Seats Kilometers (ASK)	70,046,837,151.00	74,355,999,311.00
Idle or Unused Capacity (ASK)	19,579,577,552.00	15,094,421,201.00
Expected Idle or Unused Capacity (ASK)		22,989,050,790.00

Table 6 – Processed Data used in SVA

The variance equations (1) to (14), were used to compile Table 6, based on data from Tables 3 to 6. For each SVA component, the values were summed to get the total of the component. In the end, the numbers of Table 7 indicate what the new company, LATAM, did strategically over the years along the merger process, and the factors that led them to profit or loss, according to further analysis in Section 6.

5. RESULTS

Table 7 displays the compiled results of SVA. Firstly, it is important to note that the airline increased its productivity between the year it announced the merger, and the year immediately after its conclusion. That is, after all, one of the objectives of a merger process. The productivity component generated more than R$ 1 billion of operating profit for the company, supported mainly by reduction of average cost per enplaned passenger (from R$ 65.09 to R$ 58.73); and by the increase of passenger load factors (occupancy rate) in the aircrafts (from 72.05% to 79.70). As a factor affecting productivity increase, it is worth mentioning that in the early 2010s, TAM phased out the four-engine Airbus A340 for long haul flights (Europe), and started operations with two-engine Boeing 777 (greater fuel efficiency).

Growth Component	
Revenue effect of the Growth Component	1,794,040,980
Fuel cost effect of the Growth Component	-584,891,615
Flight-related cost effect of the Growth Component	-669,134,512
Passenger-related cost effect of the Growth Component	-357,465,167
TOTAL	**182,549,686**

Price Recovery Component	
Revenue effect of the Price-Recovery Component	1,185,231,560
Fuel cost effect of the Price-Recovery Component	-2,027,329,290
Flight-related cost effect of the Price-Recovery Component	-1,250,422,530
Passenger-related cost effect of the Price-Recovery Component	235,367,655
TOTAL	**-1,857,152,605**

Productivity Component	
Fuel cost effect of the Productivity Component	138,293,904
Fuel (ASK) cost effect of the Productivity Component	865,173,904
Passenger-related cost effect of the Productivity Component	64,880,910,40
TOTAL	**1,068,348,720**

Capacity Underutilization Component	
Variations in flight-related costs relating to unused capacities	-318,492,287
Variations in flight-related costs of available capacities	-327,927,240
Variations in flight-related costs of used capacities	669,247,639
TOTAL	**22,828,112**

Table 7 – Strategic Variance Analysis TAM/LATAM (2010-2013) (R$)

The price recovery component of the TAM/LATAM merger stands out due to the huge negative value, a loss of R$ 2 billion. This component measures the capacity of an airline to increase fares, according to its increase in operational costs, holding all the rest constant.

It means that the fares charged to passengers could not cover the operational costs, coinciding with the rise of fuel prices throughout this period (from R$ 1,40 in 2010 to R$ 2,12 in 2013, an increase of more than 51%). Figure 2 shows a comparison of the component shares of the expenses. The fuel share increased by almost 5% in four years.

Another significant issue for a bad price recovery component was the increase of flight-related costs (from R$ 0.0761/ASK to R$ 0.0972/ASK, a variation of more than 27%). Table 5 demonstrates that aircraft leasing and insurance costs more than doubled. The handling, cargo and ground organization decreased by more than 4%. This result is interesting because until the year 2018 LATAM was the only airline in Brazil to self-provide the handling services; all the others used third-party companies. That seems to have been an advantage during those years.

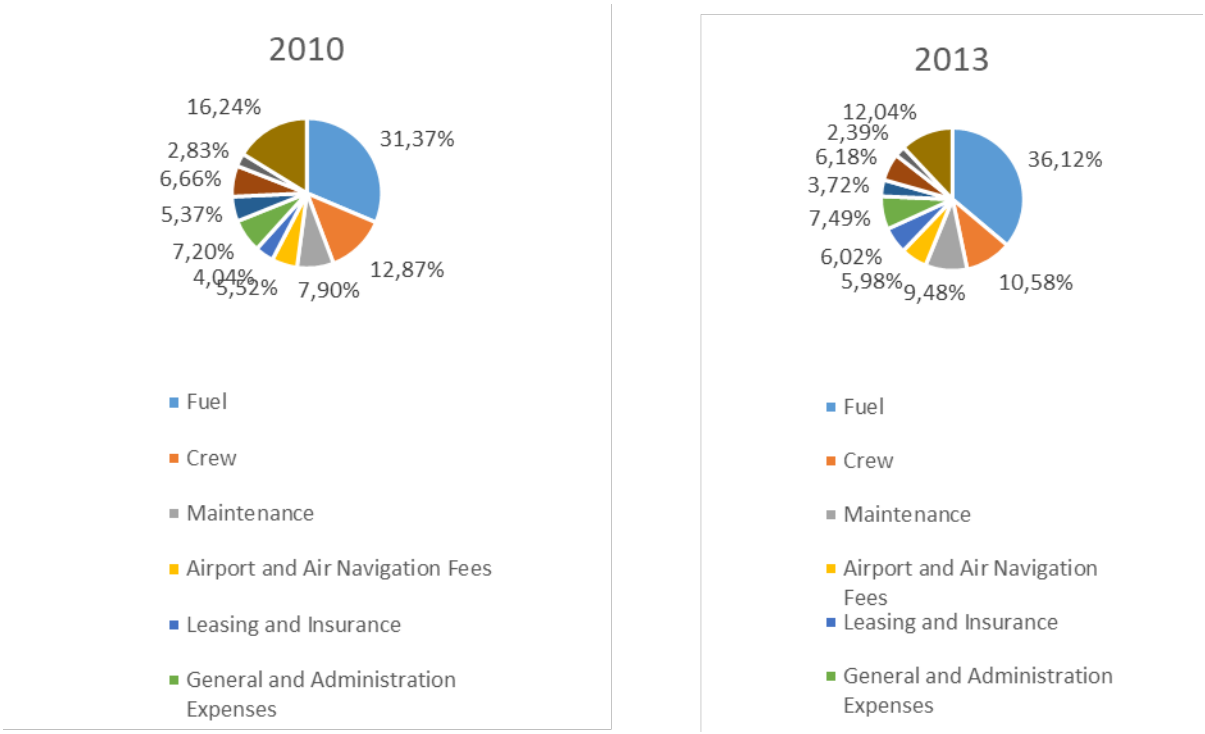

Figura 2 Pizza charts of each expense's share based on Table 5.

The growth component brought a little more than R$ 180 million of operating profit for LATAM, a reasonable value. The main ingredient which may explain this result is the increase of RPK in almost 9 billion flown-passengers-kilometers, influencing the increase of operating revenue in almost R$ 3 billion.

The capacity underutilization component showed a R$ 22 million increase for the company, which denotes that they were capable of reducing the underutilized capacity from more than 19.5 billion available-seats-kilometers to a little more than 15 billion. This ASK reduction implies that the airline succeeded in reducing its cost per unused ASK.

This study is a snapshot of TAM/LATAM's situation before and after the merger, based on official reports published by the Brazilian regulatory agency of the air transportation market. This means that the financial data provided by ANAC are the only source taken into account.

Another issue is that the research would have been more effective if the data from LAN could have been retrieved from the Chile DGAC online platforms. The data provided for the period had fewer details than the data provided by the Brazilian ANAC, and fundamental information such as the amount of fuel consumed or the cost with maintenance was not available.

It may lack other market considerations such as the expansion of TAM's main competitor, Gol, to South America and the Caribbean, the premium service offered by Avianca Brasil, or the expansion of Azul, applying effectively the hub-and-spoke model in Campinas Viracopos Airport.

Finally, ideally, the SVA should be applied to other airlines in order to give a broader dimension of the difference between 2010 and 2013 situations.

6. CONCLUSIONS

This research explored the numbers behind the LAN-TAM merger, applying the SVA method, which enabled identification, in the financial/operational balance sheets, of the causes of failure discussed in Section 5 – Results Analysis. As mentioned previously, Horngren *et al.* (2000) suggests that SVA is, *de facto*, more efficient if the data of all players of the industry are cross-referenced. Nevertheless, the SVA numbers, limited to the period between 2010 (merger announcement) and 2013 (the year after the consolidation of the new company), still managed to identify how, throughout the transition years, the expected benefits of the merger had already been overcame by high losses, although these data alone are not sufficient to affirm that the merger failed.

Among exogenous factors (increase of fuel price) and endogenous factors (increase in aircraft leasing and insurance costs, for example), the good productivity component performance emphasizes that a cost leadership strategy was adopted, which is quite reasonable because, naturally, it is one of the main objectives of an airlines merger. Thus, one conclusion that can be drawn is that the success of the productivity component was the fact that enabled LATAM to reduce its passenger-related costs.

On the other hand, a high magnitude price recovery component, but with negative value, indicates that product/service differentiation, was not LATAM's strategy. It means that a slight increase in fares prices did not cover the operating costs, a recurrent problem in Brazil. In a historically low competition market such as Brazil's airline industry, one is unlikely to come across a product/service differentiation strategy.

However, LATAM's evolution from a national airline to a transnational one took place with a huge operating loss. Immediately, it was identified with the increase of fuel costs in that time interval. In the early 2010s, the world faced a historical rise in oil prices that led to an increase in fuel costs; Brazil suffered more than other developing countries.

According to ANAC (2017), based on ANP, the average price of jet fuel (QAV) rose from R$ 1.13 per liter in August 2010 to R$ 2.06 per liter in March 2014. In an SVA perspective, this is *de facto* the main evidence of LATAM's huge operating loss, even though that on its own is not sufficient to justify the negative result.

By the end of the 2010 decade, the long-term geopolitical strategy of LATAM's merger, which started almost ten years before, finally seemed to have made its consolidation as the main "Latin American Airline" successful. Figures 3 and 4 display the top 20 airlines by RPK and absolute carried passengers in 2019 (IATA, 2020). It is important to highlight four major clusters with high level competition: United States, Europe, Middle East and China. LATAM is the only Latin American airline in the rankings (Figures 3 and 4).

The local competition in Latin America is quite intense with Azul, Gol, Avianca, Aeromexico and Copa Airlines. However, compared to them, as a global player, in 2019 LATAM was the only one to fly from Sydney to Johannesburg, from Los Angeles to Tel Aviv, from Ushuaia to Toronto, consolidating São Paulo, Santiago and Lima as major hubs.

Figure 3 – Top 20 airlines by Revenue Passenger-Kilometers (RPK) in 2019 according to IATA (2020).

Figure 4 – Top 20 airlines by absolute Carried Passengers in 2019 according to IATA (2020).

In future research, the SVA method can be expanded to other airlines at that time (Gol, Webjet, Azul, Trip and Avianca), comparing all the competitors in the market to provide a better understanding of the scenario.

Also, as this research applied SVA in a time interval that covered a relevant fact to TAM (its merger with LAN), it would be interesting to choose other periods associated to other important facts for Brazil's aviation: the concession and expansion of Guarulhos International Airport in 2013 (LATAM's main hub); the FIFA World Cup 2014; the checked baggage and the onboard food sale deregulation in mid-2017; Avianca Brasil's bankruptcy in 2019 and the COVID-19 Crisis in 2020.

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