JOÃO PEDRO MATOS DE OLIVEIRA PEREIRA

LOW-COST CARRIERS' COMPETITIVE ADVANTAGE IN EUROPE AND UNITED STATES. LESSONS FOR THE BRAZILIAN AIR TRANSPORTATION INDUSTRY

São Paulo

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Graduation Project presented to the Polytechnic School of the University of São Paulo (USP) to obtain the degree of Production Engineer

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Trabalho de Formatura apresentado à Escola Politécnica da Universidade de São Paulo para obtenção do Diploma de Engenheiro de Produção

Advisor (Orientador): Professor Doutor Fernando Tobal Berssaneti

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To my mom and dad (in memoriam)

To my family and friends

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In the first place, I would like to thank my family that has given me support during my entire life, they have been always there when I needed the most, cheering for me, incentivizing, helping me with the most important decisions of my life and doing their best to help me achieve my goals.

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“Great vision without great people is irrelevant”

Jim Collins

ABSTRACT

The air transportation sector is fundamental for the development of some regions, the integration of the country's economy, connecting business, incentivizing tourism. bringing friends and relatives together. Besides Brazilian historical importance for aviation, it still is not known for having a robust air transportation industry. The country still has a low number of trips per capita below other South America countries or developing economies, a big portion of the population never flew in their lives. Brazilian market is dominated by mainly 3 companies in an environment hard to survive the multiple operational risks. *This work* aims to identify best-practices used by Low Cost airlines in Europe and United States that lead them to succeed, differentiate and achieve competitive advantage over legacy carriers. Taking into consideration their competitive environment, bargaining powers, cost structures, and historical data for more than 20 companies from 2017 to 2019, this work does its best to identify best practices that can be used as benchmarking. All data used in this project is public data and does not target a specific company. Those best practices could be possible lessons for Brazilian airlines to leverage their operational performance targeting to reduce costs and enable lower fares. Lower fares would have huge positive effect on the number of passengers with 1% cheaper fares increasing demand by 1.4%. The study also analyzes the improvement viability, looking at what is already done and possible structural barriers. Evaluating their cost structures, identifying what are the main drivers for their competitive disadvantage or what actions are being done to keep them on the right track for operational improvement. This study identifies the main structural roadblocks or reasons for higher costs in the Brazilian air industry. Those could be objective of governmental action to incentivize the industry in a moment when a global pandemic is sapping global demand for air travel and companies struggle to survive, in a country with a long history of bankruptcies and market concentration.

Keywords: Low-cost airlines, Air transportation, Airlines, Competitive advantage

RESUMO

O setor de transportes é fundamental para o desenvolvimento de algumas regiões, integração da economia do país, conexão das redes de negócios, incentivo do turismo e união entre amigos, parceiros e familiares. Apesar da importância histórica do Brasil na aviação, ele ainda não é conhecido por ter uma indústria robusta de transporte aéreo. O país ainda tem um número baixo de passageiros *per capita*, abaixo de outros países da América Latina e economias em desenvolvimento, uma boa parte da população nunca voou na vida. O mercado brasileiro é dominado principalmente por 3 empresas, em um ambiente de difícil sobrevivência com múltiplos riscos operacionais.

Esse trabalho tem como objetivo identificar as melhores práticas usadas pelas empresas aéreas *low-cost* na Europa e nos Estados Unidos que as levaram ao sucesso, diferenciando-se e atingindo vantagens competitivas sobre as aéreas *legacy*. Considerando o ambiente competitivo, poderes de barganha, estruturas de custo e dados históricos de mais de 20 empresas aéreas de 2017 a 2019, esse trabalho faz seu melhor para identificar as melhores práticas que podem ser utilizadas como benchmarking. Todos os dados utilizados nesse projeto são informações públicos e não são focadas em uma empresa específica. Essas boas práticas podem ser possíveis lições para companhias aéreas brasileiras alavancar a performance operacional, visando reduzir custos e possibilitando reduzir tarifas. Tarifas mais baixas teriam um enorme impacto positivo no número de passageiros, dados que uma redução de 1% nos preços já cria 1.4% mais demanda.

O estudo também analisa a viabilidade da melhoria, olhando o que é feito e quais são as barreiras estruturais. Avaliando as estruturas de custo das empresas, identificando quais são os principais direcionadores de desvantagem competitiva ou quais ações são feitas para manter as empresas no caminho certo para melhoria operacional. Esse estudo identifica os principais entraves estruturais ou razões para maiores custos na indústria aérea brasileira. Fornecendo base para possíveis objetivos governamentais caso decida tomar ações para incentivar a indústria aérea, sendo chave em um momento de uma pandemia global que está saturando a demanda por viagens aéreas e as companhias estão sofrendo para sobreviver em um país com já longa história de falência e concentração de mercado.

Palavras Chave: Empresas aéreas *low-cost*, transporte aéreo comercial, vantagem competitiva

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS AND ABREVIATIONS

AAL: American Airlines

ABEAR: *Associação Brasileira das Empresas Aéreas (*Brazilian Association of Airline Companies*)*

AEL: Aer Lingus

AF: Air France/KLM

ALGT: Allegiant Air

ALK: Allaska Airlines

ANAC: *Agência Nacional de Aviação Civil* (National Civil Aviation Agency)

ANP: *Agência Nacional de Petróleo, Gás Natural e Biocombustíveis* (National Agency of Petroleum, Natural Gas and Biofuels)

ASK: available seat kilometer.

BAW: British Airways

BRL: Brazilian Real (currency R$)

BWI: Baltimore/Washington International Thurgood Marshall Airport

CAGR: Compound annual growth rate

CASM/K: Cost per available seat mile/ Cost per available seat kilometer.

CGH: São Paulo Congonhas Airport

CNF: Belo Horizonte Confins International Airport

DAL: Delta Airlines

DAL': Dallas Love Field Airport

DCA: Ronald Reagan Washington National Airport

DECEA: *Departamento de Controle do Espaço Aéreo* (Air Space Control Department)

DFW: Dallas/Fort Worth International Airport

EASA: European Union Aviation Safety Agency

EUR: Euro (€)

EWings: Eurowings

EZJ: easyJet

FAA: Federal Aviation Administration

FLL: Fort Lauderdale-Hollywood International Airport

FSC: full-service carriers, also called legacy

GIG: Rio de Janeiro Galeão International Airport

GRU: São Paulo Guarulhos International Airport

HOU: Houston William P. Hobby Airport

IAD: Washington Dulles International Airport

IAG: International Airlines Group

IAH: Houston George Bush International Airport

IATA: International Air Transport Association

IBE: Iberia

JBLU: JetBlue

LATM: Latam Airlines

LCC: low cost carriers

LF: Load factor

LHA: Lufthansa Networks

LUV: Southwest Airlines

MIA: Miami Airport

MDW: Chicago Midway International Airport

MRO: Maintenance, repair and overhaul/operations activities

OAG: Official Aviation Guide of the Airways

OEM: Original Equipment Manufacturer

ORD: Chicaco O'Hare International Airport

PAX: Passengers

PLU: Belo Horizonte Pampulha Airport

PIS: *Programas de Integração Social e de Formação do Patrimônio do Servidor Público* (governmental pension fund and unemployment fund)

QAV: *Querosene de Aviação* (jet-fuel)

RASK: Revenue per available seat kilometer

RPK: Revenue Passenger Kilometer

RRJ: Rio de Janeiro Jacarepagua Airport

RTK: Revenue tonne-kilometer

RYA: Ryanair

SAVE: Spirit Airlines

SDU: Rio de Janeiro Santos Dummond Airport

SJK: São José dos Campos Airport

SNA: *Sindicato Nacional dos Aeronautas* (National Aeronaut Union)

TRA: Transavia

UAL: United Airlines

ULCC: Ultra low-cost carriers

USD: United States Dollar ($)

VCP: São Paulo/Campinas Viracopos International Airport

VUE: Vueling

SUMMARY

1. INTRODUCTION

This work was developed concurrently with the author's internship in a strategy consulting firm and is a result of a work from a Double Degree program with *Ecole des Ponts et Chaussées* in Paris, France. This work was already presented and approved at the French school and has suffered a few improvements and adaptations to be also presented in the Brazilian institution, Escola Politécnica da Universidade de São Paulo (USP). In this paper, the author tried to conciliate technical knowledge acquired in the Production Engineering classes with his experiences obtained during his studies abroad and his internships in France, United States and Brazil to bring a unique perspective for the theme. All the information disclosed here are public information and authored by the author when not specified by citation.

1.1. Motivation and justification to choose the theme

The author is passionate about the air transportation industry and has as personal objective to understand the dynamics, particularities and differences from the Brazilian market when compared to the American or European markets, discrepancy noticed after living 1 year in the United States and 2 years France during his exchange program. Some contribution come from the author's experience with numerous flights in those markets during the period that he lived in both countries and could notice a huge disparity between the 3 markets.

A key driver was to the interest was the noticeable difference in the airplane tickets affordability between the compared markets and the Brazilian. Looking at the European market, LCCs help connect regions and stimulate the tourism industry, historically bringing fares down by a significant amount, making the access more democratic and available to a broader portion of the population. In the United States they connect regional routes, different states economies, operate in big cities and increase fares affordability, also creating a much more competitive market with multiple low-cost options and usually is the cradle of innovations. While comparing to the Brazilian market, only 3 players dominate a much more concentrated market, with many failed cases and too elevated entry barriers for new players, fares are still high compared to the average purchasing power and the number of trips per capita is still low, even if the main way of transportation for longer distances is the airplane.

This project comes in a period when a huge number of low-cost companies have failed in (2019). Also coming in a moment when understanding what is important to focus on for an airline is essential to survive with huge structural changes impacted by a global pandemic.

1.2. Objective

The objective of this paper is to analyze the European air transportation market, identifying what are the strengths and competitive advantages that made the Low-Cost Carriers so successful in that continent. Not only pointing benchmarks but also best practices that could be translated to the Brazilian market. To have a more complete approach and avoid market specificities bias, this project also aims to identify competitive advantages in the American market and, with both cases in hand, define which would be the most important lessons to learn from those low-cost carriers. Finally, this work will analyze the current Brazilian panorama to look at the context in which the Brazilian companies are inserted and, based on the lessons learned, identify if any room for operational performance leverage exist.

This project goal is that, studying the European and American markets, it will be possible to define what would be best practices and initiatives that an airline could apply to progress towards the LCCs' competitiveness level and also to see if it makes sense or not to apply those practices in Brazil, seeing if they are viable or if they are already applied.

1.3. Out of the scope

The purpose of this paper is not to define a new model for airlines to operate in the Brazilian market, nor to define what would be a business model innovative for the introduction of a new competitor to the market. It is more focused on an analysis comparing different markets. This paper also does not have as goal to prove means for a foreign airline to be introduced to the Brazilian market or to suggest any business model change.

During the development of this project our world faces an unprecedented challenge with the COVID-19 global pandemic that has caused disruptions on all industries and the air transportation industry is amongst the most impacted industries, facing extreme new challenges and a whole environmental change. As there is too much change over regulations, new habits, safety, international transportation, immigration restrictions and the whole industry has too much uncertainty around, this paper chose to analyze the situation as of December 2019. So far, most part of the experts expect the industry to recover over the next five years and for this paper timeframe it is too early to take the impacts of the change into consideration.

This paper also does not focus on a specific airline in Brazil, not having access to any internal data. Therefore, this paper will not propose any internal change in their operations or propose a new business model adapted to their specificities. Due to its paper being addressed to the market and not to a specific company, no details from any company's specific operation or internal data will be used. The report will also not cover aspects related to the liquidity, financial health or debt level of any company because it understands it would be a whole new project, thus all the financing mechanisms chose by each company and their cash, investments and working capital management will not be covered. This paper also does not measure the impact on the sector or in a specific company of possible changes presented here that would be actionable by either governmental initiatives or from the company's board of Director. Because it understands that to be able to take those estimations it would need access to internal data that are not available at the moment, nonetheless, tries to identify opportunities.

1.4. Methodology

First of all, this work will understand the airline industry as a whole, the history of how low-cost competition rose, understand the context in the global market, specially focused on the European and American cases and study the industry specifically in the Brazilian market.
After acquiring great knowledge of the sector dynamics, it will focus on understanding the differentiation factors for a Low-Cost Carrier and the specificities of the market to understand what makes that business model so particular in practice. Finding what would be best cases to study by taking out of consideration failed cases and looking closely to more resilient companies.
The following steps of this work will study the competitive environment and the strategy behind successful companies in the European and American market. Starting from a Porter's five forces and SWOT analysis frameworks presented on the literature review, and comprehend what would be key differentiation factors for a successful company.

Afterwards, validate the hypothesis with professionals that have worked with airlines before at the company where the author did his internship. Those hypothesis in hand, this work will structure a tree of profitability, to understand what are the main causes that lead to the effect of succeeding in the industry and target on the main ones that would be applicable to the Brazilian market. Studying how those factors impact the European and American market, this

work targets to obtain best-practices and benchmarks based on must-win battles which lead to success in Europe and in the United States LCCs.

Lastly it will compare those best practices to the current situation of the Brazilian airline structural environment to have an incisive view of the Brazilian air transportation panorama. Defining what would be roadblocks, possible leverages and in what aspects are the companies already on the right track.

1.5. Relation with the internship

During his internship at the strategic consulting firm, the author's learned how to identify the successful cases and their best-practices, applying not only the best-practices but also benchmarks to identify gaps for possible transformations on his projects.

The firm also has done multiple projects with airlines, having a vast background to support validation of the hypothesis here raised to make sure that the author is on track with his assumptions, in fact, many consultants that worked with airlines were interviewed and helped answer some of the author's doubts. In the past, early 2010s, the firm also did a few projects with airlines and governmental institutions that had a similar approach and goal, on which the author based his methodology and perspective. Those works are mostly confidential and when it is not it was used and cited on this paper. One work presented to the ministries of transportation and tourism even estimated that every R$1,00 spent with airlines generates over R$12,00 in economic activity.

This specific work was developed by the author without being part of a specific project for the firm. Being 100% author's authorship, however the author had support from the company and its consultants throughout the development of this project leveraging know-how, past experiences, orienting the approach and mainly using the knowledge available to validate hypothesis and progress with the works logic.

1.6. Organization of the work

This work is divided in 6 different chapters.

The first one, the introduction, already presented, explains the motivation behind the project and what are the main goals to be achieved with this paper.

The second one, Literature Review refers to the academic and theorical background on which this analysis in founded, using knowledge accumulated throughout the studies in Production Engineering to help identify the low costs` competitive advantages.

The third chapter, Market and Sectorial Analysis brings an overview of the industry. Explaining how an airline operates in that environment, defines what is considered a low-cost business model, the history behind its emergence, how it changed the industry and also a brief reading of the Brazilian air industry scenario before the COVID-19 pandemic hit the country.

The fourth chapter, Development, involves the unwind of the project, contemplating the main analysis on which the results will be based. This chapter studies and identifies the main lessons from American and European companies, so that, in possession of those lenses, we can have a different view of the Brazilian market. Here it is identified which best practices are already being used in the domestic market and what would have potential to be applied. Paving the way to specific analysis for each defined market aspect.

The fifth chapter presents the discussion and results, where, based on the industry costs, we present the biggest points of attention to improve profitability and, equipped with the markets best practices, find possible initiatives. In this chapter, will be look at each one of the main costs lines and try to identify what would be possible roadblocks, potentials for leverage and in what initiatives are the Brazilian airlines on the right path.

The final chapter, Conclusion, the author will make his finals considerations toward the learnings of the project and suggest next steps for further analysis not considered in this paper.

2. LITERATURE REVIEW

2.1. Legislation

The Brazilian regulators organizations are the DECEA (air space control department, in Portuguese) and the controlling agency is ANAC (national civil aviation agency, in Portuguese, 2019). They legislate the aircraft specifications, the certificates, the trainings required by the crew, the number of crew members and all the technical specifications over the aviation industry dictating the service from airports to flight safety.

The crew rights are specified in Brazilian legislations with the aviator law, number 7.183 of April 5th, 1984. That has suffered few modifications throughout time, most recent one is the law 13.475 of August 28^{th,} 2017.

Similarly, there are controlling agencies in Europe, the EASA (European Union Aviation Safety Agency) and in the United States the FAA (Federal Aviation Administration). An equivalent of the aviator law in Brazil proposed by EASA is the CM-CS-008 Issue 01 Revision 01.

2.2. Porter`s Five Forces

A company can outperform its competitors and succeed in the market, preserving its differential factors, either by delivering a great value for its customers compared to the other options or a comparable value but at a lower cost according to Porter (1996). This notion is essential for the thesis once the great value added to the customers is specifically how legacy carriers seek to differentiate from each other and low-cost companies are those that seek the strategy focused on cost.

A framework commonly used to assess the industry and see its attractiveness on this point of view is Porter`s Five Forces (PORTER, 1979), presented in Figure 2. With this tool, one can not only analyze the industry`s environment but also draw a strategy to address its problems using the classification. Three sources of force address the industry horizontally (competitors, substitutes and potential entrants), and two forces look at it vertically (suppliers and customers).

2.3.1. Threat of new entrants

This force measures how easy it is for a new player to enter the industry; it is an essential factor to determine future competitiveness and profitability. This variable is strictly related to the barriers of entry, with a direct relation. The higher the entry barriers, the harder it is to enter the market and higher are the profitability expected once new competitors put pressures on price and cost. (PORTER, 2008).

2.3.2. Rivalry among competitors

Competition drives discounted prices, requires higher investment on advertisement and customer acquisition as well as innovation and differentiation in an industry. The degree therefore of rivalry among existing competitors is an important industry force (PORTER, 2008).

Competition is more intense in concentrated markets, leading companies to dominate market share and overprice. Cost structure is also an important factor to shape rivalry among competitors. In industries with high costs, such as airlines, discounted ticket offers are a great example of a fight to draw variable costs down while the prices drop to differentiate and get a competitive advantage. The marginal cost of adding a passenger is marginal if compared to the fixed costs of a flight (GRANT, 2010). Other dimension would be product differentiation, when the products are not distinguishable, price is the main driver, however, when products are highly differentiated by competition, their characteristics and performance become decisive for the customer purchase behavior (PORTER,1980)

2.3.3. Threat of substitutes

How much customers are willing to pay for a specific product is directly impacted by the availability of substitute products if they fulfill a similar need for the customer using

different means (PORTER, 1979; GRANT, 2010). For example, train, bus and car trips are substitutes for flight when available in the same origin destination route.

The easier it is to substitute a product, the lower will be the profitability and make the demand more elastic, low threat of substitutes make customers less price sensitives such as in the fuel industry (GRANT, 2010). To differentiate from substitutes, companies need to invest on higher performance, branding, innovation and other means (PORTER, 1979).

2.3.4. Customer's bargain power

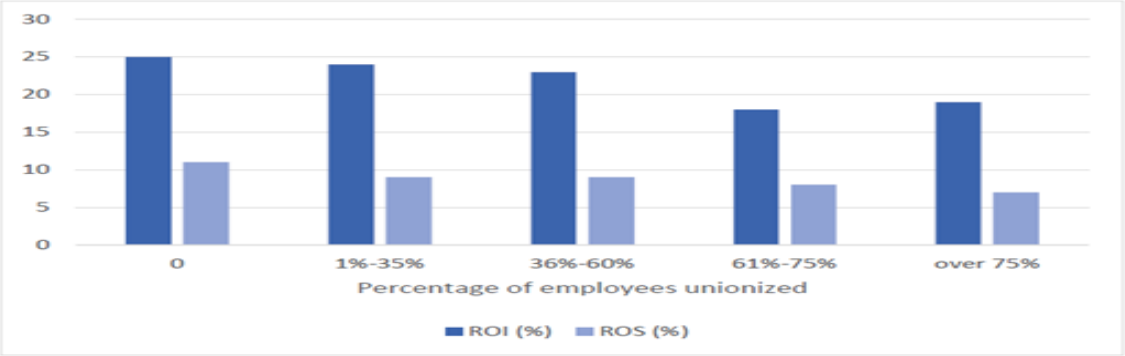
Multiple factors affect the customer`s price sensitivity, such as if the product represents a significant share of its budget, if they are income-constrained, the quality of the product acquired, the importance in their value chain, the volume of the purchase, the effect of the product on its cost structure. The force is driven by how much one transaction value influence comes from the customer compared to the company (PORTER, 2008).

According to Grant (2010), the size and concentration of buyers compared to sellers, the buyer`s information on price, cost, performance and quality, and buyer`s ability to vertically integrate characterize the power distribution.

2.3.5. Supplier's bargain power

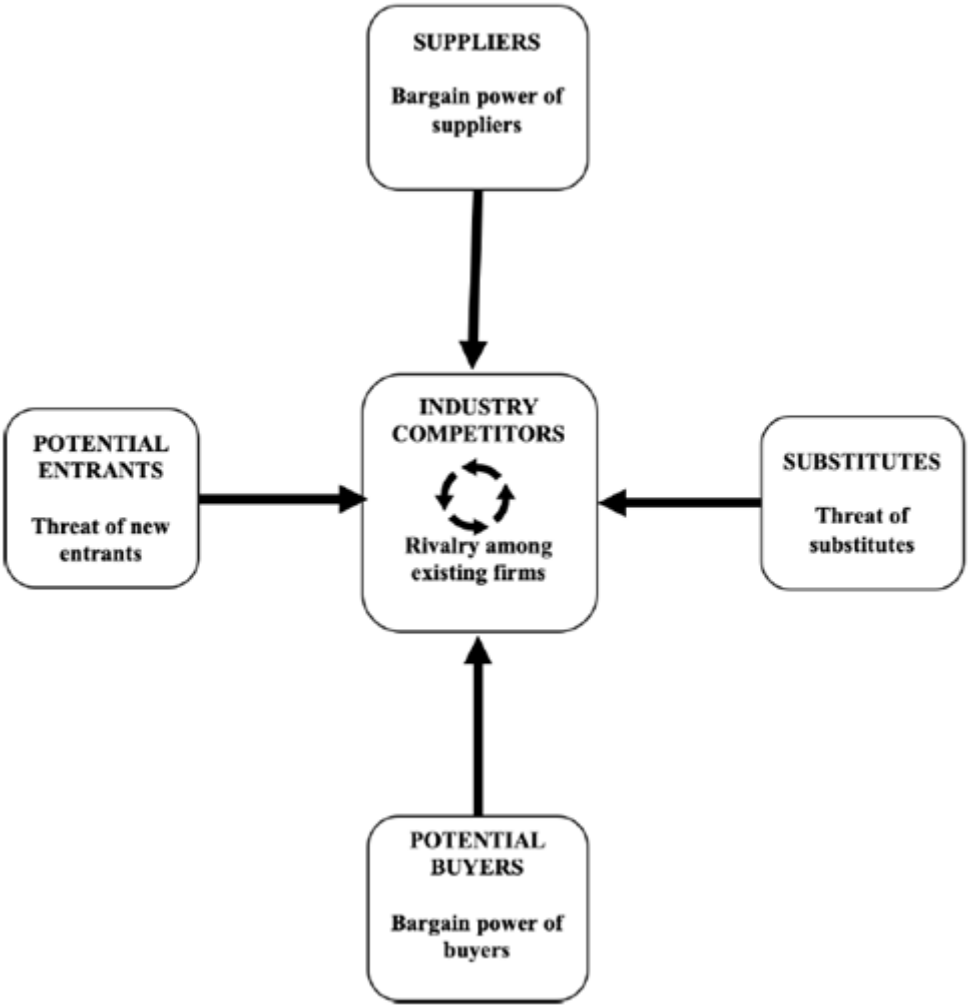
Supplier`s bargain power is symmetrical to the buyer`s one. If suppliers offer undifferentiated products, they lack bargain power, if they supply sophisticated material, they capture higher value and prices. Labor unions exert strong influence on profitability, as shown at Figure 1, by increasing the supplier bargain power (GRANT, 2010), this extremely affects pilots and crew costs for airlines. The following figure illustrates the negative relation between the employee's unionization and companies' profitability measured by Return on Investment and Return on Sales (GALE, 1987).

Figure 1- Impact of unionized employees on return of investment



Source: Gale (1987)

Figure 2 - Porter's 5 forces framework



Source: Porter (2008)

2.3. SWOT Analysis

A well-known tool used for strategic planning/management to analyze the internal and external environment for a company/industry is the SWOT analysis framework. This acronym stands for Strengths, Weaknesses, Opportunities and Threats, its main goal is to identify the limitations for a company, the competitive advantages and monitor possible risks or external elements that give the organization benefits. The SWOT analysis is a simple but powerful tool for sizing up an organization's resource capabilities and deficiencies, its market opportunities, and external threats to its future. (Thompson et al., 2007: 97)

Organizations are wholes that are in interaction with their environment and sub-systems. Strong and weak elements are analyzed looking the company's environment while opportunities and threads are originated by the external environment. This analysis is helpful to achieve organizational objectives, define harmful downsides and help management prioritize which points to give more attention. (Gürel, Emet, 2017)

2.3.1. Strengths

Organizational Strengths are characteristics that add value to the company, being more advantageous than others. Involving properties and abilities that are an advantage over competitors. Characteristics and situations where the company is more effective and efficient than its competitors. (Gürel, Emet, 2017; Andrews, 1971)

2.3.2. Weakness

Weaknesses are characteristics negative or unfavorable, something that reduces the company`s bargain power or competitiveness. Aspects or activities in which the organization is less efficient or effective than its industry peers, affecting its performance, jeopardizing the organization's potential to achieve an opportunity. (Gürel, Emet. 2017)

2.3.3. Opportunities

Opportunities are external situations that could result in positive effects to the company. Opportunities make it possible to achieve goals, overcome weaknesses, neutralize threats or take advantage of their strengths. To find opportunities the external environment needs to be analyzed in all its dimensions, as well as the market behaviors. Management needs to be always aware of new possible opportunities that may arise and act quickly to take advantage. (Gürel, Emet. 2017)

2.3.4. Threats

Threats are external situations that can harm the company`s performance, resulting in negative effects. Making it harder or impossible to achieve goals or result in losing its competitiveness. Damaging the company's success, cause unrecoverable damages or jeopardizing its effectiveness and efficiency. (Gürel, Emet. 2017)

2.4. LCCs logistics model

GÓRECKA HORAK (2014) applied a method to make a decision on which would be the best practice for LCCs logistics model to operate. Forthwith, he formulated the problem using a decomposition of the airlines costs to understand the LCCs Hub and spoke vs point to point system (at The International Conference on Logistics & Sustainable Transport 2013) questioning why low-cost airlines do not operate in this system.

Their analyses of the airports of Paris Charles de Gaulle (CDG) and Frankfurt (FRA) short vs long haul flights for flights operated by Air France and Lufthansa showed that short-haul flights were mainly (17 out of 26) non-profitable for the operating routes considered. While all the routes for long-haul flights were profitable.

It considered for the short-haul flights the major airports within 800km of the hub airport of origin in the European Union or European Free Trade Association (EFTA) countries as well as airports adjacent to the existing or planned high-speed rail network. Including Amsterdam

Schiphol (AMS), Berlin Tegel (TXL), Brussels Airport (BRU), Dusseldorf Airport (DUS), Geneva Airports (GVA), Hamburg Airports (HAM), London Heathrow (LHR), London Gatwick (LGW), Manchester (MAN), Munich Airport (MUC), Zurich Airport (ZRH) and both hub airports of origin.

As for the airports for the long-haul analysis it considers major airports in the United States, China, Japan and Singapore: Atlanta Hartsfield-Jackson (ATL), Beijing Capital International Airport (PEK), Chicago Orlando (ORD), Los Angeles International Airport (LAX), New York JFK International Airport (JFK), San Francisco International Airport (SFO), Singapore Changi (SIN), Shanghai Pudong (PVG) and Tokyo Narita (NRT).

This model does not take into consideration the customer transfer costs, what usually is the main reason why low-cost airlines tend to use more Point-to-point routes.

"For airlines, hubs are not a goal in themselves but a means to add value to airlines on both the demand and cost side in general, hubs add value to an airline through beyond market access. Moreover, they average out natural peaking of demand, can generate rents (hub premiums, density and scope economies) and provide opportunities for mixing prices. The advantages of "hubbing" become stronger with a growing network, because of the externalities and spillover effects of additional spokes" GORECKA HORAK (2014, pp.3)

This example of analysis using their airline's cost segmentations shows us a reasonable method to evaluate airlines decision making, by analyzing their cost segmentation and the impacts of each decision. In order to do so we would need a cost segmentation standard, the one proposed by IATA seams a reasonable option.

2.5. Airline's cost segmentation

Flight costs can be divided considering the IATA division in three different segments:

1) Flight operating costs (flight crew, fuel costs, routine maintenance, extensive major checks, depreciation and amortization like capital costs of airline assets, such as the aircraft and the turbine)

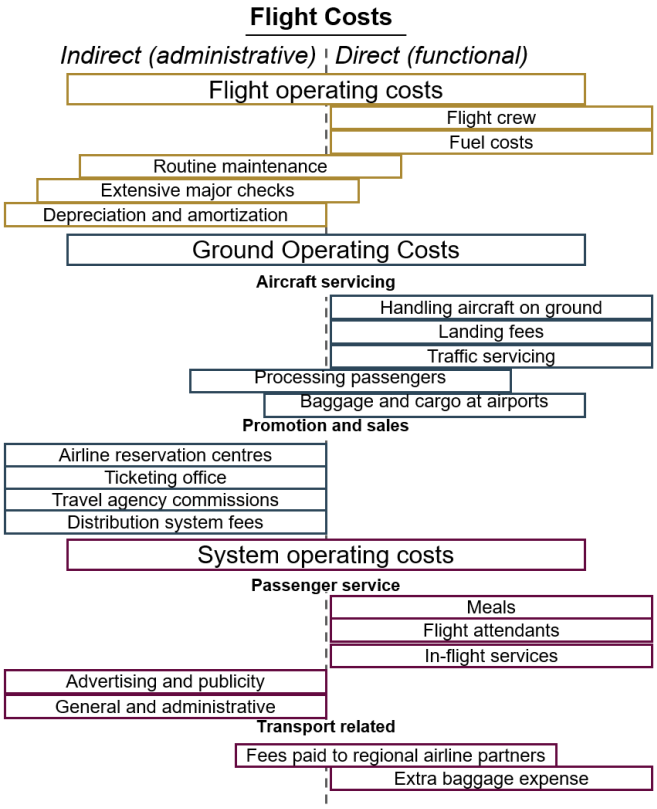
2) Ground operations costs (aircraft servicing: handling aircraft on ground, landing fees; traffic servicing: processing passengers, baggage and cargo at airports; promotion and sales:

airline reservation centers, ticketing offices, travel agency commissions, and distribution system fees)

3) System operating costs (passenger service: meals, flight attendants, in-flight services; advertising and publicity, general and administrative which cannot be associated to a particular activity; transport-related: costs associated with the generation of transport related revenues; fees paid to regional airline partners, extra baggage expense and other miscellaneous overhead)

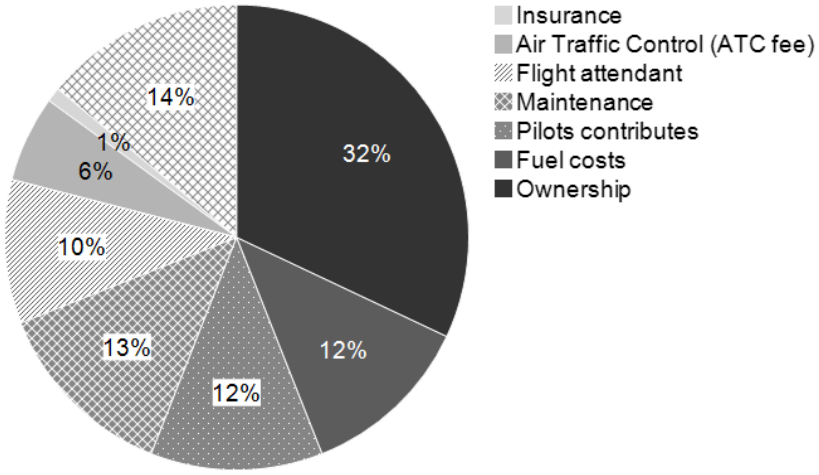
Which are classified by GÓRECKA HORAK (2014) with the following structure in Figure 3, distinguishing between two dimensions, so called administrative (indirect) or functional (direct) SWAN and ALDER (2006) estimated the proportion of each nature of costs for the airlines, getting to the following breakdown provided by GÓRECKA HORAK (2014). This breakdown can vary according to the type of airline (LCC, tradition etc.) and type of flight (short/long haul) but it gives a good estimative of the order of size of each component and its importance in the carrier's operation. Figure 4 presents an example of cost breakdown used by GÓRECKA HORAK for a low-cost logistics model comparison analysis:

Figure 3 - Flight costs structure



Source: GÓRECKA HORAK (2014), IATA

Figure 4 - Cost breakdown by GORECKA and HORAK



Source: GÓRECKA HARAK (2014)

It is possible to draw the conclusion then that the reason why those routes were not profitable in the work of GÓRECKA HORAK (2014) is because the cost structure of the companies operating it (the legacy carriers considered), is much different than the cost structure of a low cost. Therefore, it is worth it understanding the operation of an LCC and see later in this study the differences in operation between the two models and therefore drawn their cost competitiveness drivers. A big transformation caused by low-cost is that many of those routes previously considered non-profitable and used only to fill the hub for a longer trip now became profitable.

This gives an idea of analyzing the airline cost segmentation might be a good way to identify competitive advantage and best practices for the LCC. Indeed, Barney and Hersterly (2015) show that cost leadership is an important competitive advantage strategy, helping reduce the threat of new entrants by increasing the cost-based barriers of entry. The implementation of that strategy occurs when an organization adopts policies and practices that are consistent with this strategy (BARNEY and HESTERLY, 2006: 6-11), giving evidence that there might be common practices between the airline companies that chose have cost leadership as their competitive advantage strategy. Barney and Hesterly (2015:122-123) also analyses the case of Ryanair to show the importance of cost leadership as a competitive advantage, reinforcing the value of the approach to analyze the main LCCs cost structure to identify the best practices that lead to competitive advantage.

3. MARKET AND SECTORIAL ANALYSIS

3.1. Global historical context and the birth of Low-Cost carriers

"If you get your passenger to their destination when they want to get there, on time, at the lowest possible fares, and make darn sure they have a good time doing it, people will fly your airline". (Flouris, T.G. & Oswald, S.L., 2006, pp. 47)

KELLEHER, Herb. and KING, Rollin. Creators of Southwest Airlines

LCCs started to first be successful in the United States. From 1938 to 1978 the airlines in US operated under the rules set by the Civil Aeronautics Board (CAB), with assigned routes in a mix of low and high profitability, the lucrative routes subsidized the unprofitable routes. Fares were controlled by the board and cost increases were translated in increases of fares to the customers, what allowed the airlines to be profitable, once they were protected by this policy, they often agreed with labor unions demands, increasing salaries and benefits while applying more strict work rules that decreased their workforce flexibility. The competition was mainly focused in the service differentiation, to win the customer, the carrier focus was in their individual additional services, investing on meals, entertainment, adding departure times. (RIVKIN, J. and THERIVEL, L., 2005)

All this scenario lead to an increase in capacity and operational costs, often creating an even more fixed cost structure, resulting in high price tickets. In 1978 President Jim Carter signed the Deregulation Act, allowing the carrier to freely define their fares and allowing free route entry/exit. This event created a huge drop in fares and marked the introduction of the low-cost carries.

With the deregulation, most part of the carriers pivoted to the hub to spokes model to achieve greater load factor and using short-haul flights to bring passengers from cities with lower demand in smaller aircrafts and then flying them in bigger aircrafts to the further destination. (RIVKIN, J. and THERIVEL, L., 2005)

In Europe the biggest airlines (KLM in the Netherlands, British Airways in the United Kingdom, Air France in France and Lufthansa in Germany) had been set up in the 1930s or earlier. Till late 1970s, the governments preferred policies to control airlines, seen as strategic sectors of the economy, it was only in the 1980s that the mentality changed towards more market-oriented ideas such as deregulation, privatization and competition.

The deregulation started in the US in 1978, and then spread to Europe and companies evolved from government-controlled utilities agencies to private market companies, dragging fares down and introducing the low-cost carriers (LCC) models with Southwest and Ryanair.

Differently from the US, in Europe the government influence on the operations remained a big characteristic of European airlines. Governmental institutions control for example landing rights and time slots, what lead to the biggest airline players still control above 30% of their hub's total slots, like in the case of Heathrow or Frankfurt am Main. The airports were mainly state owned with the local governments playing an important role in the capacity, expansion, runways structure and all further infrastructure. Furthermore, the individual states are still the responsible for the agreements regulating traffic between countries. By 1992 any European airline was able to operate any route between two European countries. 1997 EU airlines were eligible to operate domestic flights in any EU country. (MULLER, U. and BIDAULT, F., 2015)

Low costs offer a threat in both market share and yield, with airlines not only having to reduce their ticket price to stay competitive but also losing their slots on airports and having other carriers operating the same routes.

Southwest, the first major LCC emerged in 1967 in Texas (United States) to provide interstate service and then expanding to the Southwest states, California and then towards the East Coast, limiting itself to a 10%-15% annual growth rate to keep control over its low-cost structure and assure that they do the expansion correctly, to no overgrow and generate unprofitability. The company themed with « love » provided point to point flights with an average length of 515miles using an all Boeing 737s fleet. To reduce costs, the company cut in-flight meals, seat assignment and did an all-coach cabin, it changed the relation with its employees, working closely with the unions, adding profit-sharing plans to industry competitive pay and agreeing with flexible work in return. Leading to a short turn time and high fleet utilization.

As in the air transportation market, for routes lower than 600 miles they are competing with automobiles, buses and railroads, while in longer distances they are basically alone in the market, Southwest needed to set its ticket price very low in order to compete with road transportation, the demand followed it and the company achieved high load factors. Many LCCs tried to copy Southwest model but their low success rate can be related to too quick expansion, bad route choices, or confronted directly with major airlines provoking forceful reaction in response to competitor flights in their hub airport.

Another successful emerged LCC after Southwest is Jetblue, founded by the same businessman that later founded Azul airlines in Brazil. They operated with all non-union employees, many from outside the airline industry, with very few work rules, expecting

flexibility among employees and offering corresponding flexibility in their employment packages. One-year contracts were created aiming for college students that like to travel, job-sharing packages for those that wanted more time at home.

When LCC were created, only 5% of the 30,000 cities served by legacy carriers' hub-and-spokes model had enough traffic to support a point-to-point model. Those 5% corresponded to 73% of the passengers. (RIVKIN, J. and THERIVEL, L., 2005)

United created a low-cost subsidiary named to try to contain Southwest growth on the west coast, but they failed to make the new division profitable and real low cost. Shuttle was managed by United Chicago's headquarter and failed to obtain workforce cost reductions, employees and labor unions were not willing to reduce their salary. Shuttle had the same bureaucracy as United. Other companies such as US Airways tried their own version with Metrojet, but these subsidiaries wouldn't work because they were never truly low-cost, their parent companies were hiding the true expenses cost in their financials.

After deregulation, Delta became the most profitable from the big airlines in the United States. In terms of its workforce, only the pilots had an union and the compensation and benefits across all roles was near the top of the industry, to balance it the rules for non-pilots were much less restrictive than in the other airlines, allowing Delta to achieve some productivity gains in terms of flight attendants and ground crew, and it was this competitive advantage that allowed the company to give the generous payments.

To fight Southwest competition in the Florida leisure market, in 1997 Delta launched the subsidiary Delta Express that would not fly through Atlanta's hub, it flew direct flights from the Midwest and Northeast. To avoid cannibalization Delta withdrew all mainline flights from Florida on routes served by Express.

Express had its separated gates, crew dressing, airplane painting, light snacks, and had all fleet receive a maintenance overhaul using older 737-200s. The main cost efficiency drivers were the higher airplane utilization rate and cheaper payroll, after negotiation with pilots' unions it achieved a 32% pay cut. Express would share with Delta not only its maintenance, pilots, flight attendants and ground service, but also its corporate decisions, the strategy concerning routing, flight schedule and pricing were centralized. Delta saw then by 2000 almost all its payroll advantage on Express disappear when the pilot unions fought to renew their contracts, in both lines, negotiating at once to have the same pay for the two operators. (RIVKIN, J. and THERIVEL, L., 2005)

3.2. Brazilian historical context

The Brazilian market between 1990s and 2000s as in many countries passed by a process of market liberalization, reducing market entry barriers and increasing competition. The deregulation process involved three distinct periods (Oliveira and Huse, 2004). In the first, regional airline monopolies were removed, stimulating legacy carriers to enter the market. In the sequence the price competition was increased with the beginning of price bonds structures. In 1997 the second stage started with the removal of monopolies on some lucrative routes and finally in 2001 on the third stage, most route entrance barriers were removed, with the withdraw of flight frequencies requirements and tariffs, enabling the creation of GOL. Most recently in 2019 the limit of foreign capital on an airline was removed, now an airline 100% owned by foreign capital can operate in the country, what some see as an opportunity for the increase in competition.

Figure 5 shows that the Brazilian market have a long history of airlines bankruptcy. From the main airlines in the 1990s only TAM (LATAM today after the merger with the Chilean LAN) remains, with VASP and Varig, former big players having filed for bankruptcy in the 2000s. The other 2 current main players, Gol and Azul, respectively born in the 2000s and 2010s are considered low-cost options, even if the difference in fares is not big and Azul operates multiple regional routes.

There is no airline in the market with the ultra-low-cost business model, many foreign competitors tried to enter the market but without recent success. The 4th biggest player up to 2016, Avianca Brasil have filed for bankruptcy in that year.

Figure 5 - Timeline of Brazilian airlines that filed for bankruptcy since the 9/11 terrorist attack.

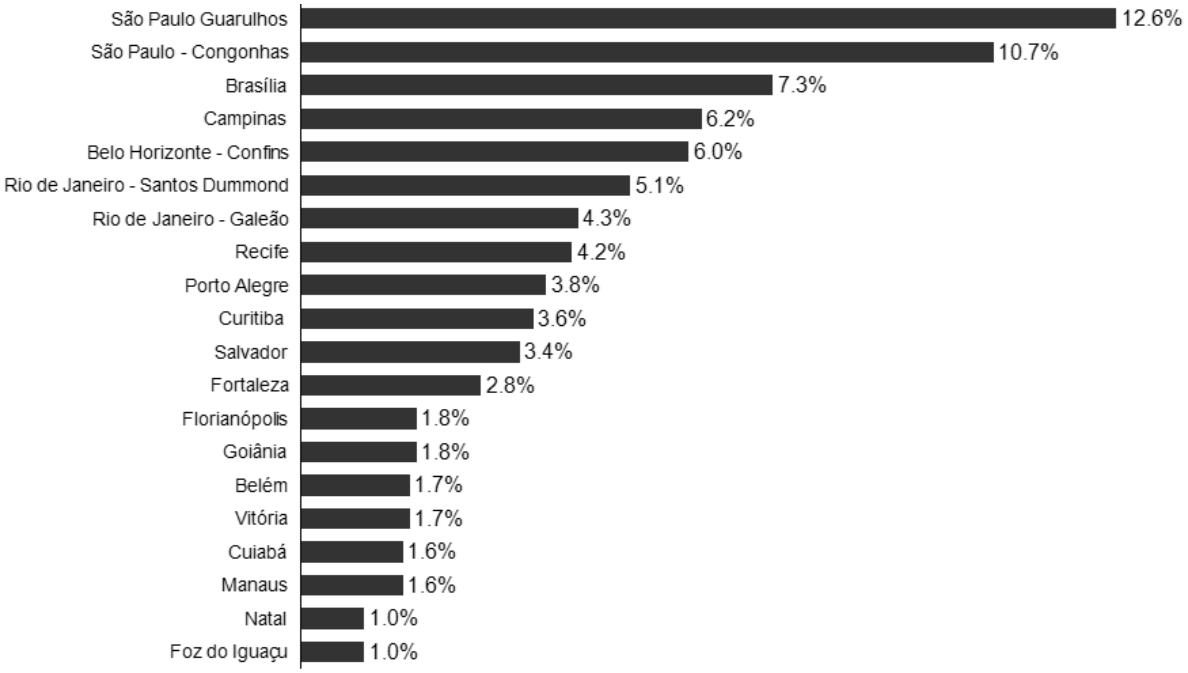
Source: Bain & Company, ABEAR (2013). *Obs: Avianca filed for bankruptcy in 2016*

The introduction of Gol and Azul to the market lead to a decrease in the average fare price with the legacy carriers TAM and at the time Varig finding a way to adapt their operations to be more productive, lowering fares.

One interesting point about the Brazilian market is the intense slot competition in some airports, for the example of the Congonhas (SP) airport where the bankruptcy of a main player in the airport (Varig) led to a huge advantage for Gol when they acquired their fleet and slots in that airport. The slot operates in a system that forces the airlines to use them with flights otherwise they lose the rights to keep it, with targets of maximum cancelation and delays but restricted by a number of takeoff/landings at the airport (around 33/h). What is a really important achievement, once, in Brazil, the most important routes are also short-haul routes, such as São Paulo Congonhas – Belo Horizonte (CNF), São Paulo Congonhas – Brasilia (BSB) and São Paulo Congonhas – Rio de Janeiro (SDU). Miranda, V. A. P., & Oliveira, A. V. M. (2018) concluded that the system has important side effects of harming the ability of airlines to freely allocate flights and manage operations, also impacting the passenger that is not able to have the most-desired times, on top of damaging competition restricting them to access airport facilities. Also finding evidence that the high concentrated competition on slots creates additional costs that are passed to air ticket fares, although reduces the disruption of the service.

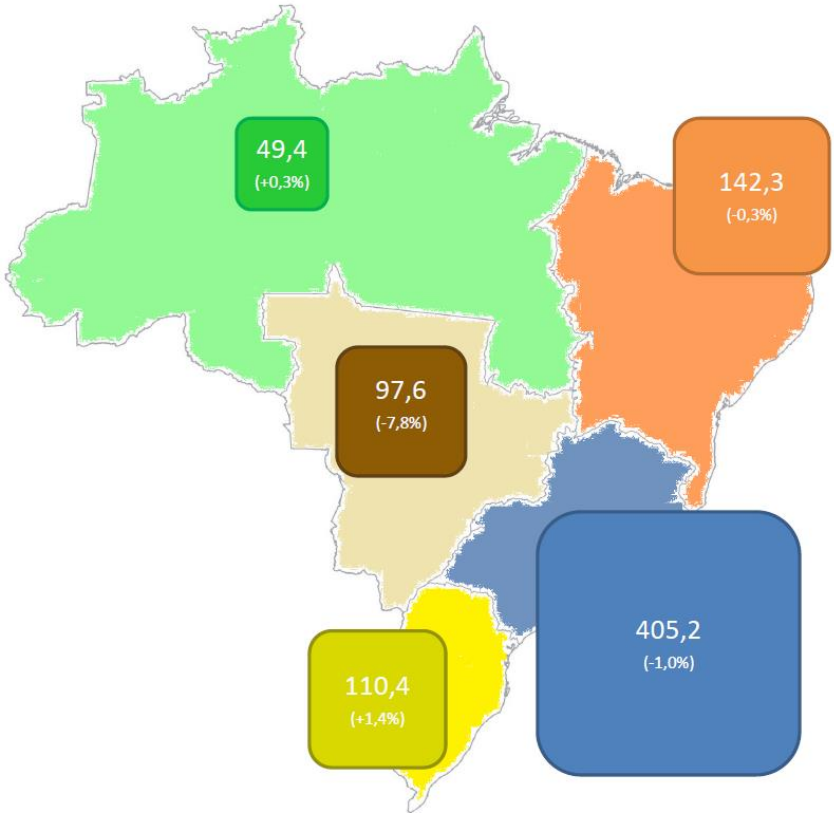
The Brazilian Department of Civil Aviation estimates that 70% of the passengers on domestic flights travel for business purposes. The routes are highly concentrated, with 20 airports accounting for 80% of the traffic (Figure 6) and one region (Southeast) accounting for 50% of the take-offs (Figure 7). It is also a concentrated market with only 3 companies accounting for more than 90% of the market share (Figure 8).

Figure 6 - Share of the 20 biggest airports in Brazilian commercial flights



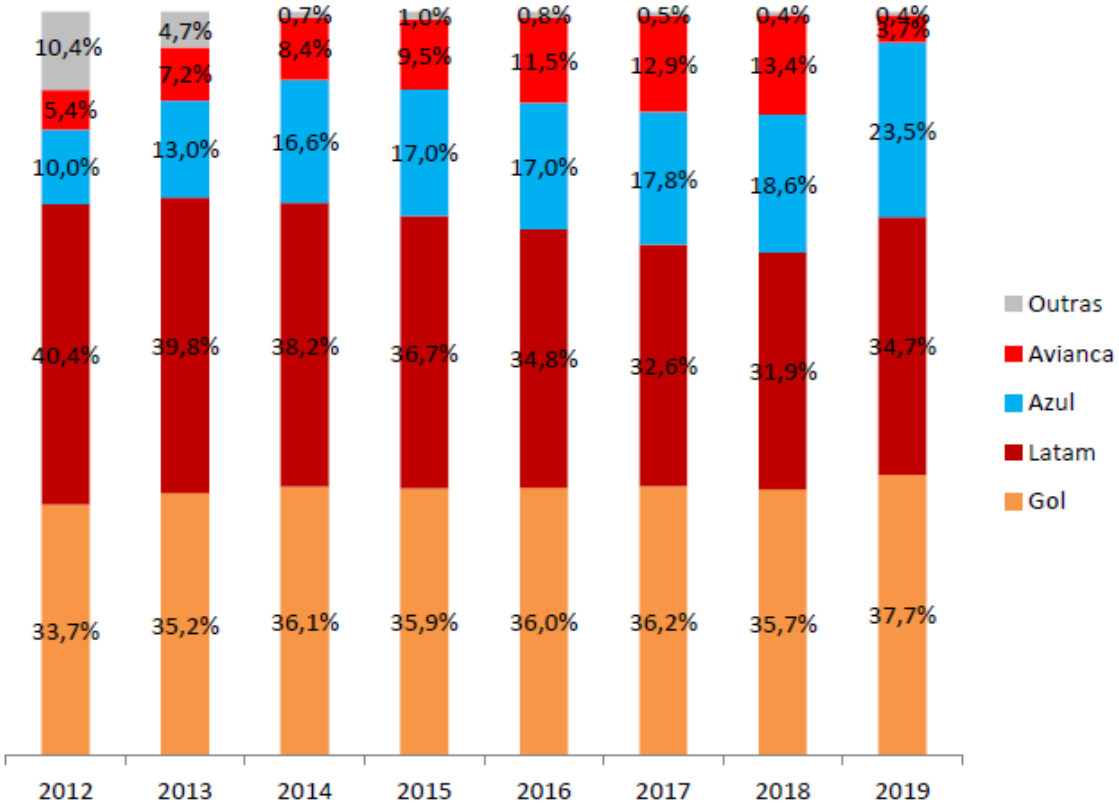
Source: ANAC (2019)

Figure 7 - Number of domestic take-off per region



Source: ANAC (2019)

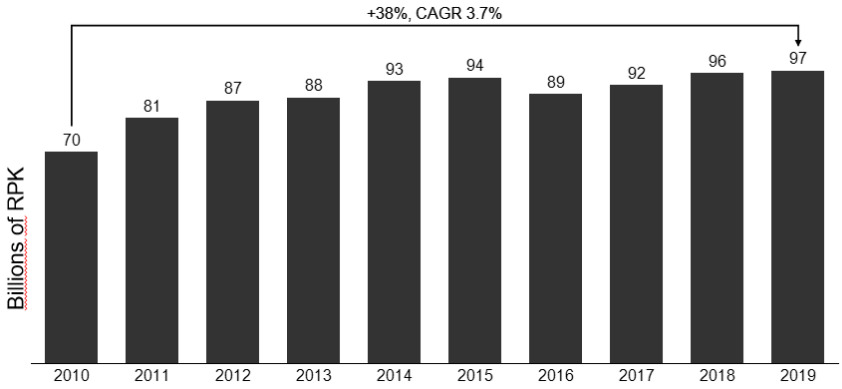
Figure 8 - Aviation Market Share (RPK)



Source: ANAC (2019)

Figure 9 presents, using data from the Brazilian civil aviation agency historical reports, that the market there has been significantly increasing from 2010-2019, even considering a reduction during the Brazilian financial crisis in 2015 and 2016, the industry grew 38% in the decade, at a compound annual growth rate of 3.7%. Afterwards the market went back to growing even with the bankruptcy of one of the major players (Avianca), with most part of its share of the market being assumed by Azul.

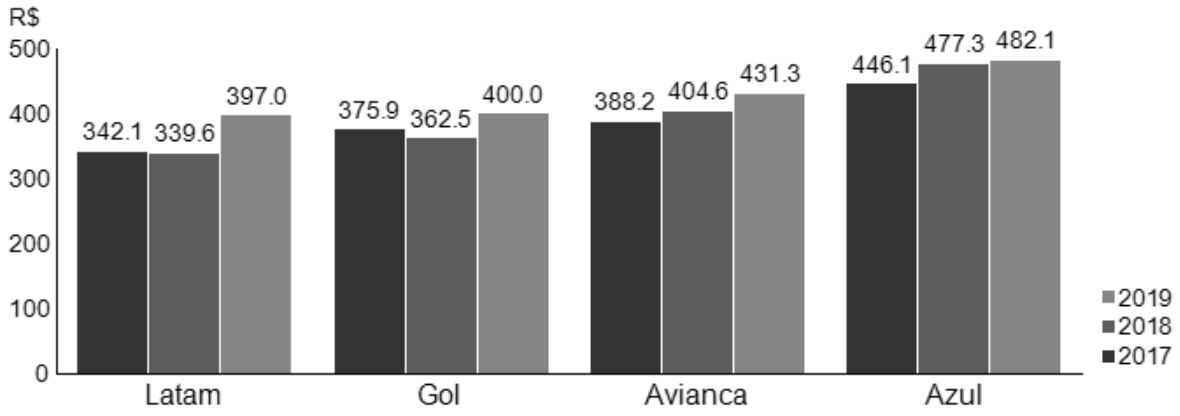
Figure 9 - RPK evolution (Billions) in the Brazilian market 2010- 2019



Source: ANAC (2019)

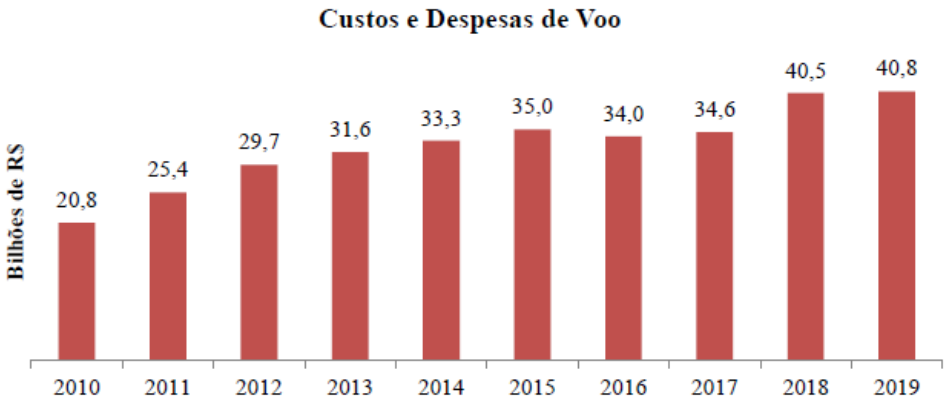
However, Figure 11 shows that the domestic market also saw an increase in the operational costs, specially in 2018 and 2019, leading also to an increase in fares, presented in Figure 10. This increase in heavily impacted by increase in exchange ratio and jet fuel/oil prices. Figure 12 shows that this fare increasing movement allowed the main companies to keep good EBIT, improving margins and remaining healthy in their operations (not considering financial mechanisms).

Figure 10 - Brazilian commercial flights average fare evolution 2017-2019



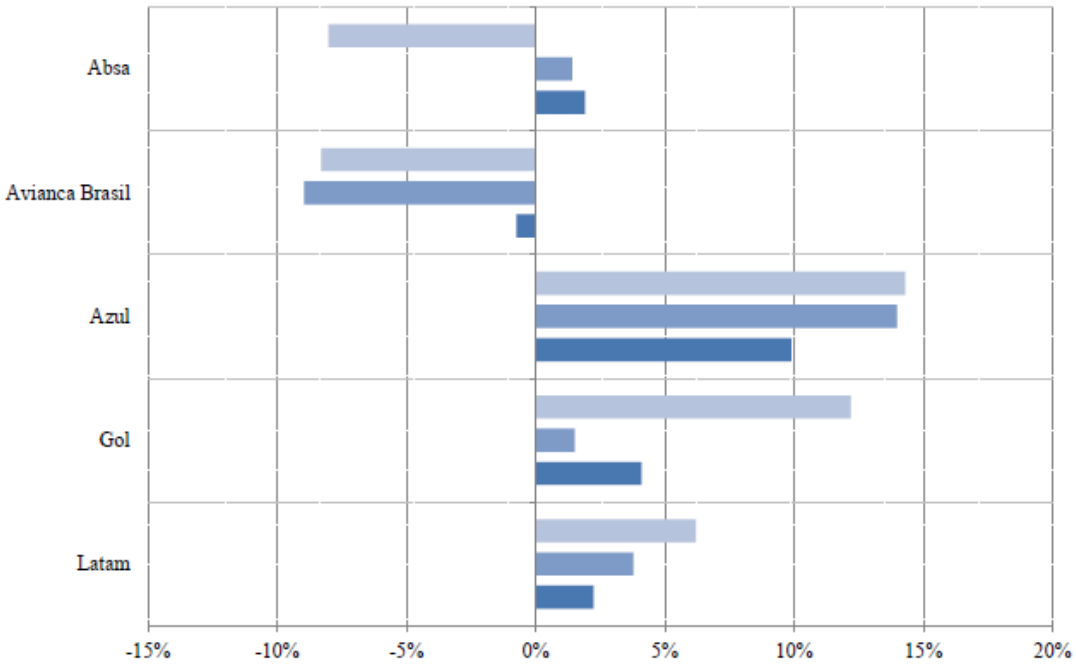
Source : ANAC (2019)

Figure 11 - Brazilian airlines' costs evolution (R$B)



Source: ANAC

Figure 12 - EBIT margin per airline, 2017-2019



	Latam	Gol	Azul	Avianca Brasil	Absa
2019	6,2%	12,2%	14,3%	-8,3%	-8,0%
2018	3,8%	1,5%	14,0%	-9,0%	1,4%
2017	2,2%	4,1%	9,9%	-0,7%	1,9%

Source: ANAC

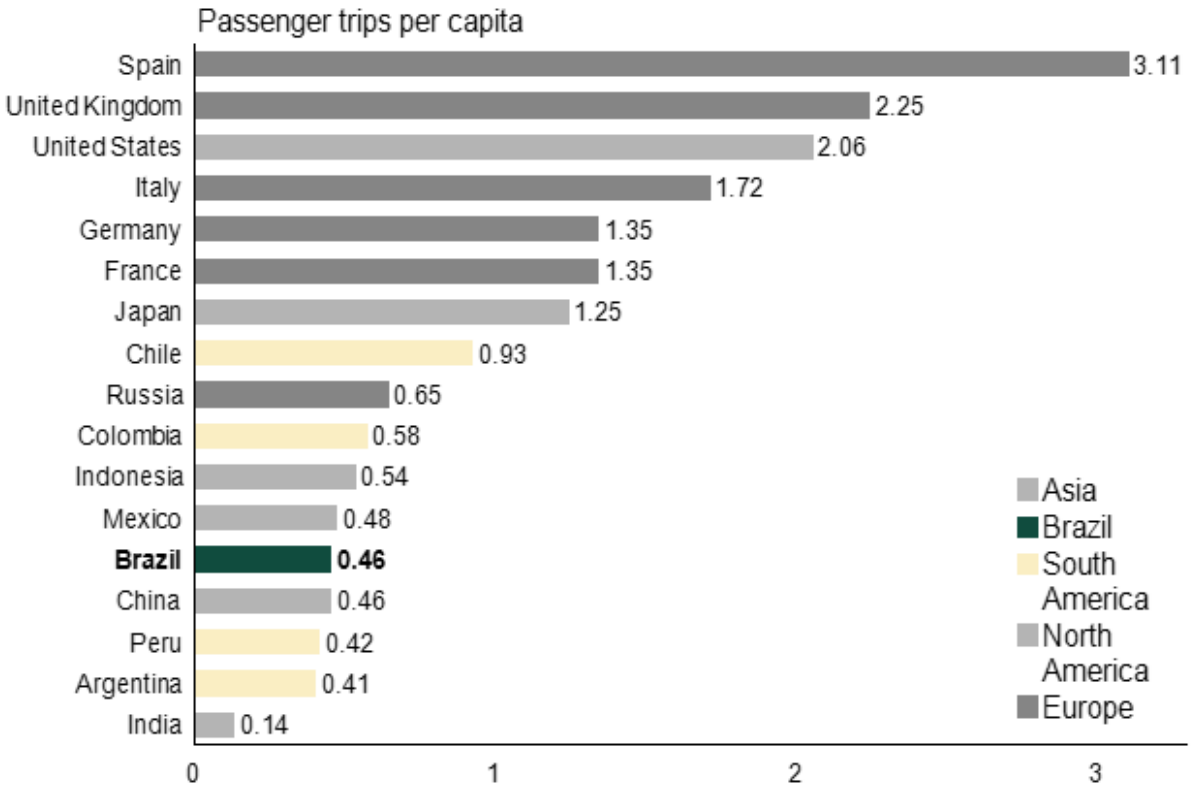
On the labor side, Brazilian flight crew is regulated by Federal law number 7183 and is considered by many analysts as outdated and restrict, particularly when compared to Chile, Uruguay or other South America countries. India and China are good benchmarks of hiring and flexibility policies according to C. Filho (2014). Brazil also forbids hiring foreign pilots and has flight crew represented in majority by a syndicate, such as the Aeronauts National Union (SNA).

McKinsey (2010) shows that the airports infrastructure, mainly administrated by Infraero, has not followed the growth in traffic from the 1990s and 2000s. In 2010, out of the 20 main airports, 13 had structural bottlenecks, today some of them had infrastructure investments with the World Cup but still the works were delayed and sometimes not sufficient for the market growth. In order to overcome this adversity many airports were privatized (Natal, Brasília, Fortaleza, Confins – Belo Horizonte, Galeão – Rio de Janeiro, Guarulhos – São Paulo, Porto Alegre, Florianópolis, Salvador and Viracopos – São Paulo/Campinas). As of today, ANAC has already announced more 5 rounds of public private airport concessions covering most part of the main airports, what is expected to drive competition and service quality

improvement. The consulting company's studies forecasted that Brazil would have to double the capacity as of 2010 in order to fulfill demand till 2030 (not considering the Brazilian crisis in 2015 or the coronavirus pandemic effects). The same study also found out that the fares prices have an elasticity of 1.4 in Brazil. In other words, for each 1% lower tickets, the demand increases by 1.4%.

Figure 13 presentes that the number of trips per capita in Brazil is still low if compared to Latin America peers such as Colombia, Mexico or Chile, and much lower than the European or American market. In parts due to the lower GDP per capita ratios but it could also indicate room to improve in the industry.

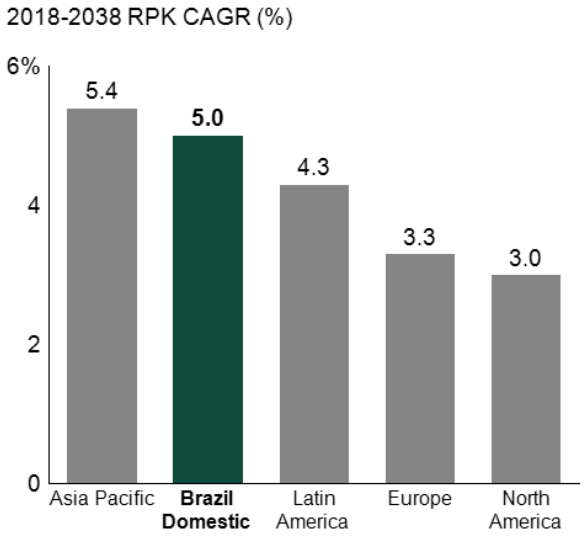
Figure 13 - Passenger trips per capita in the key countries



Source: Airbus Global Market forecast (2019), author's analysis

On the other hand, Figure 14 presents that Brazil can enjoy greater RPK growth rates, measured by a greater forecasted CAGR from 2018-2038 using Airbus 2019's Global Market Forecast (not considering the effects of the pandemic). Being is a key factor to impact competition and infrastructure capacity.

Figure 14 - Market RPK growth comparison



Source: Airbus Global Market Forecast (2019), author's analysis

3.3. Understanding the market dynamics

The air transportation market is characterized by the interaction of many players each one taking their role in the operations verbalization and having different operational profits and being susceptible to different risks but sharing the same externality risks related to: demand, terrorism, environmental changes, government control, military instability and disease transmissions. Those are impacts that affect the whole industry, examples of the effects can be seen in the September 11th, known as one of the most game changing events for the air transportation industry, redefining all the concepts of safety and changing completely airport security, highly impacting demand for some time and with a strong government interference. However, that event seems to be overpassed in terms of impact if compared to the current transformation and disturb caused by the current sanitary crisis caused by the Covid-19 pandemic, happening at the same time as this thesis is written, which transformational impacts are yet to be measured, but for sure is an historical event for aviation with thousands of planes being grounded and disrupting all the value chain.

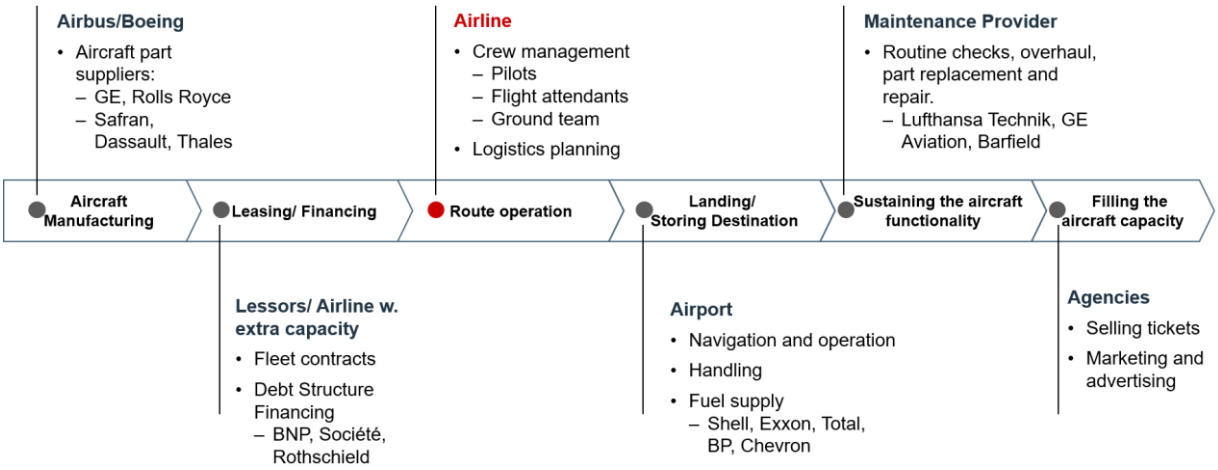
In order to understand the impacts of each player on the operation and the market mechanisms we need to first draw the value stream for Commercial Air Transportation. Here, the report will only focus on passenger transportation, not ignoring the importance of cargo for

the airline's profitability and all the impacts on bargain power and synergies, but understanding who needs to participate and how they need to get involved in order to enable a passenger flight.

The value stream must then consider and overlook from the moment that the aircraft is manufactured to the moment that the customer has the interaction to buy his ticket, which is the revenue generating point (considering only fare revenues and not analyzing ancillary revenue generated by in-flight consumption or extras for the moment). Therefore, all the related parts involved before that point can be considered the resources providers that enables the existence of the service, and each one has an element of cost to be attributed and assumed by the airline operator in order to deliver the service.

The following value stream map on Figure 15 shows the necessary activities for the service operations, shows who is the owner, responsible for the activity existence, and their main related parts giving support to their function, including some company examples to illustrate non direct stakeholders.

Figure 15 - Airline operations value generation chain



Source: Author's creation

On the flow above it is possible to identify not only the main players and their participation on the flight experience process but also which activities are under their umbrella to manage on their own, and other companies that they might interact with. This gives an idea also of what are the secondary costs associated with each step of the value chain and the distribution of the marginal cross the shareholders. We could easily do an analysis of bargain powers to notice that the airlines are in a big disadvantage.

Step by step in the flow; first of all it already will have to negotiate with the manufacturer, a highly concentrated market with few providers having a huge bargain power and having to pay for their high costs, big investments and long manufacturing cycle, with a product of lifespan but limited production capacity. The role of Airbus, Boeing, Bombardier or Embraer is mainly the product design and the parts assembly, having most part of the high value-added components manufactured somewhere else. A good example is the engines, the highest value-added part of the manufacturing and the main maintenance impactful part, it has a limited number of suppliers, among them GE and Rolls Royce. The manufacturer also needs to manage orders for the cabin design providers, with the layout and seats being customized by the airline but usually assembled at the moment of the manufacturing. One other important participant is the electronics and systems providers, such as Safran, Dassault and Thales.

To make the purchases viable and manage deliveries easier, a third party, the lessors, are frequently the intermediary player between airlines and the manufacturer, making big quantities purchases and managing their fleet availability across airlines from different geographies. To firm a contract with those providers, usually finance mechanisms are applied, with long depreciations impacting their results and long-term debt contracts on their balance sheets, in order to make this viable often a bank or financial institution participates on the debt structure of the deal.

The airplane in the airline's possession, the company is responsible for the route management, choosing which routes it will operate, following government regulations, demand and airport infrastructure. It is also responsible for all the logistics involving route operation, such as their hub position, where they will store the airplane when it is not used, cancellations and in-time departures management as well as making sure that the airplane is in shape and following all the required regulations to be able to take off. On top of managing the aircraft, the airline is also responsible for managing their crew, making sure that they are well trained to operate in the designed airplane from the pilots, the flight attendants to their ground staff. Having to manage also the people staffing and logistics, as well as being responsible for where they will stay the night and transportation when needed.

The choice of the routes is highly dependent on the airport infrastructure available, the politics incentives for the region and the navigation system provided. For that to operate we need airports with the infrastructure, following the country`s norms and the aircraft operation requirements, as well as the infrastructure to provide fuel, store the airplane if needed, and do small maintenance if needed. It will be responsible for the controlling tower and the facility to

accommodate passengers before and after the flight, providing also the baggage handling service. To do so they need to well manage their slots between the operating airlines and follow all the security procedures required by law.

In order to be able to fly, the aircraft needs to follow international rules and regulations, being compliant with the required check and overhauls. Passing by frequent programmed routine checks and maintenance points, as well as non-forecasted maintenance to repair abnormal items. The frequency of those checks depends on the aircraft model and the age, some of the checks are quick and take just a few hours, other ones can take days of intense workforce, sometimes the airplane even flies to a cheaper workforce area in order to receive the appropriate maintenance. Some companies have their own maintenance subsidiary, in a more vertical structure that allows them to have a greater flexibility and forecast their fleets maintenance, as well as negotiate their parts with suppliers, that is the case of Lufthansa Technik, the biggest MRO provider in Europe. Others recur to a secondary maintenance operator or to other airlines to receive the proper maintenance.

Maintenance overhauls divided in 4 checks, A and B can be conducted overnight and C and D require aircraft taken out of service and can cost around $2M:

A) once a month, just general inspections, lubrication and oxygen testing

B) evert 4 months, filters and operational checks requiring special equipment

C) every 12/18months, door seals, RAT, pressure decay of APU fuel system etc.,

D) 8years global check

The last and non-mandatory step in the flight experience acquisition is the channel to the customer. Many agencies are involved in the purchase to promote and market the tickets, bundling them with other experiences and targeting the customer, most commonly selling the tickets on their network and getting a percentage of the sale as fee.

3.4. Market specifications

The marginal costs of adding a passenger in the same flight is negligible, while the costs of adding a new flight with the same airplane are non-negligible, however, an airline can still significantly reduce its CASM by increasing the number of hours per day that an airplane is operating. So, the utilization of the aircraft to minimize its cost (CASM) is mainly related to its load factor and its turn-around-time (how quickly it can turn from on flight to another) from

one take off to another. In addition, an airline with lower turn time is less susceptible to delays which can cause additional refund and indemnity costs.

Most part of the costs are not sensitive to the flight's length (except for fuel, and even then, a big part of the consumption and travel time is related to the takeoff/landing stages). An aircraft in cruise speed, thus, won't add as much more cost per mile travelled. Therefore, airlines with longer flights tend to have lower CASM if compared to comparable peers with shorter flights. For a given airline flying a 1000mile route, the CASM could be 25% to 35% lower than a CASM for a 500mile route (RIVKIN, J. and THERIVEL, L., 2005);

Legacy carriers tend to be more profitable than LCC during peaks of business but less profitable during downturns. Which will be demonstrated in the following section. A quick conclusion can be made reasoning the fact that they can charge an extra premium on periods of higher demand once their customers are less price sensitive due to a higher mix of customers using their business and 1st classes. On the other hand, they have a higher percentage of their cost fixed, so when demand decreases or a crisis happens, they can't easily do an agile transformation and shift their costs. They can't decrease their fares that much to keep the load factor elevated, while LCCs are really aggressive at all times. However, our study proves that the variance of return on the low-cost carriers is higher than in the legacy carriers for a same regular year, this is probably true through a regular year due to tourism seasonality, but in the long run, LCC have a lighter burden during crisis and big costly events if compared to legacy.

October is a critical month for airlines because very little revenue is coming but large bills are charged, such as aircraft leases, fuel and handling contracts, while staff still needs to be paid. Therefore, smaller airlines with seasonal revenue are most vulnerable

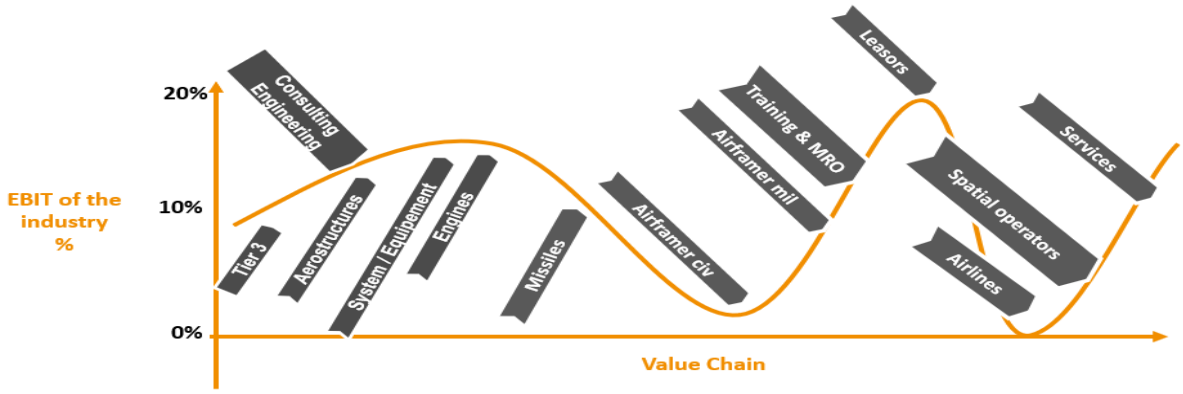
Passengers choose an airline based on primarily price, then safety, reliability and convenience, with other secondary factors such as amenities quality, entertainment and food seen as purchase influencer but not primarily decision drivers. However, business travelers rely most in the schedule and punctuality than in price, in opposition to leisure travelers.

The workforce is paid based on the hours working, except for pilots that are paid based also on the aircraft flown. Labor and crew management is a key differentiation driver, once it is a cost source that is not only related to the gain of margin but also to a better use of assets, increasing capacity with higher turnarounds on aircrafts and higher flexibility. Labor cost reductions can also be driven by productivity, containment costs, variable costs, pensions on top of wages (Bain & Company, COPPE/UFRJ, ABEAR, 2013).

Aircraft and facility rental costs represent about 15% of total cost. Boeing and Airbus compete for long-term contracts with the airlines, together both companies hold 99% of the commercial aircrafts market share, other options of aircraft sources are leasing and the used plane market. Major airlines rented about 55% of their fleet due to lower rates offered by lessors.

Aircrafts ownership is generally cheaper than leasing and enables greater flexibility (Lufthansa Group, 2019). In order to respond with flexibly to fluctuations in demand and adjust capacity at short notice, depreciated aircraft owned by the Lufthansa Group can at short notice remain in service for longer or be retired before their planned phase-out. When new purchases are required, used aircraft are also considered if the opportunity arises.

Figure 16 - EBIT margin throughout the industry



Source: Argon & Co

The airlines are the players that carries a low part of the market`s profitability margin, visible in the chart from Figure 16 created by Argon & Co, company where the author worked during 6 months in Paris. There are many participants on the value chain of flying an aircraft, most part of the margin is with the service providers, even though an airline can be seen as a service provider, it is also the risk taker and the asset manager, making it more complicated to translate capacity into profit and having lower margins due to bargain powers disadvantage and operations high fixed costs nature.

It is worth it to notice that as expected the country's GDP per capita has high impact on the trips per capita (Airbus, 2019). Although a point sometimes unnoticed is that the number of trips grows in a faster pace than the GDP, with a ratio of at least 1,2x, on top of the reduction on the ticket price that leads to an increase on the number of passengers of an order of 1.4x.

3.5. Low Cost Operational Model Differentiation

"We have never seen a high-cost carrier transform itself in a low-cost carrier, they will still be high-cost carriers selling cheat seats". (Rivkin, J. and Therivel, L., 2005. p-1)

Darreel Jenkins, Aviation Institute at George Washington

The most relevant CASK driver that improves low-cost significance when they emerged was the higher seating density, obtained through non reclining seats with less leg space. They achieve better aircraft usage through faster and simpler boarding, disembarking and services procedures. Catering costs were translated to revenues as the passenger has to pay for in-flight meal service. Ground operations and maintenance were outsourced, also using conventional metal stair to border instead of the finger gates, allowing better flexibility.

The LCC avoidance of connections, opting for point-to-point routes, reduces complexity and hence saves baggage handling costs, as well as costs related to delays of the incoming flight or to manage time between flights to allow the connection. They also have fewer flights repositions, operating on a tighter schedule not leaving the aircraft outside its operation base overnight.

Its operations using secondary airports gives the LCCs a greater bargain power, once the airports want to attract new business, with the local government background. Therefore, achieving more favorable deals for landing fees and greater slots availability. LCCs differently from the traditional airlines, are also not forced to operate in non-profitable routes for any political reason or just to improve their image.

Their main business obstacle is their limited customer segmentation, often their services are too basic for a big slice of them passengers' base. Business passengers more specifically are ready to pay a higher price for a better-quality service, once they are usually trips paid by the company. These customers are also time sensitive and with high delay avoidance, thus the LCC model where there is no reschedule, flights cancelation due to low loading factor with no refunds policy create a big gap between the LCCs value proposition and these customer needs. On top of that the secondary more distant airport are not in their best interest once they would have greater overall transportation time spent and they usually are busier passengers or with restricted time to travel.

Full-service carriers (FSC) offer a larger catalog of destinations, including both short and long-haul flights, cabin segmentation with premium tickets based on higher quality service.

They usually operate on a hub to spoke system, multiplying the options of served cities, connecting a broader range of airports and gaining load factor on long-haul routes. To complement their offer, they usually partner with other carriers in different countries to consolidate demand and increase offer capacity while sharing slots and routes among members, standardizing their services and mutualizing their mileage programs.

For these airlines, profitability is driven by their capacity of increase load factor on the inbound flight from point to hub and their mix of passengers across all the classes, mainly through a higher number of business and executive classes travelers, thus these airlines are highly dependent of business travel activity.

The FSC response to the LCC threat was diverse. Some tried their own low-cost branch, mostly not effective (Air France, KLM, BA) once the synergies were difficult to reach and it operated as a whole new company, usually not profitable. Another approach was to raise their capacity in low-cost routes and offer discounted tickets depending on the season (off-peak times), to compete with LCCs or even simplifying their fare structures targeting for business passengers, with the objective of keeping them away from the low-cost competition. In terms of logistics, the low costs changed completely the model from hub-and-spokes to point-to-point.

C. Filho (2014) shows that legacy carriers wage/traffic demand spike elasticity is lower than the LCCs because they are more capacity constraint, facing rapid growth of demand FSC can more rapidly adapt their crew through reassignments without additional costs, while LCCs usually need to hire more employees. However, LCCs are less exposed to wage prices increases, that affect FSC marginal costs heavier. Also, in case of an increase in price, LCCs margins are less impacted because they have a demand stealing effected when compared to FSC. Therefore, when the market faces greater bargaining power from the unions to increase wages, LCCs suffer less, once this increase will most likely be reflected in an increase in price and decrease in demand.

According to Evangelho, F., Huse, C., & Linhares, A. (2005), the LCC model is characterized by a combination of: 1) distribution not based on travel agents; 2) no class differentiation on in-flight service, no seat assignments, no hot meals, reduced cleaning costs; 3) high frequency flights; 4) minimum delays; 5) low tariffs and simple operations; 6) no partnership with other operators; 7) single aircraft type with high utilization (10h+/day); 8) direct short haul routes; 9) secondary airports with little congestion; 10) low turn-around times (~20 minutes); 11) cautions growth objectives (not exceeding 15%) and 12) competitive wages

with profit sharing. All these characteristics lead to high productivity and low-cost operations, an ultra-low-cost carrier would on top of that not include carry on/checked bags, not printing boarding passes, no cancelation refund, non-declinable seats, lower pitch between seats and charge for almost everything inside the airplane (water, wifi, entertainment, snacks, seats selection). It is noticeable that many of those characteristic points are present in at least one of the Brazilian airlines, but no airline follows sufficiently the guidelines to be clearly classified as low-cost, the closest one would be Gol.

E.Zu (2020) made the Table 1 to distinguish low-cost carriers operating model from service carriers, analyzing and summarizing their differentiation in terms of business type, service type and ticket service.

Table 1 - Low-cost and full-service carrier characteristics

Aspect	Item	Low-Cost Carriers (Spring Airlines)	Full-Service Carriers
Business type	Airline network	Point-to-point airline routes, mainly on direct flights	Radial network
	Model choices	Small and medium size, single model	Hybrid model
	Flight plan and strategic alliances	Not involved	Involved
	Employee salaries	Lower	Higher
	Number of air and ground employees	Fewer	More
	Target passengers	• Business passengers sensitive to prices • Tourism markets for sightseeing and leisure	• Commercial and first-class passengers served as profit sources • Economy class passengers served as the sources to cover cost
Service type	Numbers of flights	Fewer, e.g., two flights per week	Numerous flights every day
	Class configuration	Single class	Multiple classes
	Seat density	High, crowded	Low, relatively sparse
	Onboard meals	No free meals	Free meals provided
	Airport service	• Use secondary or tertiary airports • Low requirements on airport service	• Use a large hub airport • Provide services such as VIP rooms
Ticket service	Fare	• Single fare • Low fare plan	• Multi-level, multi-class fare pricing system • Large fare fluctuation ranges for the same flight
	Booking channels	Mainly direct, on-line, electronic ticket sales	• Rely on agents or travel agencies for booking • Call-centers
	Changes, refunds	Higher handling fees	Lower handling fees
	Check-in and boarding time	Automatic service, no check-in required, shorter time	Counter registration required, longer time
	Seat booking	Mon-reserved	Prior seat booking
	Free baggage	Light weight (10 kg), no towing baggage, discount available	Heavy weight, approximately 20 kg

Source: E. Zu et Al (2020) at MDPI Sustainability

On the opposing side of low costs, we have the premium examples:

Airlines such as Ethihad, Qatar and Emirates offer in general higher quality customer experience and sometimes lower fares than traditional airlines because they sometimes receive

their country's government (Qatar/United Arab Emirates) incentives like tax advantages and subsidies.

They also benefit from their geopolitical position to acquire fuel at a cheaper price and to be an important hub for international transportation once 60% of the world's population live in a 6h flight radius. These airlines count with luxurious airports, lounges, business class, good quality food, open bar and better seats and in-flight entertainment. These airlines, also known as super connectors, basically work as a huge large-scale hub and spoke model.

Another competitive advantage is their lower labor costs and no night flying restrictions what makes their aircraft usage higher than their competitors. Their aircrafts are usually newer, having less costs with maintenance and being more fuel efficient, the aeronautics market in their country in incentivized by the government, facilitating their financing instruments to acquire new airplanes.

3.6. Failed cases to learn as lesson:

There are many failed cases in the air industry, most recently in 2019 a big wave of bankruptcies broke in the market driven by especially volatile fuel prices.

- Airbus superjumbo- The major issue with the A380 airplane is the accessibility of the airports, the majority of the airports are not compatible with the jet's operations and requirements

Recent causes of bankruptcy:

- Aigle Azur - France (lower than expected growth in passenger traffic in the main routes as well as confusing network focused on Algeria);
- Germania – Germany (rise in fuel prices and currency fluctuations, victim of an overexpansion, bringing high revenues but lower profits);
- Air Berlin – Germany (delays and cancellations forcing millions of euros in compensations pays as well as debt accumulated for almost a decade);
- VLM – Belgium (insolvency, not able to secure enough funds for the winter season, operated in mainly routes dropped by other airlines for being non-profitable or in low demand);

- Joon, Air France's brand (no real cost savings, crew was paid as much as Air France's crew, older airplanes with increasing maintenance costs);
- Cobalt – Cyprus, Wow – Iceland and Primera – Denmark (running out of cash or unable to secure funding),
- Avianca Brasil – currency fluctuations and economic crisis specific to the country drove leasing defaults. The amount of debt and fines lead the company to insolvency and assets liquidation.
- Flybe and Wow (coronavirus reduce of demand), followed by many others such as Avianca.

Henceforth, the study should focus on some cases of success: Ryanair, Vueling, Easyjet, Wizz, E'wings, Spirit and Southwest as best practice cases. Norwegian is not exactly comparable to the case once it operates long-haul flights and should be studied specifically for the long-haul viability). It is also useful to compare those cases with successful legacy carriers.

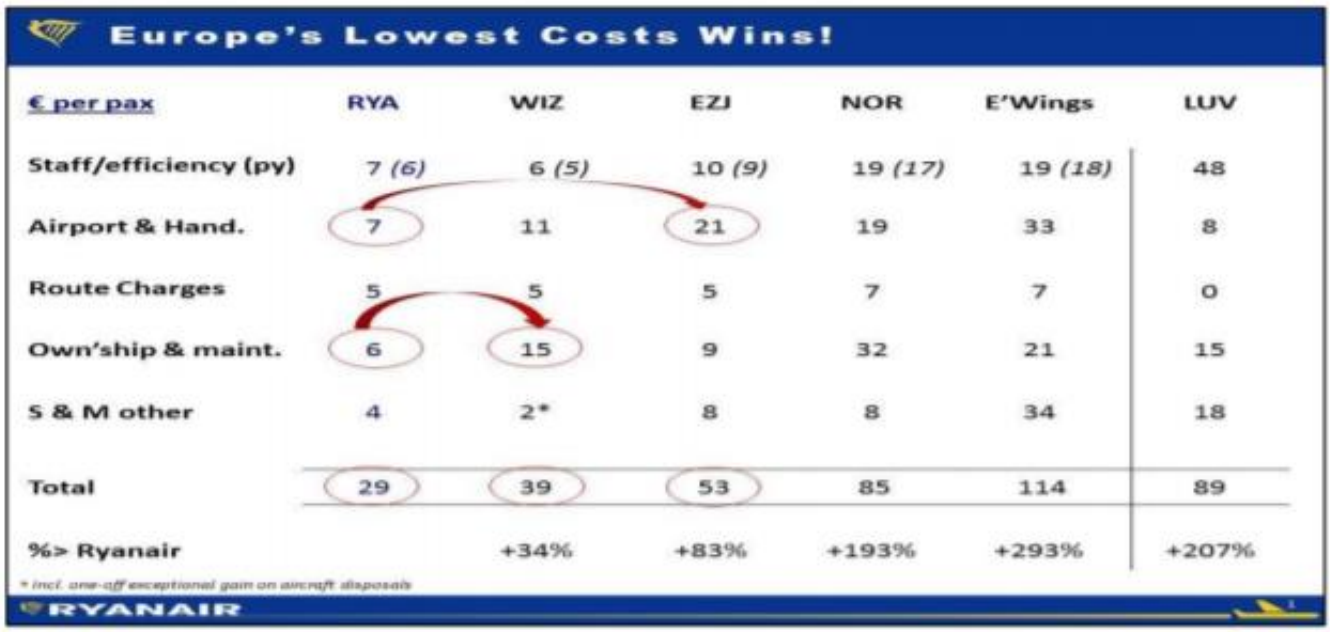
4. DEVELOPMENT

4.1. Study of a Successful LCC case in Europe: Ryanair

Ryanair's highlights 2019:

Table 2 brings Ryanair's key figures. Traffic grew 9% to over 142m guests, average fares went down 6% to 37€, revenue rose 6% to 7.6B€ and ancillary revenue increased by 11% per guest. European short-haul market has an excessive capacity and, regardless, Ryanair can profit of growth opportunities arising as airlines consolidate or exit the market given its better cost structure as well as strong balance sheet. Ryanair costs went up 16% in FY19, driven by a rise in oil prices (fuel went up 28%) at the same time of a 20% increase in the pilots pay that drove a 28% increase in the payroll. Despite the increasing costs for Ryanair, Figure 17 shows that these costs reflected a higher increase in the other airlines, widening the cost gap.

Figure 17- Ryanair comparative vs competition



Source: Ryanair 2019 annual report

Winter 2019 had especially higher fuel prices and lower fares causing many airlines including Primera, Small Planet, Azur, Germania, VLM, Cobalt, Flybmi and Wow to bankrupt. Both Alitalia and Thomas Cook are re-structuring or for sale, what was a great opportunity for Ryanair to take over demand.

Table 2 - Ryanair financial results key figures 2019

Operating Data:	Fiscal Year Ended March 31, 2019	2018	2017	2016	2015
Operating Margin	13%	23%	23%	22%	18%
Break-even Load Factor	83%	73%	73%	72%	72%
Average Booked Passenger Fare (€)	37.03	39.40	40.58	46.67	47.05
Ancillary Rev. per Booked Passenger (€)	17.15	15.48	14.83	14.74	15.39
Total Rev. per Booked Passenger (€)	54.17	54.88	55.41	61.41	62.44
Cost Per Booked Passenger (€)	47.02	42.08	42.62	47.69	50.92
Average Fuel Cost per U.S. Gallon (€)	1.79	1.65	1.83	2.21	2.34

Other Data:	Fiscal Year Ended March 31, 2019	2018	2017	2016	2015
Revenue Passengers Booked (millions)	142.1	130.3	120.0	106.4	90.6
Booked Passenger Load Factor	96%	95%	94%	93%	88%
Average Sector Length (miles)	774	775	770	762	776
Sectors Flown	789,771	725,044	675,482	609,501	545,034
Number of Airports Served at Period End	219	216	207	200	189
Average Daily Flight Hour Utilization (hours)	9.02	9.13	9.33	9.36	9.03

Source: Ryanair 2019 annual report, company data

As of June 2019 Ryanair, flew daily 250 000 flights, with an average route of 774 miles (1,245 km), a revenue per booked passenger of 54.17€ and a loading factor of 96%, therefore a revenue per seat of 56.42€, giving a RASK of about 4,53€cents (as preliminary estimated).

It is possible to see that the company is growing its load factor, capacity, ancillary revenue and passenger revenue, however the operating margin, cost per booked passenger have worsened. It could be a consequence of lower utilization and fuel costs.

Figure 18 shows Lufthansa's (main European legacy carrier) key traffic figures. Ryanair has almost 10% higher booked passenger load factor than Lufthansa, the biggest legacy carrier and largest full-service carrier in Europe. With a higher 40% higher number of passengers carried, and higher operating margin (23% for Ryanair against 11% for Lufthansa in 2018 and 13% for Ryanair against 8% for Lufthansa in 2019). This motivates the study to show what makes some low-cost carriers so successful, what are their edges over the legacy and what a low cost must focus on to succeed.

Figure 18 - Lufthansa traffic figures

T031 TRAFFIC FIGURES NETWORK AIRLINES

		2019	2018	Change in %
Flights [1]	number	859,888	840,945	2
Passengers [1]	thousands	106,978	103,639	3
Available seat-kilometres [1]	millions	295,687	284,642	4
Revenue seat-kilometres [1]	millions	243,982	232,030	5
Passenger load factor	%	82.5	81.5	1.0 pts

[1] Previous year's figures have been adjusted.

Source: Lufthansa 2019 annual report

4.2. Ryanair's business model:

Launched in 1984, supported by the adaptation of widespread deregulation policies (Air Transport – A tourism Perspective), Ryanair is Europe's largest airline with more than 145 million passengers per year (*Brussels Time*) and FY2019 profit of 885M€, the Irish low-cost company disrupted the industry with its new alignment of customer's value proposition and it's lean operation. This revolution promoted a whole new view of the industry and how the customers see air transportation, making it more affordable for many people considered non-customers and creating a much more competitive landscape in an environment where companies are fighting over price.

Ryanair's business model was initially inspired by the Dallas-TX based airline Southwest, offering to fare-conscious customers a low price for air transportation, some of those customers, would even choose alternative means of transportation instead or would not have the possibility to plan a trip at all.

Considering the European market, where people can freely move from country to country among the Members States of the European Union, being able to enter and leave freely, or citizens even being able to reside in any other Member State, the number of potential customers for a European based company could be expanded for the whole European Union,

with much less boarder operations restrictions. With so many countries and big cities, and not a big distance separating each other, the market seams attractive for short-haul flights (flights lasting anywhere from 30minutes to 3hours).

Short-haul flights are the majority of traffic at large European airports, e.g. Frankfurt Airport, a major airport in Europe, in 2011, short-haul flights accounted for 60,5% of the passenger traffic (GORECKA HORAK 2014). So, the LCC (low cost carrier) focused mainly in narrow bodies aircrafts, targeting those type of flights. At the same year, medium-haul accounted for only 10,4% and long-haul flights for 29,1%, which explains the low-cost carriers lack of interest for those categories, especially due to the fact that especially long-haul flights require different aircrafts models than those required by short-haul flights.

The company created a lean operating model, approaching the innovation by subtraction (INNOVATION MANAGEMENT, Paul Sloane, 2020), going even further than Southwest. They subtracted:

- **travel agents,** tickets can only be booked directly over their website

- **tickets**, the customers' needs to bring your printed/e-version tickets otherwise you will pay more to print them at the airport

- **allocating seats**, the seat is chosen when the passenger boards the plane

- **free drinks and snacks**, all meals are paid in-flight

- **customer care,** Ryanair has 10% of the customer care attendants if compared to British Airways

Ryanair operating model differs of the other competitors in the main cost drivers of the whole industry.

(1) Airports: the company flies mostly out of secondary airports, often further away from city centers, reducing airport taxes and getting more subsidies from local city councils. In addition, as the airport usually has a lower flow of aircrafts, Ryanair can take advantage of a better turnaround time, improving their fleet utilization.

(2) Distribution: the direct booking model previously mentioned removes the travel agency fees,

(3) Labor costs: a major part of Ryanair's pilots are not company's employees, but 3rd party contractors, this way the airline only pays the pilot when he is actually flying. Employees

are also incentivized to use lower cost hotels and transportation; the culture of economy perpetuates throughout the crew and all the operations employees. Contractually all the employees are under Irish labor contracts, which avoids different rules on wages and benefits throughout the different European countries which Ryanair maintains its operations.

(4) Fleet: the company uses a single type of aircraft (Boeing 737) in their different jet models (737-200, 737-800, 737-MAX), facilitating their costs with training, maintenance, repair and overhaul. Also increasing their staffing rates through a broader crew flexibility.

The company goal is to have low costs to offer lower prices and maximize the volume, thus, having a greater passenger per flight ratio than its competitors. The higher passenger per flight ratio also enables the company to have a better bargaining power with suppliers to ensure a good fleet utilization. An additional improvement in the company's operation is the demotivating baggage factor, the fact that the company does not provide free checked bags shift customers to carry fewer goods and therefore reduce the total weight of the aircraft, improving its fuel efficiency and also reducing the baggage handling costs at the airport.

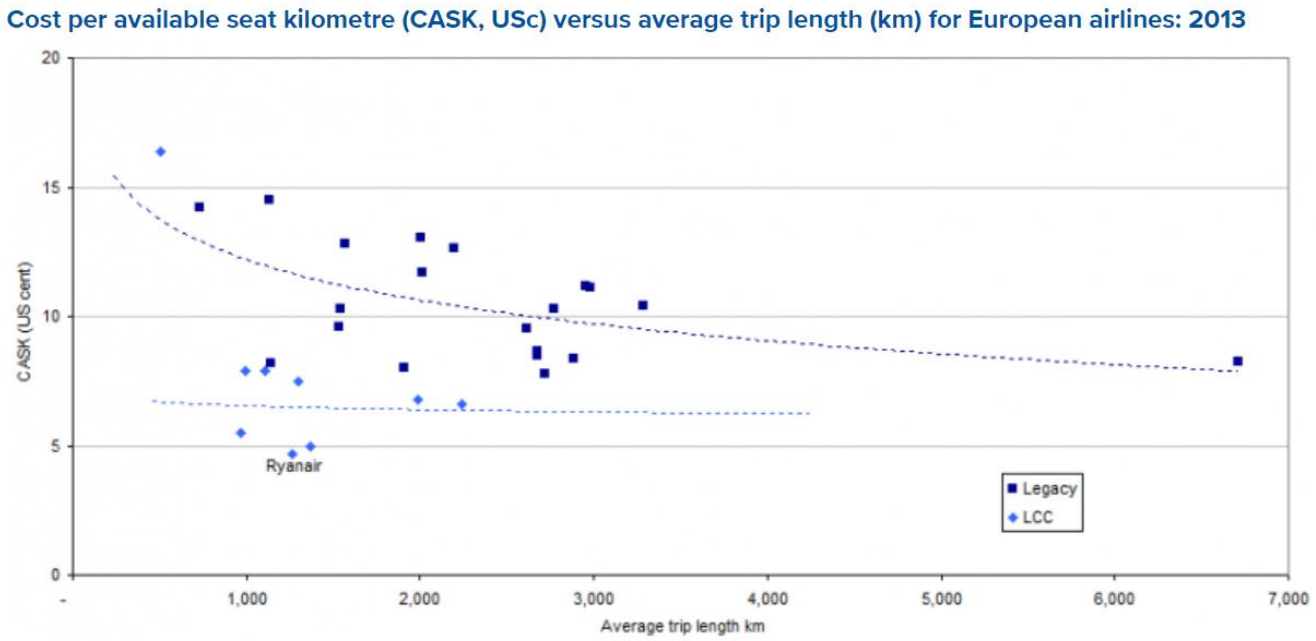
4.3. A Strategy analysis for LCC based on Ryanair's case

4.4. Ryanair's SWOT analysis

Strengths

Figure 19 shows that Ryanair has the lowest variable costs among the European air carriers, taking into consideration the CASK (cost per available seat kilometer), one of the key performance indicators for the air industry, but also in terms of cost per seat or cost per passenger in more general terms. This is because Ryanair is able to have a greater utilization of its capacity and minimizes its traffic costs. Ryanair single fleet also gives it more bargaining power over OEM's at the same time that reduces its fixed costs by increasing flexibility and aircraft utilization.

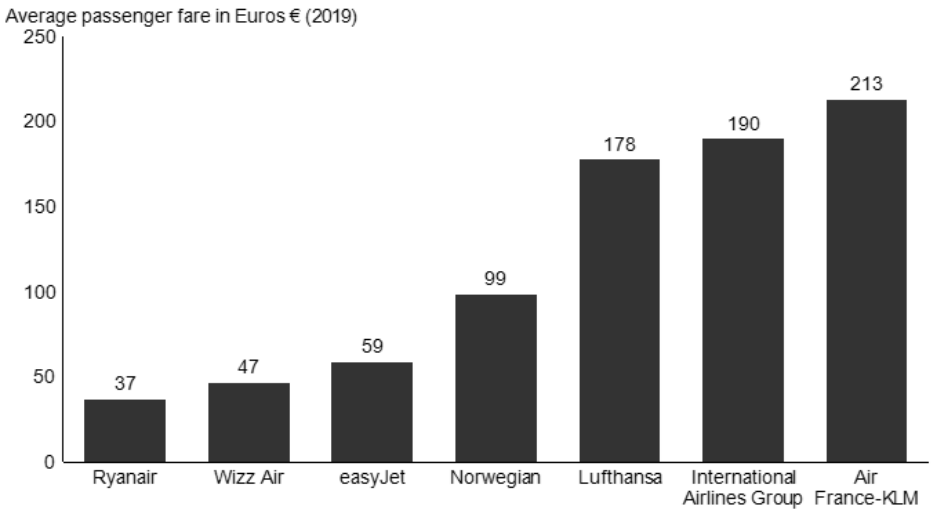
Figure 19 - CASK decrease by trip length



Source: CAPA (2019)

Figure 20 presents that Ryanair in 2019 had the lowest average fare among European airlines, with only 39€ average, its main competitor Easyjet has a 20€ more expensive average ticket, and the traditional carriers have above 100€ average prices (this chart includes also international and long-haul tickets which may distorted the result).

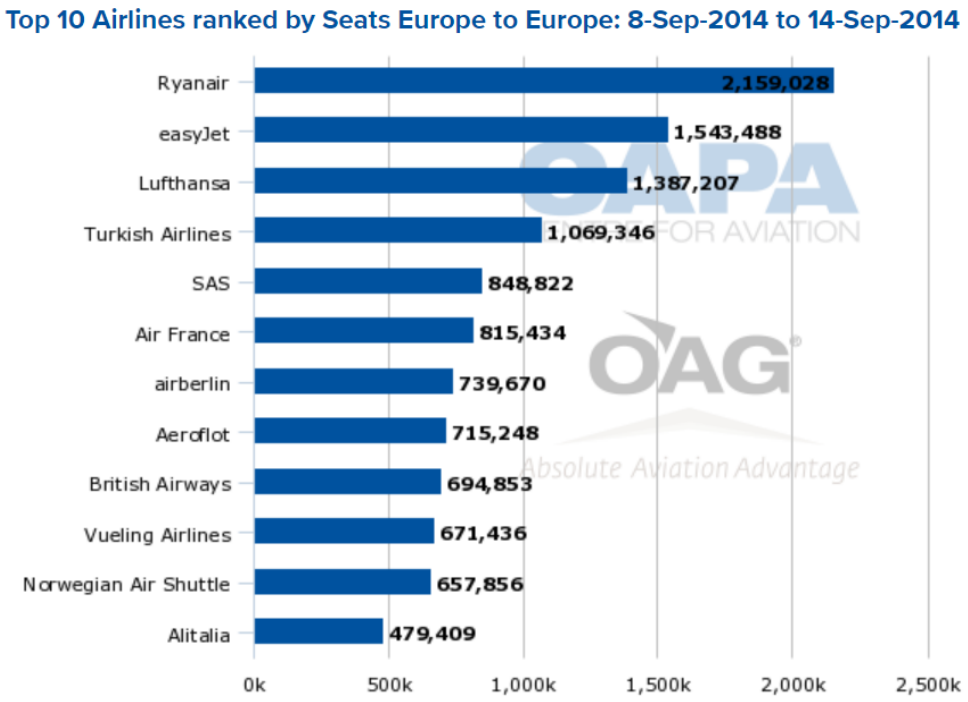
Figure 20 - Average passenger fare of selected airlines in Europe in 2019



Source: Statista (2020)

Big size and big growth: the company serves more than 200 airports with 86 base airports in 2019 (compared to 69 in 2014) doing more than 2,500 short-haul flights daily and it is number one by passenger numbers 83,4M passengers in 2014 against 84,4M for Lufthansa. Figure 21 shows that Ryanair had also the highest number of weekly flown seats, with the highest capacity of European domestic market.

Figure 21- Airlines ranked in Europe based in # of seats



Source: CAPA and OAG (2019)

Weakness:

- Brand perception. Ryanair has built an image of overcharging customers for little things, of having poor service and a lot of delays. Customers mainly want safe air travel with low costs and punctuality, and even if Ryanair can guarantee the prices, many users do not see the company as reference in the other 2 pillars. Its lack of appealing to the business customers also lowers the addressable market size. The absence of a good mileage program also drags loyalty down and increases the price competition importance as a decisive purchase element.

- Seasonality. Ryanair's earnings are extremely seasonal, with the biggest part of the revenue coming from the summer months (2Q - July to September) and having even losses during the winter (October to March).
- Route limitations. As its routes are mainly short haul using Boeing 737s, the company is constrained for expansions to longer routes. Its no partnership policies also block the doors for other international markets. The company is also limited to its low frequency flights for each route network, specially impacted by the airport locations, increasing the difficulty to attract customers and boost load factor at any time of the day.

Opportunities:

- Business travelers. A big and most profitable customer segmentation in the air industry is the business travelers and the executive class. However, these customers demand for better service and are willing to pay high premiums for privileges or better service, which does not really fit Ryanair's profile. These are customers used to preferred boarding, free reschedule, free bags, extra leg rooms and reserved seats that go completely against Ryanair's operating model.

  Ryanair even tried to launch the « Business plus » program but still did not reach the full potential of the Business market. One option would be to focus more in Small and Medium Enterprise, companies with a more "low cost" profile but that need or could profit for a more frequent and cheap mean of air transportation with low fares.
- Moments of low demand for aircraft can also means that it increases the airlines bargaining power to expand their fleet, for the introduction of new players or new routes. As crew market is cooling, it could also mean a good time to increase flexibility, improve crew management or reduce average salary paid. Times with low jet fuel price are also moments to expend operations, stimulating more demand generations in routes that require a lower fare.

Threats:

- Boeing 737 MAX. Ryanair is changing most part of its existing fleet and its fleet expansion towards the new Boeing 737MAX models that are more fuel efficient (4% more seats and 16% lower fuel consumption), however two major recent accidents with the aircraft have led most part of legislators, regulators and governments (FAA and EASA included) to ground the jet model due to safety concerns and rising doubts about the software malfunction.

  The aircraft is still grounded for almost 2 year (since 29 October 2018) at the moment of this report and every update Boeing seems to find new issues and postpone the next flight of its new model (recently in November 2020 the FAA has cleared the aircraft, however it has not been approved to fly yet). This unpredictable time without the new aircrafts, that can even lead to future groundings and safety concerns can highly impact Ryanair's fleet availability as well as the customers safety concern, creating a fear and avoidance for companies using the aircraft, as well as possible boycotting from part of the customers.
- Fluctuations in the fuel price, currency and availability. Because of Ryanair low-fare and its no-fuel surcharge policy, added to the company's expansions plans, the ability to repass fluctuations in jet-fuel price to the customers are limited and the carrier may suffer from losses due to abnormal increases in the oil prices.

  These increases may come from different reasons varying from terrorism, to geopolitical disagreements, disruption of the supply chain or unbalance between oil pumping and demand.
- Changes in Europeans labor legislation. Ryanair has a big advantage by using workforce with contracts based on the cheapest and most flexible option they have in Europe. In this case almost all of its crew has Irish contracts, recently it has gotten worse to negotiate with the unions specially in Germany, leading Ryanair o withdraw operations to some cities.

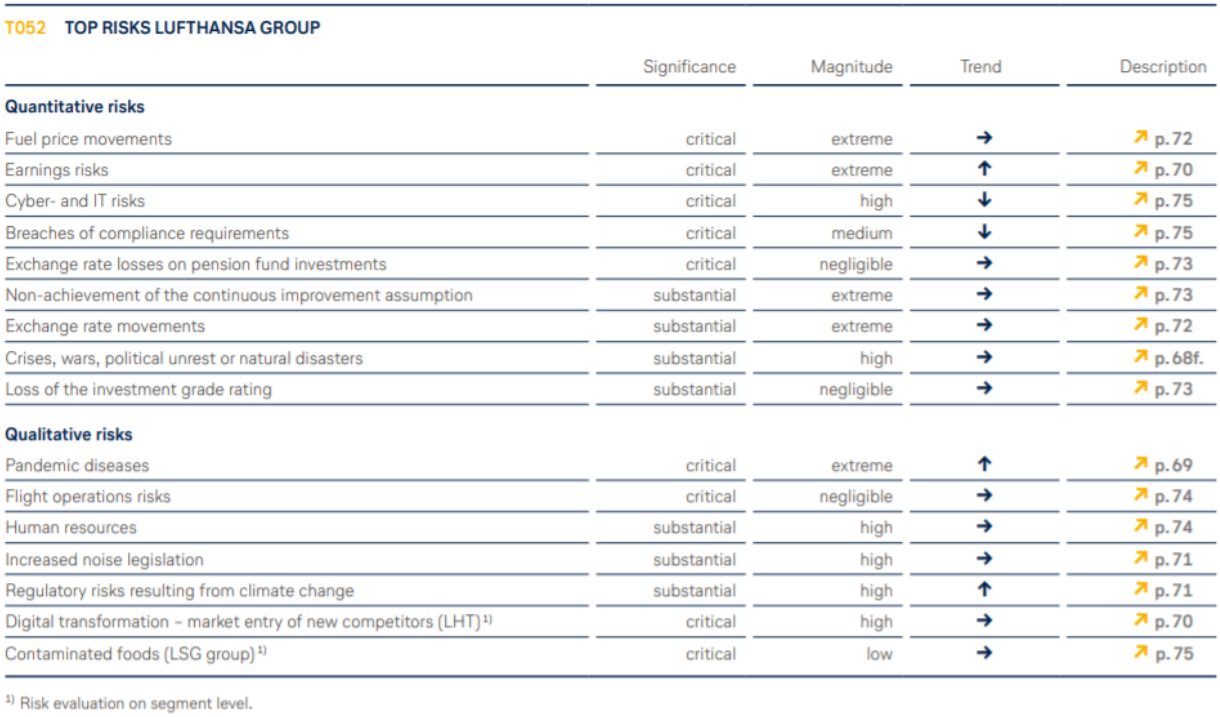
  If this scenario continues to repeat throughout many countries/cities across Europe, the company might see one of its biggest competitive advantage melts between many contracts with heavier government enforcement with taxes, benefits, contributions, boundaries and labor contributions.
- Decrease on tourism demand. As the airline targets leisure customers that are more price sensitive, any event or tendency that discourage tourism or a drop in

the number of tourists to its main destinations has a direct huge impact on their operations.

- This industry is also always threated by national security issues, once its main asset is an important item when looked from a military point of view, as well as the threat of possible terrorist attacks. Unrest between countries could put the supply chain as well as the route networks and air space open skies agreements under threat. The interconnection nature of the business also puts in threat issues such as diseases spreading or attacks coming from different countries.
- Environmental disasters or events impact directly the business. As it happened with events of volcano eruptions closing the sky routes forcing all flights to be cancelled in some countries, events such as tornados, hurricanes or even strong storms formations can disrupt the route networks. It is said that global warming may increase the number of turbulences, posing threats to the industry as it seems a tendency to reduce carbon emissions. A carbon tax may also heavily impact the industry as it is a long investment cycle industry, heavily regulated and fixed capital, making it hard to transition to a more electric, automated clean form of air transportation with new models of airplanes.

Lufthansa's 2019 fiscal year reports gives a good insight on what could be other risks for the whole airline industry on Figure 22:

Figure 22 - Air industry top risks impact and trend analysis



T052 TOP RISKS LUFTHANSA GROUP

	Significance	Magnitude	Trend	Description
Quantitative risks				
Fuel price movements	critical	extreme	→	p. 72
Earnings risks	critical	extreme	↑	p. 70
Cyber- and IT risks	critical	high	↓	p. 75
Breaches of compliance requirements	critical	medium	↓	p. 75
Exchange rate losses on pension fund investments	critical	negligible	→	p. 73
Non-achievement of the continuous improvement assumption	substantial	extreme	→	p. 73
Exchange rate movements	substantial	extreme	→	p. 72
Crises, wars, political unrest or natural disasters	substantial	high	→	p. 68f.
Loss of the investment grade rating	substantial	negligible	→	p. 73
Qualitative risks				
Pandemic diseases	critical	extreme	↑	p. 69
Flight operations risks	critical	negligible	→	p. 74
Human resources	substantial	high	→	p. 74
Increased noise legislation	substantial	high	→	p. 71
Regulatory risks resulting from climate change	substantial	high	↑	p. 71
Digital transformation – market entry of new competitors (LHT) [1]	critical	high	→	p. 70
Contaminated foods (LSG group) [1]	critical	low	→	p. 75

[1] Risk evaluation on segment level.

Source: Lufthansa 2019 annual report

4.5. Porter's forces analysis for the industry:

<u>Suppliers bargain power</u>:

From the aircraft point of view there is a strong bargain power from the suppliers as there is only 2 big standard manufacturers for the most used aircraft size, Boeing and Airbus. In the consideration of a replacement for a little smaller planes the situation remains the same with mainly Embraer and Bombardier, however Bombardier has already started a partnership with Airbus and Embraer is in negotiations of a joint-venture with Boeing, consolidating even more the airplane industry to create more diversification and synergies amongst the manufacturers. If the aircraft is leased, a large portion of the worldwide fleet is owned by lessor, whom usually buy aircrafts in bulk, having priority with orders and larger bargaining power with OEMs. When airlines lease aircrafts instead of buying, usually is because they don't have enough resources to buy one, are too exposed to risks or just don't have their balance sheet balanced to do so. This implies that they probably will have even lower bargaining power with

the lessors, that same time also rent the aircraft under a different currency and through financing.

Fuel is priced internationally according to the crude oil price, having a huge variation over time as any oil derivate commodity. Airlines try to mitigate this risk through hedging or future contracts, sometimes even buying a refinery (Delta's case) to try to reduce volatility and improve reliability. Usually for a given airport there is not a big competition over the fuel distributor, increasing their bargain power over the airlines, that would need to choose have storage the aircraft overnight on another airport in order to have other fuel supplier. The fuel taxes are dictated by local governments and the airline has very little influence, what could represent a significant percentage of the fuel price.

In some countries the crew and the pilots are heavily unionized, with high government enforced regulations that dictate the contracts rules, benefits and contributions, reducing the bargain power with this segment for many airlines. Specially in Europe, it is not unusual to see crew unions going on strike if raise negotiations don't go as well as they wanted to. A big part of the costs related to crew are originated by legislation and aircraft certification requirements, that dictate number of crew members per flight as well as their resting time and maximum number of hours flown per month.

Maintenance checks are required by the international legislations for the flight safety, however there are not many service providers, many parts are specific to one plane model and the main part, the engine has a huge price with very few providers. Usually a plane model can only use one type of engine from either Rolls Royce or GE big companies with a big bargain power for being the only suppliers.

Airports can determine their landing fee based on their demand, an airline can negotiate that it is bringing more passengers to that airport if it is not highly serviced, however often this airport are either far from the city or with low demand. What low costs do is get incentives for lower fuel and landing fees to secondary airports using the local government support to boost tourism and people transit in the region to get lower fares.

Customer's bargaining power:

The customer's bargain power can be considerate low. For instance, they cannot dictate the price or influence the decision through negotiation, however they are really price sensitive. This market has a very elastic demand and the product is highly replaceable from one airline to

the other with very little product differentiation, the main customer loyalty driver is the mileage program and previous relationships, especially important for business customers. What creates a big competitive environment, but the customer has no power to negotiate the price with the airline. A key point though, is the fact that after the customer bought the basic fare, he has even lower bargaining power over the baggage and other ancillaries' price, as one would say he virtually has no other option.

One could consider the travel agencies as customers that would negotiate as bulk; however, their fees are interpreted more as a marketing cost in the industry, therefore it is considered a supplier.

The final user, once it has basically few options of providers and doesn`t buy in high volumes or values, it can be considered a weak negotiator. It is indeed true though that during the pandemic scenario in 2020 the airlines have lost bargain power with customers, leading them to increase their offers to customers, including items and listening more to the customers' demands and reshaping the industry. However, this subject will not be deep analyzed in this essay.

Threat of new entrants:

The threat of new entrants in moderate. On one hand a big amount of new low-cost airlines has surged in the past 2 decade and other legacy carriers have tried their own low-cost model, nonetheless on the other hand the high fixed cost and investment nature of the business and the governments regulations withhold the increase in new entrants.

A big game changer in this status quo would be a change in regulations facilitating the operation of foreign airlines in the countries for national travels or a bigger deregulation on the overseas market. In Europe we already see a market where an airline can be national from one country and operate on two different ones, for example Ryanair, Norwegian and easyjet, an expansion of this agreements to broader markets or more routes could create a more competitive market.

We could also see the case of subsidiaries from one country operating in different markets. This could be the example of Avianca, the Colombian airline that entered the challenging Brazilian market, mainly dominated by 3 airlines. Avianca Brasil used the opportunity of old airplanes in sale from previous bankrupted airlines to start a new operation and could see for a few years a reasonable business but finally went bankrupt in the end of the

2010s. In the Brazilian case this threat has relatively grown since the new legislation now allows an airline to operate in the country even if 100% of its equity holders are not Brazilians. However, there is not enough evidence that this would pose a threat anytime soon.

Another game changer is the successful perspective for the Hyperloop, that could revolutionize the market. Based on vacuum tube transporting capsules with passengers, the project on a joint team with Tesla and SpaceX is expecting to transport passengers at the speed of 760mph (1,200km/h), faster than the A380`s 652mph (1,050km/h). Which could mean a faster and easier way to connect main routes today serviced by airplanes or trains.

Threat of substitutes:

The threat of substitutes is moderate. People could use other means of transportation like car, train or buses, this is more delicate in the European market where there is free flow of people across countries, the big cities are relatively close to each other and there is a big high-speed train network.

Although there is no replacement for airplanes on long trips, European market seems to see a greater public demand for high-speed trains throughout all the continent specially for environmental issues. One could argue that for a less than 4h train trip there is virtually no time savings to get an airplane if compared to a high-speed train.

For the airplane case, airports usually are much further from the city centers than the train stations, all the security checks, baggage drop, and boarding/onboarding process tend to add up to 2 and a half hours to the trip total time. While on the trains case these increases are negligible, therefore on the total transportation time from the passenger's house to the destination sometimes airplanes could take longer than trains for short routes, mostly impacting short-haul trips and the point to point networks. In Europe, also the threat of new taxes imposed to airplanes and a tendency of using cleaner means of transportation could boost investment on high speed trains infrastructure and increase the thread of substitutes.

Internal competition (Rivalry):

The internal competition is really strong in the air industry. It of course depends on the country, there are countries with few airlines sometimes even monopolies, however it's the entrance barriers that prevent the market to become competitive. As the main decision driver

for the customer to decide which player to use is price, and there is not much differentiation, it becomes a huge competitive market hard to make profits. Airlines are not only competing for the customers, they are also competing for time schedules, for routes, for gate slots on airports, for fuel suppliers, for aircrafts orders from manufacturers or lessors and even in the labor market with the pilot's salary.

This extreme competitive market also creates the need to differentiate and try to appeal to the customer`s different segments. The most premium airlines try to appeal to the high-end customers offering an exclusive flight experience, but they end up also competing with private jets. The legacy carriers try to appeal to the business customers with mileage loyalty programs and focusing their profitability on the business class seats. While low cost carriers focus on leisure travelers differentiating by minimizing the product offer, offering just the simple ticket from one place to the other with everything extra, bringing fare prices down and targeting the most price sensitive consumers, it ends up though competing with trains in the European market. Low costs business model avoids all of the mentioned competitive landscapes, flying on secondary airports, making big aircraft orders at once from the same model and using flexible labor force contracts, showing that its role in the market is to increase competition, not avoid it.

4.6. Preliminary highlights for LCC's performance

After the bibliographic review, market study an all information studied, it is possible to draw 10 preliminary conclusions about the market. Yet to be confirmed or denied with interviews and analysis on this report.

i. Supply chain conclusions:

1. The low-cost airline market is more impacted by touristic demands oscillations than the traditional market. This is due to the « all coach » seats distribution with only one cabin class and due to the customer segment being mainly composed by more price sensitive customers.

2. The main operating edge for the low-cost companies is their lower turnaround time and their higher yield. They get a higher load factor on their airplane than their competitors and this gives them a great competitive advantage.
3. The point to point model allows the LCC to have lower costs with passenger relocation and network logistics management. However, it requires a higher revenue forecast management in order to always achieve high load factor in the routes with lower demand.

ii. Cost conclusions:

4. The oil price variation has a bigger impact on the LCC. As the percentage of operational cost is more important on them than in the legacy carriers, the fuel has a more important impact than in the others. Furthermore, the flights are shorter, therefore the jet-fuel percentage of fuel spent on the taking off/landing is higher, what needs to be compared to the extra fuel filled for longer flights, but this analysis is a whole new essay.
5. A good relationship with the worker unions and the workforce flexibility is essential to a good operation. A more flexible workforce can not only reduce the costs but also improve the airplane utilization.
6. The routes choice (network management), fleet management and the lower airport fees are decisive factors for the LCC higher profitability.
7. The utilization of one single airplane model allows a higher fleet flexibility and easier pilots and crew management, as well as lower costs with maintenance and parts management, giving more bargain power of higher scale. At the same time giving better negotiation power with lessors and aircraft manufacturers when making new orders.

iii. Financing conclusions:

8. A good cash and working capital management is extremely important. An airline financial operation is as important as their logistics. Given the seasonality of the business and the supplier payment dates, it is important to have a healthy treasury, not only to reimburse the debt but also to pay the suppliers and payroll to continue operating.

9. The airplane purchasing method is really important in the debt structure. Airplanes can either be rent, leased or bought, the interest/rentals, depreciation and maintenance/overhaul cost will highly impact treasury.

iv. Business model conclusion:

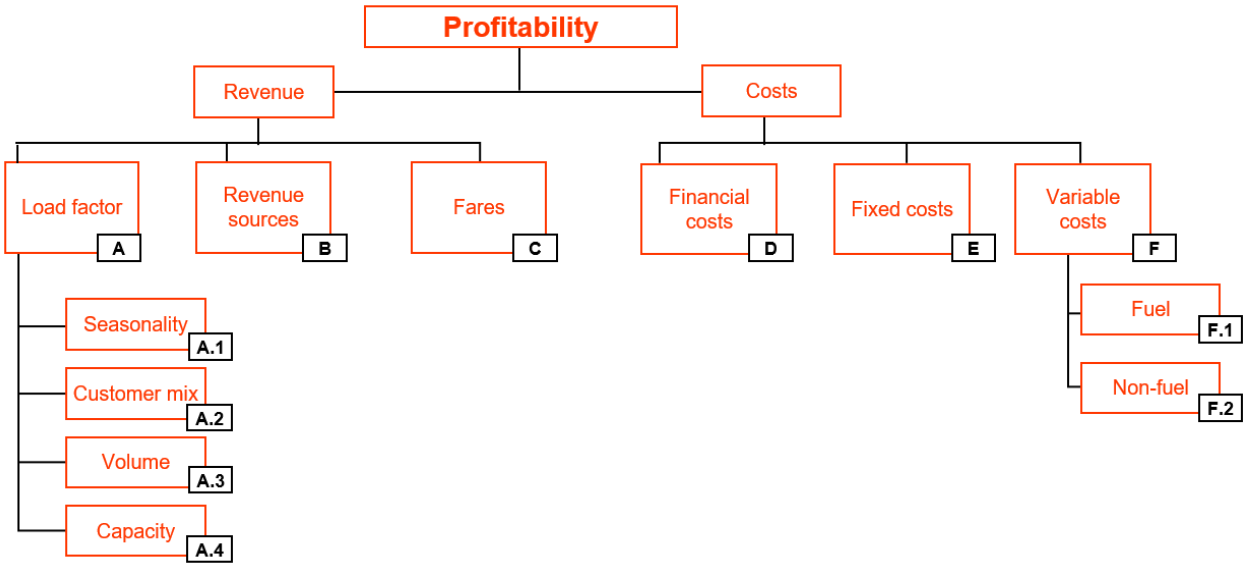
10. An airline cannot simply create a low-cost subsidiary, if the parent company is not 100% separated from the new company, it is hard to expect that with the synergy savings it won't be either hidden mutual costs or cannibalization. Numerous examples throughout history show that the failure cases happened because there were costs being masked in the structure and in truth there was not really a separation between the companies. It was just a low cost basically selling tickets with a similar structure than their parents but with lower prices, making it hard to be profitable, for example the case of Joon and Air France.

4.7. Defining the key successful practices for a low-cost airline

After taking into example the cases of failed airlines, understanding the business model for a successful LCC airline such as Ryanair, understanding how it differs from Lufthansa or other legacy carriers, it is possible to draw a few conclusions and hypothesis over what it takes for a LCC to be successful.

The approach to make this analysis will follow the hypothesis tree approach used by consulting companies to create a profitability diagram, presented in Figure 23. Trying to be collectively exhaustive and mutually exclusive. The following frame divides the key profitability drivers for an airline, each letter corresponds to a component, those letters will be used throughout to refer to which box the analysis will be related.

Figure 23- Hypothesis tree for LCC profitability



Source: Author's creation

First, it is useful to define what analysis will be out of the scope at this moment but are without doubt success factors for an airline:

- Cabin segmentation between business, economy, first class and others. It is clearly a source of increasing profitability; however as low-cost carriers tend to use only single cabin this analysis will not be done in this document **(A.2)**;
- Routes network design. Choosing profitable routes and adapting capacity, correctly balancing it with demand as well as the dates and times for each flight **(A.3)**;
- Fleet management. The correct choice of the aircraft models according to the routes and demand characteristics flown by the airline, as well as a good mix of airplanes and pilot's skills that correspond to the needed by each plane **(A.4)**;
- Competitive fares. A good model to define the ticket and ancillaries' price according to the market's demand and the consumer specifications remaining competitive and covering the company's cost structure **(C)**;
- Financial health. A good debt structure and cash flow management, with good liquidity and solvency ratios, there are multiple funding sources for airlines and each airline defines their best way to budget it. Annex 1 gives an exhibit by Morgan Stanley (2018) of how airlines have paid for their planes **(D)**;
- Fuel and currency hedging (part of F.1). Once the business is threated by huge volatility of oil prices and currency exchange, airlines need to correctly protect

their operations and give the decision makers more ability to forecast and more protection against external shocks or politics changes once the business has a big international component.

Thus, this study will focus on the operating profit drivers that differentiate the low-cost airlines from the legacies and understand what makes some carriers successful. In order to do this analysis, data from airline companies reports were collected for the following analysis. The companies analyzed are operating in the European continent both from legacy and low-cost on the time period from January 2017 to December 2019. The chosen time period is specific to avoid influence from the global pandemic in the results and to get enough published results to avoid any abnormal event.

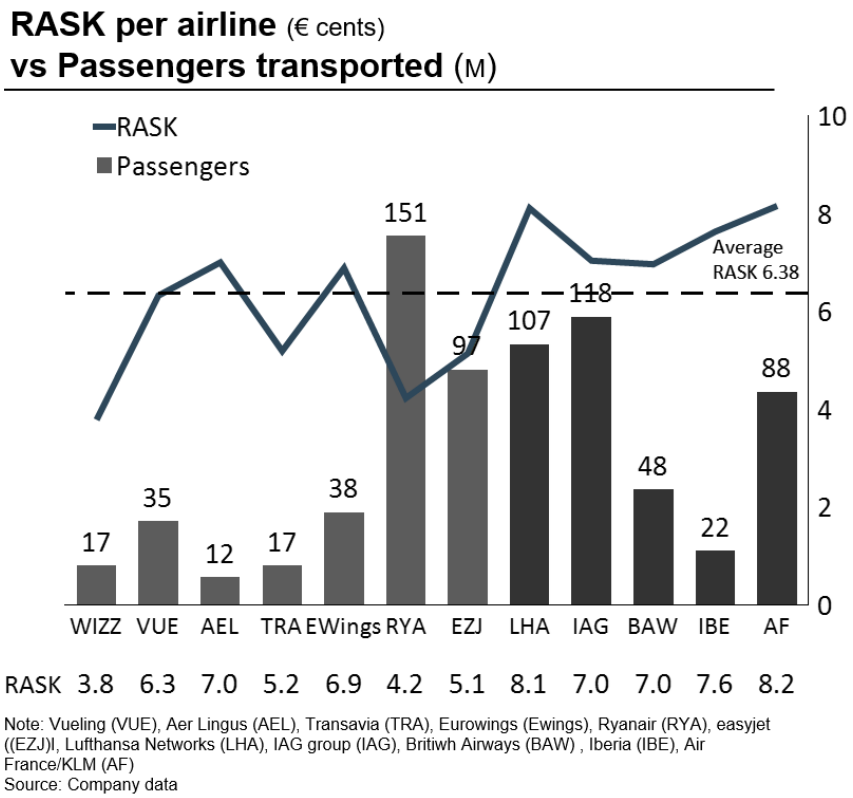
- From the low-cost carrier's sample, the companies studied were Aer Lingus, Vueling, Ryanair, Wizz, easyjet and Eurowings
- From the legacy carriers' sample, the companies studied were Lufthansa, British Airways, Air France/KLM and Iberia

Note: when referring to Lufthansa the information refers to Lufthansa Networks, which includes Lufthansa, Swiss Air and Austrian Airlines. When the information is provided as Lufthansa Group, it refers to Lufthansa Networks+Eurowings. When referring to AF/KLM the information refers to both Air France and KLM, while AF/KLM Group or only AF refers to AF/KLM+Transavia. International Airliness Group (IAG) is the group formed by Iberia, Aer Lingus, British Airways and Vueling, when referred as IAG the information provided is for the combination of all 4 airlines.

4.7.1. The revenue branch:

So, starting from the revenue side of the hypothesis tree, after removing components A.2,3 and 4 from the load factor analysis, we need to compare how the low-cost carriers perform against legacy players. The chart from Figure 24 shows their revenue per available seat kilometer (RASK) as well as their number of passengers transported in 2019 against the average RASK of the period, in dark gray we can see the legacy carriers and in light gray the low costs:

Figure 24 - RASK vs Passenger transported



Source: Author's analysis and company data

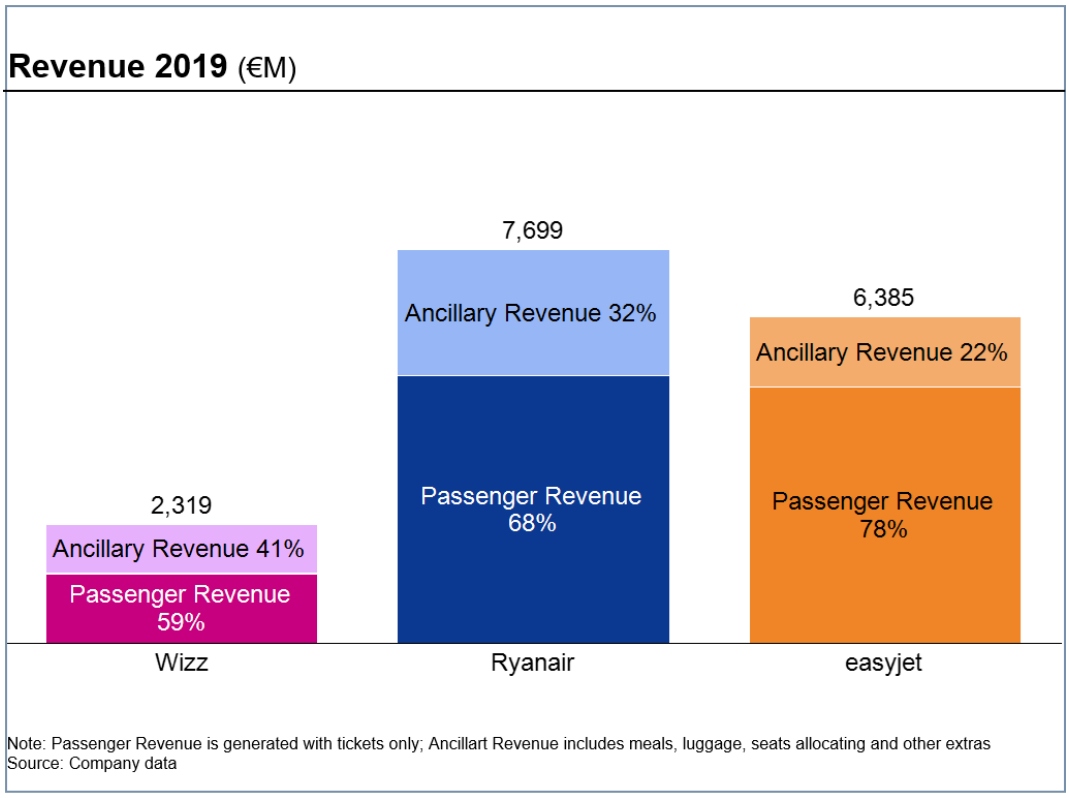
From the chart it is possible to notice that the RASK for the legacy carriers is higher than the LCCs. Another noticeable thing is that the Eurowings, Aer Lingus and Vueling enjoy high RASKs even with low volume, probably with influence of their parent companies. However, this could be the consequence of two possible options once RASK is not a measure of revenue but of revenue per available seat considering the kilometers flown. Either the airline could have higher revenue per passenger considering the distance flown, due to higher fares, leading to higher yields (a metric not comparable between airlines), either it could be a consequence of higher load factors, loading to higher percentage of available seats kilometers flown generating revenue.

This means that companies LCC needs to have significantly lower costs than legacy to be profitable, once they have much lower RASKs. The revenue used to calculate takes into account ancillary revenue, to make the revenue comparable.

(B) However, the part of the price that a passenger considers the most when choosing a ticket, creating higher competition, is the "ticket revenue", with ancillary revenue the company has higher bargain power, therefore it could be a bigger source of profitability. This is why low costs tend to lower their prices on fares to be more competitive in the entry level market segment

and get a bigger share of their revenue from “extras”. The chart from Figure 25 shows the percentage of revenue generated by “ancillary” in 3 different LCCs from the sample. Ryanair and Wizz have at least 30% of their revenue coming from ancillary revenue

Figure 25- Revenue sources for low costs

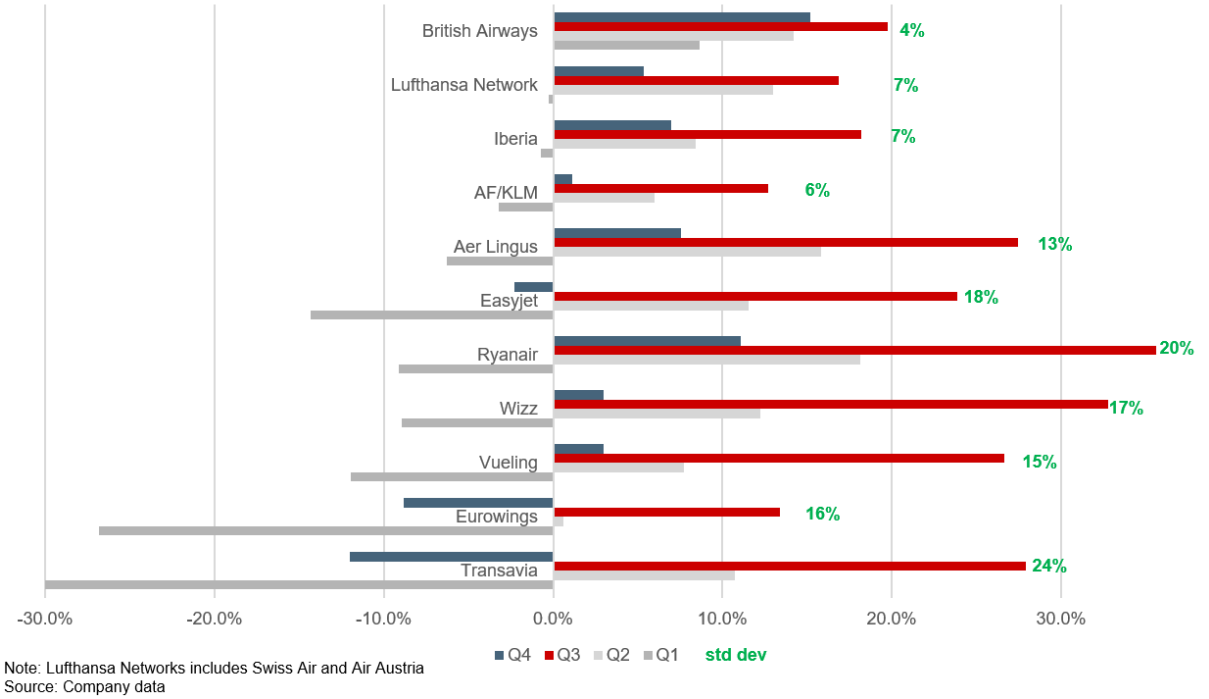


Source: Author`s analysis, company data *(note, decimal separation in the analysis was the “.”, therefore “,” represents thousands).*

(A.1) One big question to understand the airlines profitability is the seasonality, as previously pointed a big threat and reason of bankruptcy for many LCC is the high seasonality of the business, which could be explained once they are mainly focused on leisure passengers. It is worth it than to compare their operating margins. This lower season for passengers can translate to a lower load factor for any given carrier, leading to lower RASKs and profitability. It is interesting to understand how the carrier businesses differ in terms of seasonality and how it translates in their loading factors.

For this purpose, for each quarter from January 2017 to December 2019 the operating margin for the airlines in the study group was analyzed. Comparing the average return for each quarter of the year. In order to have an idea of volatility, it is useful to also see the standard deviation throughout the analysis period. Resulting in the chart from Figure 26:

Figure 26 - Operational margin seasonality and volatility



Source: Author's analysis and company data

This chart shows that indeed the legacy carriers are much more stable, with a less aggressive seasonality and lower standard deviations (below 10% vs up to 24% in the LCC case). Even though the low costs return can be higher specially in the 2nd and 3rd quarters, the main season for travelling (specially leisure in Europe), their fleet management and financial health are much more decisive than the scenario for the legacy carriers. Exceeding capacity or low cash through fall/winter season could be disastrous for LCCs. This could be explained by the higher differentiation that the legacy carriers enjoy, having higher business, national and long-haul share of their revenue driving the operations throughout low leisure periods. It is important now to understand if the reason of this lower profitability is the decrease of passengers during low seasons and if the low costs are able to adjust capacity.

(A) Studying the revenue components, it is easy to notice the importance of the load factor in the revenue and cost management. It is important now to understand if they are able to sustain high low factors in the vales of passenger times. It is useful then to compare the load factor for companies of both segments throughout time and compare it against the industry number of passengers to draw any conclusion.

Table 3 - Load factor vs passenger seasonality

Load Factor (%)	1Q18	2Q18	3Q18	4Q18	1Q19	2Q19	3Q19	4Q19
WIZZ	91%	92%	93%	91%	93%	94%	95%	93%
RYA	95%	96%	96%	95%	96%	96%	96%	96%
EZJ	90%	93%	95%	90%	91%	92%	94%	91%
VUE	83%	85%	89%	82%	84%	86%	91%	86%
AEL	75%	82%	87%	77%	68%	83%	87%	80%
BAW	59%	83%	86%	81%	80%	84%	86%	84%
IBE	85%	86%	87%	84%	85%	87%	89%	87%
LHA	78%	82%	86%	82%	78%	83%	86%	83%
PAX (M)	**126**	**165**	**180**	**147**	**134**	**178**	**190**	**154**

Source: Author`s analysis, company data

Table 3 allows us to see that the true low-cost companies (in lighter gray) sustain high load factors all over the year. With above 90% levels, while the mixed low-cost companies (AEL and VUE) have a load factor more similar to the legacy carriers, suffering with more instable load factors with higher seasonality. Adding to the seasonal profitability issue from the low costs. Now it is possible to see that even if they suffer higher impacts from leisure seasonality, they can better manage their capacity than legacy companies, lowering their ASK levels to maintain their high load factor. One hypothesis of how they do it would be to sustain even lower fares to attract customers during these valley times and keep the airplane full but compromising the profitability, however this strategy might be still better than paying the fixed costs with lower load factors. Despite the fact that lowering fares may be both the reason why the LCC are still keeping their load factors high and why their operating margins are low, we can still conclude that keeping load factors above 90% is a key successful factor for an LCC.

4.7.2. The costs branch

After covering all the revenue branch as much as possible, it is time to understand the LCC's cost structure and understand what really bring their differentiation on that branch, so it is possible to quantify their edge over the legacy players.

First it is always good to remember the components of an airline cost structure:

- Fuel – the cost paid for the jet fuel, including taxes on fuel, exchange rates, contracts and hedging. Jet fuel burning varies a lot depending on the aircraft model, the distance of the flight, how heavy is the airplane (the more passengers and cargo it carries the more fuel it burns) and the aerodynamics, head winds increase jet burning and tailwinds decrease. The more aerodynamics analysis and the oil price relations with jet fuel will not be covered in this project. Wizz and easyjet reported that their new Airbus A320neo consumption is 16% lower than the previous generation and their range is 16% higher. Ryanair reported that it's Boeing 737 MAX can carry 4% more passengers with 16% lower fuel consumption what could mean a big driver for lower fuel consumption;

- Staff – this cost is mainly composed by pilots and crew (both in-flight and ground operators). Including benefits, taxes, and salaries. This cost can be negotiated on individual contracts or in the case of an unionized workforce it is negotiated with the worker unions, terms and flexibility are a key component of this cost, generally non-unionized workforce is also related to more flexible and cheaper staff, not necessarily because of lower salaries, as it is the case of Southwest, that still offers competitive pay and sustain low staff costs. This cost includes also the training, once pilots cannot operate any airplane, also it is key to manage the schedule to match pilots and airplanes to decrease this cost;

- MRO – maintenance and repair organization, sometimes referred as maintenance repair and overhaul due to the importance of the checks on this costs weight. As previously mentioned, airplanes need to pass by numerous tests before flying as well as routine checks of key components or auxiliary tools. This cost is especially high when the airplane needs to be grounded for long periods of time, leading it to on top of the service having the opportunity cost of not using the aircraft. A big part of this cost can be MOH (manufacturing overhead) once a lot of the checks require a lot of manual work by technicians;

- Rent – costs related to the aircraft leasing, including financial costs of leasing, dry leasing and wet leasing. Leasing aircrafts varies depending on the size of the order, the model and the age of the aircraft, often a big trade-of is the higher

leasing costs vs lower operational costs, but this is an analysis for the future. This cost is also reduced when an aircraft is owned leading to the next cost;

- Ownership – the cost of depreciation and amortization from the asset owned. It can be considered that rent and ownership combined gives the cost related purely to the aircraft fleet. Neither of them includes any interest or fine paid in the contract, those are separated in the non-operational costs. Owning an aircraft gives better ability to manage demand, according to Lufthansa it is easier to retire before phasing out, and respond to fluctuations, the company also affirms that it is cheaper than leasing. One big driver of ownership is that when ordered in big buckets, usually the airlines can get a great discount with the OEM (original equipment manufacturer) and therefore have airplanes at a cheaper price, that is the strategy adopted by Ryanair for their fleet;

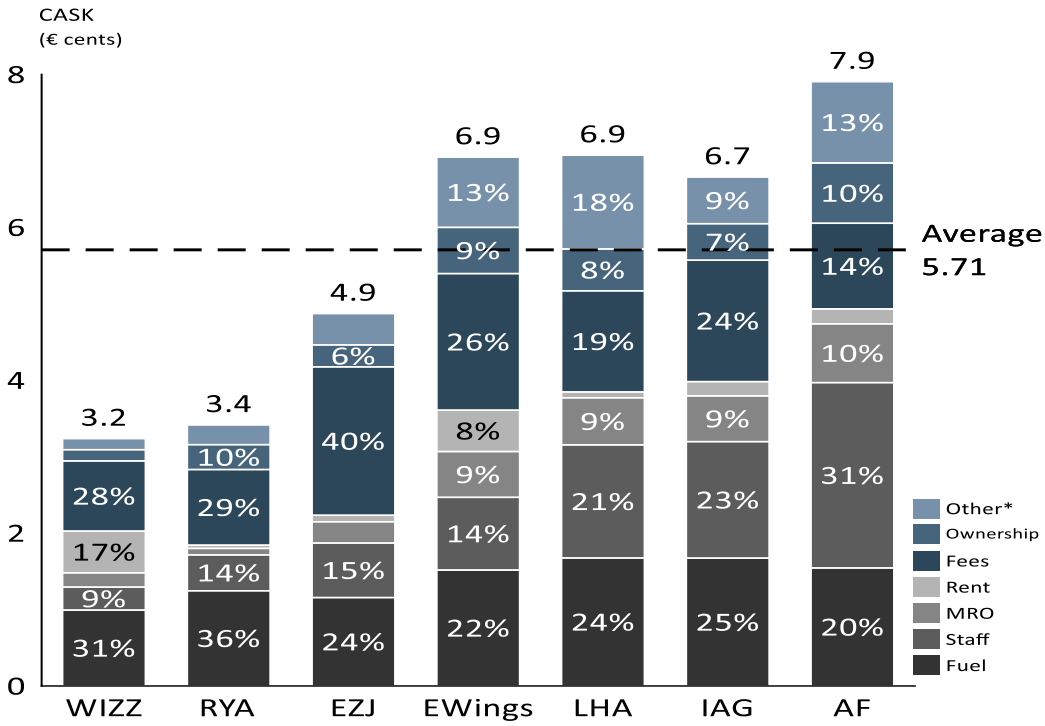
- Fees – divided in three types of fees but sometimes hard to be separated. Landing fees: fees paid to the airport for the right to land, it can be negotiated with a higher volume of flights and are very subjected to the competition for slots and gates between companies. These fees vary depending on the airport and governmental incentives to the local air industry. Navigation fees: paid to service providers to track the airplanes and all the controlling tower service provided to be able to track the planes and control the traffic throughout the whole flight. Handling fees: fees paid for the transferring of baggage between planes and from/to the terminal, sometimes those fees are all bundled together so it is easier to analyze them all together.

- Other – many costs could also be considered but for this analysis they will be all grouped. Marketing: related to both commissions to travel agencies and publicity expenses. Catering and customer servicing: expenses with food and services in-flight such as entertainment. SG&A: all general expenses and office expenses to control the operation.

Costs considered fixed are the Staff, Ownership, and Rent, the remaining costs are considered variable. To analyze the cost structure data from 2017 to 2019 was considered for the samples group. As it was not possible to separate Transavia data from AF Group, the whole

group was considered as AF, same for IAG, being considered as the combination of all 4 airlines, however this grouping did not result in any negative impact on the quality of the analysis. The costs structures for all airlines was draw using the definitions mentioned. Resulting on Figure 27:

Figure 27- CASK breakdown by origin



Source: Author's analysis and company data. **Other includes distribution and marketing expenses.*

With this analysis we can draw a few conclusions:

I. The fuel price doesn't have a huge variance in size as expected depending on the airline (~1.4€ cents/ASK). It has a higher impact on the percentage of the costs for low costs because the other costs are lower. This is a yellow flag though, because a higher percentage of their cost needs hedging for being susceptible to external variations. Low-cost airlines still achieve slightly lower fuel costs (average 1.2 vs 1.6€ cents/ASK for the legacy), what could be explained by a newer fleet, with more efficient airplanes but also for the fact that they have higher bargain power with secondary airports, the fuel sellers in last instance, giving them the opportunity to better negotiate fares with a fuel provider;

II. Ownership cost represents a 50% lower CASK for the LCC's, specially because Ryanair and easyJet buy their fleet in big packages, in the long term, leading to lower costs and better fleet flexibility with a higher fleet standardization and more cost-efficient planes;

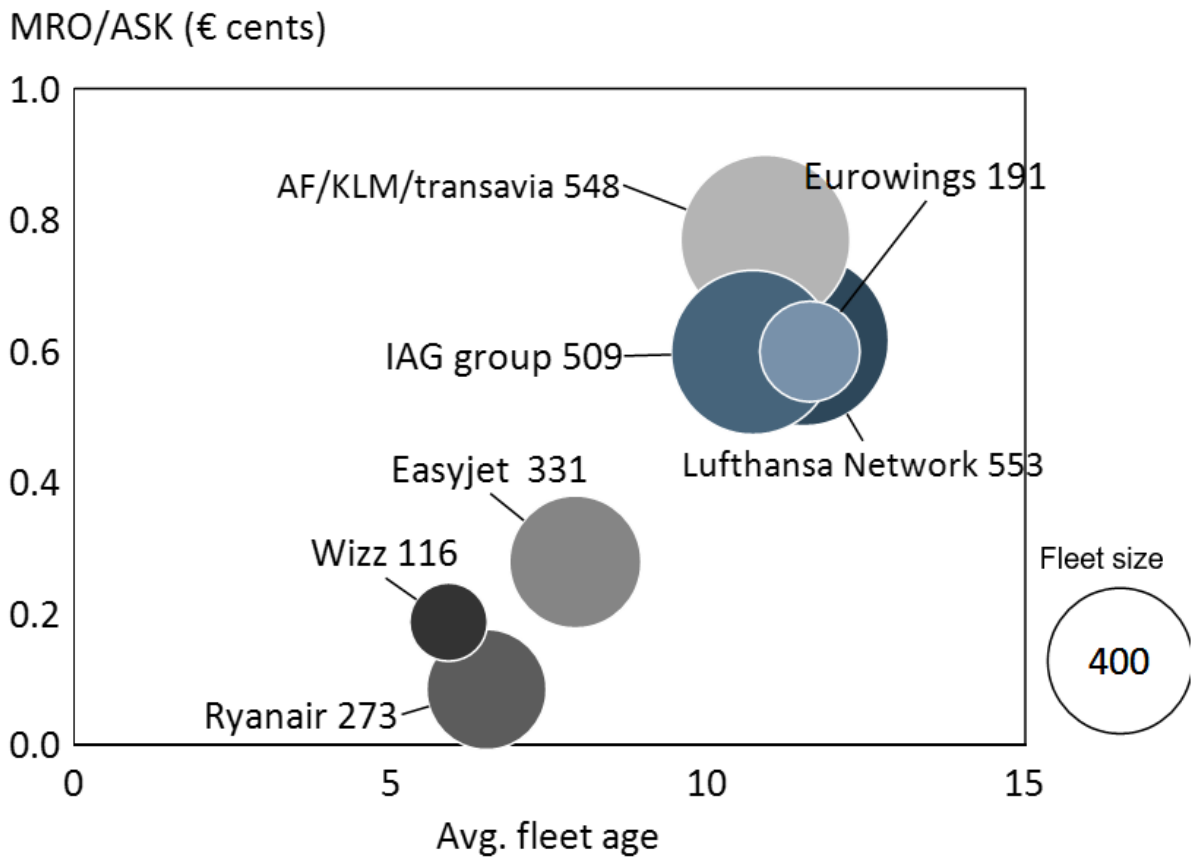
III. Ryanair and Wizz enjoy lower landing fees (~1€ cents/ASK) while easyJet and the legacy have higher fees in CASK numbers (average 1.5€ cents/ASK). This is an effect of flying through secondary airports, resulting on better negotiation power, as well as lower handling fees due to baggage drop policies, partially overturned when more traditional airlines start to charge for baggage. One point to be studied in a future moment would be why is landing fees so high in easyJet;

IV. Even if Eurowings sells tickets at lower prices, its cost structure ends up having the same weight as Lufthansa Networks in total CASK. However, the cost structure is quite different. This could be a consequence of diluted shared costs being hidden in the cost structure of both companies;

V. The main cost differentiation, with the higher impact when comparing the companies is the staff costs. In the case of Air France, they are particularly high (2.42€ cents/ASK), a hypothesis is that it is a consequence of a higher influence of the French government with welfare programs, higher benefits or labor taxes requirements, higher power of the worker unions on the French market, government intervention to maintain high salaries or even bad fleet and crew management. The main drivers to lower crew costs are aircraft standardization and greater flexibility in contracts (LCCs keep staff costs bellow 0.75€ cents/ASK). Southwest teaches a lesson on how to keep employees happy without a union and paying good salaries;

One cost to be studied separately is the MRO, once it is really related to the fleet it needs to have its own analysis taking into consideration the fleet size for economy of scale purposes and age.

Figure 28- Influence of fleet age and size on MRO costs



Source: Author's analysis, Airfleets and company data

From Figure 28, it is possible to see that the low-cost companies have lower costs of maintenance mainly because their fleet is younger (6 to 8 years vs around 11 years for legacy). One factor to add is the fact that they have standard fleet, allowing to better forecast parts and buy in bulk. An interesting fact is that even if Lufthansa has its own maintenance subsidiary, both Eurowings and Lufthansa Networks still have MRO costs in line with legacy. Allowing us to conclude that the main driver for MRO costs is the fleet's age. It also adds up to the fact that the older an aircraft, the more intensive are the checks required, enforcing a plane to be grounded for a longer period of time and having heavier costs.

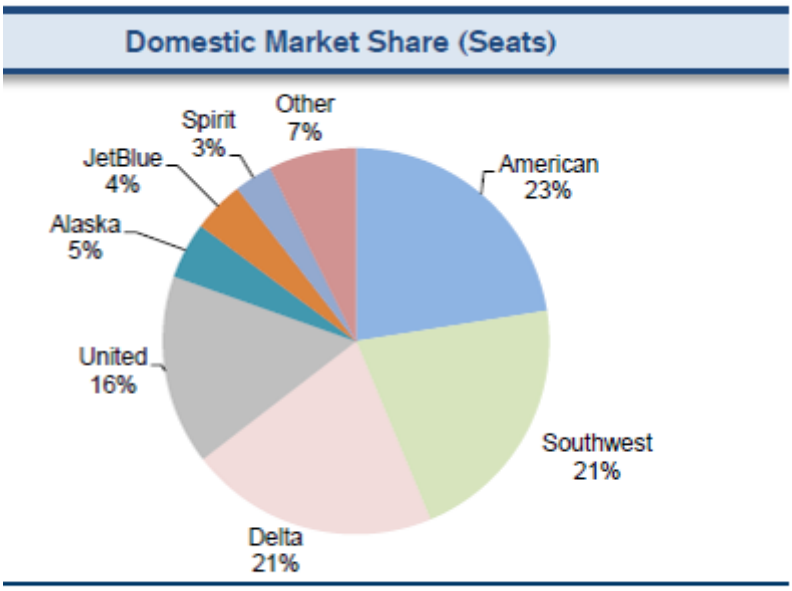
A key takeaway after doing this analysis is that a big part of the possibilities to have success as a low-cost short haul airline in Europe is related to the size of the continent and the amount and concentration of big cities (important fact studied by Airbus in their Global Market forecast). Therefore, it is important to look to another country with dimensions similar to Brazil, a good example would be the United States.

4.8. Study of successful LCC cases in the United States

4.8.1. Southwest Airlines best practices

As previously mentioned, Southwest Airlines (LUV) was the pioneer in the low-cost business model starting as a regional airline in Texas -USA. Southwest is characterized by a loyal customer base, achieving #1 US airline in both long-haul and short-haul flights satisfaction according to JD Power at USA Today (2020). Employees are also highly satisfied with the airline, ranking #1 company at Workforce (2019), showing that the company strategy to have good relationship with employees, paying competitive salaries with good benefits in exchange for more flexibility have been paying its results. The company is also tied up for 2nd place in operational rank in the United States, taking into consideration delays, cancelations, complaints and problems with baggage according to Wall Street Journal (2019). Figure 29 shows that the company is among the top 3 US airlines in terms of market share (with 21%) being the only Low Cost in the group. The company also offers options for business customers, with more miles and preferential boarding.

Figure 29 - US airlines domestic airlines



Source: Credit Suisse (2019)

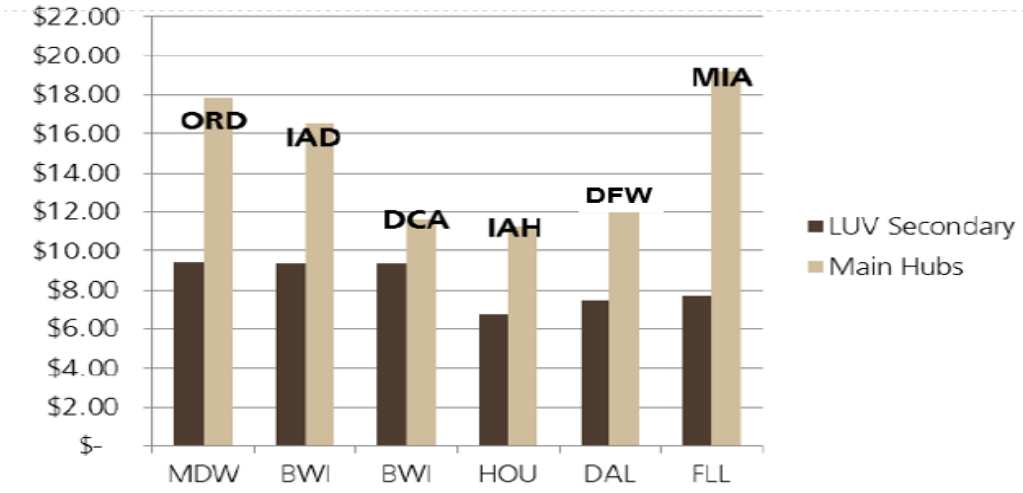
Operating on a single fleet improves its crew flexibility only possible due to American legislation combined with flexibility negotiated with employees. The only constraint is the

minimum rest to be able to board a new flight, no extra training is required, what is the case when you have different aircrafts, all members of the crew are able to perform any given flight with easy shifts, going from one flight to the other. It also allows for easier plane replacement in case of maintenance or other issues, as well as a better common maintenance parts management with better bargain power with suppliers, easier supply chain and inventory management across all flights and outstations, keeping spare parts costs down. This also offers bigger bargaining power with OEMs or lessors getting quantity/price/order delays advantages.

Differently from Ryanair and other low-cost carriers, Southwest does not charge for the first two checked bags even if they keep their one single cabin with no assigned seats or increased benefits. They also offer entertainment and messaging for free with Wi-Fi on board of their planes but at a paid price. Southwest also does not charge fees for itineraries cancellations and passengers are refunded the amount of the ticket spent in travel credit, a very different practice from the rest of the industry. More recently in August 2020, amidst the COVID-19 global pandemic, Delta, United and American Airlines all announced that they are removing their change fees for domestic flights.

A great differentiation from Southwest when compared to regular US legacy carriers is their network based on strategic positioning at secondary airports with more frequent flights. Accounting for more than 90% of the capacity in many of those secondary airports (UBS, 2019) gaining bargain power, flexibility further reducing fees and improving turnaround times. LCCs look closer for leveraging their main cities direct flights to medium cities, while ULCCs focus on small/midsize markets to avoid high competition on big cities and hunt for growth. Figure 30 shows that Southwest's strategy to use secondary hubs gives then from 20 to 60% cheaper enplanement costs, what helps bring both costs and fares down.

Figure 30 - Southwest secondary airports enplanement fees vs main hubs

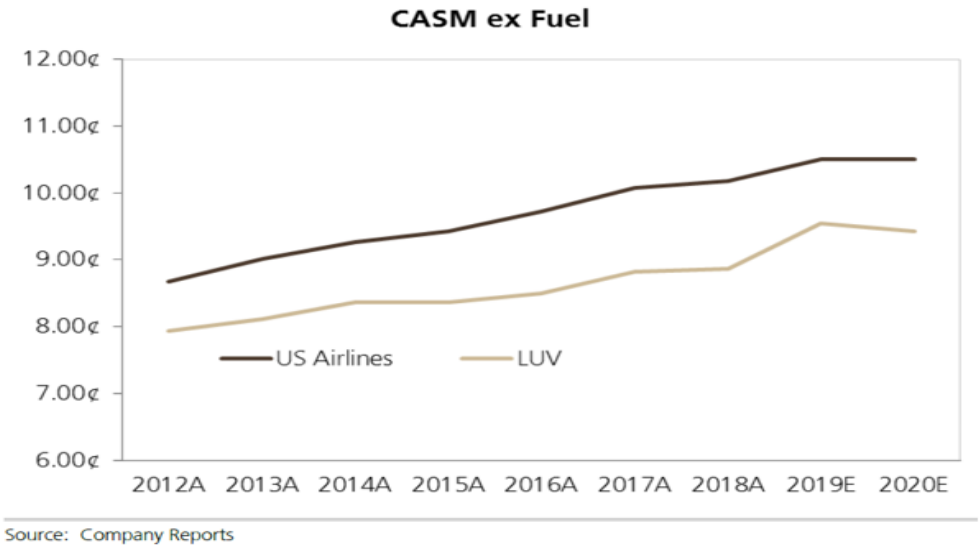


Source: UBS, FAA (2019b)

Network carriers focused on maintain their growth in hub shares, from which they get competitive advantage from basic hub economics according to Credit Suisse (2019). Any new flight added to those hubs grows revenues opportunity exponentially through connections, they are the core of network business and they aggressively defend their hubs against low-cost incursion. However, in Brazil there is not a clear system of hubs as it is the case in the United States, for example Atlanta is one of the main hubs for Delta, Dallas for American Airlines and Newark for United. In Brazil only similar case would be Viracopos for Azul but it does not operate as a connection hub.

Figure 31 shows that Southwest strategy also allows it to keep CASK ex fuel bellow US peers, mainly because of their better fleet/crew management and capacity discipline.

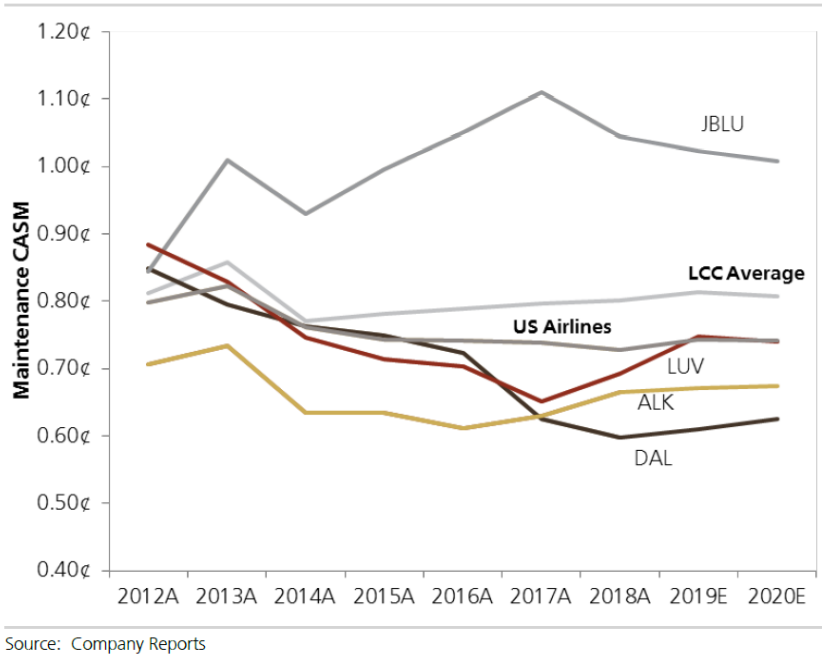
Figure 31 - Southwest cost per available seat mile ex fuel vs US peers



Source: UBS (2019b)

Part of this advantage is due to their single fleet age; their maintenance and repair costs remain relatively low and stable requiring less training. Leading to lower maintenance costs per mile and per aircraft as presented in Figure 32. Even though big checks were expected to happen in 2019 and 2020, the MRO costs remained in line with US airlines average that didn't have to do those checks.

Figure 32 - Southwest MRO cost per mile vs US peers

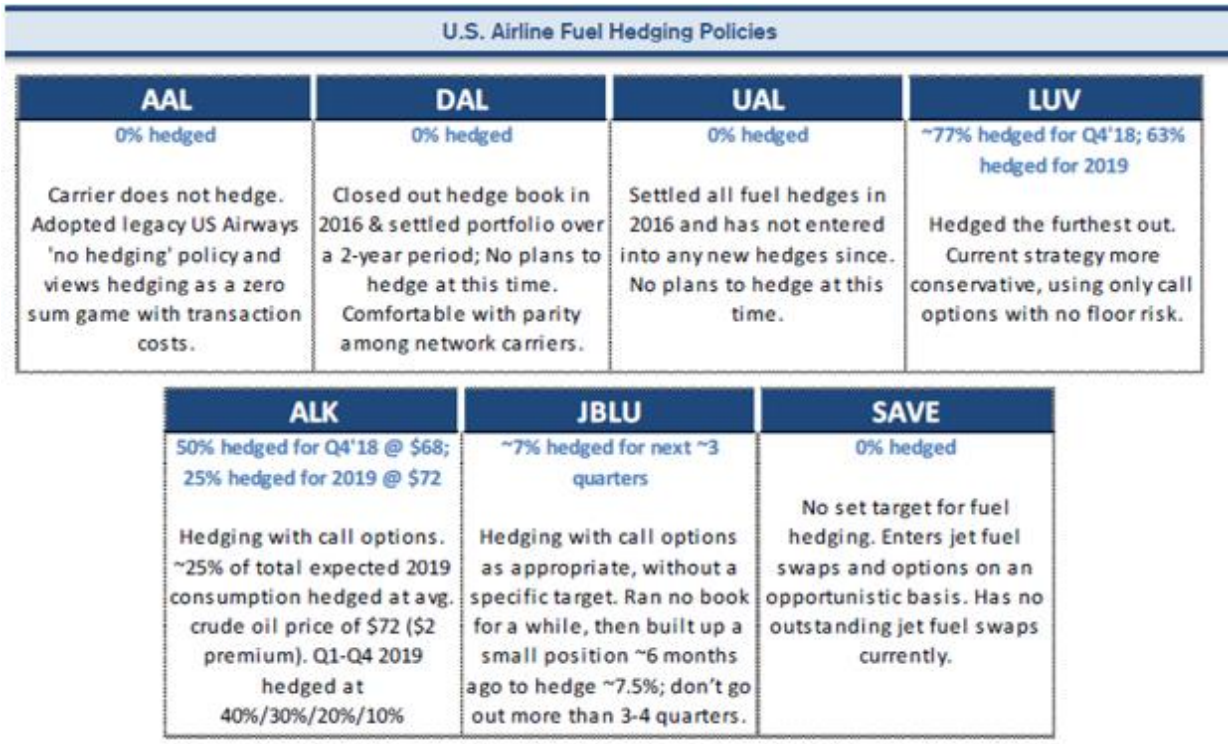


Source: UBS (2019b)

Figure 33 presents one particularity in the US market. The airlines generally don't have fuel hedging as part of their strategy. They believe that higher fuel costs must be recovered through revenue, increasing fare prices and passing the volatility to the customer. Therefore, higher oil prices in the short term have negative impact, while have positive in the long-term. On the short term there is a lag to recover those costs through revenue, but while the company focuses on top-line it forces to have a better capacity management going back on track with the market, trimming off when needed. When prices go down the effect is the opposite, they enjoy higher profitability while tickets elasticity and volatility have a been installed at a higher fare standard and will take longer to go down than the fuel prices.

Southwest is an exception, it already has good network and capacity management, therefore when oil prices increase as in 2018, they are less impacted than other airlines. One of the reasons of this particularity might be the fact that they are airlines that have as main currency the dollar therefore has one fewer volatility to handle. Southwest specificity might have an intangible component for the fact of it being a Texas airline and the jet fuel prices are set using Mexican Golf prices, with one of the main production points in Houston.

Figure 33 - US Airlines hedging policies



U.S. Airline Fuel Hedging Policies

AAL	DAL	UAL	LUV
0% hedged Carrier does not hedge. Adopted legacy US Airways 'no hedging' policy and views hedging as a zero sum game with transaction costs.	0% hedged Closed out hedge book in 2016 & settled portfolio over a 2-year period; No plans to hedge at this time. Comfortable with parity among network carriers.	0% hedged Settled all fuel hedges in 2016 and has not entered into any new hedges since. No plans to hedge at this time.	~77% hedged for Q4'18; 63% hedged for 2019 Hedged the furthest out. Current strategy more conservative, using only call options with no floor risk.

ALK	JBLU	SAVE
50% hedged for Q4'18 @ $68; 25% hedged for 2019 @ $72 Hedging with call options. ~25% of total expected 2019 consumption hedged at avg. crude oil price of $72 ($2 premium). Q1-Q4 2019 hedged at 40%/30%/20%/10%	~7% hedged for next ~3 quarters Hedging with call options as appropriate, without a specific target. Ran no book for a while, then built up a small position ~6 months ago to hedge ~7.5%; don't go out more than 3-4 quarters.	0% hedged No set target for fuel hedging. Enters jet fuel swaps and options on an opportunistic basis. Has no outstanding jet fuel swaps currently.

Source: Credit Suisse (2019)

As previously said, Southwest is the pioneer low-cost model, but there is another model surging that is known as the ULCC, ultra-low costs that charge for basically anything. Once seen as “cheap”, Spirit, a relevant US player is trying to put itself as more of a “value” position improving its operations and trying to change customer visibility.

4.8.2. Spirit airlines, a recent ascendance

Spirit (SAVE) employs a business model targeting the price-sensitive customer. Focused on leisure passengers offering low base fares with nothing but a personal item included, everything else is extra, it stimulates traffic while charging for a range of optional services and amenities that usually are free such as a carry-on item or even water. Its network is primarily low frequency point-to-point having big origination cities with large local populations as a critical component. Spirit today is present in 22 of the 25 top US metro areas and has strong presence in the main leisure markets such as Vegas or Orlando. Its expansion plan targets first big cities, then large leisure destinations, then international leisure destinations such as the Caribbean departing from cities in proximity.

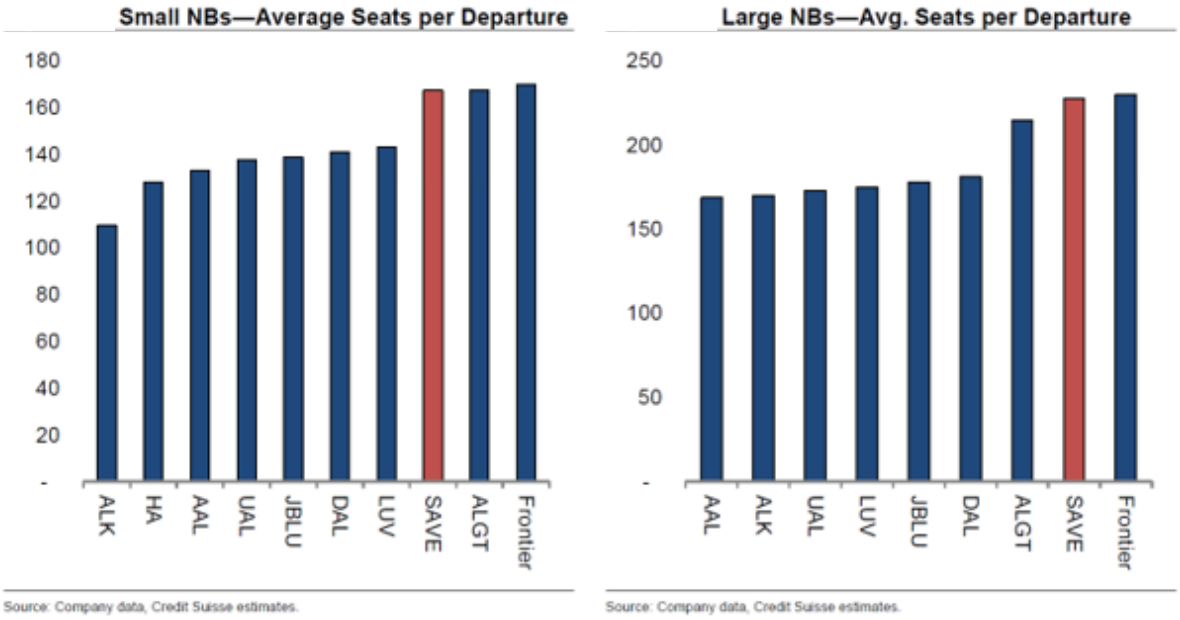
Spirit’s focus on big cities as origin using middle cities as destinations gives it an advantage over other LCC or ULCC carriers and allows it to operate on a niche not really covered by network airlines. Its international departures are mainly departing from Fort Lauderdale (FLL) or Orlando (MCO) so not covering long-haul flights.

The company has been growing its ancillary revenue strategy offering every type of ancillary option and bundling when the flight is purchased through their website, reaching around 50% of their total revenue coming from ancillary items (2019). The focus on low entry fares is a key driver to increase load factor with easier competition on the ancillary market once there are much less bargaining power or competition influence. The company also has the lowest cost structure in the market, even outperforming JetBlue and Southwest by 30% and up to 50% when compared to legacy, giving them a greater price competitive advantage, enabling consistently low fares. That was their key strategy to grow above industry, reaching even 2-3x yearly growth at the same time that the company had as a strategy reduce the number of cancelations and delays (too high at the time) to restore its image through operation performance improvement.

SAVE’s low-cost structure has a few key drivers:

1) Figure 34 shows that Spirit's small narrow-body fleet is configured with ~20% more seats than the other players because of its pitch of about 28" while the market usually has 30-32". This is also possible by their thinner non declinable seats with the personal item being stored under the front seat. This reduces significantly the comfort on the other hand (author's personal experience).

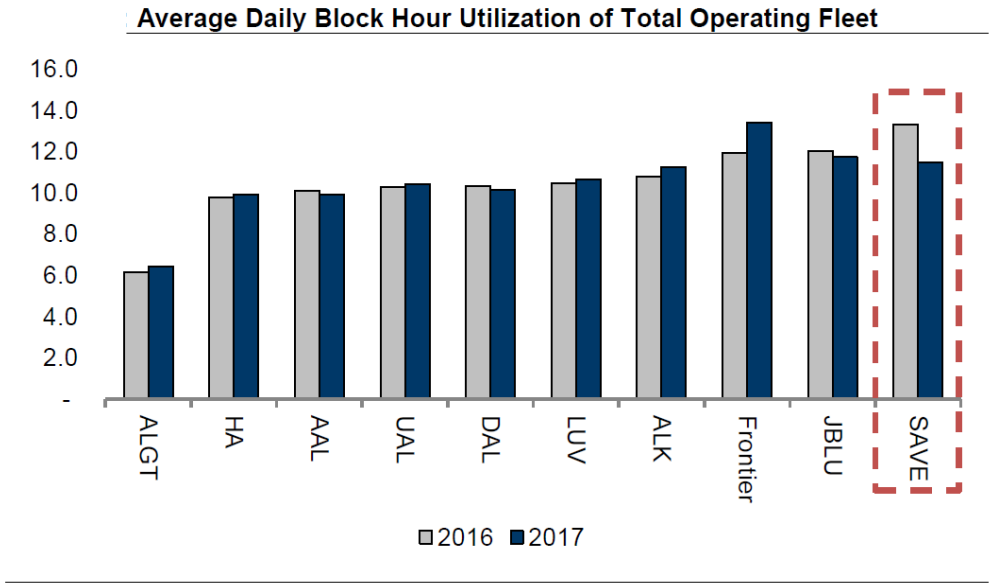
Figure 34 - Average number of seats per departure, US airlines



Source: Credit Suisse (2018)

2) Figure 35 also shows that Spirit has one of the highest average daily block hours utilization on the US industry (around 12h/day), because of its thin network system boosted by its low-cost discounted fare strategy.

Figure 35 - US Airlines aircraft utilization

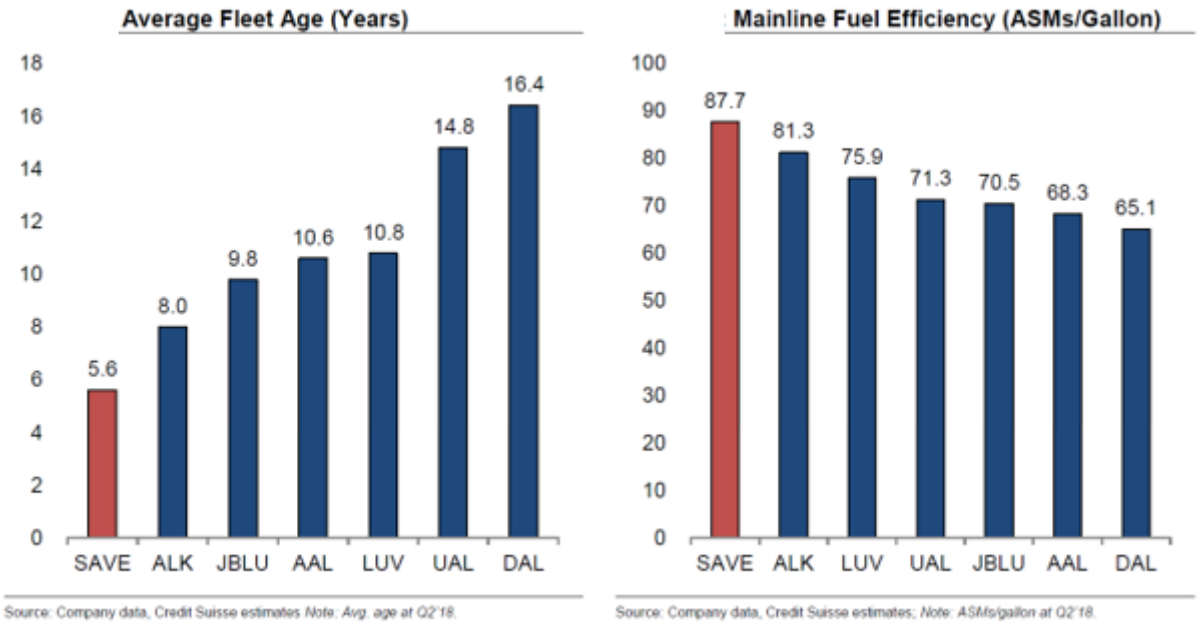


Source: Company data, Credit Suisse research; *Note: SLA to 1,000nm.*

Source: Credit Suisse (2018)

3) Figure 36 shows that Spirit has the youngest fleet (below 6 years), driving maintenance costs down and having a more fuel-efficient fleet. It also gives them some time before having to perform the bigger checks that require the plane grounding for longer time. One important factor about its fleet is that it is mainly composed by Airbus 320-1s with a big part of it being A320-Neo, leading to a higher number of passengers per plane and even better fuel efficiency that the other competitors (15% compared to Southwest). (A320 and A321 have higher capacity than A319s and the Neo generation has both higher capacity and better fuel efficiency).

Figure 36- US Airlines age and fuel efficiency



Source: Credit Suisse (2018)

4.9. Validation interviews with experts in the industry

In order to validate the conclusions from this analysis, some interviews were conducted with consultants that worked in the air industry from different countries. In order to preserve the confidentiality, only the name of the interviewees will be mentioned, without mentioning the company/project that they worked on or what each one answered, just pointing the conclusions obtained from the interviews.

Consultants interviewed: Matteo Marazzi (Italy), Marc Pilorget (France), Dmitrii Bortvin (Russia), Gabriel Purkyt (Brazil), Gustavo Strutz (Spain) and Thibaud Guedon (France).

4.9.1. Key takeaways:

- One reason of why Transavia does not obtain as much operating efficiency as easyjet or Vueling is because of its fleet size, it cannot obtain gains of scale. Employees are also paid as if they were part of Air France, paid in the French rate, that is much higher than for example the case for Ryanair using Irish rates. The case of Eurowings and Transavia lower operating profit also has somewhat

political roots, a lot of money was invested on those companies and they just wouldn't admit the fail. One key point for their lower profitability is the government interference once it has a stake on the company, making them less efficient and more dependent than the other airlines to take decisions;

- Air France has multiple factors that increase its CASK. It is the airline with the highest fleet complexity, highest salaries and very low productivity. A big part of it is due to political decisions. The company suffers from all inefficiencies possible, but they chose to be high in CASK because they have always been high in RASK too, however, they are seen the RASK decrease due to price competition;
- In France the main barrier to reduce crew costs is the unions, the crew costs are considered fixed for being contractual. Then the key is to maximize the use of the airplanes and crew by reducing the time between flights;
- Standardizing the fleet by having fewer models of airplane but with high volumes each leads to not only flexibility and crew savings but also to MRO savings with gains of scale;
- Poor fleet management is usually resulting of bad decisions took a long time ago and often with political motivations because of the high costs involved in the negotiation. It is a high cost to get a new aircraft and it need to be well structured to reduce complexity, not increase;
- Having a 3rd party maintenance may provide lower costs but also lower flexibility and increase the chances of penalties;
- The tendency of the market is to have new aircrafts with lower maintenance and fuel costs and less manual intensive MRO. Today a lot of companies use workforce in Asia for maintenance for lower rates, with the increase of digitalization the tendency is to reduce that need, the roadblock is that it is a highly regulated industry;
- There are demand tools used to forecast the network, chose the routes and define the price using benchmark of existing routes;
- 1st class tickets are not really the most profitable given the space it takes in the cabin, the profitability driver for the legacy airlines is the business class;

- The size of the business class in an airplane is defined by how much of the traffic in a certain route originates from business purposes or tourism. It is also always an experience of adjusting, removing or adding routes if there is demand or not;
- The business traveler is more demanding for direct flights;
- Sometimes legacy airlines take less profitable routes because they are adding it to their hub & spokes model for the higher profitability long-haul flight focusing on maximize the long-haul load factor even if the other part of the travel has low load factor;
- Low costs need to sustain a 90% load factor, and airplane with lower than 80% is essentially losing money;
- Legacy carriers often need to do some flights that make no economic sense but are forced by the government to do them in order to operate, low costs don't have the same requirements;
- Sometimes the CASK for legacy in comparable routes is so higher that they can't lower their prices even more;
- The module of flight sequence is always the same, served by the same aircraft. So, where you are staying overnight is really important because different cities have different demands throughout the day. For instance, leisure cities have higher demand inbound during the morning. The same is valid for the days of the week, Monday and Friday are the busiest days;
- Usually business and 1st class have lower load factors;
- LCCs are probably better in revenue management, longer duration of selling tickets, for example Ryanair sells some share of its ticket's months in advance at promotional prices, with more price levels better adapting its price to the flight's load factor at the moment, it is said to have about 60 levels of price while other carriers have less than half;
- An LCC need to utilize its fleet between 11 to 14h a day, what is about 20% higher than legacy carriers, that sometimes even between 8 and 9. When you have a higher amount of flights your fixed costs are diluted more;
- A part of the LCCs savings comes from the fact that short-haul flights don't require to pay for the crew's overnight stay;
- LCC customers are mainly leisure not business customers, so touristic destinations tend to be a good match for their business;

- LCC not providing catering, having lower checked bags, and minimizing the cleaning reduces their turnaround time significantly if compared to legacy. It is also a big leverage they use with airports;

4.10. Must-win battles for an LCC in Europe/United States

With this work resolutions it is possible to draw a few must-win battles for low-cost airlines to succeed based on European and American benchmarks that could be best-practices:

I. Sustain throughout all year a load factor superior than 90%
   a. Manage capacity reducing offer during valley periods could be an option
   b. Design multiple levels ticket pricing using an extensive level of pricing depending on the current load factor for the flight (Ryanair currently uses about 60)

II. Manage the cashflow to be ready for the leisure seasonality
   a. Promote early tickets selling and maintain lower fares are the strategies adopted today by the airlines

III. Offer single cabin. Single cabin allows to avoid lower load factors on business class and first class that would not be the target market for an LCC. It also allows a higher density of passengers with lower space between seats, especially with non-reclining seats

IV. Price economy fare without checked bag, seats selection or meals allow to decrease handling and catering fees as well as decrease turnaround time. All extras could be charged at an ancillary price, the main idea is to have a basic fare to aggressively compete with legacy carriers and ancillary products to match their offer and still have a lower price. Some airlines also charge for things as check in at gate or printing boarding passes. The goal is to obtain between 20% and 30% of total revenues from ancillary revenue

V. Own most part of aircrafts. According to the information provided by the companies owning aircrafts provide better discounts when obtaining the equipment as well as higher flexibility. Leading to lower operational costs, the main low-cost carriers tend to have a majorly owned fleet to decrease costs with lease. It is important though to manage the financing instruments.

VI. Reduce fixed costs impact through a high aircraft utilization of at least 10h/day

VII. Target 100% sales through company's website to avoid travel agencies' marketing commission
VIII. Use newest aircrafts with lower fuel consumption and MRO costs
IX. Fly through secondary airports to reduce landing fees and fuel costs
X. Negotiate flexible contracts with crew (pilots, flight attendants and ground staff) to maintain competitive salaries and benefits but have flexibility to minimize costs with staff
XI. Standardize fleet to reduce MRO and staff costs

4.11. Adapting the model to the Brazilian market

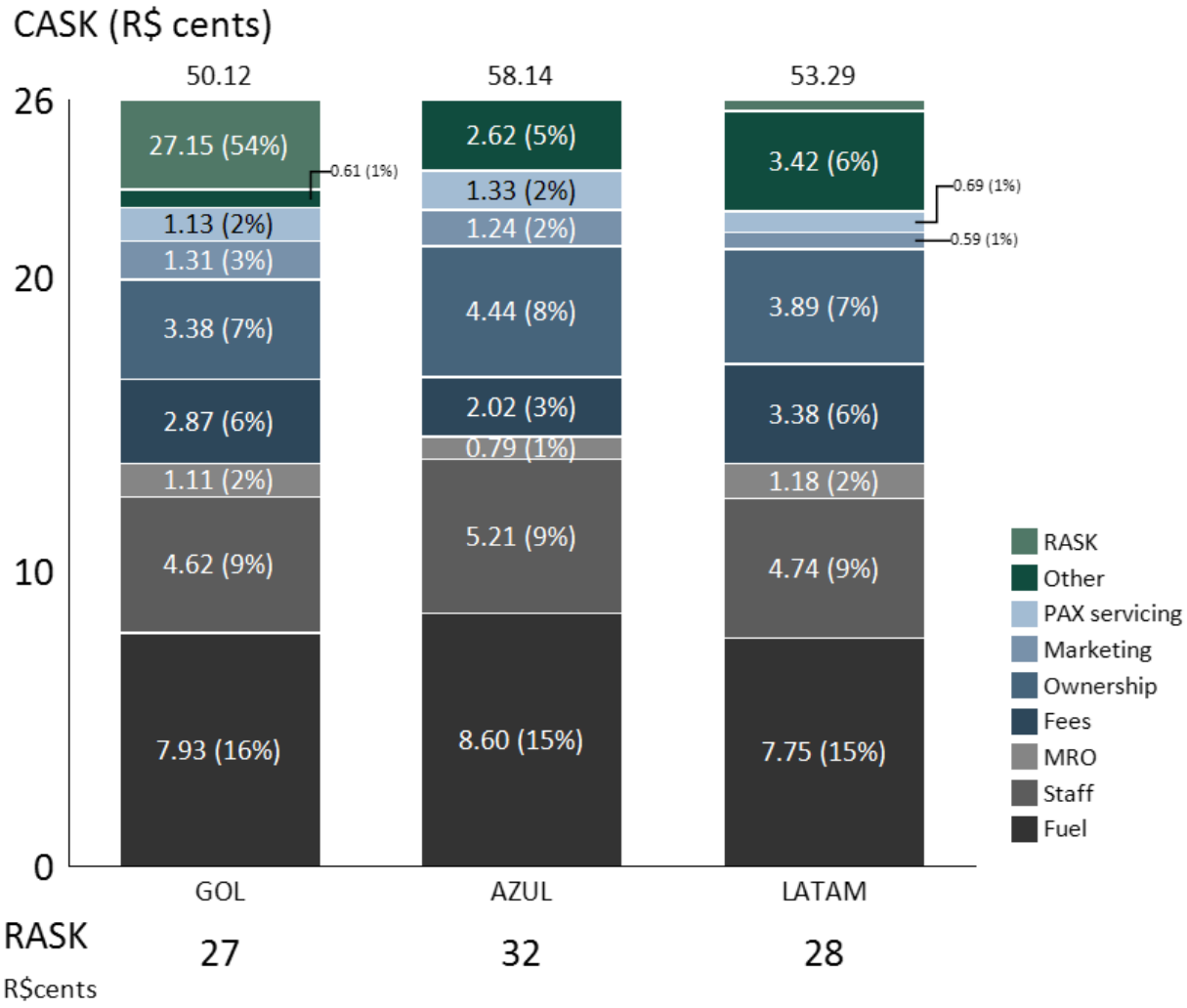
Now it is time to define if all those successful factors make sense in the Brazilian market and see if there is any operational leverage possible or what are the structural barriers.

Brazil has 3 big airlines: LATAM, Azul and GOL. The first one is a multinational legacy carrier, originated by the merge between TAM from Brazil and LAN from Chile. The second is a tentative of low cost, using mainly Embraer E-jets airplanes and with its hub on a secondary airport in São Paulo. The last one is the closest to a low cost, with a standard fleet of Boeing 737s and operating almost only national flights, using partnerships with other carriers to do international trips.

Analyzing the cost structure of these 3 airlines in Figure 37, using the same logic used on the European airlines we can draw some conclusions of the leverages that a low-cost carrier has over traditional players to see if any possibility is there to reduce costs for operations

performance improvements based on our best practices. We can also identify possible points of improvement and fragilities in the Brazilian market:

Figure 37- Brazilian airlines landscape 2019



Source: Author's analysis and company data

With this information, it is possible to choose which battles we must win to improve operations in the Brazilian market. Using the same logic applied to the European market and looking at the branches possibilities, it is possible to identify that critical fragilities would be: 1) Ownership, 2) Fuel, 3) Fees and 4) staffing costs. Now it is useful to look at the must-win battles for a LCC with the point of view of the Brazilian airlines, to see what is already applied (status of applied, not applied or partially) and what has potential (high, average or low) for improvement and possibly reduce one of those 4 costs targets. Presented in Figure 38.

Figure 38 - Best practices in the EU/US markets potential to the Brazilian airlines (2019)

Best Practice	Status	Potential	Comments
I) Sustain load factor above 90%	⊗	↑	Potential to invest. Load factor is around 80% today
II) Manage cashflow for seasonality	⋯	⋯	Requires study of the company's financial health
III) Fly in single cabin seats with higher density/non declinable seats	⊗	→	Brazil's market is 70% business, could be a leverage for cheaper leisure routes
IV) Offer economy price with low entry fare and ancillary items	✓	→	Airlines already have that policy but there was not such an aggressive reduction on fares prices
V) Own the most part of the fleet instead of leasing	⊗	↑	Potential to invest more in owned aircraft, today it is almost 100% leased fleet
VI) Increase aircraft utilization above 10h/day	✓	↑	All 3 major player already have +10/h block hours
VII) Target 100% sales through company`s website	✓	↓	Airlines investing on increasing their share sold through their website, still a strong presence of agents
VIII) Use newest aircrafts to reduce fuel consumption	⊗	↑	Very few aircrafts from the newest models on the fleet. Although GoI has orders for the grounded 737 MAX
IX) Fly through secondary airports to reduce operations costs	⊗	↑	Use secondary airports is not a practice in Brazil
X) Negotiate flexible contracts with crew unions	⊗	↑	Restricted by legislation. But some airlines have better relations with its employees than others
XI) Standardize fleet	✓	↑	Only GoI has a standard fleet in Brazil

Source: Author's creation

After looking at both the best practices and the Brazilian airlines cost structure, it is possible to target a few practices to focus. It is possible to see that some of the best practices are already being applied, at least partially or don't have huge impact change.

The ones that are currently not applied or little applied but have high potential, practices I), V), VIII), IX) and X). We should then look at flights load factor; analyze fleet in terms of ownership, type of aircrafts, fleet age and impact of standard fleet; investigate the reasons for such a high fuel cost; understand the dynamic of airport fees, seeing if there are opportunities for secondary airports; understand what are the legislations restrains for crew contracts and finally investigate if it is possible to generate more revenue through ancillary items.

5. DISCUSSION AND RESULTS

Now, uniting the cost focus with the best practices we can have better lenses to look at the issue and define main points as points roadblocks, right paths or leverage for improvement.

1. Starting with the fleet focus, we should get greater knowledge on the point view of standard fleet, fleet age, aircraft models and ownership.

2. For fuel we should understand what the main drivers of such a high jet fuel cost in Brazil are.

3. On the fees side we should understand how the airport fees are structures and if there are any potentials of using secondary airports

4. Even if staffing costs are restricted by legislations in Brazil and by deals with syndicates (such as the SNA), we should identify the restrictions compared to the other economies

5. An extra point is the revenue generation, it is important to understand if Brazilian airlines are properly taking advantage of their revenue opportunities

5.1.Fleet

The cost related to ownership, are significantly high. Most part of the airplanes from the considered airlines are leased (a weakness of the Brazilian market), in LATAM's recovery plan, 97% of its fleet is leased, most part through financial leasing and the rest through operational leasing. One way to reduce it would be buying the aircrafts, but this decision would highly depend on the company's financial health and risk leverages. The companies are in a hostage situation on this cost because of high currency fluctuations (a threat in the Brazil market), the Brazilian currency BRL (real) suffered huge depreciation on the recent years and has a big volatility historic, giving a big burden for the local operators when trying to obtain their aircrafts. The same fluctuations impact the fuel market, once it is mainly negotiated in the global market.

Analyzing the Brazilian fleet in Table 4, it is possible to see that the fleet age is still bellow European and American legacy carriers (a strength in the Brazil), but above their LCC. It might be a good option to increase the ownership of airplanes from the new generation, and gain efficiency the same way that the low costs do. A roadblock would be the currency fluctuations and the weakness of the BRL if compared to the Dollar or the Euro, complicating big purchases. It is also an important fact to be studied the financial mechanisms, interests and the cost of risk difference for a Brazilian company compared to American or European peers.

One factor that plays on the supplier bargain power favor is the size of the fleet. Brazilian fleet is much lower than the European ones, even considering Latam South America. All 3 players combined have a fleet a just a little bigger than Lufthansa. Ryanair has a fleet bigger than Gol and Latam combined, this makes it much easier to negotiate orders in bulk with the OEMs. The size of the Brazilian fleet is also a reflex of the much lower number of trips per passenger in the country.

Tabela 4 - Brazilian airlines fleet

Airline	Fleet age	Fleet size	MRO/ASK (BRL cents)	Most used aircraft
GOL	10.9	137	1.11	Boeing 737-800
LATAM	9.5	283	1.18	Airbus A320-200
AZUL	6.4	142	0.79	Embraer E195

Source: Company data, author's analysis

In terms of renewing the fleet with the newest models, Gol plans to have 50% of its fleet (68 planes) in 737-MAX by 2025 (considering that the aircraft will be certified by authorities with technical issues solved after grounding). Latam has orders for 110 airplanes from the A320s Neo family, that is about 1/3 of the current fleet, 45% of the number of A320s in the fleet today. While Azul plans to have by 2024 40% of its fleet (80 planes) coming from A320s Neo and 38% from Embraer E2 jets, phasing out its current E1 family. Therefore, we can assume that the companies have a pretty reasonable plan to renew its fleet with the most cost-efficient airplanes in the market.

Comparing Gol Linhas Aéreas Inteligentes to the other airlines it is also possible to see that aircraft standardization also didn't reflect on much cost reductions for MRO or ownership. Gol's costs are very similar to LATAM's even if Gol's fleet is composed only by Boeing 737s (mainly 737-800s).

Only Azul uses the Brazilian OEM manufacturer Embraer on their fleet, it would be expected to see lower ownership costs or at least higher percentage of owned aircrafts once the manufacturer is in Brazil, but it is not the case, also does not show significant reductions on ownership costs. It is also surprised that even if Embraer is a Brazilian OEM so little of the country's fleet is composed of E-jets. Hu, Qiwei & Zhang, Anming & Zhang, Yahua, Transport Policy, (2019) proposed, on the World Conference on Transport Research, a possibility for why regional jets are not so used. In their study, they show that emerging economies use less regional

jets mainly because they are in a higher growth market for their new routes, and they show that it is better to start a route with bigger planes if it has a high growth than to start with smaller planes only to replace it later. Even if regional jets have advantages over large planes on short-haul and “thin” routes for being easier to achieve high load factors. On the other hand, Brazil and generally emerging economies have fewer regional routes, mainly being characterized by multiple routes with longer range due to the country’s size.

Important point to notice is that according to the companies’ annual reports, almost all of their fleet is leased, and this impacts their flexibility and the increases their ownership costs, specially impacted by the exchange rate once most part of the leasing companies operate in the global market. Today, around 40% of the worldwide fleet is owned by leasing companies (Zhang and Zhang, 2018) and they have higher bargain power towards the Brazilian market, indeed this negotiating issue is one of the reasons that brought Avianca Brasil to file for bankruptcy in 2016. While companies like Ryanair and Lufthansa operate with more than 80% of their fleet owned, giving them bargain power in orders and well as reducing their ownership costs throughout time.

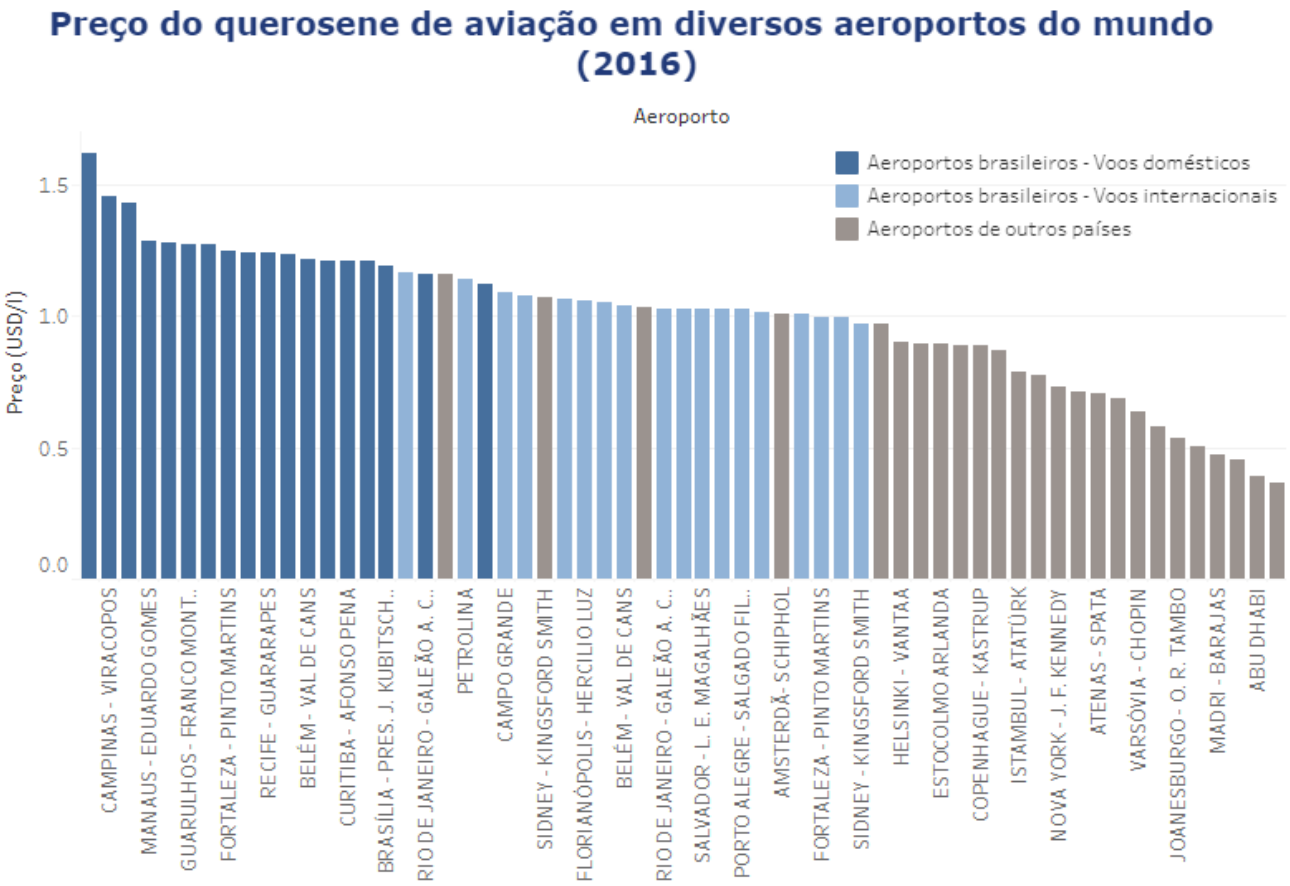
5.2.Jet fuel

Fuel cost is very similar among all airlines, as happens to be the case in the European market. The curious fact here is that Azul is the player with the newest fleet and has both highest fuel and ownership costs, this is probably related to worse mix of routes or the fact that the routes may be too short, increasing the percentage of fuel burned on taking off and landing. It could also be a problem of scalability when buying fuel, or problems related to the E-jets performance being worse than Airbus or Boeing, what would be exactly the opposite than the expected once Embraer, based in Brazil, is known for manufacturing planes with a good fuel efficiency, specially the new E-jets 190-E2. It is noticeable though that fuel represents a higher percentage of the costs in the Brazilian airlines, what is the case only in the European low costs.

The Brazilian Airlines Company Association (ABEAR) performed a study comparing the fuel costs for airports in Brazil and other countries and identified that the jet-fuel cost is much higher in the main Brazilian airports in comparison to the main European peers, presented

in Figure 39, a clear weakness in the Brazilian market. This could explain why the fuel costs represent a higher percentage of the airline's costs in Brazil and drive their CASKs up.

Figure 39 - Jet-fuel price in main airports BRA vs EUR

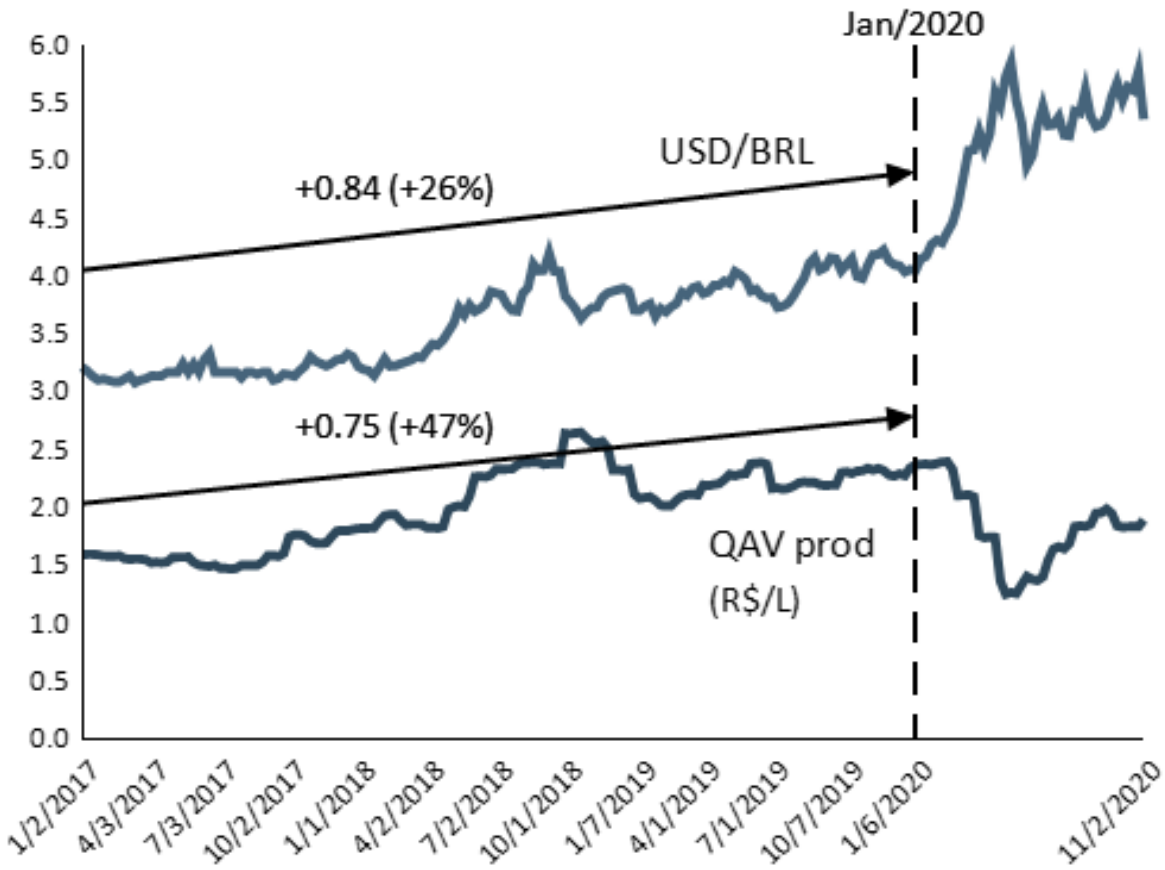


Fontes: Shell Global (exceto para os Estados Unidos), disponível em: www.shell.com/business-customers/aviation/ppp/our-posted-airfield-prices.html, dados de 19 mar. 2016; para os Estados Unidos, US Energy Information Administration (EIA), disponível em: www.eia.gov. Conversão de moedas feita em 22 mar. 2016.

Source: ABEAR (2019), EIA and Shell

This fact is partially explained by the exchange rate effect. Even if airlines usually have a hedge on their fuel prices and exchange currencies, operationally the difference in exchange ration can generate problems with gain of scale at the value chain and drive costs up. Figure 40 presents the relationship between jet fuel in Brazil and the exchange ratio, also showing the evolution of both indicators from 2017 to 2020.

Figure 40 - Aviation jet fuel (QAV) vs Dollar exchange since 2017



Source: ANP, Yahoo Finance, author's analysis

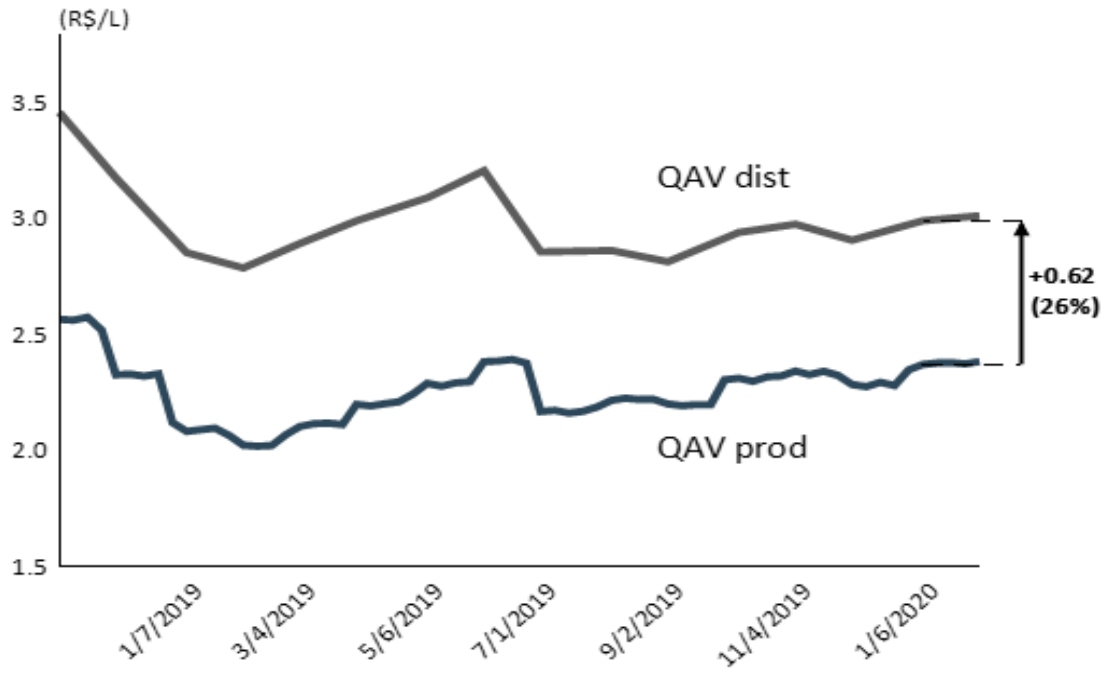
Indeed, as shown in the chart, the jet fuel distribution price and the exchange USD/BRL are highly correlated, and both suffered a strong spike between 2017-2019. This growth is one of the main drivers of the increase in cost prices for the Brazilian airlines. It is possible to observe a estrange behavior in 2020 due to the effects of the pandemic, increasing uncertainty and fiscal expenses driving exchange ratio up, as well as low demand driving fuel prices down.

A Brazilian particularity is that the tax over products in circulation (ICMS in Portuguese) also applies to jet-fuel in domestic flights. In average a little below 20%, to this tax is added PIS and COFINS (7%), taxes applied to gross-revenue and destined to governmental pension and health funds. This combined effect according to ABEAR (2013) correspond to an incremental price of 22% for the jet-fuel. The Association estimates that those combined effects, with the higher margins on the supplier chain due to higher bargain power and concentration results in a 35 to 50% higher price for jet-fuel if compared to developed economies such as United States, United Kingdom and European Union where the tax doesn't exist or does not apply to jet fuel. It is important also to notice that recently European

committees are starting to evaluate taxes over fossil originated jet-fuel to incentivize the reduction on carbon footprint generated by airplanes.

ANP (Brazilian Oil and Gas national agency) data allows us to compare the jet fuel price at the producers (without ICMS taxes but with other taxes), QAV prod, to the jet fuel price at the distributers and passed to the airlines, QAV dist., (including ICMS taxes), presented in Figure 41. Allowing us to see the real increase in the prices due to a combined effect of the distributions margin, accounting the complications of the distributions in the country, with all the infrastructure roadblocks and the state tax. Some of it is also due to the lack of refineries but this effect mostly impacts the price for the QAV prod. Showing a 26% increase in prices from the producer to the point it reaches the airlines. It is also noticeable that the jet-fuel production/distribution is a concentrated market with major players having high supplier bargain power. Raízen, BR Distribuidora and Air BP account for more than 80% of the distribution market (ANP).

Figure 41 - Jet-fuel price on the producer vs jet-fuel price on the distributer



Source: ANP, author's analysis

E.Zu at Sustainability (2020) also shows that the Brazilian airlines are working well towards increasing their energy effectiveness on jet fuel utilization, however there is still some room for improvement. They classify fuel burn productivity as being influenced by the idle capacity (expressed by the unused portion of the aircraft capacity), aircraft size and weekly frequency. During the period of 2007-2016 the means of all variables had favorable variation

for the performance improvement, with RTK per liter of fuel increasing from 1.95 to 2.40 and the idle capacity reduced from 0.42% to 0.34%, with improvements also in aircraft size adaptation and weekly frequency. Even though, aircraft still should increase aircraft size only on routes that can support growth without declining load factor and keep improving idle capacity once it is still high with room for improvements in operations, part of it is due to the lack of flexibility structurally because of Brazilian legislations.

The difference in taxes for the ICMS from different states (3% in MG against 12,5% in SP for example) also leads the companies to do what is called “tankering”, in other words carrying more fuel than necessary from the place with lower aliquot, leading to unnecessary waste provoked by flying the plane heavier than necessary.

One other structural barrier is the lack of price parity in fuel. The aviation fuel consumed in Brazil even if produced in the country has its priced defined by the value of the QAV produced in the Mexican Golf plus the freight and importing costs. A parity of the importing and exporting prices without adding the freight costs would already drive fuel costs down.

Removing these structural barriers as well as improving the parking area for the airplanes and higher flexibility to improve turnaround speed would generate an economy of at least two billion reais to the industry (McKinsey, 2010).

5.3.Airports

Landing fees reduction from secondary airports. Fees apparently have lower impact on the Brazilian market cost than in the European, representing a smaller percentage of the CASK. The reduction could potentially be measured by the gap between the fees paid by LATAM and Azul, what is about R$1.36 cents. However, it is noticeable that Brazil has much fewer secondary airports, Rio de Janeiro for example, the second most important city in terms of traffic, has its closest option of secondary airport (excluding the 2 big ones used today SDU and GIG) almost 3h away from the city center. Most part of the cities do not have a secondary airport, the case is not comparable with Europe that has different countries next to each other with multiple airport options in the main cities such as Paris, London and Milan for example.

According to the study performed by McKinsey to the BNDES (2010) Brazilian airports have availability and coverage of domestic air network adequate mirroring population concentration. The main question would not be the availability or coverage, but the type of airport, very few cities have secondary airports. There are approximately 2 498 airports

(including landing areas) in Brazil, second largest number in the world, only behind United States according to PEREIRA, D., & SOARES DE MELLO, J. C. (2020). However only 128 of them are commercially explored, 34 used for international connections and only 3 are among the top 100 in the world (IATA). The Brazilian airport's infrastructure is ranked by executives in 19th place out of 23 countries from Latin America and Caribbean, and 112th globally (IATA 2016).

Fageda (2015) point that low-cost make real gains with point-to-point routes when they work almost in a monopoly, while legacy carriers focus on hubs to better utilize their air network and the prices in the hubs put pressure on the fee for tickets impacting their operational results. Lu and Mao (2015) point to the importance of governmental actions to support efficiency and the airport authority roles with their policies as enablers to the low-cost routes through secondary airports on a point-to-point model.

However, what we see in Brazil today is the airports publicly administrated by Infraero having higher fees than the privatized ones, presented in Figure 42. This probably is because they bundle the airports in categories, using the most profitable airports to compensate for the non-profitable ones, at the same time that they do not increase the profitability of the airport through secondary sources of revenue, neither work on the infrastructure improvement to increase traffic. Today there is very little competition between airports and the administration of Infraero jeopardizes the investment on new secondary airports and the airports administrated by the government have fairly higher fares in all categories than almost all the private ones.

Figure 42 - Brazilian airport fees details

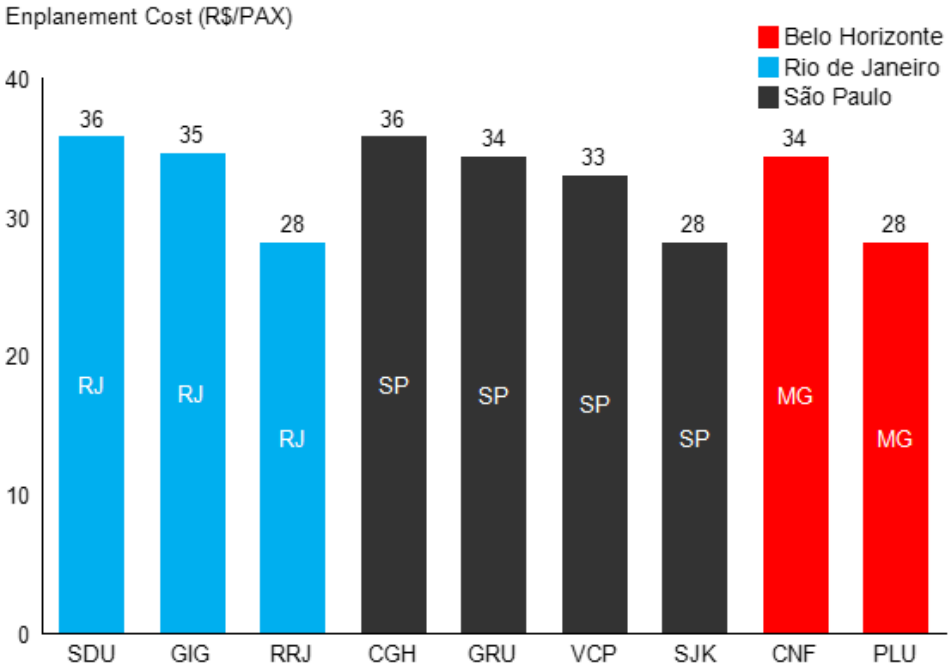
Airport Code	Location	Source (Portaria ANAC)	Enplanement cost (R$/PAX)	Boarding (R$/PAX)	Landing (R$/ton)	Conection (R$/PAX)	Overstaying AE (R$/ton .h)	Overstaying PM (R$/ton . H)
ASGA	Natal	nº 1.627/2019	25.726	23.140	7.245		0.304	1.432
BSB	Brasília	nº 2.147/2019	33.379	30.666	9.601	10.395	0.403	1.897
CNF	Confins	nº 1.418/2019	34.495	31.690	9.925	10.740	0.416	1.961
FLN	Florianópolis	nº 2559/2019	34.973	32.130	10.062	9.830	0.425	1.984
FOR	Fortaleza	nº 2555/2019	34.973	32.130	10.062	9.830	0.425	1.984
GIG	RJ - Galeão	nº 1.417/2019	34.669	31.850	9.975	10.790	0.418	1.971
GRU	SP - Guarulhos	nº 2.089/2019	34.494	31.690	9.921	10.730	0.416	1.960
Infraero	Category 1	nº 103/2019	35.867	32.950	10.320	10.080	0.436	2.035
	Category 2	nº 103/2019	28.289	25.890	8.490	7.920	0.353	1.661
	Category 3	nº 103/2019	23.264	21.450	6.420	6.480	0.270	1.288
	Category 4	nº 103/2019	15.681	14.830	3.010	4.320	0.125	0.602
POA	Porto Alegre	nº 2556/2019	34.973	32.130	10.062	9.830	0.425	1.984
SSA	Salvador	nº 2557/2019	34.973	32.130	10.062	9.830	0.425	1.984
VCP	Viracopos	nº 2.091/2019	33.068	30.380	9.511	10.300	0.399	1.879

Source: ANAC, author's analysis

Additionally, Figure 43 shows that only 3 cities have more than one real options for airports in Brazil today. The best viable example for a new secondary would be the use of São José dos Campos Airport as an option for São Paulo airports, today already served by Congonhas, Guarulhos and Viracopos. However, the airport is located more than 2h distant from the center of the capital. Another near location would be the Sorocaba airport, but this airport does not have, today, infrastructure to receive Boeing 737 or Airbus 320 flights, being used more by regional jets. It is worth it to mention that both airports are considered in the most

recent rounds of the concession plans that might include upgrade on infrastructure and possibly expending capacity for narrow-body aircrafts.

Figure 43 - Secondary airports options for Brazilian Main cities by enplanement cost (R$)



Source: Infraero, ANAC, author's analysis

This move, not considering additional infrastructure investments necessarily to increase airport capacity, would result on, considering best case scenario, an improvement of 23% from the Congonhas (CGH) enplanement cost. Very little if compared to the gains obtained on the US airlines' case (up to 60%).

The lack of infrastructure in airports and navigation affect the number and the time for take-off/landings, increases the time flown under lower altitudes, what increases the fuel waste, sub optimizes routes utilization and geographic distribution with lower distance between aircrafts, reduces overnight costs. Often airplanes must spend the night on an airport that was not desired in their route network planning, this makes the airplane be less utilized reducing either one route at night or one route in the morning, or even force then to fly with low load factor.

The airport revenue is marked by low leverage of the commercial revenue (generated by stores and other business inside the airport) and resources transfer to non-sustaining airports

(McKinsey 2010). According to international benchmarks (for example airports in London), revenue from business operating the airport should be about 55% of the total airport's revenue, reducing the dependence over landing fees. In Infraero operated airports, those revenues account for less than 25% of the total revenue. When considering only the boarding fees, paid by the customers, Brazilian airport fees are competitive if compared to the international market. However, if considered all the fees paid by the airline to operate in that airport, airports such as Guarulhos (2010) have the about the same airport fee as the main airports in Europe. The biggest problem in Brazil is that this price does not have a big reduction when considered lower traffic airports.

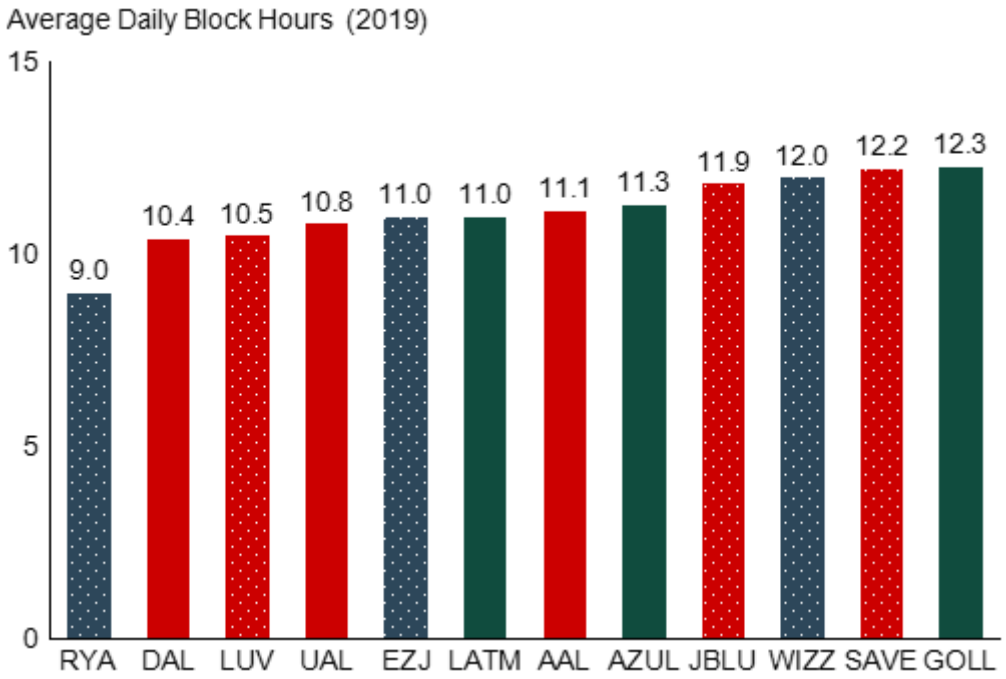
5.4.Crew

Crew costs in Brazil represent a middle point in the cost structure between LCC and legacy carriers in Europe. They are still substantially high, but one could say that the staff managing in not horrible. As previously seen the main drivers for lower the crew costs would be standardization of the fleet and high aircraft utilization. Azul for instance has an aircraft utilization of 11.1h/day, same as easyjet and higher than Ryanair, Latam stayed a little behind with 11h/day, still higher than the LCC bottom target and above US peers. Gol is an even better example with an aircraft utilization of 12.3h/day, higher than Wizz. Figure 44 shows Brazilian airlines daily block hours (indicator of aircraft utilization) comparing to US and European companies.

Gol also has a standard fleet, almost all composed by Boeing 737-NGs, therefore we could take Gol as benchmark for minimum staff costs in Brazil using those levers. But it would only represent a R$0.10 cents decrease against LATAM and Azul again differently than expected has the highest staff costs. It could be related to be a better service or problems of scale. It is also noticeable that the turnaround time that the companies perform in Brazil is also

not bad, achieving even 30minutes turnaround in Congonhas airport, one of the busiest in the world.

Figure 44 - Aircraft utilization comparing main Brazilian, European and American players



Source: Company data, MIT Airline Data Project, author's analysis

Brazilian legislation is more restrictive than European and American legislations (according to ANAC, EASA, FAA). The resting time is higher in Brazil, pilots and flight attendants are not even allowed to take a plan back home as passengers, forcing them sometimes to spend the night out, increasing costs with hotels and transportation. Until early 2010s, the number of flight attendants on an airplane depended on the number of emergency exits and not on the number of passengers as it is in the US and European markets (change given on the Resolution #334, of 01. Jul.2014, ANAC). Now it is a factor of the total number of seats.

The monthly limit of hours traveled by crew member in Brazil is restricted to 85h, while in the European and American market it is up to 100h. In theory, increasing the limit to meet international standards would be beneficial for both pilots/crew members and airlines, once their payment has a big variable component dependent of the number of hours flown, while the airline gains more flexibility to manage their network and crew staffing. In the practice, it would mainly adequate the number of flown hours to the legislation today, because as stated by Johannes Castellano, Human Resources Director at Azul, the industry practices 76h/month crew flight hours. Jerome Cadier, LATAM's CEO stated that their pilots today fly in average 63h, much below the European ceiling.

On top of that, there is a 5 landings per day limit, what also adds complexity to the network. Additionally, Jerome mentioned that in the case of airport closure, most part of the times the airline is responsible for paying the crew logging instead of the airport or navigation operator. The CEO also complained about the IT infrastructure in the country that makes it much harder to plan connections and operates the network, causing unnecessarily delays and canceling. Showing an additional weakness for the Brazilian airlines.

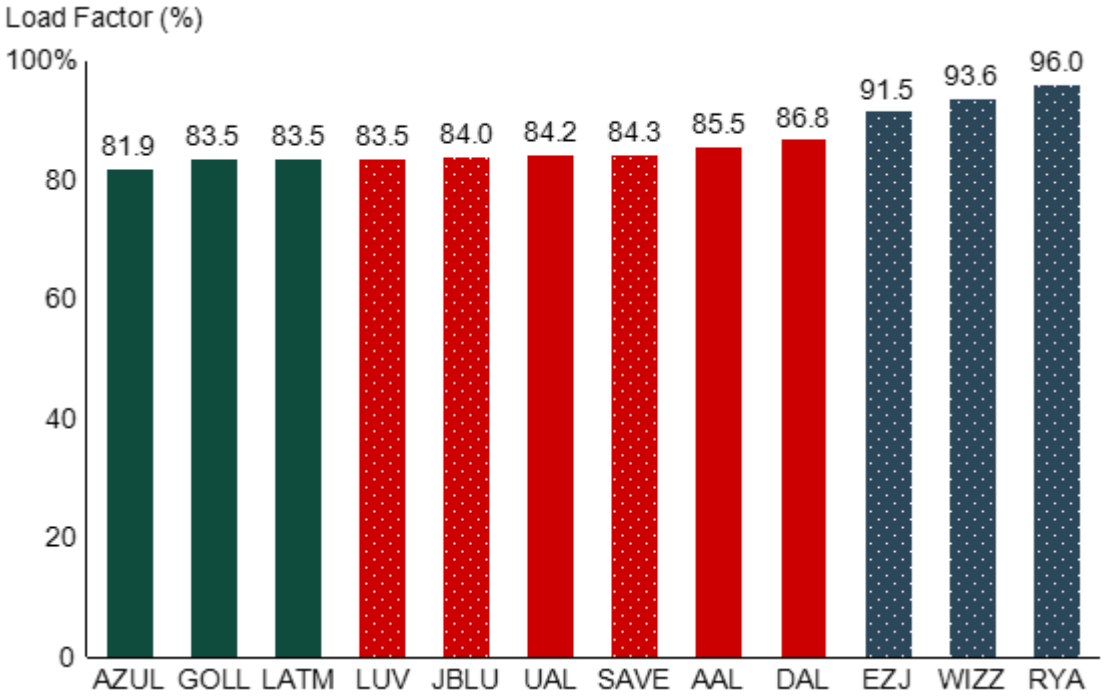
One important point stated by Gol's CEO Paulo Kakinoff and pointed by Evangelho, F., Huse, C., & Linhares, A. (2005) is the good relationship that the company has with its employees, closer to the Southwest model. They have a culture of "no one abandons the ship" and generally pay the best wages, offering participation in profits and motivation their employees with a more informal "fun" workplace.

5.5.Revenue

On the revenue side, one of the biggest differentiations for LCC is their higher ancillary revenue and lower handling costs. However, in the Brazilian market since Dec/2016 the Brazilian aviation agency (ANAC) authorizes the airlines to charge for checked bag, since then the airlines already offer the basic fare without baggage and charge for it separately (included on the considered RASK). Even though we still don't see enough revenue coming from other sources other than fare revenue in the three companies.

Figure 45 shows that one big point of focus with room to improve would be the load factor. About 84% in the Brazilian airlines, still bellow European benchmark, in line with some American peers, but an improvement of 3% to meet Delta Airlines standards would be extremely beneficial for margin. It could be derivative of the size of the country and lower number of big cities concentrated in comparison to Europe. It is noticeable though, looking at MIT Airline Data project historical series and ANAC reports, that there was a big improvement in load factor during the 2010s for both American and Brazilian airlines (from around 67 to 70% to above 80%).

Figure 45 - - Airlines load factor (%) in Europe, Brazil and United States



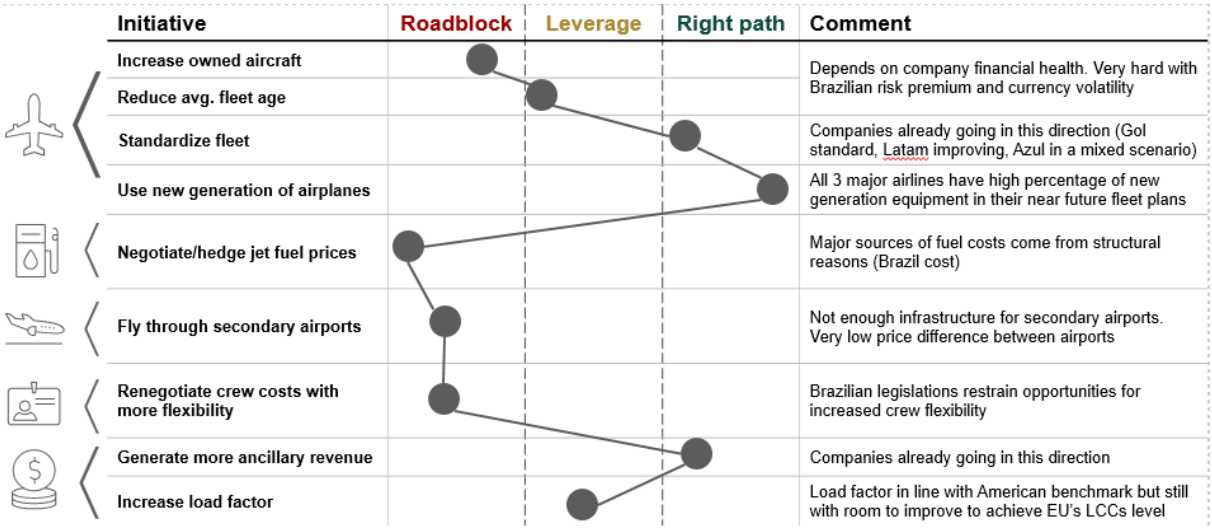
Source: Company data, MIT Airline Data Project, author's analysis

5.6. Results

It is now possible to look at initiatives analyzed in this paper and classify them, seeing if there are roadblocks that would prevent it from being scaled or how hard it is to put into practice, if not to see if it is a real leverage that the company could apply, or if the company is already going in that direction and is performing well, considered in the right path. Presented at Figure 46.

After analyzing the cost structure for airlines, it is possible to conclude that there is not much space for operation cost improvement in the Brazilian market, most part of the roadblocks come from structural issues. From an operational and improvement point of view the airlines are already going on the right path and the main potential for leverage remains on the increase of the load factor targeting to achieve 90%. This would be possible with a better network and revenue generation management.

Figure 46 - Initiatives classification



Source: Author's creation

Reducing structural barriers that lead to roadblocks and evitable costs for airlines could reduce 11-15% of air transportation domestic market in Brazil (McKinsey, 2010). This would be related to reducing taxes over jet fuel, having parity over fuel price, reduce airplane equipment importing tariffs, remove infrastructural restrictions, changing the limit for time of flight, improve the turnaround time and reduce bureaucracy.

Another adding factor to this conclusion is the fact that as previously mentioned, LCCs operate well in short-haul flights, in Europe, once there are many countries next to each other with big cities providing traffic, it makes more business sense for LCCs to operate the way they do. In the United States, the regions as more fairly developed, with more big cities near each other, even with bigger regional routes (and more regional aircrafts), while in Brazil population concentration is bigger and the flights are mostly concentrated in one region, the population is concentrated in few big cities, and the other capitals are spread through the country in bigger distances with small number of big markets in between, creating geographic complication.

One option regarding the best practices studied would be to invest on an operational model for leisure routes different from the model approached on the business routes. So, in those routes it would be possible to stimulate demand with low entry level fares, single cabin with lower pitch and non-declinable seats, charging for ancillaries and targeting to achieve maximum load capacity. Sustaining a very lean operation, focused on tourists that are price sensitive. To have or not a carry-on/checked bag would depend on the airline strategy and

handling costs. A remaining challenge is that most part of the touristic routes in Brazil are not short-haul flights, implying that the impact of fuel would need to be studied to decide.

6. CONCLUSION

6.1. Contributions

The air transportation sector is fundamental for the development of some regions, the integration of the country's economy, connecting business, incentivizing tourism. bringing friends and relatives together. Aviation is especially important in Brazil, with Santos Dumont's invention giving birth to the industry, and being home country to one of the most important OEMs, Embraer. Besides that, Brazil still is not known for having a robust air transportation industry. The country still has a low number of trips per capita and fares that are not affordable to a big portion of the population, depriving them to have access to many opportunities.

This project had as objective to study the success of American and European low-cost companies, to identify what battles they chose to win to get competitive advantage, identifying benchmarks and best practices that could be good lessons for the Brazilian airlines. This project also looked at the Brazilian market from the angle of how each best practice could be applied and what is the current situation of the country in that aspect, identifying roadblocks, possible leverages and areas in which the airlines are on track with the world class recommendation.

The objective of this project was achieved, identifying the main practices and points that were crucial for the rise of low-costs internationally and identifying how Brazil is performing in those aspects. Unfortunately, this report concludes that the components undermining operations efficiency, are structural roadblocks, resulted of governmental actions and out of the companies' reach. It also concludes that the airlines are mostly on the right track and performing well if taken into consideration the environment. The main point of improvement would be targeting a load factor closer to benchmarking of 90%. However, the means to achieve it are beyond this report's limitations.

This report first studied the European airlines, using frameworks presented in the literature review, identifying the LCCs most successful cases competitive advantages over FSCs, and understanding which battles they chose to win. To avoid any bias or tendency caused by analyzing only the European market, the American market was also studied considering 2 different models of recognized lean champions. In the sequence, the author validated his

hypothesis with professionals from the company where he did his internship and worked in the industry. Once the best practices were defined, they were compared to the Brazilian environment, and the current airlines operations, separating what is already done, what could be done and what is unviable to be done.

The contributions of this work, in the first place, for the Brazilian airlines is to have a non-exhaustive, nevertheless robust study of other markets best-practices, raising ideas and targetable benchmarks. For other stakeholders, such as workers unions, suppliers and customers, it lightens up how the sector works, the drivers for price setting and complications for the operators in Brazil. For the Government, this work presents the impacts of taking initiative in some items are jeopardize the companies' efficiency, generating a greater growth in the sector and economic stimulation (even though not estimated at the moment). For the author, it gives an opportunity to apply knowledge accumulated with all his years of study and teaches about the industry allowing to understand companies' operations in 3 different markets.

This project has, nonetheless, some limitations. Due to the fact of not having access to internal company data, network management or strategy, it is complicated to cover some desired analysis or measure the size of the gains from proposed initiatives.

6.2. Future analysis

Airlines also require substantial financial investments, for fleet, maintenance, information systems and operations growth. A big reason why many airlines file for bankruptcy is a poor cash management amplified by the high complexity and risk of the business. A future analysis is to analyze the financial mechanisms used by airlines to support their working capital, looking at solvency and liquidity ratios, debt structure in aircraft purchase, their exposure to foreign currency fluctuations, hedging mechanisms and their net debt multiples.

A broader study for the US market would be helpful to understand why they have a large number of airlines, analyze their entry barriers and bankruptcy history, comparing to Brazil. Understanding key differences and identifying causes for the high bankruptcy ratio.

It would be helpful to study the seasonality in the Brazilian market and analyze individually the main routes for each market segment (business, leisure or visiting friends and relatives) in order to identify initiatives to leverage revenue generation. Also analyze fare vs GDP per capita in Brazil and other countries, identifying customer segmentation to study better possibilities and conduct a pricing analysis.

The current global pandemic situation will require huge changes in the market's environment, to have perspective of how the changes might impact the results, it is important to use a PESTEL approach, analyzing Political, Economic, Social, Technological, Environmental and Legal aspects of the scenario AS IS and what are the expected changes. Afterwards creating a scenario analysis considering possible options for the future of aviation.

Lastly it is important to study also emergent markets such as India or Russia with successful low-cost airlines and also other countries in Latin America to have a more comparable situation of infrastructure and per capita income.

GLOSSARY

- ASK: available seat kilometer. Metric of capacity that multiplies the number of seats flown by a company by the total kilometers flown by that seat
- CASK: Cost per available seat kilometer. Obtained dividing the operational cost by the number of available seats and kilometers flown. The cost to fly 1 kilometer 1 available (occupied or not) seat.
- Cost per enplanement: The average passenger airline payment per enplaned passenger at a given airport
- HUB AND SPOKE: routing model where the operator serves a central point with multiple flights from different locations sent to a long distance after consolidation
- LF: Load factor. Obtained dividing RPK by ASK, defined as how full in average the airplanes were for a given company in a certain period. Allows to see how many of the seats actually have passengers on it
- POINT TO POINT: routing model that connects two cities with direct flights
- RASK: revenue per available seat kilometer, revenue generated by each seat flown per kilometer it flew
- RPK: Revenue Passenger Kilometer. Obtained multiplying the number of revenue seats occupied by the number of miles flown
- RTK: Revenue tonne-kilometer. The revenue load in tonnes multiplied by the distance flown
- Turnaround time: Time between opening the door for one flight and closing for the next.
- Wet leasing is when an airline lends a plane to another airline including crew, flight attendants, fuel, certificate, on board service and sometimes even in-flight entertainment.
- Yield is defined, in cents, the revenue earned for each passenger per mile/kilometer flown, or in other words the passenger's revenue divided by the number of revenue passenger kilometer (RPK). In the United States, full-service and low-cost carriers report similar passenger yields while ultra-low-cost report far lower yields.

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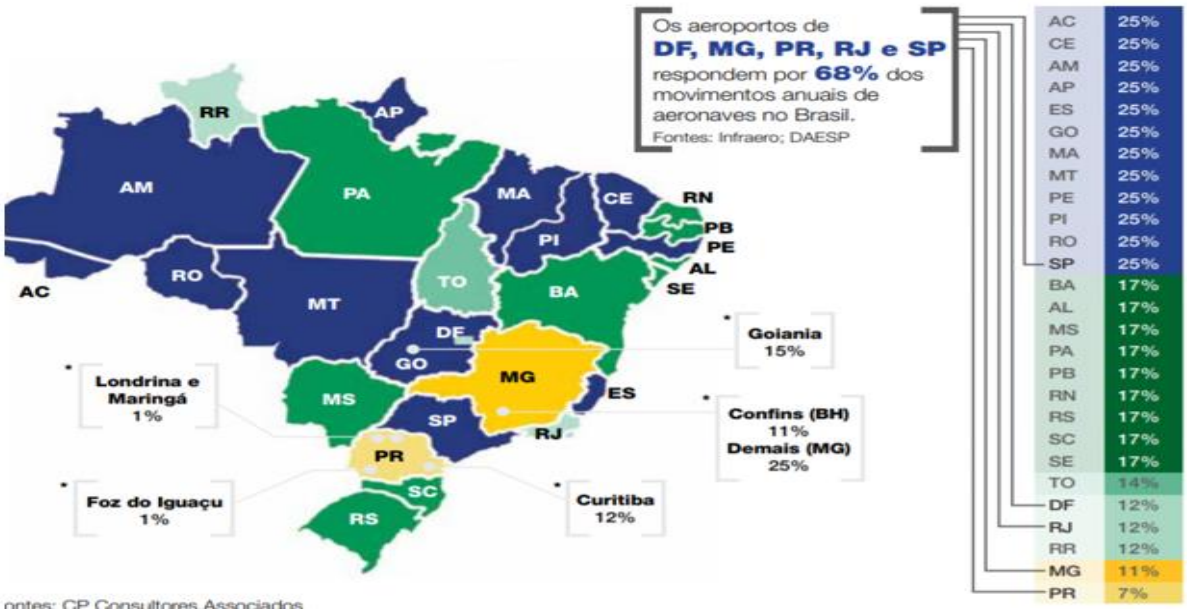
APPENDIX

Figure 47 - Aircraft funding breakdown

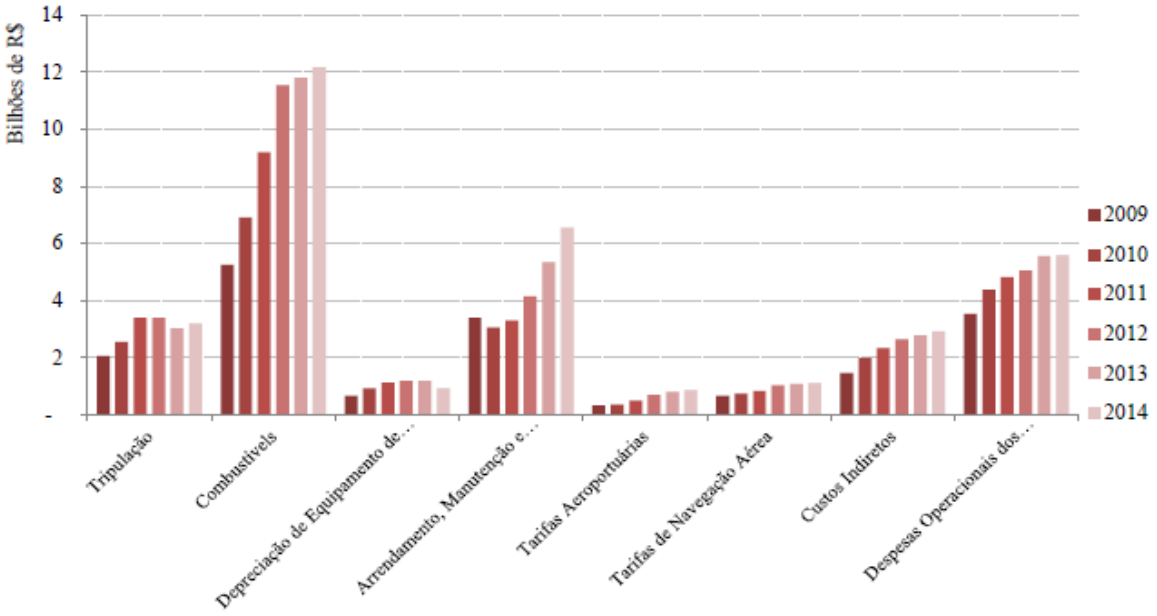
Source: Morgan Stanley (2018)

Figure 48 - ICMS per state. *obs: Recently SP ICMS reduced to 12,5%*



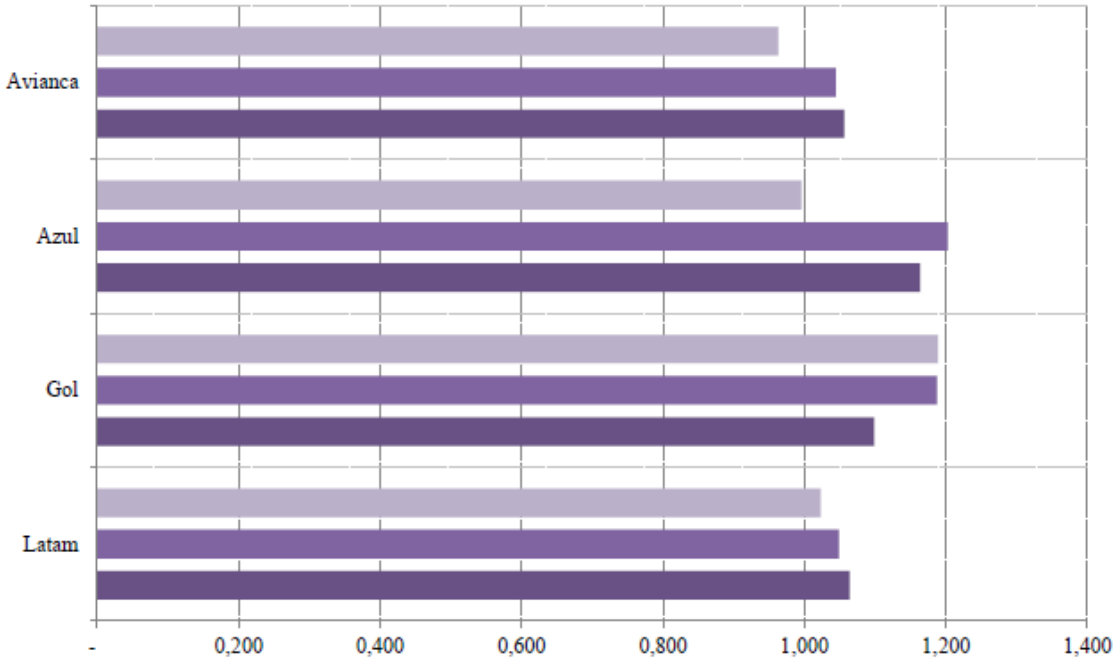
Souce: ABEAR, Bain & Company, CP Consultores Associados (2013)

Figure 49 - Evolution of industry expenses and flight costs - by type, 2019 and 2014



Source: ANAC (2019)

Figure 50 - Evolution of industry expenses and flight costs - by type, 2019 and 2014



	Latam	Gol	Azul	Avianca
2019	1,023	1,188	0,996	0,962
2018	1,048	1,187	1,203	1,044
2017	1,064	1,098	1,163	1,056

Source: ANAC (2019)

Figure 51 - Cot per enplanement main US airports

Main	CPE	LUV	CPE	Δ
ORD	$ 17.87	MDW	$ 9.38	$ 8.49
IAD	$ 16.53	BWI	$ 9.33	$ 7.20
DCA	$ 11.60	BWI	$ 9.33	$ 2.27
IAH	$ 11.29	HOU	$ 6.71	$ 4.58
DFW	$ 12.90	DAL	$ 7.48	$ 5.42
MIA	$ 19.20	FLL	$ 7.71	$ 11.49

Source: UBS (2019)